



REGIONAL  
DISTRICT  
OF NANAIMO

PROSPERING TODAY, PROTECTING TOMORROW:  
THE STATE OF SUSTAINABILITY  
OF THE REGIONAL DISTRICT OF NANAIMO

September 2006

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**MESSAGE FROM THE REGIONAL GROWTH MONITORING ADVISORY COMMITTEE**

Our committee's official name is a reminder of our original mandate – to monitor the regional district's progress toward the goals of the Regional Growth Strategy adopted in 1997. However, the project has developed into a much larger task: to test the Strategy, and the Region itself, against the overarching principles of *sustainability*. We asked, Is the Regional District of Nanaimo, as we know it today, sustainable? Is the Growth Management Strategy contributing to the Region's sustainability? What does "sustainability" mean?

Thus we became known as the Region's "Sustainability Committee", and our work has lasted three years. We first arranged and hosted a one-day public workshop on sustainability in April, 2004, then digested and organized the rich results produced by the 200 participants. We identified approximately 150 indicators we thought would reveal much about the region's sustainability. Westland Resources helped us choose the most useful indicators and collect available data. This year, EBA Engineering Consultants revised and edited the entire document. Over many meetings, the committee reviewed the material as it came in, discussed the implications and limitations, proposed formats and styles of presentation, corrected and clarified the text.

The result is what you hold in your hands. Due to limits on resources and effort the report has some shortcomings: some of the information is incomplete and dated, and the scope is not as comprehensive as we had hoped. Nevertheless, the report represents a remarkable effort by a volunteer committee of residents within the available funding. It provides an informative and provocative snapshot of the Region's current sustainability, identifying significant problem areas that require immediate and ongoing attention and some truly successful initiatives the Board should continue to support.

Most importantly, the report now becomes a Living Document. It provides a framework for updates as new data arrives, and can continue to provide guidance to the Regional District and member municipalities for years to come. This information base should help local governments contribute effectively to the economic, social, and environmental sustainability of our Region. Our committee has much more to do but we can feel pleased with what we have accomplished to date. We have already had an impact. As a result of our committee's deliberations, the Regional Board has passed motions encouraging "green" building techniques and responsible farming practices, set up committees to examine the quality and quantity of drinking water, and adopted a Strategic Plan that highlights sustainability in every aspect of the Region's operations.

On a personal note, I wish to thank every member of the Sustainability Committee for their diligent and passionate devotion to our project. You are an exceptionally talented and motivated group, and serving as your Chair has been one of my most rewarding experiences as a local representative. You deserve the appreciation of the entire Regional District. Thanks also to Dave Bartram, my colleague on the Regional Board, and the very able Deputy Chair of our committee, for his sage and timely assistance and advice.

Finally, the Committee joins me in acknowledging Christina Thomas, the Regional District planner assigned to our committee, who has now departed for Ontario. Right to the very last day of her time here, she kept us focussed on our task, referred us to countless sources, wrote impeccable minutes of our meetings, emailed us regularly, managed the consultants, and did all the work between our meetings. She was our trailblazer, a true professional, always pointing the way ahead. Thank you, Christina!

Bill Holdom, Chair, and Regional Board Director (City of Nanaimo)

## EXECUTIVE SUMMARY

The Regional District of Nanaimo recognizes its responsibility to promote sustainability and is demonstrating its commitment through a variety of decisions and actions, including the creation of this report. This report identifies the characteristics of a sustainable region and, using indicators, measures the region's sustainability status against the expressed targets. This report provides a regional evaluation that will influence future decisions and actions to improve the region's sustainability over time.

One of the first definitions of sustainability that gained prominence was found in the 1987 Brundtland Commission report *Our Common Future*. It defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Since 1987, the term sustainability has been defined in a variety of ways and is not necessarily limited to the perspective of development.

Sustainability is about recognizing the inter-relationships between our environment, our society and our economy. It is about recognizing that people are a part of an ecosystem, and that the economic and social lives of people should be integrated into the environment in ways that maintain or enhance the environment, rather than degrade or destroy it. Put another way, sustainability recognizes that our economy exists within society, that society exists within the environment, and that the environment surrounds and supports society.

### 1.0 STATE OF SUSTAINABILITY PROJECT

The Local Government Act requires regional districts to monitor their regional growth strategies' implementation and progress. The Regional District of Nanaimo's (RDN) State of Sustainability Project is a result of this directive. One of the components of the project is the selection of sustainability characteristics and indicators to measure the sustainability of the region.

The Regional Growth Monitoring Advisory Committee (RGMAC) identified the characteristics of a sustainable region using participant feedback from a public Sustainability Workshop and reviewing a wide range of literature. The result of this exercise is a list of 22 characteristics, categorized as environmental capital, social capital and economic capital, which make up the framework for this report.

#### Environmental Capital

- There is a safe, sufficient supply of water for all living beings and uses in the RDN.
- Important ecosystems and ecological features are protected, healthy and productive.
- The air is clean and safe to breathe.
- All natural resources are conserved, and renewable resources are available in perpetuity.
- Energy requirements are reduced, and/ or energy is obtained in ways that minimize negative impacts on the environment and greenhouse gases are minimized.

- Land and resources are efficiently used, and the negative impacts of land use and development are minimized.
- Waste is minimized, treated, and disposed using environmentally sound methods.

#### Social Capital Characteristics

- Healthy residents and the availability of healthcare facilities when needed.
- Educated and trained residents who qualify for employment.
- Employed residents and a wide variety of employment opportunities.
- Financially independent residents and minimal poverty.
- Affordable housing and a variety of different types and sizes of housing to accommodate the demographics of the region.
- Minimized need for travel by private automobile.
- High level of safety, where residents care for and respect one another.
- Number of opportunities for residents to interact with each other and nature.

#### Economic Capital Characteristics

- Positive economic growth.
- The tax system favours sustainable, environmentally responsible economic activities.
- The economy is characterized by a diversity of different types and sizes of businesses and services.
- A wide variety of employment opportunities exist, and residents are employed.
- Residents have training that qualifies them for employment.
- The downtown urban core areas of the region are characterized by their vitality.
- Regional consumption of products and services produced in the region in economically viable ways is maximized.

After the characteristics of a sustainable RDN were identified, the RGMAC brainstormed candidate indicators for each of the characteristics. The brainstorming process resulted in an extensive list of over 200 candidate indicators. A consulting firm, Westland Resource Group (Westland), was retained to help evaluate the candidate indicators to determine their suitability according to a series of defined criteria. The RGMAC used Westland's report to develop its recommendations for the RDN Board. On January 25, 2005, the RDN Board approved the 41 indicators for use in a report about the sustainability of the region recommended by the consultant, the RGMAC and staff. This report is based on the 41

approved indicators<sup>1</sup> and the information obtained through additional groundwater research.

## 2.0 INTER-RELATIONSHIP OF CHARACTERISTICS

A series of characteristics, divided into environmental, social and economic capital have been selected that describe a healthy, functioning and efficient region. A variety of indicators evaluate each characteristic, and through the evaluation process, reveal how intertwined residents' health and welfare are with the choices and actions that are made in the region, by residents, corporations and governments.

A sustainable region has a safe, sufficient supply of water. The surface and groundwater quantity and quality are affected directly by human action, whether through development, consumption or pollution. Negative changes to quantity and quality of water impact human and ecosystem health and the economic growth potential of the region.

The ecosystems and ecological features are protected, healthy and productive in a sustainable region. This includes protecting the soil, vegetation, air and water from pollution and over development in order to provide the best circumstances for natural functions. Every action or land use in and around ecosystems and ecological features has the potential to benefit or impact these features.

In a sustainable region, the air is clean and safe to breathe. The everyday choices that residents and corporations make for their method of transportation, production and living/operating affect the cleanliness of the air. Air pollution threatens the health of humans and ecosystems and the region's economic growth potential.

All natural resources are conserved, and renewable resources are available in perpetuity in a sustainable region. The region's social and economic fabric is dependent on the region's natural resources as a source of food, employment, beauty and ecosystem health.

A sustainable region has reduced energy requirements, or it obtains energy in ways that minimize the negative impacts on the environment and the amount of greenhouse gas emissions. The region's social and economic potential relies currently on the use of non-renewable energy for transportation, production and heating, amongst others. However, the consumption of non-renewable energy is unsustainable economically, environmentally and socially. Most energy sources used in the region are costly to produce and deliver, cause air pollution and greenhouse gases and impact the health of people and ecosystems.

The land and resources are efficiently used, and negative impacts of land use and development are minimized in a sustainable region. Efficient use of the land and minimizing the impacts of land development include designating areas for population growth and development in order to preserve natural areas and resource and agricultural

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<sup>1</sup> Note: during the process of preparing this report, some indicators were revised and one was added, subject to Board approval.

production areas. By doing so, important natural features are preserved, including water sources and ecosystems, efficient transportation options are optimized, and there is greater opportunity to meet regional needs from local resources.

In a sustainable region, waste is minimized, treated and disposed using environmentally sound methods. The amount and type of products consumed, the types of businesses that operate in the region and the region's population level all contribute to the amount of waste produced. Once waste is produced, it is costly to provide infrastructure and services to dispose or recycle waste in an environmentally sound manner.

Residents are healthy, and healthcare facilities are available when needed in a sustainable region. Residents' health is a result of several factors, including the types of food consumed, access to education and health care, adequate income to provide basic necessities, amount of physical activity, and cleanliness of soil, water and air. Each of these factors is influenced by individual, corporate, and government choices and actions.

A sustainable region has educated and trained residents who qualify for employment. On an individual level, increased educational attainment has been shown to increase a person's economic and social standing, including their health. On a regional scale, educated and trained residents provide opportunity for diversified economic growth.

A wide variety of employment opportunities exist and residents are employed in a sustainable region. Unemployment affects individuals and the region as a whole. Unemployment represents a loss of income for the provision of necessities such as food, clothing and housing; this directly affects individuals' health and welfare. The economic cost of providing social assistance programs and the social and economic loss from people moving away to find employment elsewhere affects the entire region.

In a sustainable region, housing is affordable and a variety of types and sizes of housing is available. Housing affordability is a function of the demand for housing and the cost to produce housing. Rapid population growth in the region and the current economic boom in the province have driven up the price of housing and labour costs associated with construction. The high cost of renting and buying housing limits the amount of available money for other necessities, potentially affecting their health and welfare. The region is then affected when people are forced to live further from work and amenities and must travel further distances, are forced to move away from the region altogether, or require assistance in the provision of housing.

The need for travel is minimized and necessary trips do not rely solely on private automobile travel in a sustainable region. Reduced travel by automobiles is encouraged through the creation of biking and walking trails, improved transit services and residential development located near amenities. Individuals benefit through increased physical activity and reduced costs to maintain and operate an automobile. The region benefits through reduced economic costs to build and maintain road infrastructure, increased safety through reduction of motor vehicle accidents, and reduced air pollution caused by vehicles.

A sustainable region is a safe place to live and residents care for and respect each other. The motivation for crime is influenced by a number of factors including substance abuse and economic and social standing, amongst others. Crime impacts people emotionally and economically, and if the amount of crime is deemed too high, then people may choose to move away from the region. Crime has a high economic toll on the entire population, as tax dollars are spent on preventative programs, policing and the justice system.

In a sustainable region, there is a variety of opportunities for residents to interact with each other and nature. Interaction with people occurs through participation in programs. Participation in elections is a form of interaction with governments and, as a result, the decision-making arena. Park land is necessary for people to have interaction with nature. Each form of interaction is socially important in that it places value on each other, democracy, and the environment.

There is positive economic growth in a sustainable region. Economic growth results from an interaction of many factors including environmental and social conditions. Conditions include ecosystem and human health, educational attainment, and available resources and supplies. A sustainable region provides potential for economic growth; however, maximization of economic growth in the traditional sense is not necessarily sustainable.

A sustainable region has a tax system that favours sustainable, environmentally responsible economic activities. Taxes may be used to curb or promote behaviour; and depending on the amount of taxes imposed, may encourage or discourage economic growth and population growth in the region.

In a sustainable region, the economy is characterized by a diversity of different types and sizes of businesses. A diverse range of businesses protects the region from economic busts in certain sectors. As well, it provides a range of employment opportunities for people with varying educational levels resulting in a broader range of social, cultural and economic opportunities.

Residents have training that qualifies them for employment in a sustainable region. Educational attainment levels should complement the diversity of businesses in the region in order to maximize the potential for local employment.

A sustainable region's urban core areas are characterized by their vitality. This vitality is a result of the amount and types of businesses that are located there, which is also a function of the residential and cultural base found within that area. A vital urban core provides commercial, recreational, residential and cultural opportunities.

In a sustainable region, the regional consumption of products and services produced in the region in economically viable ways is maximized. Sustainability involves producing and consuming local products and services in support of local employment and the local economy. An added benefit is the reduction of environmental costs associated with transporting goods to and from an area.



## 3.0 ENVIRONMENTAL CAPITAL

Environmental Capital is one of the three pillars of a sustainable region. It is defined as the “stock of natural resources and environmental assets...[that] includes water, soils, air, flora, fauna, minerals, and other natural resources” (Agricultural Trade Policies and Issues, 2006). The region is sustainable when environmental “capital is non declining through time... [when] resources are managed so as to maintain a sustainable yield of natural resource services... [and when it] “satisfies the minimum conditions of ecosystem stability and resilience through time” (Jackson, 2005).

The following subsections contain the environmental capital characteristics and corresponding indicators, as well as the data used to evaluate the grade and trend along the sustainability spectrum.

### 3.1 THERE IS A SAFE, SUFFICIENT SUPPLY OF WATER

#### Water Consumption Trends

- In 2003, per capita surface and groundwater consumption in the RDN was 471 L/day, which exceeded the provincial average of 425 L/day.
- From 2001 to 2004, water consumption increased by 1,737,742 m<sup>3</sup>, or eight percent. In comparison, the population has increased by an estimated 3.8 percent over the same period of time. This represents a change in daily water consumption per capita of 441 L/day in 2001, to a high of 471 L/day in 2003, decreasing to 459 L/day in 2004.

#### Groundwater Elevation

- More long term and detailed information from monitoring and operating wells is required to build an understanding of the long-term behaviour of the aquifers.
- Small water systems do not monitor this parameter.
- The available information does not indicate large drops of water table over time except in the Parksville-Qualicum Beach area and in Cassidy. Drops were mostly noticeable in the late 1990s and early 2000s.
- In the Parksville-Qualicum Beach and Cassidy area, significant water table drops and decreasing trends were observed in the recent past. For the aquifers in the Parksville area, the drops represent a significant portion of the available water column.

#### Groundwater Quality

- There is a significant lack of information on water quality, both for the parameters measured and the duration of monitoring.
- Small water systems generally only monitor coliforms.
- For the few wells where data are available, the groundwater quality parameters are within the applicable water quality standards.

- Increasing trends in electrical conductivity and chloride concentrations were observed in some wells, indicating a deterioration of water quality.

#### Impermeable Surface Area

- Many sub-watersheds show impermeable areas covering more than 8 percent of their total area.
- No trends are yet defined.

#### Volume of Water Extracted

- In 2004, an estimated 4.4 million m<sup>3</sup> of groundwater was used in the RDN (not including water from the District of Lantzville and some private water systems).
- Volume of water extracted increased in 2004, over 2002 and 2003, likely due to the increase in population.
- Small water systems do not monitor the volume of water they pump.
- Water conservation is promoted and locally implemented (e.g., RDN, Epcor, etc.). It is presently difficult to assess if/how groundwater use is curbed compared to population increase and to measure the effect of water conservation measures.

#### Stream Temperature

- Very few streams have available data on water temperature.
- The stream temperature data do not appear, on the whole, to indicate increasing or decreasing trends in water temperature, with the exception of Nile Creek.
- The Nile Creek shows a decrease in winter temperature and an increase in summer temperature, indicating that the groundwater flow into Nile Creek has decreased over the past 10 years.

### 3.2 IMPORTANT ECOSYSTEMS AND ECOLOGICAL FEATURES ARE PROTECTED, HEALTHY AND PRODUCTIVE

#### Water Quality in Selected Lakes and Rivers

- Nitrite and nitrate concentration levels sampled between 2000 to 2004 were below the CWQG of 13.1 mg/L.
- Cadmium levels have exceeded the CWQG levels in Brannen Lake, Green Lake, Little Qualicum River and French Creek.
- Zinc levels at all monitoring locations were within the CWQG of 0.030 mg/L between 2000 and 2004.
- The average concentration of lead in the water samples taken at the Englishman River during 2001 greatly exceeded the CWQG; the lead concentrations in the Englishman River have since declined to well within the CWQG levels.

### Amount of Land and Length of Watercourses Protected by Park or Development Permit Application

- Twenty one percent, or 45,075 hectares, of the RDN's land base is protected under development permit areas; the majority of which is found in the electoral areas and District of Lantzville.
- Less than two percent of the RDN's land base is protected as regional or provincial parks, federal wildlife reserve and nature trusts.
- 288 trees are protected as either eagle or heron nesting trees.

## 3.3 THE AIR IS CLEAN AND SAFE TO BREATHE

### Ground Level Ozone

- Since 1999, Nanaimo has exceeded the health reference level for ozone between 37 and 51 percent of the time, annually.
- There is a slightly increasing trend in the percent of time that ozone exceeds the health reference level.
- Ground level ozone levels have been less than 95.0 mg/m<sup>3</sup>, well under the Canada Wide Standard since 2001, but appear to be slightly increasing over time.

### Fine Particulate Matter (PM<sub>2.5</sub>)

- Since 1999, Nanaimo has exceeded the health reference level less than 0.5 percent of the time, annually. In 2003, Nanaimo did not exceed the health reference level.
- The Canada Wide Standard for PM<sub>2.5</sub> was not exceeded in Nanaimo between 2000 and 2005, and the 98<sup>th</sup> percentile has decreased slightly.

## 3.4 ALL NATURAL RESOURCES ARE CONSERVED, AND RENEWABLE RESOURCES ARE AVAILABLE IN PERPETUITY

### Managed Forest Lands/ Resource Lands and Open Space Subdivision

- In 2005, 152,902 hectares are managed forests within the RDN, representing 73 percent of the RDN land base. Most of the managed forests are within the Resource Lands and Open Space areas.
- Between 1995 and 2004, 2,942 hectares of managed forests lands/ Resource Lands and Open Space have been developed.

### Current and Projected Age Class Distribution for Arrowsmith Timber Supply Area

- The portion of the Arrowsmith TSA within the RDN has an unbalanced age class distribution, with a noticeable lack of trees over the age of 120 years old, in both the timber and forested non-timber harvesting land bases.
- There are no projections for the TSA within the RDN.

- In comparison, the entire Arrowsmith TSA currently has a small distribution of trees aged 60 to 240, contrasted by a large percentage of trees less than 60 years and older than 240 years (for both timber and forested non-timber harvesting land bases).
- It is projected that in the next 100 and 200 hundred years, that the age class distribution will fluctuate slightly, then return to a similar distribution pattern to the current age class distribution.
- From the current and projected data for the entire Arrowsmith TSA, the older trees in the timber harvesting land bases are continuously harvested, with a majority of area with trees younger than 60 years.
- From the current and projected data for the entire Arrowsmith TSA, the majority of area within the forested non-timber harvesting land base has trees older than 240 years. In 2200, the area with trees younger than 240 years and area with trees older than 240 years will approximately equal.

#### Amount of Agricultural Land Reserve (ALR)

- In 1974, 21,053 hectares of land was designated ALR in the RDN.
- By 1994, the amount of land in the ALR had declined to 18,682.
- The rate of decline has slowed since 1994, and in 2004, 18,485 hectares remained in the ALR.

#### Proportion of Farmland in Crops

- In 2001, the RDN has approximately 33 percent of land in crops compared to the provincial average of 23 percent.
- Between 1991 and 2001, the proportion of land in crops increased slightly; and
- Total amount of land in crops in the RDN increased by 63 percent compared to the provincial average of nine percent, from 2,508 hectares in 1991 to 4,050 hectares in 2001.

#### Sustainable Farming Practices

- In 2001, 8.62 percent of farmland in crops in the RDN applied insecticides and fungicides compared to the provincial average of 8.45 percent.
- The amount of farmland in crops applied with insecticides and fungicides has decreased since 1996 at a faster rate than the provincial average.

#### Farms Reporting Sale of Organic Crops

- In 2001, the RDN had five farms, or 1.02 percent of all farms, reporting production of certified organic products. The provincial average is 1.57 percent of farms.

### 3.5 ENERGY REQUIREMENTS ARE REDUCED/ ENERGY IS OBTAINED IN WAYS THAT MINIMIZE NEGATIVE IMPACTS ON THE ENVIRONMENT AND GREENHOUSE GASES ARE MINIMIZED

#### Amount of Electricity and Natural Gas Consumed

- The region's total electricity consumption increased from 1.12 billion kWh in 1994 to 1.38 billion kWh in 2004, an increase of 19 percent.
- Residential electricity consumption increased from 705 million kWh in 1994 to 851 million kWh in 2004, an increase of 17 percent.
- Commercial electricity consumption increased from 421 million kWh in 1994 to 531 million kWh in 2004, an increase of 21 percent.
- Per capita consumption increased from 9,137 kWh in 1994 to 10,078 kWh in 2004, an increase of nine percent.
- The region's total natural gas consumption increased from 2.08 million GJ in 2003 to 2.38 million GJ in 2004, an increase of 14 percent.
- Natural gas consumption increased by eight percent per customer per day between 2003 and 2004.

#### Greenhouse Gas Emissions

- In 2002, an estimated total amount of community greenhouse gas emissions was 667,769 tonnes. Of this, 63 percent or 422,929 tonnes were emitted from transportation sources.
- In 2002, the community emissions per capita were 4.98 tonnes.

#### Mode of Transportation to Work and Location of Work

- In 2001, 88 percent of RDN residents commute to work in private vehicles (as driver or passenger), which exceeds the provincial average of 82 percent.
- Eight percent of RDN residents walk or cycle to work.
- Two percent of RDN residents use public transit; this is less than the provincial average.
- There is an increasing reliance on vehicles for commuting to work.
- The RDN has more employed residents who live and work in the same census subdivision and at home than the provincial average.

#### Bus Rides Per Capita

- In 1998, there were 1.5 million bus rides in the RDN; this increased by 45 percent to 2.2 million in 2004.
- Ridership increased by 39 percent per capita between 1998 and 2004.

#### Residences within Walking Distance of Amenities

- Between 2000 and 2005, the percent of residences within walking distance of schools, retail and services increased; there was a decrease in number of residences within walking distance to green space and recreation.
- Overall increase in percent of residences within 400 m of multiple amenities between 2000 and 2005.

#### Residents Inside Urban Containment Boundaries (UCB) Living Within Walking Distance of a Bus Stop

- In 2001, 89 percent or 80,407 RDN residents within the UCB lived within walking distance of a bus stop.
- In 2005, 94,900 residents lived within walking distance (i.e., 400 m) of a bus stop (although it was not clear what portion of those residents lived within the UCB).
- There are 12 transit routes in the City of Nanaimo and three transit routes servicing Parksville-Qualicum Beach. There are limited transit services within electoral areas.

#### Vehicles per Household

- Between 2001 and 2003, there was an increase in the number of vehicles in each municipality in the RDN.
- There was a slight increase in the average number of vehicles per household, from 2.21 in 2001 to 2.22 in 2003; compared to Vancouver and Victoria of less than 1.11 vehicles per household.
- It is estimated that vehicle travel accounts for 63 percent of the greenhouse gas emissions in the region.

### 3.6 LAND AND RESOURCES ARE EFFICIENTLY USED, AND NEGATIVE IMPACTS OF LAND USE AND DEVELOPMENT ARE MINIMIZED

#### Population Growth and Density and Amount of Land in Urban Containment Boundaries (UCB)

- The regional population has nearly tripled since 1971.
- In 1971, population was 48,005; the 2001 census revealed the regional population was 127,016; recent estimates indicate the population has increased to 141,080 in 2005.
- Density has increased within the UCB from 7.30 people per hectare in 1991 to 8.62 people per hectare in 2001, an increase of 18 percent.
- Density has increased outside the UCB from 0.13 people per hectare in 1993 to 0.19 people per hectare in 2001, an increase of 46 percent.

#### Amount of Land Outside Urban Containment Boundaries (UCB) that may be Subdivided into Parcels Smaller than 4 or 10 hectares

- In 2005, there were 22,974 hectares available for subdivision of less than four hectares outside the UCB.
- In 2005, there were 18,712 hectares available for subdivision of less than ten hectares outside the UCB.

### 3.7 WASTE IS MINIMIZED, TREATED AND DISPOSED USING ENVIRONMENTALLY SOUND METHODS

#### Amount of Waste to Landfill, Amount of Waste Diverted, and Amount of Waste Recycled

- Since 1998, waste generated in the region has increased by 27 percent from 101,795 tonnes in 1998 to 137,826 tonnes in 2004.
- Total amount of waste to landfill has also increased by 13 percent from 58,057 tonnes in 1998 to 65,666 tonnes in 2004.
- Total amount of waste recycled increased by 63 percent from 38,362 tonnes in 1998 to 62,762 tonnes in 2004.
- Total amount of waste reduced and/or recycled increased by 75 percent from 5,376 tonnes in 1998 to 9,398 tonnes in 2004.
- Per person waste generated increased by 29 percent between 1989 and 2004.
- Per person waste disposed to landfill increased by eight percent, from 1.22 kg/day in 1998 to 1.32 kg/day in 2004.
- Per person waste recycled increased by 54 percent, from 0.81 kg/day in 1998 to 1.25 kg/day in 2004.
- Per person waste reduced and/or reused increased by 73 percent from 0.11 kg/day in 1998 to 0.19 kg/day in 2004.
- There were greater waste diversion rates in the RDN compared to the Capital Regional District and the North Okanagan Regional District.

#### Quality of Biosolids from Wastewater Treatment Plants

- Concentrations of arsenic, cadmium, mercury and lead parameters are within the Province's Organic Matter Recycling Regulation (OMRR) limits.
- Arsenic (OMRR = 75 µg/g). Greater Nanaimo Pollution Control Centre (NPCC) measured 6.0 µg/g in 2003.
- Cadmium (OMRR = 20 µg/g). NPCC measured 2.3 µg/g in 2003.
- Mercury (OMRR = 15 µg/g). NPCC measured 6.3 µg/g; French Creek Pollution Control Centre (FPCC) measured 2.6 µg/g.
- Lead (OMRR = 500 µg/g). NPCC measured 72 µg/g; FPCC measured 27 µg/g.

- The majority of parameters measured indicate declining trends in the region.

### 3.8 ENVIRONMENTAL CAPITAL CONCLUSION

There are 27 indicators within seven sustainability characteristics that determine the region's environmental capital. Of the 27 indicators, eight are not graded (?), 15 indicators are below to slightly below comparable averages (\* or \*\*) and four indicators are above to well above comparable averages (\*\*\*) or \*\*\*\*). Of the non-graded indicators, four do not have a discernible trend, two indicate declining trends, one is stable to declining, and one indicates an improving trend. Of the 15 below average indicators, three indicate improving trends. Below average indicators occur in all but one characteristic: waste is minimized, treated and disposed using environmentally sound methods.

In the Environmental Capital section of this report, the overall grading and identification of trends was limited by lack of indicator data or lack of comparable data. It is expected that subsequent reports will be able to build upon these baseline data and indicate, more accurately, grades and trends for each indicator and sustainability characteristic.

The following table provides an overview of the assessments for all indicators.

ENVIRONMENTAL CAPITAL PROGRESS REPORT			
Characteristic	Indicator	Grade	Trend
There is a Safe, Sufficient Supply of Water	Water Consumption Trends	*	Getting Worse
	Groundwater Elevation	?	Stable to Getting Worse
	Groundwater Quality	?	Getting Worse
	Impermeable Surface Area	*	Getting Worse
	Volume of Water Extracted	*	Uncertain
	Stream Temperature	***	Stable to Getting Worse
Important Ecosystems and Ecological Features are Protected, Healthy and Productive	Water Quality in Selected Lakes and Rivers	*	Uncertain
	Amount of Land and Length of Watercourses Protected by Park or Development Permit Area Designation	?	Uncertain
The Air is Clean and Safe to Breathe,	Ground Level Ozone	*	Stable
	Fine Particulate Matter (PM <sub>2.5</sub> )	?	Uncertain
All Natural Resources are Conserved, and Renewable Resources are Available in Perpetuity	Managed Forest Lands/ Resource Lands and Open Space Subdivisions	?	Getting Worse
	Current and Projected Age Class Distribution for Arrowsmith Timber Supply Area	*	Stable
	Amount of Agricultural Land Reserve (ALR)	*	Getting Worse



	Proportion of Farmland in Crops	***	Getting Better
	Sustainable Farming Practices	**	Getting Better
	Farms Reporting Sale of Organic Products	*	Uncertain
Energy Requirements are Reduced/ Energy is Obtained in Ways that Minimize Negative Impacts on the Environment and Greenhouse Gases are Minimized	Amount of Electricity and Natural Gas Consumed	*	Getting Worse
	Greenhouse Gas Emissions	?	Uncertain
	Mode of Transportation to Work, and Location of Work	*	Getting Worse
	Bus Rides Per Capita	?	Getting Better
	Residences Within Walking Distance of Amenities	*	Getting Better
	Residents Inside Urban Containment Boundaries Within Walking Distance of a Bus Stop	**	Uncertain
	Vehicles per Household	*	Getting Worse
Land and Resources are Efficiently Used, and Negative Impacts of Land Use and Development are Minimized	Population Growth and Density, and Amount of Land in Urban Containment Boundaries	**	Getting Better
	Amount of Land Outside Urban Containment Boundaries that may be Subdivided into Parcels Smaller than 4 or 10 hectares	?	Uncertain
Waste is Minimized, Treated and Disposed Using Environmentally Sound Methods	Amount of Waste to Landfill, Amount of Waste Diverted, and Amount of Waste Recycled	***	Getting Better
	Quality of Biosolids from Wastewater Treatment Plants	****	Getting Better

? – the data cannot be assessed.

\* - the region is well below average.

\*\* - the region is slightly below average.

\*\*\* - the region is meeting the average.

\*\*\*\* - the region is exceeding the average

Getting Worse - the trend indicates movements away from the goals of 'Where do we want to go?'

Stable – the trend indicates no discernible movement towards or away from the stated goal.

Getting Better – the trend indicates movement towards or exceeding the stated goal.

Uncertain – there are not enough data or historical depth to accurately identify the indicator's trend.

#### 4.0 SOCIAL CAPITAL

Social capital, within the context of sustainability, refers to social relations that support our communities. By identifying key indicators of social capital, it is possible to understand how the social resources are developed, accessed and benefit society. According to Robert Putnam (Putnam, 2003: 3), "social capital [is] a key factor in explaining the persistence of localized economies in the face of globalization, and presents evidence that social capital is more important than income as a determinant of subjective well-being."

There is no one definition of social capital, but the primary components include citizenship, neighbourliness, social networks and civic participation. According to the United Kingdom's National Statistics (2003), "Research has shown that higher levels of social capital are associated with better health, higher educational achievement, better employment outcomes, and lower crime rates. In other words, those with extensive networks are more likely to be 'housed, healthy, hired and happy'. All of these areas are of concern to both policy-makers and community members alike."

The following subsections contain the social capital characteristics and corresponding indicators, as well as the data used to evaluate the grade and trend along the sustainability spectrum.

#### 4.1 RESIDENTS ARE HEALTHY, AND HEALTHCARE SERVICES AND FACILITIES ARE AVAILABLE WHEN NEEDED

##### Birth Weight

- Nanaimo – Rates have remained relatively stable, and in keeping with the provincial trend, of between 45 to 49 occurrences of low birth weight per 1,000 births, or 4.5 to 4.9 percent.
- Qualicum – Rates have decreased from 50 to 32 occurrences of low birth weight per 1,000 births, or 5.0 to 3.2 percent.
- Alberni - Rates have decreased from 43 to 38 occurrences of low birth weight per 1,000 births, or 4.3 to 3.8 percent.
- Courtenay – Rates have increased from 44 to 54 occurrences of low birth weight per 1,000 births, or 4.4 to 5.4 percent.

##### Life Expectancy at Birth

- Between 1999 and 2003, life expectancy in the RDN increased from 79.4 years to 79.9 years.
- The Regional District of Nanaimo's life expectancy at birth is less than the average Vancouver Island rate of 80.4 years, Vancouver Coastal rate of 82.0 years and the average provincial rate of 80.8 years.

### Live Births to Teenage Mothers

- There are approximately 14.7 live births per 1,000 teenage women in the RDN; compared to a provincial average of 13.7 live births per 1,000 teenage women.
- The rate of live births per 1,000 teenage women in the RDN is declining.

### Motor Vehicle Accident Rates

- An average of the motor vehicle accidents rates in RDN communities (Nanaimo, Parksville and Qualicum Beach) indicates a slightly declining trend from 60.5 accidents per 1,000 insured vehicles in 2000 to 56.3 accidents per 1,000 insured vehicles in 2003;
- The total number of pedestrian related accidents in municipalities within the RDN between 2000 and 2003 ranged from 66 accidents (in 2002) to 87 accidents (in 2001) per 1,000 insured vehicles.
- The total number of cyclist related accidents increased from 32 accidents (2000) to 45 accidents (2003) per 1,000 insured vehicles.

## 4.2 RESIDENTS ARE EDUCATED OR TRAINED SO THEY ARE QUALIFIED FOR EMPLOYMENT

### Educational Attainment

- The percent of students in the RDN not graduating from high school decreased from 35 to 32 percent between 1998 and 2003, but this is still significantly (six percentage points) higher than the provincial average.
- Since 1991, the percentage of residents with university level education has increased from 17 percent to 22 percent; however, the region's levels of university or other non-university education is below the provincial average.
- The percentage of residents with trades certificates and diplomas has increased from 1996 to 2001, from 5 percent to 16 percent.
- The number of residents with a high school degree or less has decreased. The region's residents exceed the provincial average for residents with high school degrees or less, trades certificates, and diplomas.

## 4.3 A WIDE VARIETY OF EMPLOYMENT OPPORTUNITIES EXIST, AND RESIDENTS ARE EMPLOYED

### Unemployment Rate

- The City of Nanaimo's unemployment rate has declined. Most recently, the unemployment rates have declined to 7.8 percent in 2004; however, the City of Nanaimo's unemployment rates remain higher than the provincial average.
- At present, the number of Employment Insurance recipients in the City of Nanaimo is declining. Employment Insurance rates in the RDN remain above the provincial average at 3.7 percent compared to the provincial average of 3.6 percent.

#### 4.4 POVERTY IS MINIMIZED, AND RESIDENTS CAN MEET THEIR BASIC NEEDS

##### Average Annual Income Compared to Cost of Living (Real Income per Capita)

- Consumer Price Index, a measure of inflation, indicated an increase of 5.0 percent between 1995 and 2000.
- Average gross income in the region increased by 4.5 percent between 1995 and 2000.
- The average annual income in the region is not increasing at the same rate as the cost of living, which ultimately decreases the amount of disposable income available.
- More recent data are required to adequately assess this indicator.

##### Households Below Low Income Cut-Off

- The overall pattern for the RDN indicates an increase in number of households below income cut-offs since 1991; however, it remains below the provincial average. In 2001, more than 21,000 people in the RDN were considered to be living below the low income cut-off.

#### 4.5 HOUSING IS AFFORDABLE, AND A VARIETY OF DIFFERENT TYPES AND SIZES OF HOUSING IS AVAILABLE

##### Residents in Core Housing Need

- Between 1991 and 2001, the percentage of homeowners in the RDN in core housing need (having inadequate, unsuitable and/or unaffordable housing) has increased three percent to 8.2 percent, as compared to the provincial average of 8.3 percent.
- In 2001, the RDN had the highest percentages of renters (36 percent) in core housing need, above the provincial average (31 percent). Percentages have decreased since 1996, but remain higher than 1991 levels.
- From 1991 to 1996, there was a drastic increase in core housing need throughout the province; this was followed by a decline in core housing need by 2001.

##### Applicants on Wait List for Subsidized Housing

- The RDN has the highest number of applicants per subsidized housing unit in the province
- The RDN has 6.7 applicants per expected available family unit, compared to provincial average of 3.7; this may indicate a wait time of almost seven years.
- The RDN has 0.7 applicants per expected available seniors unit, compared to provincial average of 0.5; this may indicate a wait time of less than one year.

#### 4.6 THE NEED FOR TRAVEL IS MINIMIZED, AND NECESSARY TRIPS DO NOT RELY SOLELY ON PRIVATE AUTOMOBILE TRAVEL

##### Mode of Transportation to Work and Location of Work:

- In 2001, 88 percent of RDN residents commute to work in private vehicles (as driver or passenger), which exceeds the provincial average of 82 percent.
- Eight percent of RDN residents walk or cycle to work.
- Two percent of RDN residents use public transit; this is less than the provincial average.
- There is an increasing reliance on vehicles for commuting to work.
- The RDN has more employed residents who live and work in the same census subdivision and at home than the provincial average.

##### Bus Rides Per Capita

- In 1998, there were 1.5 million bus rides in the RDN; this increased by 45 percent to 2.2 million in 2004.
- Ridership increased by 39 percent per capita between 1998 and 2004.

##### Residences within Walking Distance of Amenities

- Between 2000 and 2005, the percent of residences within walking distance of schools, retail and services increased; there was a decrease in number of residences within walking distance to green space and recreation.
- Overall increase in percent of residences within 400 m of multiple amenities between 2000 and 2005.

##### Residents Inside Urban Containment Boundary Living Within Walking Distance of a Bus Stop

- In 2001, 89 percent or 80,407 RDN residents within the UCB lived within walking distance of a bus stop.
- In 2005, 94,900 residents lived within walking distance (i.e., 400 m) of a bus stop (although it was not clear what portion of those residents lived within the UCB).
- There are 12 transit routes in the City of Nanaimo and three transit routes servicing Parksville-Qualicum Beach. There are limited transit services within electoral areas.

##### Vehicles per Household

- Between 2001 and 2003, there was an increase in the number of vehicles in each municipality in the RDN.
- There was a slight increase in the average number of vehicles per household, from 2.21 in 2001 to 2.22 in 2003; compared to Vancouver and Victoria of less than 1.11 vehicles per household.

- It is estimated that vehicle travel accounts for 63 percent of the greenhouse gas emissions in the region.

#### 4.7 THE REGION IS A SAFE PLACE TO LIVE, AND RESIDENTS CARE FOR AND RESPECT EACH OTHER

##### Crime Rate

- Since 1999, serious violent crime rates (i.e., all crimes involving a weapon, sexual assaults resulting in bodily harm, non-sexual assaults resulting in serious injury, and abductions) have been generally decreasing province-wide for both juveniles and adults.
  - Juvenile serious violent crimes decreased from 5.0 to 3.1 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 4.0 to 3.0 crimes per 1,000 people in the same period.
  - Adult serious violent crimes decreased from 2.4 to 2.1 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 3.4 to 2.9 crimes per 1,000 people in the same period.
- Overall, juvenile and adult break and enter crimes have been declining since 1999.
  - Juvenile break and enter crimes decreased from 9.4 to 6.9 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 6.8 to 3.9 crimes per 1,000 people in the same period.
  - Adult break and enter crimes decreased from 16.9 to 11.9 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 18.2 to 12.5 crimes per 1,000 people in the same period.
- Significant decreases in rates of non-cannabis drug offences have occurred in the RDN since 1999. Meanwhile, adult non-cannabis drug offence rates are rising slightly in the CRD, GVRD, and the province as a whole.
  - Juvenile non-cannabis drug offences decreased from 6.5 to 4.6 crimes per 10,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 5.3 to 5.1 crimes per 10,000 people in the same period.
  - Adult non-cannabis drug offences decreased from 15.2 to 8.7 crimes per 10,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 11.8 to 13.7 crimes per 10,000 people in the same period.

#### 4.8 THERE ARE A VARIETY OF OPPORTUNITIES FOR RESIDENTS TO INTERACT WITH EACH OTHER AND NATURE

##### Participation in Recreational and Cultural Programs

- Since 1995, the City of Nanaimo's arenas have had fluctuating usage, but overall, the trend has increased. The RDN's arena has also increased its usage since 2002.

- There has been an increase in number of admissions at both the RDN and City of Nanaimo aquatic centers.
- The number of registrants has increased slightly since 2000 for recreational, cultural and continuing studies programs and courses offered by the RDN, City of Nanaimo and Malaspina University-College.
- 6,078 organized groups utilize the School Districts 68 and 69's fields.

#### Participation in Elections

- Voter turnout in the past three federal elections in the RDN has fluctuated slightly, between 65 and 68 percent, but has shown an overall increase. The electoral areas in the RDN (Nanaimo-Alberni and Nanaimo-Cowichan) have greater participation than the provincial average.
- The number of voters participating in provincial elections has been declining in the RDN and the province in general. The RDN's electoral areas consist of Nanaimo and Parksville-Qualicum; both of which have experienced a decline of between four and five percent between 1991 and 2001.
- For municipal elections, voter turnout has had no discernible trend. In 1999, voter turnout ranged from 28 to 65 percent of registered voters within the Parksville, Nanaimo and Qualicum Beach.

#### Amount of Active and Nature Park Land

- The region has 3,525.5 hectares of activity parks, nature parks and provincial parks within its boundaries, or 27.75 hectares of park land per 1,000 residents.

### 4.9 SOCIAL CAPITAL CONCLUSION

There is a wide range of grades and trends for the 19 indicators that determines the region's social capital. Fifteen of 19 indicators are below to slightly below the comparable averages (\* or \*\*); however, seven of the 15 below average indicators have improving trends. Below average indicators occurred in every sustainability characteristic; all but two of these characteristics indicate trends of improvement over time. The two characteristics indicating uncertain or declining conditions are:

- Poverty is minimized, and residents can meet their basic needs; and
- Housing is affordable, and a variety of different types and sizes of housing is available.

The following table provides an overview of the assessments for all indicators.

SOCIAL CAPITAL PROGRESS REPORT			
Characteristic	Indicator	Grade	Trend

SOCIAL CAPITAL PROGRESS REPORT			
Characteristic	Indicator	Grade	Trend
Residents are Healthy, and Healthcare Services and Facilities are Available When Needed	Birth Weight	***	Getting Better
	Life Expectancy at Birth	*	Getting Better
	Live Births to Teenage Mothers	**	Getting Better
	Motor Vehicle Accidents	**	Stable
Residents are Educated or Trained to Qualify for Employment	Educational Attainment	*	Getting Better
A Wide Variety of Employment Opportunities Exist, and Residents are Employed	Unemployment Rate	*	Getting Better
Poverty is Minimized, and Residents can Meet Their Basic Needs	Average Annual Income Compared to Cost of Living (Real Income per Capita)	*	Getting Worse
	Households Below Low Income Cut-Off	***	Uncertain
Housing is Affordable, and a Variety of Different Types and Sizes of Housing is Available	Residents in Core Housing Need	*	Getting Worse
	Applicants on Wait List for Subsidized Housing	*	Uncertain
The Need for Travel is Minimized, and Necessary Trips do not Rely Solely on Private Automobile Travel	Mode of Transportation to Work, Location of Work	*	Getting Worse
	Bus Rides Per Capita	?	Getting Better
	Residences Within Walking Distance of Amenities	*	Getting Better
	Residents Inside Urban Containment Boundaries Within Walking Distance of a Bus Stop	**	Uncertain
	Vehicles per Household	*	Getting Worse
The Region is a Safe Place to Live, and Residents Care for and Respect Each Other	Crime Rate	**	Getting Better
There are a Variety of Opportunities for Residents to Interact with Each Other and Nature	Participation in Recreational and Cultural Programs	**	Getting Better
	Participation in Elections	**	Stable
	Amount of Active and Nature Park Land	***	Uncertain

? – the data cannot be assessed.

\* - the region is well below average.

\*\* - the region is slightly below average.

\*\*\* - the region is meeting the average.

\*\*\*\* - the region is exceeding the average

Getting Worse - the trend indicates movements away from the goals of 'Where do we want to go?'

Stable – the trend indicates no discernible movement towards or away from the stated goal.

Getting Better – the trend indicates movement towards or exceeding the stated goal.



Uncertain – there are not enough data or historical depth to accurately identify the indicator's trend.

## 5.0 ECONOMIC CAPITAL

Economic capital is a primary component of sustainability. Economic capital, when sustainable, can contribute to social and environmental capital. On the same note, healthy and progressive environmental and social capital also contribute to economic capital. However, when economic capital is unsustainable, it can also cause environmental degradation if combined with inappropriate consumption, which will inevitably affect human health (United Nations, 2005).

While sustainability calls for reduced consumption of environmental resources, it also requires economic stability and social cohesion (Federal Office for Sustainable Development, 2005).

Economic development is sought by societies not only to satisfy basic material needs, but also to provide the resources to improve the quality of life in other directions, meeting the demand for health care, education and a good environment. Many forms of economic development make demands upon the environment; they use natural resources which are sometimes in limited supply, and generate by-products of pollution and waste.

But there are also many ways in which the right kind of economic activity can protect or enhance the environment. These include energy efficiency measures, improved technology and techniques of management, better product design and marketing, waste minimization, environmentally friendly farming practices, making better use of land and buildings, and improved transport efficiency. The challenge of sustainable development is to promote ways of encouraging this kind of environmentally friendly economic activity, and of discouraging environmentally damaging activities (University of Reading).

The following subsections contain the economic capital characteristics and corresponding indicators, as well as the data used to evaluate the grade and trend along the sustainability spectrum.

### 5.1 THERE IS POSITIVE ECONOMIC GROWTH IN THE REGION

Average Annual Income Compared to Cost of Living (Real Income Per Capita)

- Consumer Price Index, a measure of inflation, indicated an increase of 5.0 percent between 1995 and 2000.
- Average gross income in the region increased by 4.5 percent between 1995 and 2000.
- The average annual income in the region is not increasing at the same rate as the cost of living, which ultimately decreases the amount of disposable income available.
- More recent data are required to adequately assess this indicator.

Business Formations and Bankruptcies

- The number of business formations in the RDN increased to 606 in 2004.
- The number of business bankruptcies in Nanaimo decreased to 19 bankruptcies in 2004.
- There has been an overall indication of economic vibrancy in the region.

## 5.2 THE TAX SYSTEM FAVOURS SUSTAINABLE, ENVIRONMENTALLY RESPONSIBLE ECONOMIC ACTIVITIES

### Taxes Paid Per Capita

- From 2000 to 2004, the municipal property taxes in the region have increased by \$90 per capita, from \$538 to \$628. The average municipal property taxes paid in the region are less than Victoria and Vancouver.
- From 2000 to 2004, the municipal residential property taxes in the region have increased. In 2004, the residential property taxes for municipalities in the RDN ranged from \$420 to \$496 per person.
- Municipal non-residential property taxes per capita have also been increasing in the region, except in Qualicum Beach, where the taxes have slightly decreased; the average non-residential tax per capita is \$174.

## 5.3 THE ECONOMY IS CHARACTERIZED BY A DIVERSITY OF DIFFERENT TYPES AND SIZES OF BUSINESSES

### Personal Income from Top Three Industries as a Proportion of Personal Income in Region and from Industry.

- Since 1990, the top income-generating industry in the RDN has changed from manufacturing, to retail, to health and services.
- In 2000, the top three income generating industries were health and social services (12.3 percent), manufacturing (10.8 percent) and retail (10.7 percent).
- In 2000, the RDN's top three industries generated 33.8 percent of total personal income for all workers aged 19 to 64; this is comparable to the provincial average of 33.6 percent.
- The total percent of top three income generating industries in the RDN has decreased from 36.0 to 33.8 percent between 1990 and 2000; compared to the provincial average that indicates an increase from 31.7 to 33.5 percent.
- Of the top three industries, the actual employee incomes for health and social services increased slightly and the incomes for manufacturing and retail declined.

## 5.4 A WIDE VARIETY OF EMPLOYMENT OPPORTUNITIES EXIST, AND RESIDENTS ARE EMPLOYED

### Employment by Industry Sector

- The largest single percentage of workers is employed in retail trade industries, approximately 15 percent, followed by the health and social service industries at almost 12 percent.
- The service sectors, when combined, represent over 79 percent of the economy indicating that the region has a mature economy. The region's service sector proportion is equivalent to the provincial average.
- The top three employers are retail trade, health and social services, and accommodation, food and beverage service industries. Incomes in retail trade have decreased; incomes in health and social services have increased slightly and income in the accommodation, food and beverage industry has remained relatively stable between 1990 and 2000. However, retail and accommodation, food and beverage industries are among the industrial groups with the lowest income per employee in the region.

#### Unemployment Rate

- The City of Nanaimo's unemployment rate has declined. Most recently, the unemployment rates have declined to 7.8 percent in 2004; however, the City of Nanaimo's unemployment rates remain higher than the provincial average.
- At present, the number of Employment Insurance recipients in the City of Nanaimo is declining. Employment Insurance rates in the RDN remain above the provincial average at 3.7 percent compared to the provincial average of 3.6 percent.

### 5.5 RESIDENTS HAVE TRAINING THAT QUALIFIES THEM FOR EMPLOYMENT

#### Educational Attainment

- The percent of students in the RDN not graduating from high school decreased from 35 to 32 percent between 1998 and 2003, but this is still significantly (six percentage points) higher than the provincial average.
- Since 1991, the percentage of residents with university level education has increased from 17 percent to 22 percent; however, the region's levels of university or other non-university education is below the provincial average.
- The percentage of residents with trades certificates and diplomas has increased from 1996 to 2001, from 5 percent to 16 percent.
- The number of residents with a high school degree or less has decreased. The region's residents exceed the provincial average for residents with high school degrees or less, trades certificates, and diplomas.

### 5.6 THE URBAN CORE AREAS OF THE REGION ARE CHARACTERIZED BY THEIR VITALITY

#### Population Density and Amount of Land in Urban Containment Boundaries

- Density has increased within the Urban Containment Boundary, from 7.30 people per hectare in 1991 to 8.62 people per hectare in 2001, an increase of 18 percent.

- Density has increased outside the Urban Containment Boundary, from 0.13 people per hectare in 1993 to 0.19 people per hectare in 2001, an increase of 46 percent.

#### Retail Space Inside and Outside of the Urban Core Areas

- 37 percent of retail space is found within the urban core areas of Nanaimo, Parksville and Qualicum Beach.

### 5.7 REGIONAL CONSUMPTION OF PRODUCTS AND SERVICES PRODUCED IN THE REGION IN ECONOMICALLY VIABLE WAYS IS MAXIMIZED

#### Economic Health of Agriculture

- The total gross farm receipts in the RDN increased from 1991 to 2001. In 1991, the total gross farm receipts were \$15.3 million; they then rose to a high of \$17.5 million in 1996, and declined in 2001 to \$16.6 million.
- Although the total gross farm receipts in the RDN have increased, the gross farm receipts per farm are declining. The average farm receipts in 1991 were \$38,724, and declined to \$33,903 in 2001.
- In 2001, the majority of farms (84 percent) in the RDN reported gross farm receipts less than \$25,000; this is higher than the provincial average. The RDN has approximately seven percent of 'high return' farms reporting greater than \$100,000 in gross farm receipts.
- The total farm capital in the RDN nearly doubled from \$125 million in 1991 to \$249 million in 2001. The majority (87 percent) of farm value is in the land and buildings.

### 5.8 ECONOMIC CAPITAL CONCLUSION

Of the 10 indicators that determine the region's economic capital, nine are below to slightly below comparable averages and only four indicate improving trends. All characteristics contain indicators with below average grades (\* or \*\*) except the characteristic: the tax system favours sustainable, environmentally responsible economic activities. However, all characteristics indicate some improvement over time, except the following two characteristics which indicate that they are remaining stable:

- The economy is characterized by a diversity of different types and sizes of businesses; and
- Regional consumption of products and services produced in the region in economically viable ways is maximized.

The following table provides an overview of the assessments for each indicator.

## ECONOMIC CAPITAL PROGRESS REPORT

Characteristic	Indicator	Grade	Trend
There is Positive Economic Growth in the Region	Average Annual Income Compared to Cost of Living (Real Income per Capita)	*	Getting Worse
	Business Formations and Bankruptcies	**	Getting Better
The Tax System Favours Sustainable, Environmentally Responsible Economic Activities	Taxes Paid Per Capita	***	Uncertain
The Economy is Characterized by a Diversity of Different Types and Sizes of Businesses	Personal Income from Top Three Industries as a Proportion of Personal Income in Region and Personal Income by Industry	**	Stable
A Wide Variety of Employment Opportunities Exist, and Residents are Employed	Employment by Industry Sector	**	Getting Worse
	Unemployment Rate	*	Getting Better
Residents have Training that Qualifies Them for Employment	Educational Attainment	*	Getting Better
The Urban Core Areas of the Region are Characterized by their Vitality	Population Density and Amount of Land in Urban Containment Boundaries	**	Getting Better
	Amount of Retail Inside and Outside Urban Core Areas	**	Uncertain
Regional Consumption of Products and Services Produced in the Region in Economically Viable Ways is Maximized	Economic Health of Agriculture	*	Stable

? – the data cannot be assessed.

\* - the region is well below average.

\*\* - the region is slightly below average.

\*\*\* - the region is meeting the average.

\*\*\*\* - the region is exceeding the average

Getting Worse - the trend indicates movements away from the goals of 'Where do we want to go?'

Stable – the trend indicates no discernible movement towards or away from the stated goal.

Getting Better – the trend indicates movement towards or exceeding the stated goal.

Uncertain – there are not enough data or historical depth to accurately identify the indicator's trend.

### 6.0 CONCLUSION

Overall, the region is below to slightly below provincial or comparable averages on an individual indicator-by-indicator basis; however, several indicators showed improving trends. It is not possible to fully compare the RDN with other regional districts as there is

no standard report developed by other regional districts to assess their overall sustainability. Nevertheless, the assessment of the region's state of sustainability has revealed that there is much opportunity for improvement.

The indicators have revealed that it is possible to advance the level of sustainability in the region through a variety of actions. Some actions are small, such as walking instead of driving, voting in elections and purchasing local products. Other actions require more investment in time, energy or money, such as attaining higher levels of education and providing affordable housing. Every action that residents, corporations and governments make has a corresponding impact, positively or negatively, on the region's sustainability. Therefore, it is imperative that a collective and conscious effort is made to promote sustainability within the region.

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## 1.0 INTRODUCTION

The Regional District of Nanaimo recognizes its responsibility to advance sustainability, and has demonstrated its commitment to sustainability through a variety of decisions and actions. This report identifies the characteristics of a sustainable region and, using indicators, measures the region's sustainability status against the expressed targets. This report provides a regional evaluation that will influence future decisions and actions to improve the region's sustainability over time.

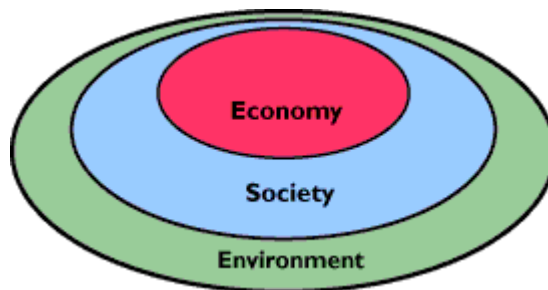
### 1.1 SUSTAINABILITY DEFINITION

One of the first definitions of sustainability that gained prominence was found in the 1987 Bruntland Commission report *Our Common Future*. It defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Other definitions of sustainability include:

- "Meeting the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity" Western Australian Government;
- "Living on earth's income rather than eroding its capital. It means keeping consumption of renewable natural resources within the limits of their replenishment. It means handing down to successive generations not only man-made wealth, but also natural wealth, such as clean and adequate water supplies, good arable land, a wealth of wildlife, and ample forests." United Kingdom's Sustainable Development Strategy;
- "Improving the quality of human life while living within the carrying capacity of supporting ecosystem" Caring for the Earth; and
- "A community is unsustainable if it consumes resources faster than they can be renewed, produces more wastes than natural systems can process or relies upon distant sources for its basic needs" Sustainable Community Roundtable.

Sustainability is about recognizing the inter-relationships between our environment, our society and our economy. It is about recognizing that people are a part of an ecosystem, and that the economic and social lives of people should be integrated into the environment in ways that maintain or enhance the environment, rather than degrade or destroy it. Put another way, sustainability recognizes that our economy exists within society, that society exists within the environment, and that the environment surrounds and supports society, as illustrated in Figure 1.

FIGURE 1 - SUSTAINABILITY MODEL



## 1.2 MANAGING GROWTH IN THE REGIONAL DISTRICT OF NANAIMO

In the early 1990s the Regional District of Nanaimo (RDN) recognized its responsibility to work towards sustainability and embarked on a process to develop a regional strategy to manage the impacts of population growth and development on a regional basis. A regional strategy was deemed appropriate in recognition of the fact that the impacts of growth span the jurisdictional boundaries of individual municipalities and electoral areas, and the fact that while it would be difficult, perhaps impossible, for local governments to stop population growth, it is possible for local governments to mitigate the impacts of population growth through the development and implementation of long range plans and strategies.

The project resulted in the adoption of a Regional Growth Strategy for the region in 1997, based on the principles of sustainability. In essence, the goals of the RDN's regional growth strategy establish the foundation of the RDN's commitment to sustainability in the region. The goals of the regional growth strategy are:

1. Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries;
2. Nodal Structure: To encourage mixed-use development that includes places to live, work, learn, play, shop and access services;
3. Rural Integrity: To protect and strengthen the region's rural economy and lifestyle;
4. Environmental Protection: To protect the environment and minimize ecological damage related to growth and development;
5. Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile;
6. Vibrant and Sustainable Economy: To support strategic economic development that respects the rural and environmental protection priorities of the region;

7. Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development; and
8. Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

The Regional Growth Strategy aims to establish a more sustainable pattern of population growth and development in the region over a twenty-five year period by encouraging and directing most new development in the region in designated urban areas, thereby keeping urban settlement compact, protecting the integrity of rural and resource areas, protecting the environment, increasing servicing efficiency, and retaining mobility within the region.

The Local Government Act requires regional districts that have adopted regional growth strategies to establish a program to monitor their implementation and the progress made towards its objectives and actions, and to prepare an annual report on that implementation and progress. Consequently, the RDN initiated the development of such a program after it first adopted a regional growth strategy in 1997. The monitoring program has evolved since that time. The initial monitoring report, published in 1997, was an administrative document that described key projects completed to implement the regional growth strategy. In 1998 and 1999 more detailed reports were prepared with a citizen committee. The 1998 and 1999 reports provided information regarding compliance with each of the policies of the regional growth strategy based primarily on qualitative data.

One-time project funding was provided in 2000 to develop a set of indicators (or measures) of regional growth strategy vision and goal attainment and to obtain the baseline data for the chosen indicators. The first report based on the data for these indicators was developed in conjunction with a citizen committee and received by the RDN Board in April of 2001. In April of 2002, the RDN Board directed staff to develop the next steps for the monitoring program and terms of reference for an associated citizen committee, with the view to providing a wider range of opportunities for public involvement in the program. The State of Sustainability Project has been designed to satisfy these objectives.

### 1.3 STATE OF SUSTAINABILITY PROJECT

The Regional District of Nanaimo Board approved the State of Sustainability Project on January 13, 2003. The Project is intended to assess the sustainability of the region, to make residents aware of progress towards sustainability, and to involve residents in the regional sustainability assessment.

The Project includes six key components:

1. A public event to discuss what sustainability means in the context of the Nanaimo region;

2. The selection of a set of indicators or measures of sustainability;
3. A report that documents the sustainability of the Nanaimo region, based on the selected sustainability indicators;
4. A public event to discuss the results of that report;
5. A report that provides ideas about how the sustainability of the region can be improved; and
6. The development and implementation of a regional sustainability awards program.

RDN Regional Growth Management Services staff organized and facilitated monthly meetings with the Regional Growth Monitoring Advisory Committee (RGMAC) regarding the Project. The RGMAC is an eleven member Regional District of Nanaimo Board-appointed citizen volunteer advisory committee. The Committee was established in August of 2003, and includes two Board directors, and nine residents from throughout the region. Director Bill Holdom Chairs the Committee, and Director Dave Bartram is the Deputy Chair. The nine residents on the Committee are: Gordon Buckingham, Betty Collins, Ross Peterson, Brian Anderson, Douglas Anderson, Adele McKillop, Janet Farooq, Sylvia Neden, and Sharon Thomson.

### 1.3.1 Sustainability Workshop

The RGMAC successfully completed the first project deliverable on April 4, 2004. A Sustainability Workshop was held to raise public awareness about sustainability and to obtain public feedback to be used in the development of a set of measures or indicators of regional sustainability. Public awareness was raised through presentations about the current activities of the RDN to advance sustainability, planning for long-term sustainability, and how sustainability could be advanced in the region. Public input regarding the desired characteristics of the region was obtained through a series of individual and group assignments. The RGMAC completed a report about the workshop to provide a summary of these presentations and participant perspectives about the sustainability of the region. This report is available on the RDN web site.

### 1.3.2 Sustainability Characteristics and Indicators

The second component of the State of Sustainability Project is the selection of sustainability characteristics and indicators for use in this report about the sustainability of the region. The Committee identified the characteristics of a sustainable region using Sustainability Workshop participant feedback and reviewing a wide range of sustainability literature. The result of this exercise is a list of 22 characteristics, categorized as environmental capital, social capital and economic capital, which make up the framework for the report.

#### Environmental Capital Characteristics

- There is a safe, sufficient supply of water for all living beings and uses in the RDN.
- Important ecosystems and ecological features are protected, healthy and productive.

- The air is clean and safe to breathe.
- All natural resources are conserved, and renewable resources are available in perpetuity.
- Energy requirements are reduced, and or energy is obtained in ways that minimize negative impacts on the environment and greenhouse gases are minimized.
- Land and resources are efficiently used, and the negative impacts of land use and development are minimized.
- Waste is minimized, treated, and disposed using environmentally sound methods.

#### Social Capital Characteristics

- Healthy residents and the availability of healthcare facilities when needed.
- Educated and trained residents who qualify for employment.
- Employed residents and a wide variety of employment opportunities.
- Financially independent residents and minimal poverty.
- Affordable housing and a variety of different types and sizes of housing to accommodate the demographics of the region.
- Minimized need for travel by private automobile.
- High level of safety, where residents care for and respect one another.
- Number of opportunities for residents to interact with each other and nature.

#### Economic Capital Characteristics

- Positive economic growth.
- The tax system favours sustainable, environmentally responsible economic activities.
- The economy is characterized by a diversity of different types and sizes of businesses and services.
- A wide variety of employment opportunities exist, and residents are employed.
- Residents have training that qualifies them for employment.
- The downtown urban core areas of the region are characterized by their vitality.
- Regional consumption of products and services produced in the region in economically viable ways is maximized.

After the characteristics of a sustainable RDN were identified, the RGMAC brainstormed candidate indicators for each of the characteristics. The brainstorming process resulted in an extensive list of over 200 candidate indicators.

Sustainability indicators are useful tools to track progress towards sustainability goals, report on key economic, environmental and social trends, and promote dialogue that improve

decision making toward a more sustainable region. Indicators typically tell us very little about why something is happening. Instead, indicators “prompt us to ask questions and learn more in order to understand what is happening and what the implications might be for ourselves and our communities” (Fraser Basin Council 2000, 2). Indicators are described as “something that helps you understand where you are, which way you are going, and how far you are from where you want to be. An effective indicator alerts you to a problem before it gets too bad and helps you recognize what needs to be done to fix the problem” (Hart 1999, 6).

Indicators are not decisive measurements or solutions, but they can reflect certain trends and help identify areas where progress is being made, or where more change is required. “Because indicators are data, changes and trends will be interpreted in different ways by different people. Identifying and tracking changes in indicators will not, on their own, bring consensus to groups of people with different values and interests. Indicators are not decisive measurements” (Fraser Basin Council 2000, 3).

A consulting firm, Westland Resource Group (Westland), was retained to help evaluate the candidate indicators to determine which ones are most suitable to monitor the sustainability characteristics and to assess the quality and affordability of data available to support the candidate indicators.

Westland used the following criteria to evaluate the list of candidate indicators:

- Relevance – does the indicator reflect the sustainability topic of interest?
- Linked to action – does the indicator support change in behaviour or improvement in decisions, goals, or policies in the region?
- Understandable – will a diverse range of people easily understand the indicator?
- Sensitive to change – does the indicator reveal a change in the social or physical environment?
- Integrative – does the indicator demonstrate connections among key dimensions of sustainability?
- Comparable – can the results for the indicator be compared with those of other regions?
- Scale – does the indicator reveal conditions and trends at the regional or subregional levels?
- Interpretable – is the indicator free of extraneous factors that could confound its interpretation?

Westland also applied the following criteria to assess the data available for the candidate indicators:

- Availability – does data exist to support the indicator?

- Scale – is the data available at a scale appropriate for sustainability reporting?
- Temporal – has the data been collected long enough to show trends over time and progress towards targets? Will data continue to be collected in the future?
- Usable- is the data format compatible with the RDN system and can the RDN perform the data interpretation and presentation needed to support the indicator?
- Accurate – is the data collection and aggregation method appropriate for the indicator?
- Affordable – is the cost of obtaining the data to support the indicator reasonable within the budget of the RDN?

Westland's evaluation resulted in recommendations regarding sustainability indicators for this report about the sustainability of the region. The consultant recommended that:

- 41 specific indicators classified as 'Tier 1' be used in the sustainability report (Appendix A);
- 14 specific indicators classified as 'Tier 2' be used to replace indicators on the tier 1 list, if necessary (Appendix B);
- 48 specific indicators classified as 'Tier 3' be dropped because they failed to meet sufficient criteria or were replaced by indicators on the previous two lists (Appendix C); and
- Further work be undertaken on eight indicators classified as 'Tier 4' before they are used in the subject or future sustainability reports (Appendix D).

The RGMAC used Westland's report to develop its recommendations for the RDN Board. On January 25, 2005, the RDN Board approved the 41 indicators for use in a report about the sustainability of the region recommended by the consultant, the RGMAC and staff. This report is based on the 41 approved indicators<sup>2</sup> and the information obtained through additional groundwater research.

EBA Engineering Consultants Ltd. (EBA) was retained in March 2006 to prepare the State of Sustainability report based on the previously collected data and a prescribed set of characteristics and indicators. Data for the report was collected by the Regional District of Nanaimo<sup>3</sup>, Westland Resources Group<sup>4</sup> and EBA Engineering Consultants Ltd<sup>5</sup>.

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<sup>2</sup> Note: during the process of preparing this report, some indicators were revised and added, subject to Board approval.

<sup>3</sup> RDN staff collected data for the following indicators: (1) population growth and density, amount of land in designated growth areas and not in designated growth areas; (2) number of, and participation in, recreational and cultural programs offered by local government and post secondary institutions.

<sup>4</sup> Westland Resource Group collected data for most of the indicators.

## 1.4 REPORT ORGANIZATION

### 1.4.1 Characteristics and Indicators

Each chapter of the report is devoted to a characteristic and its subsequent indicators. Indicators provide data to assess the region's progression towards achieving that sustainability characteristic. A series of questions is explored for each indicator, as follows:

- What does this indicator tell us? The answer to this question explains what the indicator is and any definitions or criteria associated with it.
- Why is this indicator important to our sustainability? The answer to this question discusses the social, economic and environmental impacts that this indicator has on the region.
- Where do we want to go? The answer to this question discusses stated regional, national or international goals, if known. If there are no specific goals, then general sustainability goals are discussed.
- Where are we right now? The answer to this question is comprised of data collected from reliable sources that provide evidence of the region's sustainability, according to that indicator's data. In this section, the discussion of the data precedes the illustrative figures and graphs.
- Are there any limitations for this indicator? The answer to this question states any limitations to the data, the collection method, or the indicator itself that may skew the data results.
- Assessment. The assessment is a discussion of how the data in 'Where are we right now?' compare to the goal stated in 'Where do we want to go', and how that impacts the region's sustainability, discussed in 'Why is this indicator important to our sustainability'.

### 1.4.2 Assessment Methods

The Regional District of Nanaimo is striving to be a sustainable region. Data have been provided throughout the report that compare the RDN's status with that of other regional districts and/or the provincial average. One method of assessment used throughout the report is the region's ability to meet the provincial average, where there are no regional or other goals established. In cases where no provincial average is provided, the assessment is based on a comparison with other regions or cities, or the overall trend within the RDN's data.

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<sup>5</sup> EBA Engineering Consultants collected data for the following indicators: (1) groundwater elevation (water levels); (2) groundwater quality; (3) amount of impermeable surface area; (4) total volume of groundwater extracted; and (5) stream temperature.



In some cases, there are no available data that encompass the entire RDN. Rather, there are data for the RDN’s urban centres of Nanaimo, Parksville and Qualicum Beach, or occasionally, there are data for only one city in the region. When possible, an average is taken of the cities, to indicate an overall average for the region. Where there are data for one city, it is understood that the city’s data are not entirely indicative of the region, but it does present some understanding of the trends that may be occurring in the region.

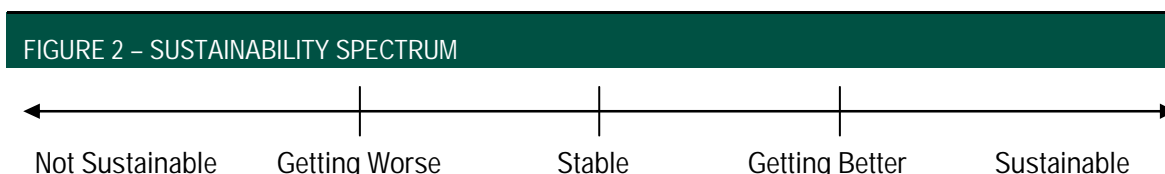
Within the assessment, a grading system has been developed that identifies whether the region is getting better, getting worse, or remaining stable. The grading system is as follows:

TABLE 1 – GRADING SYSTEM					
Grade	?	*	**	***	****
Grade Definition	The data cannot be assessed.	The region is well below average.	The region is slightly below average.	The region is meeting the average.	The region is exceeding the average.

In addition to the grade, it is important to know if the data indicate trends, or evidence of movement towards or away from sustainability. The following statements characterize the movement:

- Getting worse – the trend indicates movements away from the goals of ‘Where do we want to go?’
- Stable – the trend indicates no discernible movement towards or away from the stated goal.
- Getting Better – the trend indicates movement towards or exceeding the stated goal.
- Uncertain – there are not enough data, or historical depth, to accurately identify the indicator’s movement towards or away from sustainability.

The following figure indicates the trend or movement definitions along the sustainability spectrum.



Therefore, example assessments may be:

1. Grade: \* Trend: Getting Worse. This would indicate that the region is below the average and is moving away from the stated goal.

2. Grade: \*\*\* Trend: Uncertain. This grade indicates that the region is meeting the average, but the data are outdated and changes may have occurred in the meanwhile.
3. Grade: \*\*\*\* Trend: Getting Worse. This grade indicates that although the region is exceeding the average, the trend indicates movement towards unsustainability.

### 1.4.3 Abbreviations

There are several common abbreviations used throughout the report. They include:

BC	British Columbia
CRD	Capital Regional District
CVRD	Cowichan Valley Regional District
CSRD	Comox-Strathcona Regional District
GVRD	Greater Vancouver Regional District
NORD	North Okanagan Regional District
RD	Regional District
RDN	Regional District of Nanaimo
RGMAC	Regional Growth Monitoring Advisory Committee

### 1.4.4 Data Limitations

The RDN recognizes the inter-dependent social, economic and environmental links between Indian Reserve lands and Aboriginals living on Indian Reserves located in the region. Both lands and people are governed under federal jurisdiction and as such, Aboriginal social, economic and environmental data are not included in this report.

As well, indicators were assessed using available data, which were sometimes limited by lack of data, lack of current data, or lack of comparable data. Grades and trends were assigned using the available data, where possible. Much of the data used in the social and economic capital sections are based on census data which is collected only every five years. The data from the 2006 census was not yet released at the time that data was collected for this report and so it is recognized that the census-based indicators are in urgent need of being updated. The new census figures are expected to change the conclusions that are based on 2001 census data, significantly in many instances.

Finally, this is a 'living document' that changes over time, through scheduled review of data, indicators and characteristics. This document provides a 'snapshot' of the State of Sustainability within the RDN based on the most accurate data at the time of collection. Already there are a number of suggestions that will improve the accuracy and relevance of future editions of the State of Sustainability report.

# ENVIRONMENTAL CAPITAL

## 2.0 ENVIRONMENTAL CAPITAL INTRODUCTION

Environmental Capital is one of the three pillars of a sustainable region. It is defined as the “stock of natural resources and environmental assets...[that] includes water, soils, air, flora, fauna, minerals, and other natural resources” (Agricultural Trade Policies and Issues, 2006). The region is sustainable when environmental “capital is non declining through time... [when] resources are managed so as to maintain a sustainable yield of natural resource services... [and when it] “satisfies the minimum conditions of ecosystem stability and resilience through time” (Jackson, 2005).

## 3.0 THERE IS A SAFE, SUFFICIENT SUPPLY OF WATER

### 3.1 INTRODUCTION

A sustainable RDN has a safe, sufficient supply of water. There are several indicators used to assess this characteristic, including:

- Water consumption trends;
- Groundwater elevation<sup>6</sup>;
- Groundwater quality<sup>7</sup>;
- Impermeable surface area<sup>8</sup>;
- Volume of water extracted<sup>9</sup>; and
- Stream temperature<sup>10</sup>.

These indicators are important because they characterize the quantity and quality of water available, as well as the factors that influence water entering and exiting our surface and groundwater systems. Other indicators, such as Drinking Water Quality (see Appendix E), may be employed in the future to measure the region’s progress towards a safe, sufficient supply of water.

#### 3.1.1 Water Cycle

The hydrologic cycle (water cycle) describes how water belongs to one system. Figure 3 illustrates how water evaporates from the surface and later returns to the surface as precipitation (rain or snow). Once on the ground, water moves due to gravity and collects

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<sup>6</sup> This report section is copied from EBA Engineering Consultants Ltd. (2006) report to the RDN.

<sup>7</sup> This report section is copied from EBA Engineering Consultants Ltd. (2006) report to the RDN.

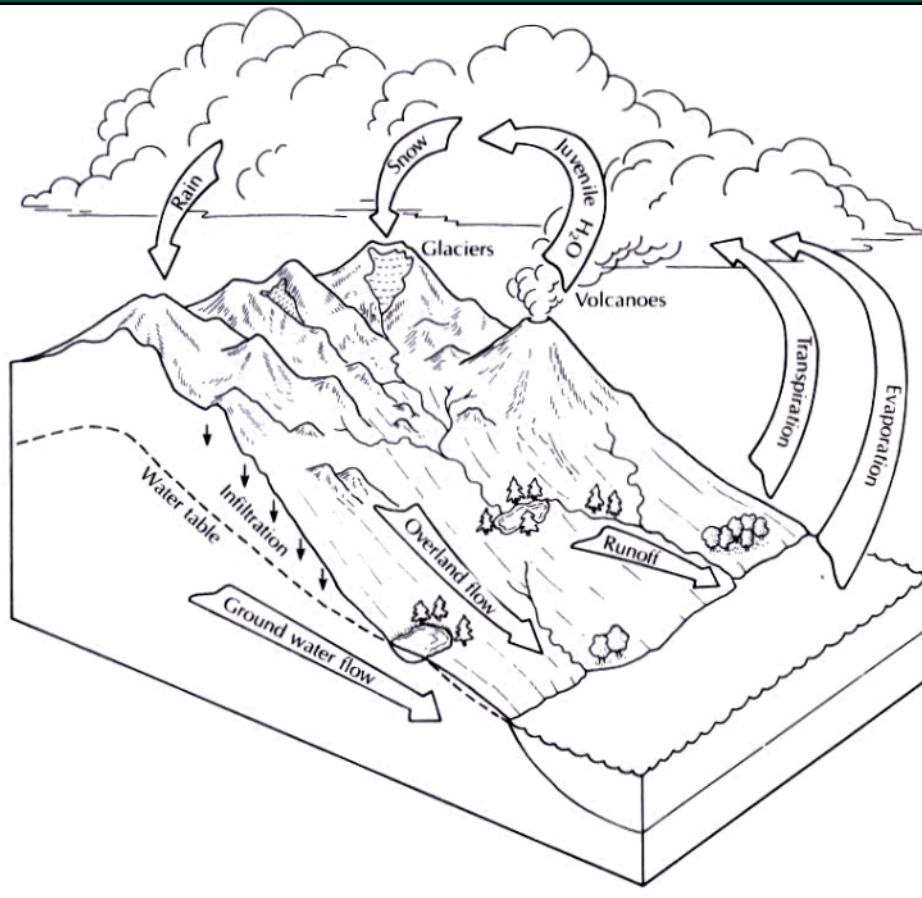
<sup>8</sup> This report section is copied from EBA Engineering Consultants Ltd. (2006) report to the RDN.

<sup>9</sup> This report section is copied from EBA Engineering Consultants Ltd. (2006) report to the RDN.

<sup>10</sup> This report section is copied from EBA Engineering Consultants Ltd. (2006) report to the RDN.

in wetlands, streams, rivers, lakes and the ocean. When water travels over the ground, some is absorbed into the soil below where it is either used by plants and trees (a process called evapo-transpiration) or it joins the water stored in aquifers.

FIGURE 3 – WATER CYCLE



As residential, commercial and industrial development and the transport network increasingly cover the ground, water can no longer be absorbed into the soil and reach streams through interflow (groundwater flow at shallow depth that discharges to streams) or infiltrate into aquifers. Instead, much of this water is collected, drained, redirected, and very often transported at surface. This reduces the amount of recharge available to replenish the water stored in aquifers.

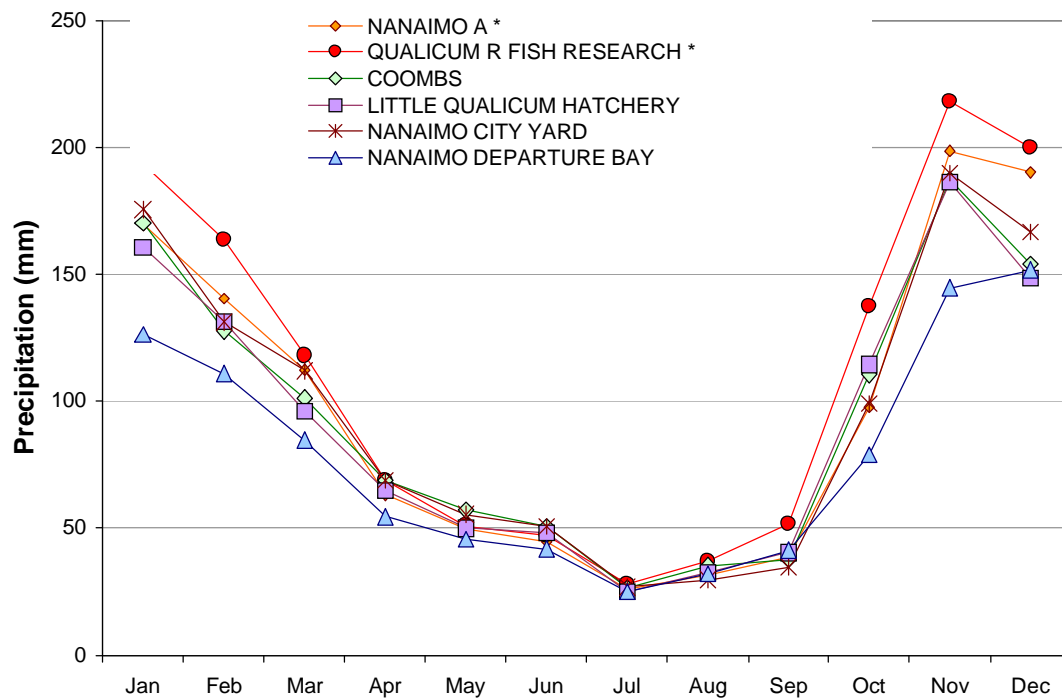
Frequently, humans continue to use groundwater even though it is not recharged as quickly as it is used. It's like someone sipping a drink from a straw, while it is only refilled drop by drop. Very soon, the drink will run out.

Therefore, it is important to understand what happens to water as it moves above and below ground while humans continue to use it.

A key component of the water cycle is precipitation. Precipitation supplies surface water and provides the baseline for the groundwater regime. EBA obtained climate data from Environment Canada for six climate stations throughout the RDN (Table 2). Annual precipitation within the RDN ranges between 938 mm and 1,314 mm and peak precipitation occurs during the period between October and March (Figure 4).

TABLE 2 - SUMMARY OF CLIMATE DATA FOR STATIONS IN THE REGIONAL DISTRICT OF NANAIMO						
Month	CLIMATE STATION					
	Coombs	Little Qualicum Hatchery	Nanaimo A	Nanaimo City Yard	Nanaimo Departure Bay	Qualicum R Fish Research
Average Temperature (1971 - 2000)						
January	2.4	2.9	2.7	-	3.6	3
February	3.3	3.7	4.2	-	4.8	4
March	5.4	5.5	6.1	-	6.6	5.6
April	8	7.9	8.8	-	8.8	8.3
May	11.4	11.4	12.3	-	12.3	11.7
June	14.3	14.3	15.2	-	15.2	14.5
July	17	16.7	17.9	-	17.7	16.8
August	16.9	16.4	18	-	18.1	16.6
September	13.7	13.2	14.8	-	14.9	13.4
October	8.7	8.8	9.7	-	10.2	9.1
November	4.5	5.1	5.4	-	6	5.4
December	2.2	2.7	2.9	-	4.1	3.3
Average Precipitation (1971 - 2000)						
January	170.2	160.7	169.5	175.5	126.3	193.4
February	127.7	131.4	140.4	131.2	110.9	163.6
March	101.3	96.2	112.4	112	84.7	118.1
April	68.8	64.8	63.1	68.9	54.6	68.9
May	57.1	50	49.9	55.5	45.8	50.9
June	50.5	48.2	44.9	50.8	41.8	47.3
July	26.3	24.9	25.9	26.8	25.1	28
August	35.3	32.6	31.6	29.7	32	36.9
September	37.5	40.4	38.5	34.8	41.3	51.7
October	110.5	114.5	97.8	99.1	79	137.5
November	187.2	186.4	198.6	189.9	144.6	218
December	154	148.5	190.2	166.6	151.7	199.9
Annual Precipitation	1,126.4	1,098.6	1,162.7	1,140.8	937.8	1,314.2

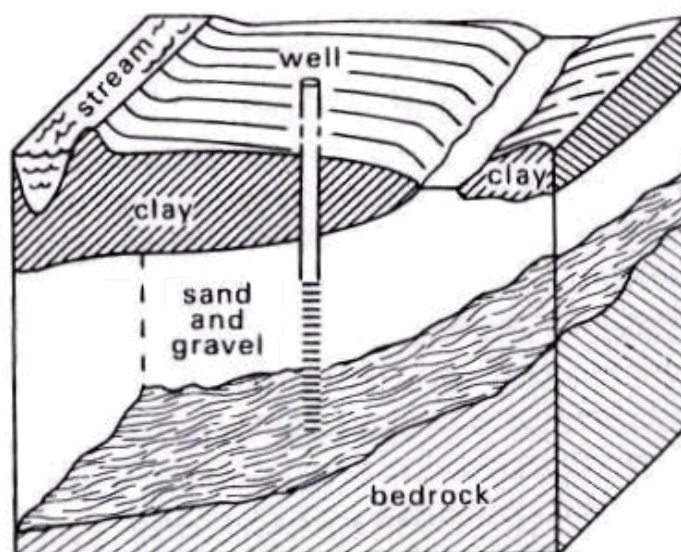
**FIGURE 4 – AVERAGE MONTHLY PRECIPITATION FOR CLIMATE STATIONS WITHIN THE RDN (1971 – 2000)**



### 3.1.2 Aquifers in the RDN

There are two types of aquifers: aquifers in overburden (i.e., sand and gravel) and bedrock aquifers. In addition, aquifers may be confined (overlain by a fine-grained protective layer) or unconfined (without a confining layer). A conceptual model of a typical confined sand and gravel aquifer, with a well, is shown in Figure 5.

The majority of the larger water supply systems in the RDN rely on groundwater drawn from water wells completed in overburden aquifers. Bedrock aquifers are typically tapped by wells serving single connection systems (residential properties) and small water systems (e.g., the RDN’s Pylades well). Both confined and unconfined aquifers are present in the RDN.

FIGURE 5 – AQUIFER CONCEPTUAL MODEL <sup>11</sup>

Aquifer production is limited by the characteristics of the aquifers (geologic material, porosity, transmissivity and storage) and the water balance in the watersheds the aquifers are located in. Water levels within the aquifers are governed by precipitation, which can be highly variable, and slow recharge rates. In addition, the inability to thoroughly (in time and space) monitor water levels can lead to groundwater sources being highly vulnerable to excessive withdrawal and physical modifications within recharge and discharge areas.

The British Columbia Ministry of Environment (MOE) maintains the BC Water Resources Atlas (WRBC), an Internet accessible mapping application that allows access to a database containing information on registered water wells and mapped aquifers in BC. The MOE has developed an aquifer classification system, which classifies aquifers based on their level of development and vulnerability to contamination as a groundwater management tool. This tool assesses the level of development of an aquifer (determined by assessing demand versus the aquifer's yield or productivity) to yield a classification of high (I), moderate (II), or low (III). The degree of potential vulnerability of an aquifer to contamination from surface sources (assessed based on type, thickness and extent of geologic materials overlying the aquifer, depth to water (or top of confined aquifers), and the type of aquifer materials) is identified by the classification system as high (A), moderate (B), or low (C).

The WRBC database indicates that there are 28 identified aquifers within the RDN. Table 3 summarizes information for each aquifer, including the aquifer number, aquifer classification, aquifer name (if applicable), aquifer location, MOE observation wells

<sup>11</sup> Source: Bair, et al (1991).



completed in the aquifer (if any), aquifer size, aquifer type, aquifer productivity, aquifer demand and aquifer vulnerability. Please note that the estimation of the demand is qualitative and refers to an estimate at the time the aquifer was assessed by MOE. Over time, the demand on aquifers may have increased. For example, the present rating could shift a previous "moderate" demand estimate to a "high" demand estimate.

TABLE 3 - AQUIFERS IN THE REGIONAL DISTRICT OF NANAIMO (LISTED FROM NORTH TO SOUTH)									
Aquifer No.	Class	Aquifer Name	Aquifer Location	MOE Obs Well No.	Size (km <sup>2</sup> )	Aquifer Type	Aquifer Productivity	Aquifer Demand	Aquifer Vulnerability
416	II B	Thames River to Mapleguard Pt.	Bowser / Deep Bay	310, 331	13.7	S & G	High	Low	Moderate
421	III B	Nile Creek to Thames Creek		none	6.2	S & G	Low	Low	Moderate
665	III B	-	Between Bowser & Qualicum	none	22.8	S & G	Moderate	Low	Moderate
662	II C	-		none	53	S & G	Moderate	Moderate	Low
661	III A	-		none	3.8	S & G	Moderate	Moderate	High
664	IA	-	Near Qualicum	none	5.0	S & G	High	High	High
663	III A	-		none	9.6	S & G	Moderate	Moderate	High
217	I B	Qualicum	Qualicum	295, 303, 321	42	S & G	Moderate	Moderate	Moderate
212	III C	Parksville	Parksville	none	5.9	Bedrock	Low	Low	Low
216	I B	Parksville		304, 314	24.9	S & G	Moderate	Moderate	Moderate
221	II A	Parksville		none	4.0	S & G	High	Moderate	High
220	II B	Errington	Errington	287	26.6	Bedrock	Low	Low	Moderate
209	III C	Errington		none	8.5	S & G	Moderate	Low	Low
214	III B	Madrona Point	Nanoose	none	5.6	Bedrock	Low	Low	Moderate
219	II C	Nanoose Creek		none	27.4	S & G	Moderate	Moderate	Low
218	II B	Nanoose Hill		none	13.6	Bedrock	Low	Moderate	Moderate
210	II C	Nanoose Bay		none	3.4	Bedrock	Low	Moderate	Low
213	II C	Lantzville	Lantzville	340	42	Bedrock	Moderate	Moderate	Low
215	II C	Lantzville		232	14.3	S & G	Moderate	Moderate	Low
166	III B	Stevenson Point	Nanaimo	none	12.0	Bedrock	Low	Low	Moderate
211	III C	Nanaimo		none	13.4	Bedrock	Low	Low	Low
167	III B	Westwood Lake		none	2.4	S & G	Moderate	Low	Moderate
165	II B	S. Wellington		none	17.1	Bedrock	Low	Moderate	Moderate
164	III B	Extension		none	6.3	Bedrock	Low	Low	Moderate
161	II A	Cassidy	Cassidy	312, 330	29.9	S & G	High	Moderate	High
160	III C	Lower Cassidy		228	6.0	S & G	High	Low	Low
163	II B	Cedar, N. Holden Lake	Cedar	none	1.6	S & G	Moderate	Moderate	Moderate
162	II A	Cedar, Yellow Point, N. Oyster		315, 337	79	Bedrock	Low	Moderate	High

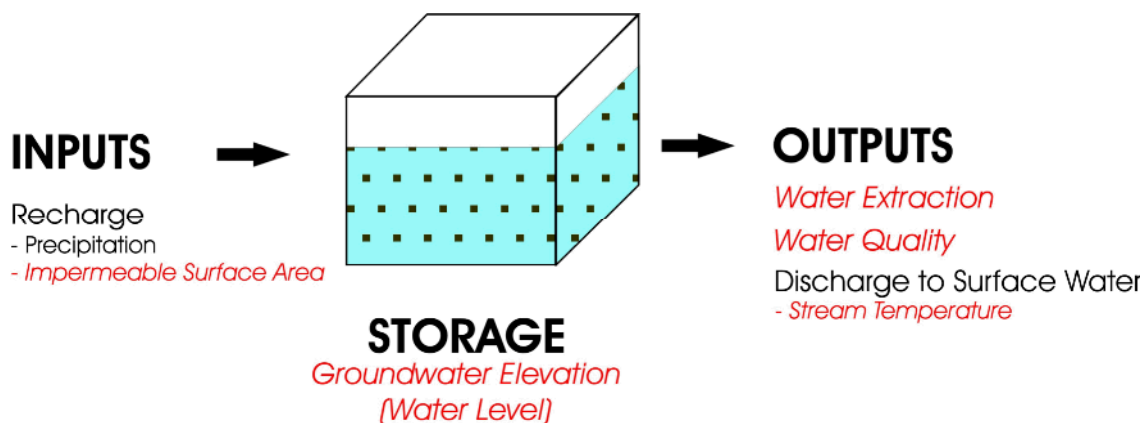
Note: S & G = Sand and Gravel Aquifer Type.

Recently, a study was completed in partnership with various water purveyors (RDN, City of Parksville, Town of Qualicum Beach and Breakwater Enterprises), MOE and EBA that characterized and detailed the aquifers and the groundwater regime between the Englishman River and the Little Qualicum River. A preliminary 3D model was generated (2005 - EBA Engineering Consultants Ltd. 2005, January. Mt. Arrowsmith Aquifers Modeling Project).

### 3.1.3 Groundwater Sustainability

A large portion of the population in the RDN relies on groundwater resources for its drinking water supply. In order to understand the concept of sustainability applied to groundwater (i.e., "there is a safe, sufficient drinking water supply in the RDN") and how it relates to the selected indicator parameters, one must first have a basic understanding of the water cycle (Figure 5) and how it relates to groundwater stored and transiting in aquifers. Figure 6 provides a schematic diagram of the groundwater flow system, which shows the relationship between the five key indicator parameters.

FIGURE 6 – GROUNDWATER SUSTAINABILITY INDICATORS<sup>12</sup> IN RELATION TO THE GROUNDWATER REGIME



A key component of the groundwater flow system is recharge, which depends on the precipitation and the percentage of impermeable surface area. Precipitation falls within a watershed and supplies water to:

- a) Surface water: the most visible aspect of the water cycle, from ditches to estuaries. Water transits relatively quickly, in hours to days from the top of the watershed to the discharge point; and,
- b) Groundwater: water percolates in the ground and reaches aquifers - large mobile bodies of groundwater where flow velocities are usually very slow. In overburden aquifers, water will typically move 10 metres to a few 100 metres in a year. Aquifers typically

<sup>12</sup> Note: indicators are identified in italics.

show a seasonal variation of pressure (variation of the water table) indicative of the flux of water percolating through their recharge zone. Over long periods of time (hundreds of years), the continuous recharge of aquifers has created a state of equilibrium represented by the slope of the water table from the top to the bottom of the watersheds. This water table (or series of water tables if there are a series of aquifers) shows a continuous flux of groundwater travelling through the aquifer(s) and discharging groundwater to streams (where groundwater and surface water are interconnected), lakes, wetlands and foreshores and sustaining ecosystems.

In the RDN, during periods of peak precipitation (the wet winter months), the groundwater level elevations increase as a greater amount of water infiltrates through the overburden and recharges the aquifers. Recharge temporarily increases the amount of water stored in the ground and creates the drive for the groundwater flux. However, the summer months of April to September have considerably less precipitation throughout the RDN (see Figure 4). The amount of groundwater stored in aquifers decreases during these months. Unfortunately, the summer is also the time when the demand for water is the highest and thus, there is a time lag between peak supply and peak demand. In addition, recharge to the groundwater flow system can be impeded by the placement of impermeable surfaces, such as paved roadways and developed areas.

When groundwater is pumped to the surface, the water table is drawn down (i.e., the groundwater level elevations become lower) and there is a modification of the groundwater flow system (e.g., less water being discharged to creeks due to the locally lower water table). If the amount of water taken out from an aquifer does not translate into a drop of the water table over the long term or does not significantly reduce the flux out of the aquifer (to sensitive ecosystems), then the extraction can be considered sustainable. If, on the contrary, a dropping trend of the water table can be observed or if recipients of groundwater (ecosystems) are not supplied any more (drying wetlands or springs), then the extraction is unsustainable.

When the amount of water stored in aquifers is relatively constant or stable over a long period of time it indicates that the groundwater resource is sustainable. A sustainable groundwater resource is obtained when a balance between the inputs to the groundwater flow system (i.e., excess in recharge during very wet years) and the outputs from the groundwater flow system (i.e., the amount of water leaving the system) is maintained. In an ideal and perfectly sustainable situation, all the water extracted would be returned to the aquifers.

## 3.2 WATER CONSUMPTION TRENDS

### 3.2.1 What does this indicator tell us?

Water consumption trends illustrate how much water residents, businesses and industries use over time. Water consumption is influenced by personal choice, policy, population size, and sector use. The data identify if average consumer use is increasing or decreasing, or if

water consumption is increasing or decreasing due to other factors, such as population growth or economic growth. Data include both groundwater and surface water consumption levels from the following sources:

- Regional District of Nanaimo
- City of Nanaimo
- City of Parksville
- District of Lantzville
- Town of Qualicum Beach
- Deep Bay Waterworks District
- North Cedar Improvement District
- Bowser Waterworks District
- Qualicum Bay/Horne Lake Waterworks District
- Little Qualicum Waterworks District
- William Spring Improvement District

The data do not include water consumed from private wells, private surface water licenses or private water purveyors for domestic, commercial, or industrial purposes. Data were not collected due to the relatively small percentage of water consumption and the difficulty in obtaining data for each of the above.

### 3.2.2 Why is this indicator important to our sustainability?

The level of water consumption and the trend in water consumption are important to the region's sustainability as they identify how much water is consumed and if the trend is increasing or decreasing over time. The rate of replenishment for surface and groundwater should equal or exceed the rate of withdrawal in order to be sustainable. Therefore, increasing water consumption may indicate the potential for unsustainable withdrawal of water resources that may impact other uses such as industrial, agricultural, recreational and ecosystem function.

As economic activity and population increase, so too does the demand for water, resulting in an increase in the total amount of water used. People take long showers, water their lawns, and some have pools and hot tubs; businesses and industries also require water for personal or commercial use. Therefore, the greater the population and economic activity, the greater the amount of water consumed, unless there is a reduction in personal consumption or eco-efficiency. When domestic water use rises, costs for water collection, storage, distribution and treatment also rise. By reducing our demand for water, we can defer expensive capital upgrades to both our supplies and our wastewater treatment systems.

Although water is a basic necessity, water consumption is directly related to social characteristics. The municipalities within the RDN and the RDN itself have implemented several water conservation programs and policies. For example, the RDN has four levels of water conservation. Level 1 allows watering every other day; level 2 allows watering twice per week; level 3 allows watering once per week and Level 4 bans watering. Levels 3 and 4 also restrict what water can be used for. The water restrictions are implemented on an

annual schedule, or as required. Therefore, this indicator also identifies if municipal and regional water conservation programs and policies are effective.

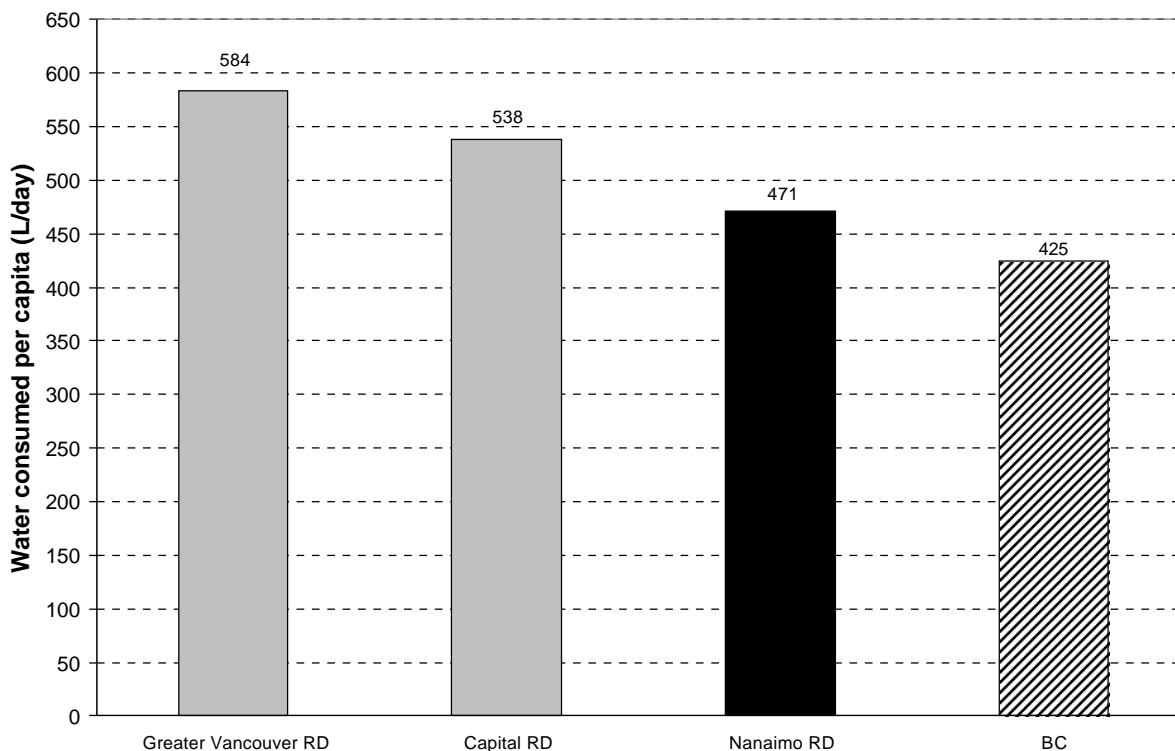
### 3.2.3 Where do we want to go?

The RDN's Regional Growth Strategy that addresses water consumption is Goal 4: Environmental Protection - to protect the environment and minimize ecological damage related to growth and development. Therefore, a sustainability goal for water consumption is to consume less than or equal the annual replenishment rates of water sources, without compromising aquatic ecosystems.

### 3.2.4 Where are we right now?

In 2003, per capita surface and groundwater consumption in the RDN was 471 L/day, which exceeded the provincial average of 425 L/day. This represents a change in daily water consumption per capita of 441 L/day in 2001, to a high of 471 L/day in 2003, decreasing to 459 L/day in 2004.

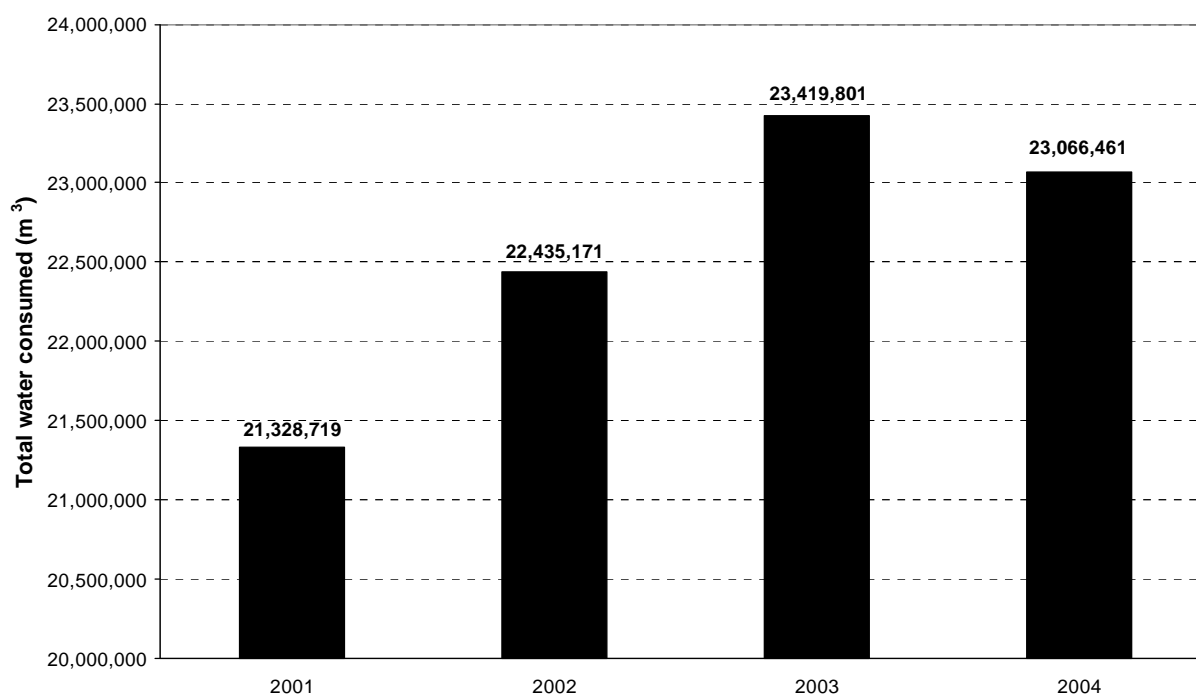
**FIGURE 7 – COMPARISON OF AVERAGE DAILY WATER CONSUMPTION PER CAPITA , PER REGION (2003)**



\*Note: data do not include private water suppliers or people/ industries with private water supplies or people/ industries with surface water licences.  
 Source: Regional District of Nanaimo, City of Nanaimo, City of Parksville, Town of Qualicum Beach, District of Lantzville, Deep Bay Waterworks District, Bowser Waterworks District, Qualicum/ Horne Lake Waterworks District, Little Qualicum Waterworks District, William Springs Improvement District, North Cedar Improvement District, Capital Regional District, Greater Vancouver Regional District, and Environment Canada.

From 2001 to 2004, the total water consumed increased by eight percent or 1,737,742 m<sup>3</sup>. In comparison, the population has increased by an estimated 3.8 percent over the same period of time. Figure 8 illustrates the change in amount of water consumed per year.

**FIGURE 8 - TOTAL WATER CONSUMED ANNUALLY IN THE RDN (2001 – 2004)**



\*Note: data do not include private water suppliers or people/ industries with private water supplies or people/ industries with surface water licences.

Source: Regional District of Nanaimo, City of Nanaimo, City of Parksville, Town of Qualicum Beach, District of Lantzville, Deep Bay Waterworks District, Bowser Waterworks District, Qualicum/ Horne Lake Waterworks District, Little Qualicum Waterworks District, William Springs Improvement District, and North Cedar Improvement District.

### 3.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The data do not differentiate between residential, commercial or industrial uses. It reflects all water supplied by the RDN, City of Nanaimo, City of Parksville, Town of Qualicum Beach, District of Lantzville, Deep Bay Waterworks District, Bowser Waterworks District, Qualicum Bay/Horne Lake Waterworks District, Little Qualicum Waterworks District, William Spring Improvement District, and North Cedar Improvement District.
- The data do not include information from private water suppliers, private wells, or water supplied from surface water licences.

- The short reporting period, from 2001 to 2004, does not provide an accurate trend.
- Data are collected for large areas and do not distinguish between municipal and rural users. By categorizing the data by user types (municipal or rural), it may provide insight into how to encourage effective, sustainable consumption.

### 3.2.6 Assessment

Although the data from 2003 to 2004 indicate a slight decrease in water consumption, the trend since 2001 indicates an overall increase in water consumption. In addition, the RDN remains well above the province's per capita water consumption average. The rate of increasing consumption is greater than the increasing population, which implies that people are consuming more water. What is not taken into account is the amount of water used by domestic, commercial, and industrial sectors that use water from private suppliers, private wells or surface water licenses.

Grade: \*

Trend: Getting Worse

Indicator: Water Consumption Trends

Rationale: The RDN consumes more water per capita than the provincial average, and that average is increasing at a greater rate than population growth.

## 3.3 GROUNDWATER ELEVATIONS

### 3.3.1 What does this indicator tell us?

Groundwater elevation is a measure of changes or fluctuations in the amount of groundwater stored in aquifers. Groundwater elevation is typically measured by measuring the depth to the groundwater in wells (Figure 5).

### 3.3.2 Why is this indicator important to our sustainability?

Groundwater is a fully allocated resource and provides freshwater to discharge areas such as lakes, rivers, estuaries, wetlands and foreshores. Ecosystems are impacted when groundwater is not fully returned to the aquifers<sup>13</sup> or to the ecosystems relying on it. It is, therefore, very important in a developed area to assess and understand humans' 'footprint' on the water cycle, and specifically, groundwater.

<sup>13</sup> Aquifers are defined as fully saturated geologic units that transmit significant quantities of water under ordinary hydraulic gradients.

This indicator is important to assess sustainability because monitoring long-term trends in groundwater levels can indicate whether aquifers are used beyond their long-term capacity. The amount of water “stored” in and transiting through aquifers is finite and ultimately limits the amount of water that can be extracted for human consumption.

If more groundwater is extracted than is sustainable or if the rate or recharge is reduced by increasing impermeable surface areas, then the water table elevation will drop and less water will be available from the aquifer(s).

### 3.3.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

Ideally, the aquifers within the RDN should be sustainable, which means that the amount of water “stored” in the aquifers is fluctuating within acceptable limits and the aquifers respond to years with higher than normal precipitation or a series of “wet” years with rising water tables. By monitoring trends in groundwater levels, the RDN can extrapolate trends into the future and, if required, take appropriate remedial action prior to long-term consequences becoming irreversible. Such actions may involve more monitoring, a better definition of the groundwater regime and aquifers, education, and the implementation of a groundwater management plan that may include reduction of the extraction rates.

The RDN should undertake an initiative to require all water suppliers and purveyors to collect and record water level (piezometric) data on a regular basis (at least monthly, static (non-pumping) levels). This could be accompanied by a training program that would be offered to small water systems administrators and operators to describe the rationale and the importance of this monitoring. Technical advice and support could be provided.

Specific attention should be paid to the fluctuation of the water table in the Parksville-Qualicum Beach and Cassidy area where significant water table drops and decreasing trends were observed in the recent past.



### 3.3.4 Where are we right now?

EBA identified the following potential sources of groundwater elevation data:

- All monitoring wells monitored by the MOE in the RDN (with the exception of Electoral Area B);
- All production and monitoring wells operated by the RDN;
- All production and monitoring wells operated by EPCOR (formerly Breakwater Enterprises);
- All production and monitoring wells operated by the City of Parksville;
- All production and monitoring wells operated by the Town of Qualicum Beach;
- All production and monitoring wells operated by the District of Lantzville;
- All production and monitoring wells operated by all improvements districts (with the exception of Electoral Area B) within the RDN.

Data was requested and/or collected from each of the following sources.

TABLE 4 - SOURCES OF GROUNDWATER ELEVATION DATA IN THE REGIONAL DISTRICT OF NANAIMO		
Data Source	Number of Wells	Period of Record
Ministry of Environment	14 observation wells	Mar 1978 – Feb 2006
Regional District of Nanaimo	23 production wells	Jan 1996 – Dec 2004
Epcor (formerly Breakwater)	10 production wells 2 observation wells	Feb 1999 – March 2006 Jan 1996 – March 2006
Town of Qualicum Beach	3 production wells	Jan 2004 – May 2006

In addition, EBA requested water level data for the wells operated by the District of Lantzville, the North Cedar Improvement District and numerous other small water systems. The City of Parksville was undergoing a system upgrade and could not provide groundwater elevation data in time to be incorporated into this study. The District of Lantzville recently moved and the water level data provided was for nearby MOE observation wells and not for production wells. The North Cedar Improvement District does not collect water level data, but did supply other data, as discussed below.

None of the small water systems contacted by EBA collect water level data.

Monitoring locations were selected to represent as many of the 28 aquifers in the RDN as possible. Ideally, the long term monitoring of the groundwater in the RDN should include all aquifers identified. However, data are typically more readily available for highly developed areas, such as near well clusters (i.e., in the Parksville area). EBA reviewed all of the data and determined that the groundwater elevation data from the MOE observation well network would be the most representative of the entire region and the most reliable for

observing long-term trends. Water elevation data collected from pumping wells will be influenced by pumping.

The groundwater level elevation data are presented graphically in Appendix F, allowing for the identification and interpretation of any trends. Hydrographs (a plot of water level elevation versus time) for each of these 14 observation wells are presented in Appendix F1. The cumulative precipitation departure (CPD) curve is included for a nearby climate station on each hydrograph. The CPD curve provides the value of cumulated precipitation at any given time compared to the equivalent cumulated precipitation considering an average precipitation over the period of interest. The CPD curve allows the identification of periods showing deficit or credit in water, compared to average precipitation. It allows the identification of series of “dry” (the curve goes down or below average precipitation) or “wet” years (the curve shows an upward trend or above average precipitation).

The following sections describe the results of the interpretation for the MOE observation wells, the RDN production wells and the Epcor production wells and observation wells.

#### 3.3.4.1 MOE Observation Wells

The MOE has 15 active observation wells located within nine different aquifers in the RDN (Table 3). Fourteen of the 15 active observation wells have reliable data (MOE, personal communication). The following sections describe the observations from the hydrographs for the different geographic areas, starting from the north (Bowser/Deep Bay area) and moving progressively towards the south (Cassidy/Cedar area). In summary, there are two MOE wells located in the Bowser/Deep Bay area, six MOE wells located within the Parksville/Qualicum area, two MOE wells located in the Lantzville area, and five wells (four with reliable data) located within the Cassidy to Cedar area (see Table 5).

TABLE 5 - MOE OBSERVATION WELLS IN THE REGIONAL DISTRICT OF NANANIMO (NORTH TO SOUTH)					
Aquifer No.	Location	Aquifer Classification	Aquifer Type	Size (km <sup>2</sup> )	MOE Obs Well No.
416	Bowser / Deep Bay	II B	S & G	13.7	310, 331
217	Qualicum	I B	S & G	42	295, 303, 321
216	Parksville	I B	S & G	24.9	304, 314
220	Errington	II B	Bedrock	26.6	287
213	Lantzville	II C	Bedrock	42	340
215	Lantzville	II C	S & G	14.3	232
161	Cassidy	II A	S & G	29.9	312, 330
160	Cassidy	III C	S & G	6.0	228
162	Cedar	II A	Bedrock	79	315 <sup>a</sup> , 337

Notes:

<sup>a</sup> Unreliable data.

I, II, III = high, moderate, low development, respectively.

A, B, C = high, moderate, low vulnerability, respectively.

#### Bowser / Deep Bay Area:

Both MOE Observation Well No. 310 and MOE Observation Well No. 331 are installed in Aquifer #416 in the Bowser area. The hydrographs indicate seasonal fluctuations in the order of 2.5 m with the lowest groundwater level elevations recorded in late summer. Both observation wells show fluctuations of groundwater elevations that appear to fluctuate with the CPD curve, indicating a natural response of the aquifers that is not overridden by excess use of the aquifers.

#### Parksville / Qualicum Area:

MOE Observation Well No. 287 is installed in Aquifer #220, located in the Town of Coombs in the centre part of the catchment boundary. The well is completed in the lower bedrock aquifer. The hydrograph (Appendix F1) indicates seasonal fluctuations in the order of 2 m to 3 m with the lowest water levels recorded in late summer to early fall. The groundwater levels are fairly stable with slight increasing and decreasing trends that occur in three to four year cycles. Since 2000, the lowest water levels observed in the summer have dropped by approximately 1.0 m. No obvious dropping trend was observed.

MOE Observation Well No. 295 is located in the Town of Qualicum Beach. The hydrograph indicates seasonal fluctuations in the order of 4 m with the lowest water table elevation generally recorded in late summer. The monitoring well indicates water table fluctuations that generally follow the CPD curve. No obvious indication of aquifer stress is observed based on this recording.

MOE Observation Well No. 303 is located in the community of French Creek and in the vicinity of two Epcor production wells (Ravensbourne and Drew Road wells) and several RDN wells. The hydrograph indicates seasonal fluctuations in the order of 2.0 m to 6.0 m with the lowest water level generally recorded in late summer. The amplitude of water level variations has increased in recent years and a declining trend can be observed, as demonstrated by the fact that the highest groundwater elevations have dropped by approximately 6 m since 1988. A decreasing trend is indicated in the water levels from 1988 to 1996. The groundwater elevations were fairly stable from 1996 to 1998; however, water levels have been decreasing again since the fall of 1998.

In 2001, EBA conducted a preliminary assessment of the reduction in aquifer capacity, based on the observed drop of water level. The results of the investigation were based on the simplistic assumption that the capacity of the aquifer corresponds to the amount of water that can be released before the aquifer becomes unconfined (when the piezometric level (i.e., water level) reaches the top of the aquifer/the bottom of the confining layer). The observed drop in piezometric level indicates that the aquifer has lost 24 percent of its capacity. In addition, the curve indicates that the aquifer does not rebound following a series of "wet" years. The downward trend indicates the aquifer(s) is not used in a sustainable manner and mitigation measures need to be taken.

MOE Observation Well No. 304 is located in the City of Parksville and in the vicinity of the City of Parksville production wells. The hydrograph indicates seasonal fluctuations in the order of 0.5 m to 1.0 m with the lowest water levels generally recorded in late summer to early fall. The groundwater levels dropped from 1988 to 1991 and were fairly stable from 1991 to 1998. A decrease in groundwater levels is observed from 1999 to 2004, and then there is a stabilization to the present. Groundwater elevations in spring 2003 were the lowest levels ever recorded.

In 2001, EBA conducted a preliminary assessment of the reduction in aquifer capacity, based on the observed drop of water level. Based on the simplistic assumption that the capacity of the aquifer corresponds to the amount of water that can be released before the aquifer becomes unconfined, this drop in piezometric level indicated that the aquifer had lost 26 per cent of its capacity. Since 2004, the decreasing trend has stopped and there is a slight "rebound" of the aquifer. Future monitoring will confirm if the water table has reached more stable conditions. This apparent stabilization of the aquifer should be compared to aquifer use (i.e., is this apparent stabilization of the water level related to known reduction or interruption of extractions from some production wells?).

MOE Observation Well No. 314 is completed in Aquifer #216 and is located in the City of Parksville in the vicinity of Epcor's Hills of Columbia (HC) production wells. The hydrograph indicates seasonal fluctuations in the order of 0.5 m to 1.5 m with the lowest groundwater elevations generally recorded in the late summer to early fall. The water levels decreased slightly from 1992 to 1996 and were fairly stable from 1996 to 1999, even showing a raise associated with the wetter years (1994 – 1998). Groundwater elevations have decreased between 1999 and 2003 and appear to have stabilized in 2004 and 2005. However, groundwater elevation levels in summer 2005 were the lowest levels ever recorded. In 1992, the groundwater elevation level was approximately 4.0 m below grade and has dropped to approximately 8.0 m below grade. In this area, the aquifer is unconfined and approximately 17 m thick. This drop of water level has resulted in a water table elevation that is below the top of the aquifer formation. The downward trend observed in the last 10 years indicates the aquifer has not been used in a sustainable manner. It should be monitored closely and mitigation measures considered under a groundwater management plan.

MOE Observation Well No. 321 is completed in Aquifer #217 and is located in the City of Parksville in the vicinity of Epcor's Oceanside well. The hydrograph indicates seasonal fluctuations in the order of 2 m to 7 m with the lowest water levels generally recorded in late summer. The groundwater elevation data indicate that a decreasing trend of approximately 1.5 m has occurred since 1992 and that the groundwater elevations were fairly stable from 2002 to present.

#### Lantzville Area:

MOE Observation Well No. 232 is located in Lantzville and in the vicinity of Lantzville's Well #6. The hydrograph indicates seasonal fluctuations in the order of 2.5 m to 3 m with the lowest water table elevations generally recorded in late summer. The groundwater levels have been relatively stable in the last 10 years and appear to follow the CPD curve, indicating that the aquifer is not overused.

MOE Observation Well No. 340 is also located in Lantzville. Data are available for a relatively short period of time (since 1999). No obvious trends or large drops of the groundwater level are observed.

#### Cassidy / Cedar Area:

MOE Observation Well No. 228 is installed in the Lower Cassidy Aquifer (Aquifer #160). The hydrograph indicates typical annual amplitudes in the order of 4 m; with the lowest groundwater levels (summer) remaining very stable (i.e., the maximum depth to groundwater is consistently around 8 m) and the highest groundwater levels (winter) fluctuating similarly to the CPD curve.

Both MOE Observation Well No. 312 and MOE Observation Well No. 330 are installed in the Cassidy Aquifer (Aquifer #161). The hydrographs indicate annual amplitudes in the range of 3 m to 6 m. The hydrograph for MOE Observation Well No. 312 indicates a slight decrease (approximately 1 m) of the water table between 1992 and 2000 followed by a slight increase of 0.5 m in 2000 to 2002. From 2003 to 2005, the groundwater levels appear relatively stable with a slightly rising trend. The hydrograph for MOE Observation Well No. 330 indicates a significant drop (approximately 5 m) in water level between 1996 and 1999. Since then groundwater level appears relatively stable at this location. The hydrographs indicating dropping water levels in these two observation wells between the mid to late 1990s may indicate a possible concern because these years were a series of "wet" years where the aquifer should have been replenished.

Both MOE Observation Well No. 315 and MOE Observation Well No. 337 are installed in Aquifer #162 in the Cedar area. MOE Observation Well No. 315 does not provide reliable data (MOE, personal communication). The hydrograph for MOE Observation Well No. 337 indicates large amplitudes of the groundwater levels (up to 15 m). Data are available for a relatively short period of time (since 1999). No obvious increasing or decreasing trends or large drops of the groundwater level are observed.

Generally, the aquifers in the Cassidy/Cedar area do not indicate signs of stress due to excessive groundwater extraction, with the possible exception of the Cassidy Aquifer (Aquifer #161), which showed decreasing trends in groundwater levels during a period of "wet" years in the mid to late 1990s. Further monitoring will be required to fully assess trends in aquifers in the Cassidy/Cedar area.

### 3.3.4.2 RDN Production Wells

The RDN has a number of production wells located in the Parksville and Nanoose areas, 23 of which have dataloggers that record groundwater level elevations. Hydrographs for each of these 23 production wells are presented in Appendix F2.

The period of record is too short (i.e., only 1 to 1.5 years of data) to make any interpretation of trends for six of the RDN wells, including Nanoose #3, Nanoose #5, Fairwinds #3, Madrona #4, River's Edge #2 and River's Edge #3 (see Appendix F2).

RDN production wells located in the City of Parksville (French Creek #1 through French Creek #7) have the longest period of record (1996 to 2004). The hydrographs indicate seasonal fluctuations with the lowest groundwater levels recorded in late summer to early fall and amplitudes that range from 4 m to 8 m. All seven of these production wells show fluctuations in groundwater elevations that appear to fluctuate with the CPD curve, thus indicating a natural response of the aquifers that is not overridden by excess use of the aquifers. However, data from some of the MOE observation wells in the Parksville area indicated that there is a potential problem with the overuse of the aquifer. Groundwater elevation data should continue to be monitored in this area and reassessed for trends in the future.

Three of the RDN production wells located in the Nanoose Peninsula area (Nanoose #1, Nanoose #2, Nanoose #4) show a decrease in the lowest groundwater levels measured in 2004 as compared to the lowest groundwater levels measured in 2002. Contrary to this trend, the CPD curve showed a slight increasing trend during the same time period (2002 to 2004). The period of record is relatively short for all of the production wells in the Nanoose Peninsula area, therefore, further monitoring will be required to fully assess the observed trends in the groundwater level elevations in this area.

The remaining RDN production wells (Fairwinds #1, Fairwinds #2, Pylades, West Bay #3, San Pareil #1, San Pareil #2 and Surfside #1) all show groundwater elevations that increase as the CPD curve increased.

### 3.3.4.3 Epcor Production Wells and Observation Wells

Epcor (formerly Breakwater) has 10 production wells and two observation wells with detailed groundwater elevation data. These wells are all located in the Parksville area. A map showing the details of the Parksville area (including the locations of Epcor production and observation wells, City of Parksville production wells, RDN production wells and MOE observation wells) is attached in Appendix F. Hydrographs for each of the 10 production wells and two observation wells are presented together with the CPD curve for a nearby climate station (Coombs) in Appendix F3. All of the production wells show fluctuations of groundwater elevations due to pumping (sharp drops in groundwater elevation), due to seasonal fluctuations and due to longer-term fluctuations that appear to mimic the CPD curve. In addition, the two observation wells show fluctuations of groundwater elevations that appear to fluctuate with the CPD curve. The fluctuations that vary with the CPD curve

indicate a natural response of the aquifers that is not overridden by excess use of the aquifers.

Other data in the Parksville area indicate that there are potential problems with the overuse of the aquifer and groundwater elevation data should continue to be monitored in this area in the future.

#### 3.3.4.4 Town of Qualicum Beach Wells

The Town of Qualicum Beach provided water level data for three wells located in the Qualicum Beach area. Hydrographs for each of these three wells are presented together with the CPD curve for a nearby climate station (Coombs) in Appendix F4. All of the wells show fluctuations of groundwater elevations due to seasonal fluctuations and due to pumping (sharp drops in groundwater elevation, which are particularly large in the summer months). The period of record (2004 to 2006) is too short to determine with confidence whether longer-term fluctuations mimic the CPD curve, however, based on limited data, this does appear to be the case. The observed fluctuations do not appear to indicate excess use of the aquifers at this time; however, longer-term monitoring will be required to confirm this observation.

Other data in the Qualicum Beach area (i.e., water levels in MOE wells No. 303 and 321, located in Qualicum Aquifer No. 217) indicate that there are potential problems with the overuse of the aquifer and groundwater elevation data should continue to be monitored in this area in the future.

#### 3.3.5 Are there any limitations for this indicator?

Groundwater elevations are controlled by more than one variable, which may all fluctuate simultaneously. The variables that affect water level elevations include recharge (a function of available precipitation and percentage impermeable surface area), water extraction rates and discharge to streams and other groundwater receptors. It is difficult to differentiate which component has led to which amount of change in water levels.

Another limitation for this indicator is the availability of data. In addition, there is poor distribution of the data, as groundwater monitoring wells are focussed in the aquifers that are most heavily developed.

#### 3.3.6 Assessment

Table 6 summarizes observed trends from the MOE observation well hydrographs. Most of the MOE observation wells showed natural fluctuations in groundwater levels that mimic the CPD curve. In particular, no obvious increasing or decreasing trends were observed, with the exception of MOE observation wells no. 303 and 321 (in Aquifer #217), MOE observation wells no. 304 and 314 (in Aquifer #216) and MOE observation wells no. 312 and 330 (in Aquifer #161). Hydrographs for the RDN production wells and the Epcor production and observation wells (all located in the Parksville area) indicate that the groundwater levels generally follow the same trends observed in the CPD curve.

TABLE 6 - SUMMARY OF GROUNDWATER ELEVATION TRENDS IN MOE OBSERVATION WELLS IN THE RDN				
Aquifer No.	Location	Trend	Drop in 1995-2005	MOE Obs Well No.
416	Bowser / Deep Bay	No Trend		310, 331
217	Qualicum	Dropping	2 to 3 m	295, 303, 321
216	Parksville	Dropping	1.5 to 2 m	304, 314
220	Errington	No Trend		287
213	Lantzville	No Trend		340
215	Lantzville	No Trend		232
161	Cassidy	Dropping in mid-late 1990s	1 to 5 m	312, 330
160	Cassidy	No Trend		228
162	Cedar	No Trend		315, 337

Grade: ?                      Trend: Stable to Getting Worse

Indicator: Groundwater Elevation

Rationale: There are some areas within the RDN with decreasing groundwater elevations indicating that groundwater is being used in an unsustainable manner. This situation will not likely improve without mitigative measures, particularly since the rate of development is high throughout the RDN. Need to collect more data.

### 3.4 GROUNDWATER QUALITY

#### 3.4.1 What does this indicator tell us?

Groundwater quality is affected by several factors. Surface pollution can trickle into the water, and saltwater intrusion, through excessive or prolonged pumping, can impact aquifers near the coast. Electrical conductivity, pH, chloride, nitrate and nitrite were selected to represent the groundwater quality because they are common and affordable parameters to monitor and are themselves broad indicators of groundwater quality. Their monitoring will identify the negative impacts from human activities and allows a global assessment of the deterioration of the groundwater quality.



### 3.4.2 Why is this indicator important to our sustainability?

This indicator is important to assess sustainability because long-term trends in groundwater quality can provide valuable information on the health of the groundwater resource and will aid in determining future actions to improve its sustainability.

A deterioration of the groundwater quality will (a) reduce the capacity of using groundwater as a water supply and (b) increase the cost of use due to required treatment. In addition, since groundwater often discharges to streams, the water quality has an important influence on fisheries.

### 3.4.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

Ideally, the aquifers within the RDN should be sustainable, which means that there is a sufficient supply of drinking water that meets applicable guidelines. Guidelines are provided by Health Canada<sup>14</sup> and MOE<sup>15</sup> and they set quality criteria for health and aesthetic reasons and for the protection of aquatic life.

The overall objective is to keep groundwater of good quality. The short-term objective is to increase our level of knowledge and have more information on the groundwater quality in the region. The RDN should undertake an initiative to require all water suppliers and purveyors to collect and retain a full potability analysis on an annual basis (explanation, training and basic technical support could be provided).

### 3.4.4 Where are we right now?

EBA identified the following potential sources of groundwater quality data from wells sampled in the RDN (with the exception of Electoral Area B):

- Observation wells sampled by the MOE;
- Production wells sampled by the RDN;

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<sup>14</sup> Guidelines for Canadian Drinking Water Quality, updated in March 2006

<sup>15</sup> British Columbia Approved Water Quality Criteria (Guidelines) for the protection of drinking water, updated in August 2001

- Production and monitoring wells sampled by EPCOR;
- Production wells sampled by the City of Parksville;
- Production wells sampled by the Town of Qualicum Beach;
- Production wells sampled by the District of Lantzville;
- Production wells sampled by all improvements districts within the RDN.

EBA requested data from all these sources and were successful in collecting the data outlined in Table 7:

TABLE 7 - SOURCES OF GROUNDWATER QUALITY DATA IN THE REGIONAL DISTRICT OF NANAIMO		
Data Source	Number of Wells	Period of Record
Ministry of Environment	9 observation wells	Aug 1986 – Oct 2005
Regional District of Nanaimo	26 production wells	Oct 2003 – Oct 2005
Epcor (formerly Breakwater)	21 production & observation wells	Aug 1981 – Sep 2005
City of Parksville	Composite sample from production well field	August 2005
Town of Qualicum Beach	8 wells	Dec 1988 – Sep 2003
District of Lantzville	2 production wells	Oct 2005
North Cedar Improvement District	3 production wells	Feb 2005

With the exception of the North Cedar Improvement District, the small water systems do not collect comprehensive water quality data. These small water systems collect bacteriological data only, as required by the Vancouver Island Health Authority (VIHA).

The available groundwater quality data for pH, electrical conductivity, chloride, nitrate and nitrite were compiled and are presented in Appendix G. Selected water quality parameters (pH, electrical conductivity and chloride) were plotted versus time for wells with at least three data points, thus allowing for the identification and interpretation of any trends. Since the majority of the nitrate and nitrite data indicated that concentrations were below the analytical detection limits, these two parameters were not included on the graphs.

The following sections describe the results of the interpretation for the MOE observation wells, the RDN production wells, the Epcor production wells and observation wells and the Town of Qualicum Beach wells. The period of record for the City of Parksville production wells, the District of Lantzville production wells and the North Cedar Improvement District production wells was too short to interpret any trends; however, the data are included in the Appendix G for completeness.

#### 3.4.4.1 MOE Observation Wells

The MOE monitors water quality approximately once every three years in selected wells in their observation well network, including nine observation wells located in the RDN

(Appendix G). Four of these observation wells have sufficient data to create graphs and thus possibly interpret trends. These include (from south to north) MOE observation well no. 228 (located in Cassidy), MOE observation well no. 232 (located in Lantzville), MOE observation well no. 295 (located in Qualicum) and MOE observation well no. 310 (located in Bowser). Concentrations of the selected parameters (pH, electrical conductivity, chloride, nitrate and nitrate) measured in groundwater samples collected from these nine MOE observation wells met the drinking water quality guidelines, with the exception of pH (an aesthetic objective) at MOE observation well no. 337.

MOE Observation Well No. 228 is installed in the Lower Cassidy Aquifer (Aquifer #160). The water quality graph does not indicate any increasing or decreasing trends in pH, electrical conductivity or chloride.

Water quality data for MOE Observation Well No. 295, located in the Town of Qualicum Beach, indicates that there may be a slight increasing trend in electrical conductivity and chloride concentrations; however, further monitoring will be required to confirm this trend. MOE observation well no. 295 is not located near any of the major production well fields, and we are uncertain of the possible source of changes to the water quality in this well.

The water quality graph for MOE Observation Well No. 310 (installed in Aquifer #416 in the Bowser area) does not indicate any increasing or decreasing trends in pH, electrical conductivity or chloride.

MOE Observation Well No. 232, located in the vicinity of Lantzville's production well #6, appears to show an increasing trend in both electrical conductivity and chloride concentration, particularly between the August 1988 measurement and the June 1997 measurement. However, the trend appears to have levelled off since that time.

#### 3.4.4.2 RDN Production Wells

The RDN monitors groundwater quality for their production wells on an annual basis. Water quality data are presented for 26 production wells in Appendix G, including graphs for six of these wells. The period of record was too short (i.e., less than three data points) to make any interpretation of trends for the remaining RDN production wells. None of the water quality graphs indicate any significant increasing or decreasing trends.

#### 3.4.4.3 Epcor Production Wells and Observation Wells

Epcor has a total of 21 production and observation wells with groundwater quality data, located in the Parksville area. Water quality graphs were created for eight of these wells (Appendix G). Five of these eight wells show potential increasing electrical conductivity and chloride concentrations, including Hills of Columbia 6, Hills of Columbia 9, Bosa 1, Springhill Road 1 and Springhill Road 2. These wells are all in the vicinity of MOE observation well no. 314. The three remaining Epcor wells did not show any significant increasing or decreasing trends in the selected parameters.

#### 3.4.4.4 Town of Qualicum Beach Wells

The Town of Qualicum Beach has a total of eight wells with groundwater quality data. Water quality graphs were created for five of these wells with sufficient periods of record (Appendix G). Four of these five wells show potential increasing chloride concentrations, including well #1A, well #2, well #3 and well #5. However, the largest increase was observed during the most recent monitoring event and further monitoring will be required to determine whether this increase is a long-term trend. In addition, one of the wells (well #4) shows increasing electrical conductivity values. These observations are consistent with the increasing trend in chloride concentrations and electrical conductivity values observed in MOE well No. 295, which is also located within the Town of Qualicum Beach. No other significant increasing or decreasing trends were observed in any of the other selected parameters.

#### 3.4.5 Are there any limitations for this indicator?

Groundwater quality may be influenced by more than one source, including salt water intrusion, surface water contamination, groundwater flow pathways (i.e., type of aquifer and length of contact time) and biochemical reactions happening within a very short distance of the well (well biofouling). Therefore, it may be difficult to differentiate between potential sources of impacts to groundwater quality.

A limitation for this indicator is the availability of data, for example, the small water users do not collect full water quality data. Another limitation for this indicator is the availability and spatial distribution of the data (which is concentrated mainly in one area). However, this parameter is very important and will provide an understanding of the groundwater regime and show areas with concerns, over time and with an increasing size of the database.

Furthermore, the groundwater quality data presented only include data for a limited number of selected parameters. Many other parameters are not included, typically because they are not measured or the analytical cost as part of a long term monitoring plan would be prohibitive, even though they are important from a human health perspective.

#### 3.4.6 Assessment

In general, the groundwater quality data for the selected parameters indicate that the groundwater quality in the RDN is good overall. The groundwater quality data met the guidelines for all selected parameters, with the exception of pH measured in one MOE observation well (no. 337), two RDN wells (Madrona #4 and San Pareil #2) and two Epcor wells (Drew Road Intake and Imperial). The pH is an aesthetic objective, and the pH values observed were marginally outside the range provided in the guidelines and do not represent a human health concern.

Overall the groundwater quality data do not indicate any obvious significant increasing or decreasing trends in pH, electrical conductivity or chloride concentrations (Table 8). The only wells with possible observed increases in electrical conductivity and chloride concentrations were located in the Lantzville area (MOE observation well no. 232), the

Qualicum Beach area (MOE observation well no. 295, and Town of Qualicum Beach wells #1A, #2, #3, #4 and #5) and the Parksville area (Epcor wells Hills of Columbia 6, Hills of Columbia 9, Bosa 1, Springhill Road 1 and Springhill Road 2). Further monitoring will be required to assess the trends.

TABLE 8 - SUMMARY OF GROUNDWATER QUALITY TRENDS IN WELLS IN THE RDN				
Aquifer No.	Location	Wells with Water Quality Data	Electrical Conductivity Trend	Chloride Trend
416	Bowser / Deep Bay	MOE obs well no. 310 MOE obs well no. 331	No trend Insufficient Data	No trend Insufficient Data
217	Qualicum	MOE obs well no. 295 Town of Qualicum Beach well #1A Town of Qualicum Beach well #2 Town of Qualicum Beach well #3 Town of Qualicum Beach well #4 Town of Qualicum Beach well #5 RDN wells Surfside #1 and #2	Increasing No trend No trend No trend Increasing No trend Insufficient Data	Increasing Increasing Increasing Increasing No trend Increasing Insufficient Data
216	Parksville	MOE obs well no. 314 RDN wells French Creek #1 to #7 Epcor wells HC-6, HC-9, Bosa-1, SR-1, SR-2 <sup>a</sup> Epcor wells HC-7, Oceanside, Drew Road Epcor wells CR-1, CR-2, CR-3, CR-4, HC-8, HC-11, Bosa, Ravensbourne; Epcor obs wells SR-0, SR-2A City of Parksville well field	Insufficient Data Insufficient Data Increasing No trend Insufficient Data Insufficient Data	Insufficient Data Insufficient Data Increasing No trend Insufficient Data Insufficient Data
221	Parksville	RDN San Pareil #1 to #3	Insufficient Data	Insufficient Data
n/a	Parksville / Nanoose	RDN wells River's Edge #2 and #3	Insufficient Data	Insufficient Data
218 / 219	Nanoose	RDN wells Arbutus, West Bay #3, Nanoose #1 to #6, Fairwinds #1 to #3 RDN well Madrona #4	Insufficient Data No Trend	Insufficient Data No Trend
213	Lantzville	MOE obs well no. 340	Insufficient Data	Insufficient Data
215	Lantzville	MOE obs well no. 232 Lantzville wells #6, #9	Increasing Insufficient Data	Increasing Insufficient Data
161	Cassidy	MOE obs well no. 312	Insufficient Data	Insufficient Data
160	Cassidy	MOE obs well no. 228	No trend	No trend
162	Cedar	MOE obs well no. 337 RDN well Pylades North Cedar Improvement District wells #1, #3, #6	Insufficient Data Insufficient Data Insufficient Data	Insufficient Data Insufficient Data Insufficient Data

Notes: <sup>a</sup> These wells are located near MOE observation well no. 314; Periods of record are provided in Table 7.

Grade: ?

Trend: Getting Worse

Indicator: Groundwater Quality

Rationale: Overall good water quality, some possible indication of increasing trends in electrical conductivity and chloride concentrations in localized areas. Need to collect more data.

### 3.5 IMPERMEABLE SURFACE AREA

#### 3.5.1 What does this indicator tell us?

The total impermeable surface area within the RDN is a good indicator of potential disturbance to the water cycle, as impermeable areas prevent infiltration of precipitation and reduce groundwater recharge. Increasing development can have an impact on groundwater recharge and the overall groundwater sustainability by reducing recharge and lowering the volume of groundwater stored and transiting in aquifers.

#### 3.5.2 Why is this indicator important to our sustainability?

This indicator is important to our sustainability because an increase in impervious area creates a reduction in recharge and interflow, which can ultimately lead to a reduction in the amount of water transiting and stored in the aquifers. This will reduce the amount of water available for both human consumption and for discharge to streams.

Impermeable areas include surfaces such as concrete and asphalt driving and parking surfaces and building roofs. Diversion of precipitation leads to a reduction in recharge as well as a greater and more frequent release of flow into drainage channels and to increases direct runoff into streams or ditches. In addition, increases in impervious area increases run-off, potentially resulting in more erosion within the drainage network, which, in turn, translates into deterioration of the fish habitat, higher peak flows, lower low flows and higher stream temperatures during periods of low flow.

One of the problems associated with impermeable areas is the infrastructure required for stormwater management. Runoff is channelled from impermeable surfaces directly into drainage and pipes that convey the water, eventually, into a waterbody. Impermeable areas modify the response of a watershed to storm events as water will move faster on impermeable surfaces and in pipes, thus discharging quicker and at higher rates in streams. This translates in more frequent, faster and larger flows having greater eroding power, with the following effects:

- A decrease in aquifer recharge rates;
- A reduction of continuous discharge of groundwater to streams (interflow) which are essential to “buffer” stream flows during periods of low flow;
- The natural runoff is diverted away from nearby streams and waterbodies into the stormwater system, upsetting the ecosystems’ balance;
- The system must be designed for maximum flood events (costly);
- The local soils and riparian vegetation become eroded; and
- The fish habitat is damaged or destroyed.

### 3.5.3 Where do we want to go?

The RDN's Regional Growth Strategy has two goals that support this indicator.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

Achieving sustainability requires the promotion of the allocation of storm water to elements of the water cycle and ecosystems, which respond slowly to changes (aquifers, sensitive receptive ecosystems), supply water where it is needed (e.g., irrigation) and minimize sudden and high-energy events that can destroy surface water networks and their ecosystems.

Ideally, the RDN wants to minimize impervious surfaces to levels below 8%, which would minimize the impact impervious surfaces have on the disruption of the water cycle, in particular the reduction of subsurface flow and the modification of stream response to storm events.

The RDN should undertake to update the impervious areas assessment every other year. The analysis of impermeable areas should integrate a coefficient that takes into account elements that increase the “net” permeability of impermeable areas (e.g., storm water directed back to the footprint of developed properties, permeable materials used for paving, etc.) to come up with ratios of impermeable areas that are more representative of reality. The RDN could address subsurface infiltration specifications under the building permit and development and re-zoning permit processes. By ensuring that stormwater management systems constructed during development result in post-development subsurface infiltration being equivalent or better than pre-development infiltration, recharge to groundwater will be maintained or enhanced.

### 3.5.4 Where are we right now?

For this study, EBA calculated the amount of impermeable surface area in the RDN (with the exception of electoral area B) using the proposed method in the EBA August 2005 report, "Regional District of Nanaimo Groundwater Indicators Study". The amount of impermeable surface area was calculated for a photo mosaic taken in 2005.

EBA generated a series of maps, using the following four categories:

- Impervious area < 5%;
- Impervious area between 5 and 8 %;
- Impervious area between 8 and 10%; and
- Impervious area greater than 10%.

These values of ratios have been selected because it is understood that if the impermeable area exceeds 8 to 10%, infiltration is reduced to the point the interflow does not maintain a sufficient baseflow in streams and the dynamic of the storm events (frequency and intensity) is significantly modified. This has been observed to translate into loss of greater than 80% of the fish stock (MOE and CH2M HILL workshop, Nanaimo, 2002).

EBA used sub-watershed boundaries as our polygon boundaries to better reflect the character of individual sub-areas. Appendix H shows the sub-watersheds in tabular form and the corresponding map listing the sub-watersheds locations.

The sub-watersheds within the RDN range from 0 to 100% impervious surface. The sub-watersheds with the highest percentages of impervious surfaces are located within the larger urban centres including Nanaimo, Parksville and Qualicum Beach. Overall, roughly 9.5% of the RDN is covered by impervious surfaces.

#### 3.5.4.1 Impact of Land Clearing and Tree Harvesting

The effect of land clearing and tree harvesting on the water cycle is complex and has many implications, many of which are site specific and are not fully understood. The effects of land clearing are also related to the size and scale of the harvesting operation. One potential consequence of logging is changes to stream hydrographs. Extensive land clearing can accentuate the hydrograph of surface water flows, through a loss of retention.

In general, for small logged areas, the water used by vegetation or exchanged through evapotranspiration exceeds the quantity of water infiltrating to the ground, leading to a deficit in soil moisture during some parts of the year. Therefore, tree harvesting may result in a short term net increase of infiltration and rising water tables, provided the treed areas are not replaced by impervious surfaces. However, when looking at a larger area, soil cover and vegetation play a key role in buffering the input and output of water (runoff, evapotranspiration and infiltration). At a very large scale, excessive tree harvesting has even modified climate patterns.



### 3.5.5 Are there any limitations for this indicator?

In this study, a conservative approach was taken and all paved and roofed areas were considered impervious. However, this does not take into account that some areas may have proper stormwater management systems in place that promote infiltration. In this case, a coefficient could be used to take into account the benefit provided and estimate the corresponding impermeable area. In addition, the analytical method used by EBA does not take into account partially impervious areas, but specifies 100% runoff from all impervious area.

EBA's methodology may over-estimate the impervious surface area and thereby overestimate the volume of recharge that is intercepted, but it was considered an important first step in the analysis of this indicator. The analysis can be refined with additional information, time and budget.

### 3.5.6 Assessment

As this is the first time an impervious surface assessment of the RDN had been performed, it is not possible to assess the changes with time. However, this first assessment reveals that many areas of the RDN are at or beyond the point where impermeable surfaces can have an impact on the surface and groundwater flow. Obviously as the level of development within the region increases the impervious surface area will also increase. Careful planning to ensure that recharge is maintained will be required.

Grade: \*

Trend: Getting Worse

Indicator: Impermeable Surface Area

Rationale: Because this is the first impervious area assessment of the RDN, detailed assessment of change or rate of change is not possible.

## 3.6 VOLUME OF WATER EXTRACTED

### 3.6.1 What does this indicator tell us?

The supply of groundwater is finite and groundwater extraction should be considered with a good understanding of the groundwater regime and the available recharge. The volume of water extracted is a measure of the amount of groundwater currently being removed from storage and flux of the groundwater within aquifers underlying the RDN via wells.

### 3.6.2 Why is this indicator important to our sustainability?

This indicator is important to our sustainability because groundwater is a fully allocated resource. As the level of development increases, the demand for water and water extraction rates will also increase, leading to a reduction in the volume of water stored in the aquifers. Decreasing volumes of groundwater in storage will eventually become unsustainable.

Humans extract groundwater through wells to provide water supply systems that distribute water to homes, offices and industries. Water used in these homes, offices and industries is typically discharged to the ocean via sewage treatment plants and is not returned to the aquifers. Agricultural businesses typically are not part of water distribution systems and extract water directly for their own use. When the volume of water extracted exceeds the volume of recharge, then the water levels in aquifers goes down. It is normal for water levels to decrease in the summer, when there is less precipitation to recharge the groundwater storage (aquifers), and increase in winter, when recharge via precipitation is higher.

### 3.6.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

Ideally, the amount of groundwater being extracted from storage within the aquifers should be less than the excess volume of water being contributed via recharge. In addition the amount of water extracted should not lead to a significant reduction in the amount of groundwater available for discharge to surface streams, which will negatively impact fisheries resources.

The RDN should undertake an initiative to require all water suppliers and purveyors to collect daily groundwater extraction data.

### 3.6.4 Where are we right now?

EBA used data supplied by several of the water systems listed in Section 3 to estimate the total volume of water extracted in the RDN (with the exception of electoral area B) on an annual basis. However, not all water systems cooperated in supplying data, so volume estimates must be considered as preliminary estimates only. Water extraction data are graphed in Appendix I. Data were received from both public and private utilities, including the following well locations:

- RDN wells at Nanoose. French Creek, San Pareil, Surfside, River's Edge, West Bay, Fairwinds, Pylades and Madrona;
- Epcor (formerly Breakwater);
- City of Parksville;
- Town of Qualicum Beach; and,
- North Cedar Improvement District.

#### 3.6.4.1 RDN Wells

The RDN operates 23 wells throughout the region. These wells are listed and discussed by name below:

- Fairwinds Wells:

EBA received water consumption data for Fairwinds #1 and #2 from 2002 and 2004 and for Fairwinds #3 from 2004; no 2003 data were included. The maximum monthly pumping volumes in Fairwinds #1 and #2 were approximately 11,500 – 12,000 m<sup>3</sup>. The maximum monthly demand of Fairwinds #3 was 5,100 m<sup>3</sup> in 2004. The total annual consumption (2004) was 81,820 m<sup>3</sup> in Fairwinds #1, 72,715 m<sup>3</sup> in Fairwinds #2 and 32,815 m<sup>3</sup> in Fairwinds #3. Annual demands in Fairwinds #1 and #2 have decreased slightly from 2002.

- Arbutus Park:

The RDN operates one well in the Arbutus Parks area. The data for this well, like the Fairwinds #1 and #2 wells, were for 2002 and 2004; no 2003 data were received. The maximum monthly extraction in 2004 was 5,080 m<sup>3</sup> recorded in August and annual extraction was 39,140 m<sup>3</sup>. Consumption decreased slightly between 2002 and 2004.

- Madrona #4:

The water consumption data for Madrona #4 received by EBA started in 2002, but contained large gaps. The total extraction from this well was 17,500 m<sup>3</sup> in 2004. The highest monthly extraction of 3,780 m<sup>3</sup> was recorded in January. The data record for the Madrona #4 well is not continuous enough to allow interpretation.

- Pylades:

The water consumption data records provided for the Pylades well were for 2002 and 2004 only and indicate that this well does not have a high annual or monthly extraction rate. The annual demand in 2004 was 903 m<sup>3</sup> and the highest monthly demand was 209 m<sup>3</sup> recorded in August. Total annual demand decreased slightly from 2002 to 2004.

- French Creek:

The RDN operates seven wells in the French Creek area. As shown in Appendix I1, the water extraction data records for these wells are incomplete, with data from 1998 and 2003 missing. The wells with the most complete data record include French Creek #2, #4 and #7. All wells, except French Creek #1 and #3 contained 2004 data. Water consumption was highest in French Creek #2, #5, #6 and #7 in July (totalling 5,560, 11,130, 10,180 and 6,290 m<sup>3</sup> respectively) and in French Creek #4 in June (6,160 m<sup>3</sup>). In total there were 212,865 m<sup>3</sup> extracted from five French Creek wells in 2004.

As presented in Appendix I1, the consumption graphs for French Creek #1, #2 and #7 show no trends in water consumption from 1996 to 2004. Water extraction from French Creek well #4 shows a decreasing trend with time, from 1996 to 2004. The water consumption from French Creek #5 and #6 show overall increases from 1996 to 2004.

- Nanoose:

Six RDN wells are located in Nanoose. The water consumption data records for these wells dated back to 2002 but excluded 2003. The data indicate that the highest monthly extraction occurred in July 2005, with Nanoose #1 supplying 16,355 m<sup>3</sup> and Nanoose #1 and #4 supplying 10,000 m<sup>3</sup> each. The highest monthly consumption from Nanoose #3 and #6 occurred in early 2004 and involved pumping approximately 2,200 m<sup>3</sup> of groundwater.

Nanoose #1, #2 and #4 indicated a higher level of water consumption occurred in 2004 than occurred in 2002. The data for Nanoose #3 showed water consumption from this well decreased over the same period. The water consumption data for Nanoose #5 and #6 were too incomplete to comment on.

- Surfside:

The RDN operates two wells at Surfside. Based on the two years of pumping data supplied to EBA (2002 and 2004) the wells are pumped alternate months, beginning with Surfside #2 in January 2002. The maximum volumes pumped from these wells were 1,859 m<sup>3</sup> from Surfside #1 in June 2004 and 2,167 m<sup>3</sup> from Surfside #2 in July.

The data also indicated that the volume of groundwater pumped from the wells did not vary greatly from 2002 to 2004. The water consumption data records for these two wells were too short to interpret.

- River Edge:

The RDN operates two wells in the River's Edge area. The water consumption data for the River's Edge wells covered the period from April to December 2004 and is too short for interpretation.

- San Pareil:

There are three wells in the San Pareil system. The water consumption data indicate there have been records kept for two years 2002 and 2004. The maximum monthly consumption in 2004 from the wells has been 8,380 m<sup>3</sup> in May (San Pareil #1), 3,815 m<sup>3</sup> in August (San Pareil #2) and 6,210 m<sup>3</sup> in July (San Pareil #3). The annual volumes pumped from these three wells in 2004 were 57,700 m<sup>3</sup>, 35,000 m<sup>3</sup> and 37,900 m<sup>3</sup>.

The three wells show different trends over the two years of water consumption. The annual demand in San Pareil #1 decreased slightly from 2002 to 2004, the demand in San Pareil #2 remained unchanged and the demand in San Pareil #3 increased slightly.

- West Bay:

Water consumption data was provided for one West Bay well (#3) for 2002 and 2004. The data indicated that over 23,040 m<sup>3</sup> of water was pumped in July 2004 and over 20,000 m<sup>3</sup> were pumped in both June and August. Total consumption for 2004 was 167,330 m<sup>3</sup>. The demand in 2002 was similar to that of 2004, indicating that no increase in water consumption occurred over the two years.

#### 3.6.4.2 Epcor Wells

Epcor operates 10 wells, mostly located in the Parksville / Qualicum Beach area of the region, as indicated on the map in Appendix F. These wells were formerly operated by Breakwater Enterprises and several of these wells have data records that extend back to early 1994 as shown in Appendix I2. There are also gaps in the water consumption data, however, given the number of pumping wells and the volume of data available, the Epcor well data remain the best indicators of groundwater consumption in this area of the region.

The data indicate that the monthly consumption of groundwater is highly variable, but tends to be the greatest during the summer months of July and August. The annual consumption data for the Epcor wells in 2004 was 655,930 m<sup>3</sup>.

As shown in Appendix I2, the water consumption data for the Epcor wells show considerable variation over the period of record. Decreasing water consumption trends are present in wells CR-1, CR-2, CR-3, CR-4, HC-9, SR-2, Bosa-1, R-1, D-1 and DRM. Wells with no apparent trends in water consumption include HC-6, HC-7, HC-9, HC-11 SR-1, IR-1 and L-1. However, the overall trend in the Epcor wells showed that annual consumption peaked in 2002, decreased roughly 30,000 m<sup>3</sup> in 2003 and increased slightly since that time.

### 3.6.4.3 City of Parksville

The City of Parksville provided water consumption data for three wells – Parksville well No. 1, Parksville Trill well and Parksville Rail well, for three years beginning in 2002. The data were consistent over the three years and contained no gaps (Appendix I3).

The water consumption data indicated that the months with maximum extraction in Parksville well No. 1 and Parksville Rail well tend to be during the winter (roughly 48,000 m<sup>3</sup>) likely due to operational demands. The corresponding pumping records for the Parksville Trill well showed water extraction was minimal during the winter and early spring.

Annual water usage in three Parksville wells in 2004 was 481,200 m<sup>3</sup> from Parksville well No. 1, 346,620 m<sup>3</sup> from Parksville Rail well and 137,990 m<sup>3</sup> from Parksville Trill well. The total groundwater extraction from the Parksville wells was 902,810 m<sup>3</sup> in 2004. This was a slight decrease from each of the preceding two years.

### 3.6.4.4 Town of Qualicum Beach

The Town of Qualicum Beach provided annual water consumption data for two wells (Berwick well and Riverwell well) from 1997 to 2005. The data were consistent over the nine years and contained no gaps (Appendix I4).

2004 annual water usage in the two Qualicum Beach wells was 901,710 m<sup>3</sup> from the Berwick well, and 855,990 m<sup>3</sup> from the Riverwell well. The Berwick well showed an increasing trend in groundwater extraction from 2001 to 2004, followed by a decrease in 2005. The large increase observed in the Berwick well in 2004 was compensated for by the observed decrease in groundwater extracted from Riverwell well; although, the overall total groundwater extracted in 2004 did increase slightly over the previous year. The Riverwell well showed a slight increasing trend between 1999 and 2002, followed by an overall decreasing trend from 2002 to 2005.

The total groundwater extraction from the Qualicum Beach wells was 1,757,700 m<sup>3</sup> in 2004. This was an overall increase from each of the preceding three years.

### 3.6.4.5 North Cedar Improvement District

The North Cedar Improvement District well, located south of Nanaimo, has one of the longest water consumption data sets submitted to EBA. The data set starts in 1993 and lists quarterly water consumption, rather than monthly usage. This makes interpretation of monthly pumping rates impossible; however, the July – September quarter generally shows the highest yearly consumption.

The annual water consumption in 2004 was 444,450 m<sup>3</sup>. As shown on the water consumption graph in Appendix I, the annual water consumption in the North Cedar Improvement District has increased steadily since 1999.

#### 3.6.4.6 Private Wells

Although numerous homes within the RDN utilise use groundwater via private wells, until recently it was not mandatory for drillers to create a well report when drilling new wells. The number and locations of private wells within the RDN and the volume of groundwater pumped from them is largely unknown.

#### 3.6.5 Are there any limitations for this indicator?

The limitations on the water extraction data are related to several factors. These include:

- Not knowing the large number of private wells and the extraction rates associated with them.
- The data are clustered mainly in one area and may not be representative of the rest of the RDN.
- The data records that do exist are frequently either short or contain gaps, both of which limit interpretation.
- Several of the large water suppliers including the District of Lantzville did not supply their water consumption data for this study.
- Water consumption data are not recorded by many small or private water suppliers.
- Not all water suppliers are known to the RDN; therefore not all extraction can be accounted for.
- The data records do not include agricultural withdrawals.

#### 3.6.6 Assessment

The water extraction data, presented on a series of graphs in Appendix I, can be used to estimate the consumption of groundwater in the RDN on an annual basis and to perform a preliminary analysis on increasing or decreasing trends (see Table 9). The volume of groundwater extracted, divided by the number of residents, can also be used to estimate water use per person, to assist in water use efficiency and to approximate future trends.

The water extraction data presented in Appendix I indicate that approximately 4.4 million m<sup>3</sup> of groundwater were used in the RDN in 2004. This number must be considered to underestimate use, as data were not received from the District of Lantzville or private water supply systems, apart from Epcor and North Cedar Improvement District. In addition extraction from private wells, while small, was not accounted in this estimate.

The water use graphs, also presented in Appendix I indicate that groundwater usage increased slightly in 2004 over 2003 and 2002. This small increase may be due to increasing development within the region, however, weather condition, especially during summer months, likely also impacted water use. A longer period of record is required for more detailed assessment.

TABLE 9 - SUMMARY OF TRENDS IN GROUNDWATER EXTRACTION RATES IN THE RDN			
Aquifer No.	Location	Wells with Groundwater Extraction Data	Recent Groundwater Consumption Trend
217	Qualicum	RDN wells Surfside #1 and #2 Town of Qualicum Beach Berwick Well Town of Qualicum Beach Riverwell Well	Insufficient Data Increased No Trend
216	Parksville	RDN wells French Creek #1 to #7 Epcor wells HC-6, HC-7, HC-9, HC-11, SR-1, IR-1, L-1 Epcor wells CR-1, CR-2, CR-3, CR-4, HC-9, SR-2, Bosa-1, R-1, D-1, DRM City of Parksville well field	Increased No Trend Decreased  Decreased
221	Parksville	RDN well San Pareil #1 RDN well San Pareil #2 RDN well San Pareil #3	Decreased No Trend Increased
n/a	Parksville/ Nanosee	RDN wells River's Edge #2 and #3	Insufficient Data
218 / 219	Nanosee	RDN wells Arbutus, Fairwinds #1 to #3 RDN well West Bay #3 RDN wells Nanosee #1 to #6 RDN well Madrona #4	Decreased No Trend Insufficient Data Insufficient Data
215	Lantzville	Lantzville wells #6, #9	Insufficient Data
162	Cedar	RDN well Pylades North Cedar Improvement District wells #1, #3, #6	Decreased Increased

Grade: *	Trend: Uncertain
Indicator: Volume of Water Extracted	
Rationale: Considering the uncertainty in the data, it is not possible to assess this parameter at present.	

### 3.7 STREAM TEMPERATURE

#### 3.7.1 What does this indicator tell us?

Stream temperature is an indicator of the health of the hydrologic cycle and an indirect measure of the overall health of the groundwater flow system. Since groundwater has a constant temperature of approximately 10°C, groundwater discharge moderates the annual



average temperature in stream water by increasing stream temperature in the winter and decreasing temperature in the summer.

### 3.7.2 Why is this indicator important to our sustainability?

This indicator is important to the RDN's sustainability because decreases in groundwater discharge to streams may indicate that there is less water available in storage, which may be caused by reduced infiltration or increased water extraction or a combination of both.

Groundwater discharging to surface water streams has the effect of moderating the stream temperature throughout the year, as groundwater typically does not exhibit seasonal temperature changes. This groundwater and surface water interconnection is critical during periods of low flow when groundwater is the main contributor to stream flow.

Water temperature, therefore, is a good general indicator of the impacts from land development and land use on groundwater and surface water interaction. Increases in stream temperature over time may indicate a reduction of the volume of groundwater discharge into local streams, which in turn reflects larger changes to the groundwater regime and implies that recharge may have been compromised over time.

According to Mellina, et al (2002), timber harvesting along riparian areas increases the stream's exposure to the sun, thereby increasing its maximum temperatures and influencing aquatic ecosystems, often negatively. The "degree to which stream temperatures respond to clear-cut harvesting also depends on factors such as the stream's discharge and streambed composition, stream depth, temperature of groundwater inputs, and the percentage of the riparian shade that is removed during logging" (ibid). Therefore, water temperature is a good global indicator of the impacts from land development and land use on groundwater and surface water interaction.

### 3.7.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

Ideally, the groundwater discharge into streams should remain relatively constant and thus, the moderating effect that groundwater discharge has on stream temperature would also remain unchanged. Constant stream temperatures, especially during the summer months are especially important for healthy fisheries.

Temperature data should be collected from the rivers and creeks discussed in this report on a monthly basis to establish long term trends in temperature fluctuations, should any exist. As this parameter is easy to monitor, every stream of the RDN should be monitored. Fish-bearing streams that require temperature monitoring, should be identified in consultation with the Department of Fisheries and Oceans and the Ministry of Environment.

#### 3.7.4 Where are we right now?

EBA compiled water temperature data for several rivers and streams throughout the RDN. These included the Big Qualicum River, French Creek, Nile Creek, Haslam Creek, Milestone Creek and Jump Creek. Data records for these creeks vary in periods covered.

Water temperature data have been collected at Jump Creek since the late 1960's and ended in the late 1990's, as shown in Appendix J. Stream temperatures showed seasonal fluctuations throughout the periods of record, but there does not appear to any increasing or decreasing trends in the temperature data recorded for Jump Creek.

Water temperatures for Haslam Creek were also recorded in the late 1950's, however, after six years of collection, data collection ceased until the early 1990's. Temperature data were again recorded for five years, before data collection ceased for a second time. The data that do exist, however, showed no increasing or decreasing temperature trends over the short periods that they were recorded.

The water temperature for Milestone Creek followed a similar pattern, as data were collected in the early 1960's for two years, then a hiatus appeared until the mid 1980's. Water temperature data were again collected for a period of twelve years, before data collection ceased in the late 1990's. No long term increases or decreases in water temperature are shown in the data collected for the Milestone Creek.

Data for the Big Qualicum River have been collected since 1997. Over the ten-year period of record, a slightly increasing trend in low temperatures is observed.

Water temperature data for Nile Creek were collected from 1958 to 1997, the longest period of record for any of the stream temperature data EBA was able to access. The stream temperatures have ranged from a high of 17.0° C in 1990 to a low of 5.6° C in 1974. However, the data revealed that the three highest annual temperatures (17, 16 and 15° C) were recorded after 1990. There is a slow but steady increase in the annual maximum temperature in Nile Creek, as shown in the data in Appendix J. The annual minimum temperature has ranged from 0.0° C in 1993 to 6.1° C in 1961. The minimum annual temperatures have shown a slow but steady decrease over the period of record. The implications of these two temperature trends is that less groundwater is available to discharge into Nile Creek and moderate both summer temperatures (by cooling) and winter temperatures (by warming).

The period of record for water temperatures in French Creek is 10 years, starting in 1996. The water temperature data show no increasing or decreasing trends in temperature over that period.

### 3.7.5 Are there any limitations for this indicator?

The limitations of the stream temperature data include incomplete data sets (i.e., sporadic measurements), or short periods of record, that do not give a clear picture of maximum and minimum temperature throughout the year. Gaps in the data record or data records that are short, do not allow clear interpretation of long-term trends. In particular, some of the data gaps occur in recent years. Since considerable development has occurred in the RDN during recent years, more recent data will be required to fully assess any potential impacts.

In addition, since stream temperature is also dependent on air temperature, large changes in air temperature will have a profound effect on water temperature and mask the input from groundwater discharge. Air temperature can be influenced by numerous factors, one of which is the presence or absence of streamside vegetation that shades the stream. In the RDN, many of the stations with water temperature data do not have corresponding air temperature data or surveys outlining the changes in streamside vegetation (if any) over time.

### 3.7.6 Assessment

The stream temperature data do not appear, on the whole, to indicate increasing or decreasing trends in water temperature, with the exception of Nile Creek.

Grade: \*\*\* Trend: Stable to Getting Worse

Indicator: Stream Temperature

Rationale: Annual maximum and minimum temperatures in Nile Creek show an increasing and decreasing trend respectively. These trends may be associated with a reduction in the volume of groundwater contributing to the creek. No streams show trends in stream temperatures.

## 3.8 SUMMARY

### Water Consumption Trends

- In 2003, per capita surface and groundwater consumption in the RDN was 471 L/day, which exceeded the provincial average of 425 L/day.
- From 2001 to 2004, water consumption increased by 1,737,742 m<sup>3</sup>, or eight percent. In comparison, the population has increased by an estimated 3.8 percent over the same period of time. This represents a change in daily water consumption per capita of 441 L/day in 2001, to a high of 471 L/day in 2003, decreasing to 459 L/day in 2004.

### Groundwater Elevation

- More information from monitoring and operating wells is required to build an understanding of the long-term behaviour of the aquifers due to the complexities of aquifer analysis.
- Small water systems do not monitor this parameter.
- The available information does not indicate large drops of water table over time except in the Parksville-Qualicum Beach area and in Cassidy. Drops were mostly noticeable in the late 1990s and early 2000s.
- In the Parksville-Qualicum Beach and Cassidy area, significant water table drops and decreasing trends were observed in the recent past. For the aquifers in the Parksville area, the drops represent a significant portion of the available water column.

### Groundwater Quality

- There is a significant lack of information on water quality, both for the parameters measured and the duration of monitoring.
- Small water systems generally only monitor coliforms.
- For the few wells where data are available, the groundwater quality parameters are within the applicable water quality standards.
- Increasing trends in electrical conductivity and chloride concentrations were observed in some wells, indicating a deterioration of water quality.

### Impermeable Surface Area

- Many sub-watersheds show impermeable areas covering more than 8 percent of their total area.
- No trends are yet defined.

### Volume of Water Extracted

- In 2004, an estimated 4.4 million m<sup>3</sup> of groundwater was used in the RDN (not including water from the District of Lantzville and some private water systems).
- Volume of water extracted increased in 2004, over 2002 and 2003, likely due to the increase in population.
- Small water systems do not monitor the volume of water they pump.
- Water conservation is promoted and locally implemented (e.g., RDN, Epcor, etc.). It is presently difficult to assess if/how groundwater use is curbed compared to population increase and to measure the effect of water conservation measures.

### Stream Temperature

- Very few streams have available data on water temperature.
- The stream temperature data do not appear, on the whole, to indicate increasing or decreasing trends in water temperature, with the exception of Nile Creek.
- The Nile Creek shows a decrease in winter temperature and an increase in summer temperature, indicating that the groundwater flow into Nile Creek has decreased over the past 10 years.

## 4.0 IMPORTANT ECOSYSTEMS AND ECOLOGICAL FEATURES ARE PROTECTED, HEALTHY AND PRODUCTIVE

### 4.1 INTRODUCTION

In a sustainable RDN important ecosystems and ecological features are protected, healthy and productive. For the purpose of this report, ecosystems are identified as areas within the Sensitive Ecosystem Inventory program, the marine coastline, streams and rivers, lakes, wetlands and other ecosystems that may be identified in local Official Community Plans. Ecological features include eagle and heron nest trees, perching trees and natural lands within regional and municipal 'nature parks'. The indicators used to measure this characteristic include:

- Water Quality in Selected Lakes and Rivers; and
- Amount of Land and Length of Watercourses Protected by Park or Development Permit Application Designation.

### 4.2 WATER QUALITY IN SELECTED LAKES AND RIVERS

#### 4.2.1 What does this indicator tell us?

The chemical condition of the water in streams and rivers is an indirect measure of their health and productivity, and can be used to help determine the specific cause of any biological change detected by biological monitoring of benthic invertebrates.

#### 4.2.2 Why is this indicator important to our sustainability?

Water quality is important to sustain aquatic ecosystems. Some water quality parameters reflect natural conditions of the watershed, others are useful in detecting harmful land use and other practices that may contribute to point and non-point pollution. Environmental stresses on streams and rivers, including those from various types of land uses, developments and industrial activities are sometimes manifested through chemical and other changes in the water. These can include changes in temperature, dissolved oxygen, pH, turbidity, total dissolved solids, total suspended solids, and conductivity; all important determinants of health and productivity of aquatic organisms. Changes can also include additions of harmful substances such as nutrients over a threshold level, heavy metals, and

toxicants such as pesticides and petroleum products. Any of the above changes or additions to water quality may cause a change in biological condition. For instance, high levels of nitrate can overstimulate the growth of aquatic plants and algae, resulting in high dissolved oxygen consumption causing death of fish and other aquatic organisms in a process called eutrophication.

Changes to water quality also indicate the effects of human activities. Heavy metals such as mercury, copper, lead, cadmium, and zinc may originate in industrial discharges, runoff from city streets, mining activities, leachate from landfills, and a variety of other sources. These toxic chemicals can cause death or reproductive failure in fish and other organisms. As well, they can accumulate in animal and fish tissue and be absorbed in sediments. Human health may also be affected through consumption of contaminated organisms. Awareness of the linkages between water quality and human activities is essential to prevent water contamination and protect water quality.

There are also economic consequences to poor water quality. Poor water quality in lakes and streams threatens the fishery and aquaculture industry, tourism, ecosystem and human health. The economic impacts occur in the downturn of the industries and costs to mitigate the contamination.

#### 4.2.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator. They include:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

A sustainability goal for water quality parameters is (a) comply with Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life, and (b) to ensure there is no harmful change in water quality conditions or substances that are not included in the CWQG. The CWQG protect freshwater organisms by establishing levels of some conditions and substances deemed acceptable for aquatic life. Measuring these conditions and substances is through standardized water quality testing. Benchmark water quality conditions should be determined for selected or index streams and rivers in the region, as a basis for gauging future change and harmful effects.

#### 4.2.4 Where are we right now?

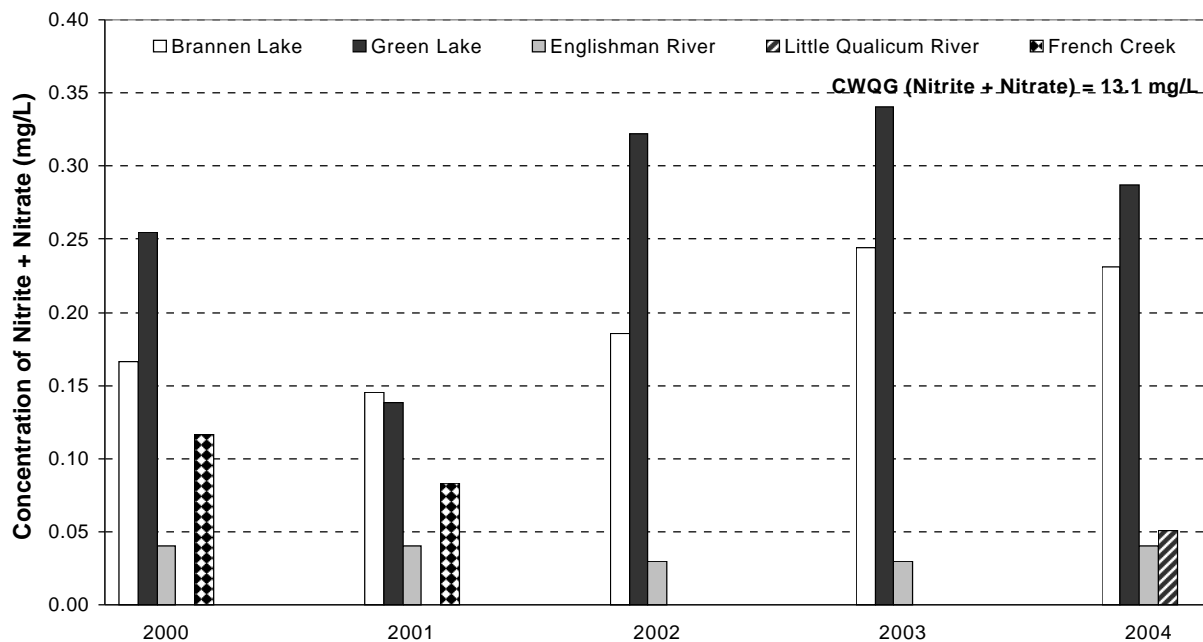
The Ministry of Environment is responsible for sampling water quality in the region's lakes and rivers. Below are the sampling programs that provided data for this section:

- French Creek’s sampling program ended in 2001;
- Brannen Lake and Green Lake are sampled at various depths, every three years;
- Water Quality Objectives (WQOs) are currently being developed for Englishman River and Little Qualicum River. This process involves monitoring every year for three years, developing the WQO in the fourth year, and then monitoring once every 3-5 years. Sampling at Little Qualicum River began in 2004, with thirteen samples collected over the course of the year. At Englishman River, one sample was taken during 2000 and one during 2001, with more frequent sampling occurring throughout 2002, 2003, and 2004. Samples are taken at five different locations on the Englishman River.

There are few reliable data on current water quality conditions for aquatic life in the region. Data suggest that nitrite and nitrate, zinc and lead concentrations in the region’s water are generally within the CWQG, whereas cadmium levels occasionally exceed the CWQG in selected lakes and rivers.

Nitrite and nitrate concentration levels, sampled during 2000 to 2004, were below the CWQG of 13.1 mg/L.

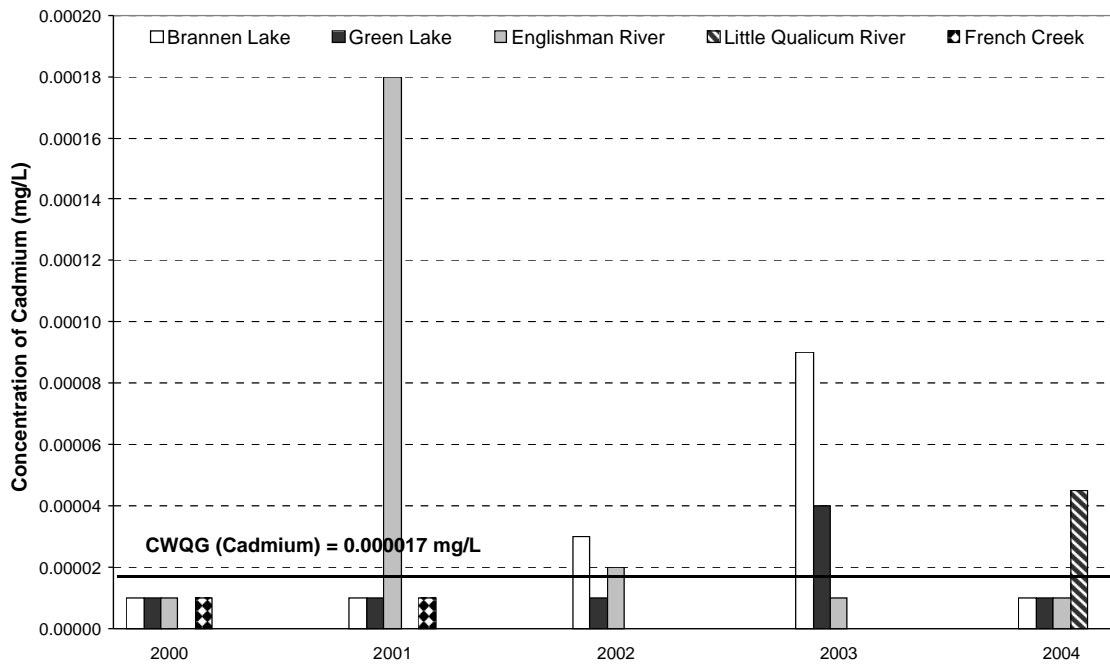
**FIGURE 9 - COMPARISON OF CONCENTRATION LEVELS OF NITRITE AND NITRATE (2000 – 2004)**



\*Note: CWQG refers to specific parameters within the Canadian Water Quality Guidelines for the Protection of Aquatic Life.  
Source: Ministry of Environment

Cadmium levels have exceeded the CWQG levels in Brannen Lake, Green Lake, Englishman River and Little Qualicum River.

**FIGURE 10 – COMPARISON OF CADMIUM CONCENTRATIONS (2000 – 2004)**

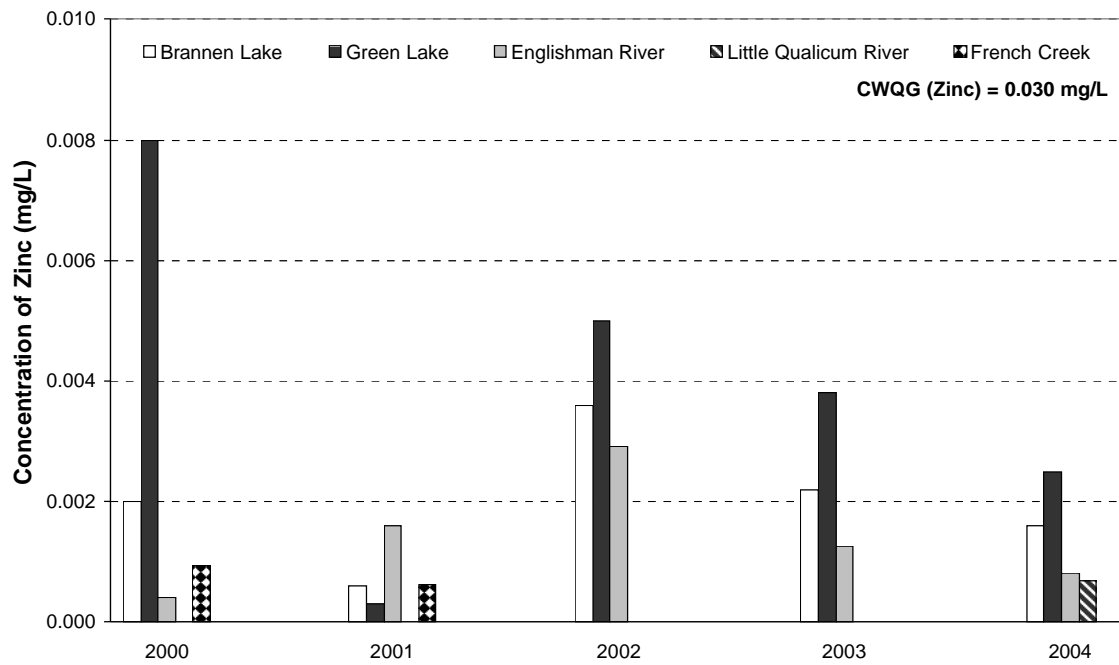


\* Note: CWQG refers to specific parameters within the Canadian Water Quality Guidelines for the Protection of Aquatic Life.  
Source: Ministry of Environment



Zinc levels at all monitoring locations were within the CWQG of 0.030 mg/L between 2000 and 2004.

**FIGURE 11 - COMPARISON OF ZINC CONCENTRATIONS (2000 – 2004)**

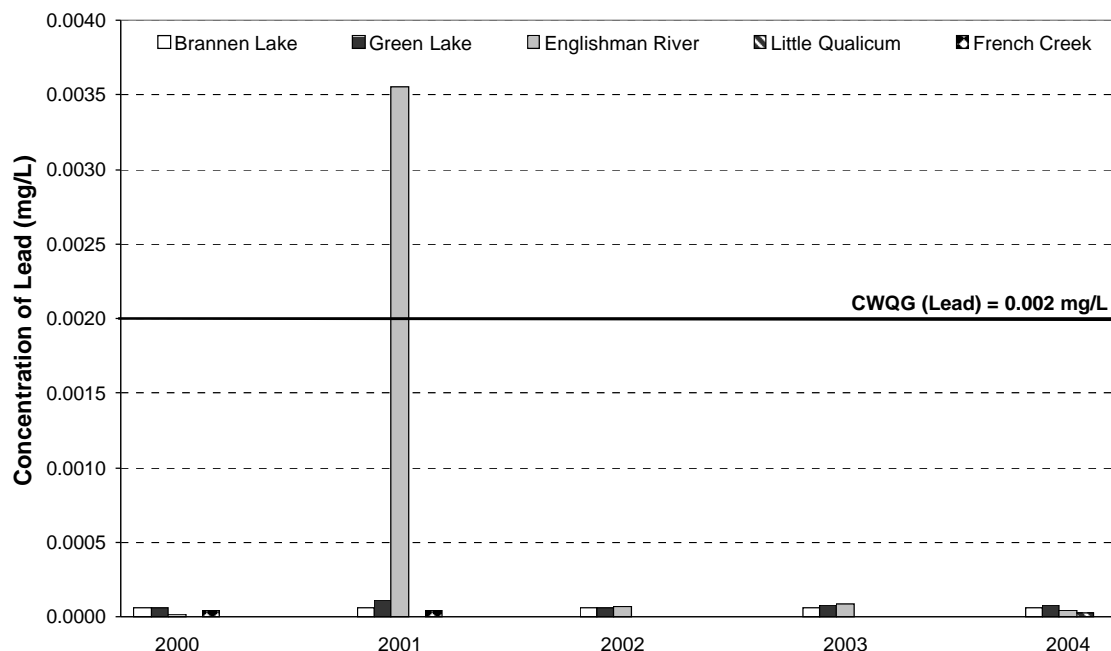


\* Note: CWQG refers to specific parameters within the Canadian Water Quality Guidelines for the Protection of Aquatic Life.

Source: Ministry of Environment

The sample taken in Englishman River in 2001 showed lead concentration greatly exceeded the CWQG<sup>16</sup>; the lead concentrations in the Englishman River have since declined to well within the CWQG levels.

FIGURE 12 – COMPARISON OF LEAD CONCENTRATIONS (2000 – 2004)



\* Note: CWQG refers to specific parameters within the Canadian Water Quality Guidelines for the Protection of Aquatic Life.  
Source: Ministry of Environment

#### 4.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Not all degradation to stream and river ecosystems are manifested through water quality.
- The sporadic and sparse nature of the 2000 to 2003 Ministry of Environment sampling and the uncertain sampling techniques employed make it difficult to draw definitive conclusions about water quality conditions for either the water bodies tested or the region in general.

<sup>16</sup> The CWQG for lead is hardness dependent and ranges from 0.001 mg/L of lead in soft water to 0.007 mg/L of lead in hard water. A default value of 0.002 mg/L lead was used for this indicator.

- Data are only available from the Ministry of Environment for Brannen Lake, Green Lake, French Creek, Little Qualicum River and Englishman River.
- Data for French Creek are only available for 2001, and for Little Qualicum River data are only available for 2000 and 2001.

#### 4.2.6 Assessment

Due to the sporadic and sparse nature of sampling events it is difficult to draw any solid conclusions about water quality in the region. A sampling program should be undertaken to collect consistent and frequent data in the RDN at selected waterbodies, identified in consultation with the Ministry of Environment.

It is recognized that this indicator is limited in its application and that eventually another indicator, such as Biodiversity in Aquatic Ecosystems (see Appendix E), should be used once resources and data become available.

Grade: *	Trend: Uncertain
Indicator: Water Quality in Selected Lakes and Rivers	
Rationale: Cadmium and lead levels did not comply with acceptable levels in some watercourses. Due to sporadic and sparse sampling it is not possible to determine the movement towards or away from sustainability.	

### 4.3 AMOUNT OF LAND AND LENGTH OF WATERCOURSES PROTECTED BY PARK OR DEVELOPMENT PERMIT AREA DESIGNATION

#### 4.3.1 What does this indicator tell us?

Cataloguing or tabulating the aerial or lineal extent of ecosystems<sup>17</sup> under park and development permit area (DPA) designation indicates the theoretical protected status of ecosystems and provides a means of measuring changes over time. For this indicator, watercourse lengths, areas of environmental DPAs, community and regional parks, provincial parks, nature trusts, wildlife management areas, and federal wildlife reserves, and number of eagle and heron nest trees are documented.

<sup>17</sup> Ecosystems are defined as "a functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow" (Ward et al, 1998).

Data for this indicator include community and regional parks within Electoral Areas A, C, E, F, G and H of the RDN<sup>18</sup>, City of Nanaimo, City of Parksville, Town of Qualicum Beach and District of Lantzville as well as provincial parks located in the region. However, data for this indicator do not include playfields or playgrounds, or any park located in Electoral Area B as it is not within the geographic focus of this report. Provincial park designations are determined by BC Parks.

Community and regional parks are created by a local government purchasing land, or by a property owner donating land to a local government, or as a Local Government Act (Section 941) required condition as a part of a subdivision development application process, or through a negotiated developer donation as a part of a rezoning development application process. Regional parks are created by a local government purchasing land, or by special agreements with a property owner, or through a negotiated developer donation as a part of rezoning development application process.

The Local Government Act empowers local governments to designate DPAs for five reasons, one of which is the protection of the natural environment, its ecosystems and biological diversity (Section 919.1 (1)(a)). DPA designation for protection of development from hazardous conditions (Section 919.1 (1)(b)) may also provide for some environmental protection.

Once an area is designated development permit area, the OCP must specify guidelines to address the land's special conditions. If a property owner inquires about developing the property, the local government planning staff generally recommend that the owner develop the portion of the property that is not within the DPA. If a property owner decided to apply for a development permit application, then local government planning staff would prepare a report for consideration by the appropriate decision making body (i.e., the council of a member municipality, the RDN Board for land in electoral areas A, C, E, F, G and H); this may also include public involvement. The report would include recommended conditions for the development based on the criteria contained in the OCP regarding the DPA, then the appropriate decision making body would make a decision about the application.

Development permit areas provide limited protection, not necessarily preservation, of environmentally sensitive land and watercourses. DPAs are limited as they do not specifically prohibit the development of land that contains environmentally sensitive areas, either by directing development to portions of the property not containing environmentally sensitive areas or by prohibiting development of the property entirely. Another limitation to DPAs is that their designation is based on available information. Limited funding for data collection on environmentally sensitive areas, usually by provincial and federal government sources, potentially limits the accuracy, extent and timeliness of data within a region. As well, DPAs are also subject to public support, either for or against DPA

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<sup>18</sup> Electoral Area B is not included in this report as the Regional Growth Strategy does not apply to it.

designation. As a result, some land and water that may otherwise warrant DPA designation might not be given DPA status.

For this report, development permit areas issued pursuant to Local Government Act Section 919.1 (1)(a) within the RDN (including member municipalities) were measured.

#### 4.3.2 Why is this indicator important to our sustainability?

A protected natural environment contributes to the environmental, economic, social and spiritual well being of the region. The natural environment contributes clean air and water for residents and ecosystems to thrive. In addition, a substantial amount of tourism activity in the region is dependent on the natural environment, and many residents enjoy outdoor recreation pursuits within the region.

Most local Official Community Plans (OCPs) state a public preference for the protection of ecosystems and ecological features, including watercourses, the marine coastline, Sensitive Ecosystems, eagle and heron nest and perch trees, and other natural areas.

The provincial government has enacted legislation, in coordination with the federal Department of Fisheries and Oceans, to protect riparian areas. The Riparian Areas Regulation “provide protection for the features, functions and conditions that are vital in the natural maintenance of stream health and productivity. These vital features, functions and streamside area conditions are numerous and varied and include such things as sources of large organic debris (fallen trees and tree roots), areas for stream channel migration, vegetative cover to help moderate water temperature, provision of food, nutrients and organic matter to the stream, stream bank stabilization and buffers for streams from excessive silt and surface runoff pollution (Ministry of Environment, 2006).”

Section 12 of the Fish Protection Act enables the Province to provide direction to local governments to protect riparian fish habitat by:

- Including riparian area protection provisions in zoning bylaws and permits, or
- Ensuring that its bylaws and permits under Part 26 of the Local Government Act provide a level of protection that is comparable to or exceeds that of the directive.

#### 4.3.3 Where do we want to go?

The RDN’s Regional Growth Strategy has several goals that support protection of the natural environment, including:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

The RDN (2005) also has several specific goals for the regional parks and trails:

- Represent key landscapes and ecosystems of the region;
- Encompass unique natural historic, cultural and archaeological features;
- Assist in protecting watersheds and important habitats as part of the RDN's broader land use planning mandate;
- Promote the enjoyment and appreciation of regional parks and trails in a manner that assures their qualities are unimpaired for generations to come;
- Provides education and interpretation of the region's natural features;
- Links components within the system as well as with other parks and trails in the region and adjacent regional districts;
- Provides opportunity to all RDN residents to access and enjoy regional parks and trails; and
- Assists the economy of the Regional District by attracting tourists and generating revenue, as appropriate, to support the parks and trails system.

In order to ensure continued environmental, economic and social benefits, a sustainability goal is to maintain all identified watercourses and riparian zones, the marine coastline, sensitive ecosystems, eagle and heron nest and perch trees, and nature parks in their natural condition and protect them from the negative impacts of residential, commercial and industrial property development and from other negative land use activities.

#### 4.3.4 Where are we right now?

The RDN and its member municipalities have strategically focussed on creating comprehensive and inclusive environmental protection measures, given the tools available such as DPAs. OCPs adopted in recent years contain significant regulation to protect riparian areas, water systems, sensitive ecosystems, aquifers, nesting trees, and others. OCPs with DPA designations for specific features are identified in the following text. In addition to DPAs, the RDN has secured ownership of several critical habitat areas through subdivision, rezoning, and outright purchase of property.

However, since data have only been collected and reported for one year, a trend cannot be established. Monitoring the data over successive years will provide a measure of changes.

#### 4.3.4.1 Watercourses

The Province's Riparian Areas Regulation (RAR) protects the features, functions, and conditions that support fish processes in riparian areas. Under the RAR, local governments cannot approve or allow any proposed development located within a Riparian Assessment Area to proceed until notification that an assessment report prepared by a Qualified Environmental Professional has been accepted by the Ministry of Environment. The QEP determines the required Streamside Protection and Enhancement Area (SPEA), which is usually between 15 to 30 metres, but may be less in some cases. Within the SPEA, land development and related activities are prohibited unless a special variation to the SPEA can be obtained. This requires approval from the Department of Fisheries and Oceans and the local government.

This legislation is primarily enforced through bylaw and is reinforced by DPA status within OCPs for all Electoral Areas, and for Nanaimo, Parksville Qualicum Beach and Lantzville. This means that ultimately, the RDN and municipalities will undertake primary responsibility for protection of watercourses as they play the dominant role in authorizing land use activities that may affect watercourses and their riparian zones.

Marshlands have DPA designation in Nanaimo, Qualicum Beach and Electoral Areas A and C.

#### 4.3.4.2 Marine Coastline

The marine coastline is nominally protected by Federal Government legislation (i.e., Fisheries Act and Habitat Protection regulations). These regulations prohibit the introduction of deleterious substances into waters containing fish, and generally regulate activities that are a risk to fish habitat. These, however, are mainly punitive measures and are not normally effective in preventing damage in the first place.

Prevention of environmental damage to the marine coastline is reinforced through DPA designations in Nanaimo, Parksville, Qualicum Beach, Lantzville and through bylaw (no. 500) setbacks in all Electoral Areas<sup>19</sup>.

#### 4.3.4.3 Protected Lands and Features

Some important and sensitive ecosystems and features have been designated nature parks, trusts and DPAs. Twenty one percent, or 45,075 hectares, of the RDN's land base are designated development permit areas; the majority of which are found in the electoral areas and District of Lantzville. Less than two percent of the RDN's land base is protected within municipal, regional or provincial parks, federal wildlife reserves and nature trusts. Also, 255 eagle trees are protected along with 33 heron nesting trees. Eagle and heron nest trees are protected under Section 34 of the BC Wildlife Act, which requires a 60 metre and

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<sup>19</sup> Electoral Area B is located inland. Electoral Area A does not have development permit areas along the marine coastline.

100 metre buffer zone respectively around nest trees; only Electoral Areas A, E, and H and Qualicum Beach have incorporated this protection into their OCPs.

Table 10 indicates the length of watercourses, area of environmental DPAs, nature parks, wildlife areas, and number of eagle and heron nest trees within the RDN.

TABLE 10 – MAXIMUM AMOUNT OF LAND AND WATERCOURSES POTENTIALLY PROTECTED IN THE RDN (2005)						
Type	RDN & Lantzville	Parksville	Qualicum Beach	Nanaimo	Total	Protected Land base (%)
Length of Watercourses <sup>20</sup> (km)	3,039	15	7	107	3,168	-
Environmental DPAs* (ha)	43,158	552	300	1,065	45,075	21.6
Community and Regional Nature Parks <sup>21</sup> (ha)	512	62	20	426	1,019	0.5
Parksville-Qualicum Beach Wildlife Management Area (ha)					1,024	0.5
Provincial Parks (ha)					1,736	0.8
Nature Trust (ha)					220	0.1
Federal Wildlife Reserve (ha)					56.5	0.03
Eagle Nest Trees Protected (#)					255	
Heron Nest Trees Protected (#)					33	

\* Note: Data may include some Sensitive Ecosystems; total area of the RDN (not including Electoral Area B) is 208,410 ha. Area of parks and watercourses do not include areas within Electoral Area B.

Source: RDN, BC Parks, City of Nanaimo, City of Parksville, Town of Qualicum Beach and District of Lantzville, BC Parks, RDN Regional Parks and Trails Plan.

Sensitive Ecosystems, as described by the Sensitive Ecosystem Program for Southern Vancouver Island, are included in DPA designations in Electoral Areas C and E, and in Nanaimo and Qualicum Beach although their total preservation is not always the outcome. Environmentally Sensitive DPAs are found in Electoral Areas D, G and H. Table 11 shows the extent of Sensitive Ecosystems in the RDN.

According to BC Parks, there are 12 provincial parks in the RDN (not including Electoral Area B). They include: Petroglyph (2 ha), Arbutus Grove (23 ha), Englishman River Falls

<sup>20</sup> Data do not differentiate between fresh watercourses and marine shoreline.

<sup>21</sup> Nature parks are defined as parks with natural areas, without active uses such as playing fields.



(97 ha), Hemer (93 ha), Horne Lake Caves (158 ha), Little Qualicum Falls (440 ha), MacMillan (157 ha), Morden Colliery (4 ha), Rath Trevor (347 ha), Roberts Memorial (14 ha), Spider Lake (65 ha) and Newcastle Island (336 ha).

In addition to the land and watercourses in the table above, there are other ecological reserves in the region that provide some level of protection for the environment. Ecological reserves include privately held protected areas and the Mount Arrowsmith Biosphere Reserve, amongst others.

TABLE 11 – SENSITIVE ECOSYSTEMS IN THE RDN (1998)

	CB (ha)	HT (ha)	OF (ha)	RI (ha)	SV (ha)	WD (ha)	WN (ha)	TOT (ha)	FS (ha)	SG (ha)	TOTAL (ha)
Nanaimo	17.7	20.8	20.8	109.7	3.8	44.5	250.1	480.9	66.6	516.9	1,050.9
Parksville	0.0	3.6	0.0	39.3	0.0	0.0	32.5	75.4	0.0	43.5	118.9
Qualicum Beach	0.0	0.0	16.4	21.5	0.0	0.0	1.4	40.5	0.0	6.5	45.8
Electoral Areas	26.0	421.6	1,426.0	1,976.0	45.1	37.5	1,272.8	5,190.5	890.2	7,189.4	13,264.8
Gabriola	8.0	3.8	0.0	0.0	0.4	4.4	28.9	45.5	43.1	218.2	306.8
Total	51.7	449.8	1,463.4	2,146.5	49.3	86.4	1,585.7	5,832.8	999.9	7,954.5	14,787.2

Key: CB Coastal Bluff

HT Herbaceous Terrestrial

RI Riparian

OF Older Forest

FS Seasonally Flooded Agric. Field

SG Older Second Growth Forest

WD Woodland

WN Wetland

SV Sparsely Vegetated

Source: Sensitive Ecosystems Inventory, East Vancouver Island and Gulf Islands - 1993-1997

#### 4.3.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Although the Provincial Riparian Areas Regulation has been given over to local governments to manage (as of March 31, 2006), not all local governments have yet enacted appropriate local bylaws.
- Tabulation of protective status represents theoretical protection only. It does not assume that enforcement of these various measures has always been applied, or that all areas under such status have been or are being preserved.
- Not all DPAs and park types provide environmental protection; for example, an area determined to be a nature park may be authorized for future development into an active park for use as a sports field.
- Data do not differentiate between the length of fresh watercourses and marine shoreline.
- It is unclear if the data include areas designated DPA under the Local Government Act (LGA) section 919.1 (a) for environmental protection alone or if it also includes areas designated DPA under LGA 919.1 (b) that protects development from hazards.

- Data have only been collected and reported for one year.

#### 4.3.6 Assessment

A substantial proportion, 23 percent, of the RDN's land base is designated DPA status, parks, federal wildlife reserves or nature trusts. Although it can be assumed that there have been some losses to important ecosystems and features over the years, there has been no systematic tabulation of the numbers and extent of these environmental assets that would quantify such changes. A reassessment of these data at intervals will provide some indication of gross changes to the region's environmental capital.

Grade: ?

Trend: Uncertain

Indicator: Amount of Land and Length of Watercourses Protected by Park or Development Permit Application Designation

Rationale: There are neither comparative data nor historic data to accurately assess the region.

#### 4.4 SUMMARY

##### Water Quality in Selected Lakes and Rivers

- Nitrite and nitrate concentration levels sampled between 2000 to 2004 were below the CWQG of 13.1 mg/L.
- Cadmium levels have exceeded the CWQG levels in Brannen Lake, Green Lake, Englishman River and Little Qualicum River.
- Zinc levels at all monitoring locations were within the CWQG of 0.030 mg/L between 2000 and 2004.
- The average concentration of lead in the water samples taken at the Englishman River during 2001 greatly exceeded the CWQG; the lead concentrations in the Englishman River have since declined to well within the CWQG levels.

##### Amount of Land and Length of Watercourses Protected by Park or Development Permit Application:

- Twenty one percent, or 45,075 hectares, of the RDN's land base is designated development permit area; the majority of which are found in the electoral areas and District of Lantzville.
- Less than two percent of the RDN's land base is protected as regional or provincial parks, federal wildlife reserve and nature trusts.
- 288 trees are protected as either eagle or heron nesting trees.

## 5.0 THE AIR IS CLEAN AND SAFE TO BREATHE

### 5.1 INTRODUCTION

Another characteristic of sustainability is that the air is clean and safe to breathe. Air is a basic requirement for most living organisms. The air we breathe may be affected by the presence of harmful gases, particles or biological agents – which, in high enough concentrations, can affect human health. According to the Provincial Health Officer (2003), air pollution is “the state of atmosphere where substances are present at concentrations that harm humans and other life forms.” A clean atmosphere may contain the same pollutants as a polluted atmosphere; however, the concentrations of the pollutants in the clean atmosphere may be so low they do not cause undesirable effects (Provincial Health Officer, 2003).

Air pollution is a serious problem that affects humans and ecosystems. According to the Provincial Health Officer (2003), “the World Health Organization estimate[s] that three million people die each year due to air pollution, and many others become ill from asthma, chronic bronchitis, circulatory disorders, and other conditions.” The results of poor health are increased emergency room and physician visits, increased hospitalization and medication, and lost work or school days.

In addition, air pollution affects ecosystems. Gas and fine particulate matter will chemically react with plants, soil and surface water when the air movement brings them in contact. This contamination then affects not only natural processes, but also potentially animals and humans that consume the produce and water.

Although some air pollutants are naturally occurring, pollution is also caused by human activities. In British Columbia (BC), the types of human activities that affect local air quality include industrial emissions, vehicle emissions and prescribed burning, among others. Air pollution may be emitted in one location, but impact another location due to wind, weather and topography. By understanding the sources of air pollution, the region may identify methods or policies to reduce pollution.

According to the BC Lung Association, the two air pollutants that pose the greatest risk to BC communities are ground level ozone and particulate matter.

### 5.2 GROUND LEVEL OZONE

#### 5.2.1 What does this indicator tell us?

This indicator identifies the amount of ground level ozone in the air. Ozone is a gas that occurs naturally in the stratosphere, where it has the important function of filtering out ultraviolet radiation. Ground level ozone is a secondary pollutant formed as a result of atmospheric reactions involving nitrogen oxides and reactive volatile organic compounds in the presence of sunlight; it is a colourless, odourless gas at ambient concentrations and is a major component of smog.

### 5.2.2 Why is this indicator important to our sustainability?

The concentration of ground level ozone in the air is a major indicator of the suitability of the air for public and ecosystem health and the agricultural industry, as well as an indicator of the impacts of vehicle emissions and other fossil fuel users.

Even at low concentrations, ground level ozone may be detrimental to human, wildlife and ecosystem health. Ozone exposure can contribute to asthma and reduced resistance to colds and other infections. Exposure to high levels of ground level ozone results in chest tightness, coughing, and sinus irritation. According to the Government of Ontario (2006), people with pre-existing respiratory and heart problems are particularly at risk. A sick population has social and economic consequences including worker absenteeism, reduced worker productivity, increased hospital admissions and medical care.

Motor vehicle emissions are a major contributor to ground level ozone (Government of British Columbia, 1998). According to Hancey (1999), nitrogen oxides, a major contributor to ground level ozone, are "primarily emitted by anthropogenic sources, most notably fossil fuel combustion, while natural sources are considered negligible." Ozone concentrations result from available sunlight and the patterns of motor vehicle emissions.

As well, high levels of ground level ozone typically occur from May to September. "The World Health Organization reported evidence that "average" day-to-day concentrations may provide a greater burden on public health than infrequent very high concentrations." (Provincial Health Officer, 2003). Therefore, all ground level ozone levels needs to be reduced.

Naturally occurring ground level ozone also contributes to monitored levels. Measurements of ground level ozone in remote areas unaffected by pollution show a naturally occurring range of 40 to 80  $\mu\text{g}/\text{m}^3$  or 20 to 40 parts per billion (ppb) (Environment Canada).

### 5.2.3 Where do we want to go?

Canada-Wide Standards (CWS) have been established for ground level ozone by Environment Canada (2002) that may be met by 2010. Ozone should not exceed 130  $\mu\text{g}/\text{m}^3$  (65 ppb) over an eight hour period. Achievement is based on the fourth highest annual measurement over three consecutive years.

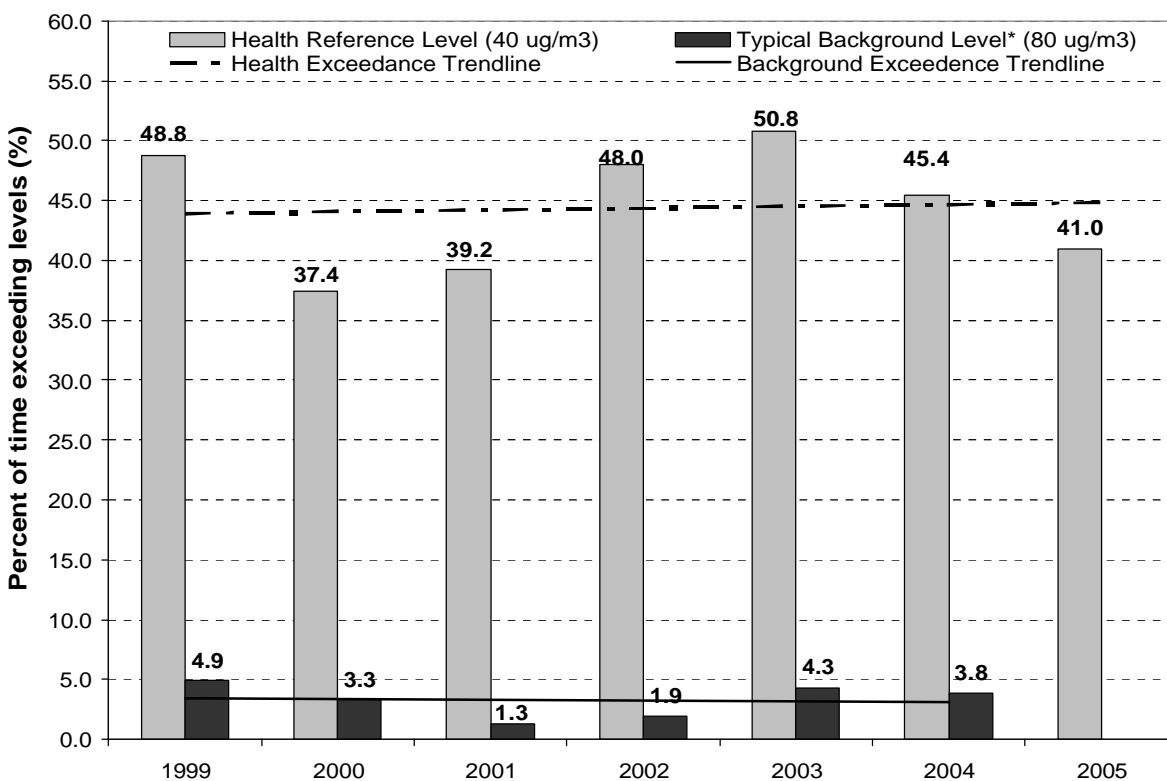
CWS may not be sufficient to achieve a level of air quality desired by the region, and in fact, conforming to the CWS could lead to a deterioration of air quality in the RDN since even low levels of ozone are considered unsafe. Another standard has also been determined based on the lowest ambient ozone concentration at which statistically significant increases in human health effects have been detected, known as the health reference levels. This level is 40  $\mu\text{g}/\text{m}^3$  (20 ppb) over one hour daily maximum. Therefore in a sustainable RDN, the ground level ozone levels should be lower than the Canada Wide Standard and the health reference level.

### 5.2.4 Where are we right now?

The Provincial Ministry of Environment operates an ozone monitoring site on Labieux Road in Nanaimo. There are 32 sites monitored in the province (Provincial Health Officer, 2003). Although the monitoring station within the City of Nanaimo may not accurately reflect the regional ground level ozone levels (particularly non-urban areas), it does provide a rough indication of ground level ozone levels for the region as a whole.

Ozone levels in the City of Nanaimo are exceeding both the health reference level and the typical background levels<sup>22</sup>. Since 1999, the health reference levels of 40 µg/m<sup>3</sup> (20 ppb) have been exceeded between 37 and 51 percent of the time. Whereas, over the same period of time, the ozone levels exceeding a typical level of 80 µg/m<sup>3</sup> (40ppb) or less have been exceeded between one and five percent of the time.

**FIGURE 13 - OZONE EXCEEDANCE OF HEALTH REFERENCE AND BACKGROUND LEVELS IN NANAIMO (1999 - 2004)**

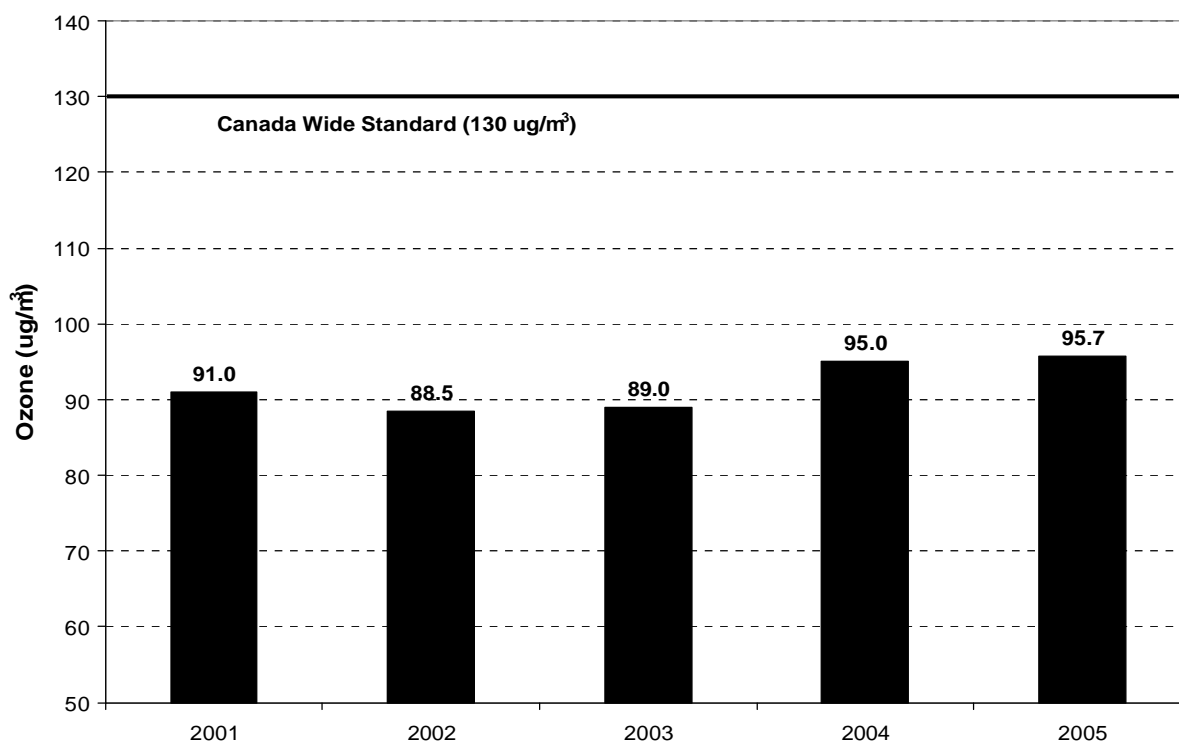


\*Note: There are no sources cited for determining the typical background levels.  
Source: BC Ministry of Water Land and Air Protection

<sup>22</sup> It is not clear how the 'typical background levels' were determined.

The ground level ozone levels in the RDN were well below the Canada Wide Standard of  $130 \mu\text{g}/\text{m}^3$  (65ppb) for all five years of data in Figure 14.

FIGURE 14 - CWS GROUND LEVEL OZONE LEVELS IN NANAIMO (2001 – 2004)



Source: BC Ministry of Water, Land and Air Protection

### 5.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator, including:

- Data do not differentiate between naturally occurring ground level ozone, and that which is generated by human activity.
- It is not possible to determine if the source of the contributing factors that create ground level ozone are from the region or are transported into the region from elsewhere.
- Data for this indicator are collected at one location in the region.

### 5.2.6 Assessment

Nanaimo's average ozone levels remain below the Canada Wide Standard, but are increasing over time. Research reveals that there is no safe level of ground level ozone, only a threshold level where the level of health issues increases significantly. Ozone levels exceeded the health reference level every year and consistently exceeded the typical background level of  $80 \mu\text{g}/\text{m}^3$  and the trend is increasing.

Grade: \*

Trend: Stable

Indicator: Ground Level Ozone

Rationale: Ground level ozone levels are relatively stable within the City of Nanaimo, and are well below the Canada Wide Standard.

## 5.3 FINE PARTICULATE MATTER (PM<sub>2.5</sub>)

### 5.3.1 What does this indicator tell us?

The level of fine particulate matter describes the amount of particulate matter that has a diameter of 2.5 micrometres (microns) or less, that is suspended in the air. This is known as PM<sub>2.5</sub>. Particulate matter is the general term used for a mixture of solid particles and liquid droplets found in air. The level of particulate matter is a measure of how clean the air is, which directly impacts public health.

Particulate matter can be emitted directly into the atmosphere, or it can be formed in the atmosphere. Particulate matter that is emitted directly into the atmosphere includes dust from roads, soot from fires (wildfires, wood stoves, agricultural burning, garbage incineration), vehicle emissions, and industrial activity. As well, fine particulate matter is formed by reactions between gases, including sulphur dioxide, nitrogen oxides, and some volatile organic compounds (Bauer, 2002). The chemical composition of particles depends on the location, time of year and weather.

### 5.3.2 Why is this indicator important to our sustainability?

Similar to ground level ozone, the concentration of PM<sub>2.5</sub> in the air is a major indicator of the suitability of the air to public and environmental health, as well as an indicator of the impacts of human activity.

The health risks associated with PM<sub>2.5</sub> are considerable. The fine particulate matters are capable of lodging deeply in the lungs, and depositing in the respiratory tract (Brauer, 2002). This may result in breathing disorders and premature death (Environmental Protection Agency, 2006). Potentially harmful substances have been found in PM<sub>2.5</sub> such as sulphates

and elemental carbon (which can pick up cancer causing substances like benzopyrene and transport it to the lungs), and toxic trace metals such as lead, cadmium, and nickel.

PM<sub>2.5</sub> can remain in the air for days or weeks and can cause several health related concerns. Acute episodes of PM<sub>2.5</sub> can last for several hours to several days, depending on atmospheric conditions or the presence of forest fires or other factors. According to the United States' Environmental Protection Agency (2006), PM<sub>2.5</sub> can cause aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia. Particularly at risk are children, seniors and people with heart and lung disease. "Given that scientists have not been able to determine a no-effects threshold, and that health risks are known to increase with exposure, even areas below the standard will require some degree of action to maintain or reduce PM<sub>2.5</sub> levels" Provincial Health Officer (2003).

### 5.3.3 Where do we want to go?

Canada-Wide Standards (CWS) have been established by Environment Canada (2002) for PM<sub>2.5</sub> to be met by 2010. PM<sub>2.5</sub> should not exceed 30 µg/m<sup>3</sup>, 24 hour averaging time period, with compliance measured based on 98<sup>th</sup> percentile of readings averaged over three consecutive years. However, since scientists have not been able to determine a no-effects threshold for PM<sub>2.5</sub>, CWS may not be sufficient to achieve the level of air quality desired by the region, and in fact, conforming to the CWS could lead to a deterioration of air quality in the RDN. Therefore, another standard has also been determined based on the lowest ambient PM<sub>2.5</sub> concentration at which statistically significant increases in human health effects have been detected, known as the health reference levels. This level is 15 µg/m<sup>3</sup>, 24 hour average (Environment Canada, 2002). However, scientists have not been able to determine a no effects threshold for particulate matter.

In a sustainable RDN, the PM<sub>2.5</sub> levels should be less than the Canada Wide Standard and health reference levels.

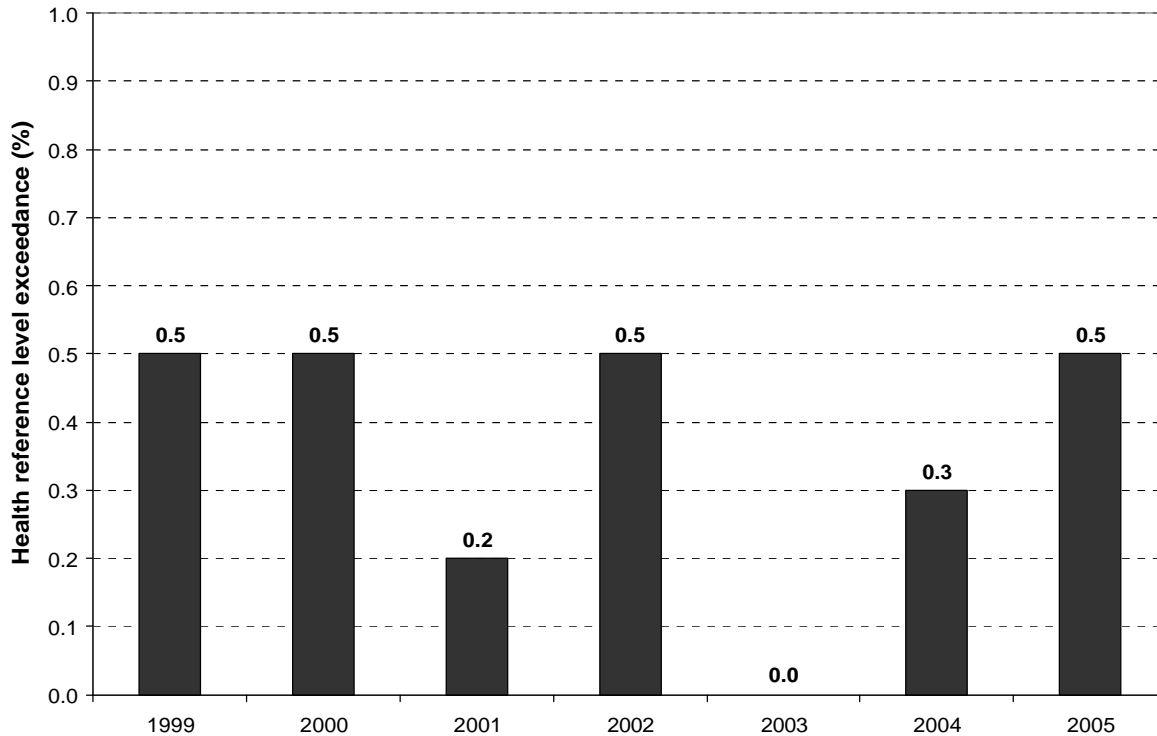
### 5.3.4 Where are we right now?

Fine particulate monitoring is conducted at the Provincial Ministry of Environment's property on Labieux Road in Nanaimo. This is one of 31 sites currently monitored in the province (Provincial Health Officer, 2003). Although the monitoring station within the City of Nanaimo may not reflect the regional PM<sub>2.5</sub> levels (particularly non-urban areas), it does provide a rough indicator for the region as a whole. Also, the single monitoring site is not sensitive to local or neighbourhood conditions which could be much different due to local sources of fine particulates.



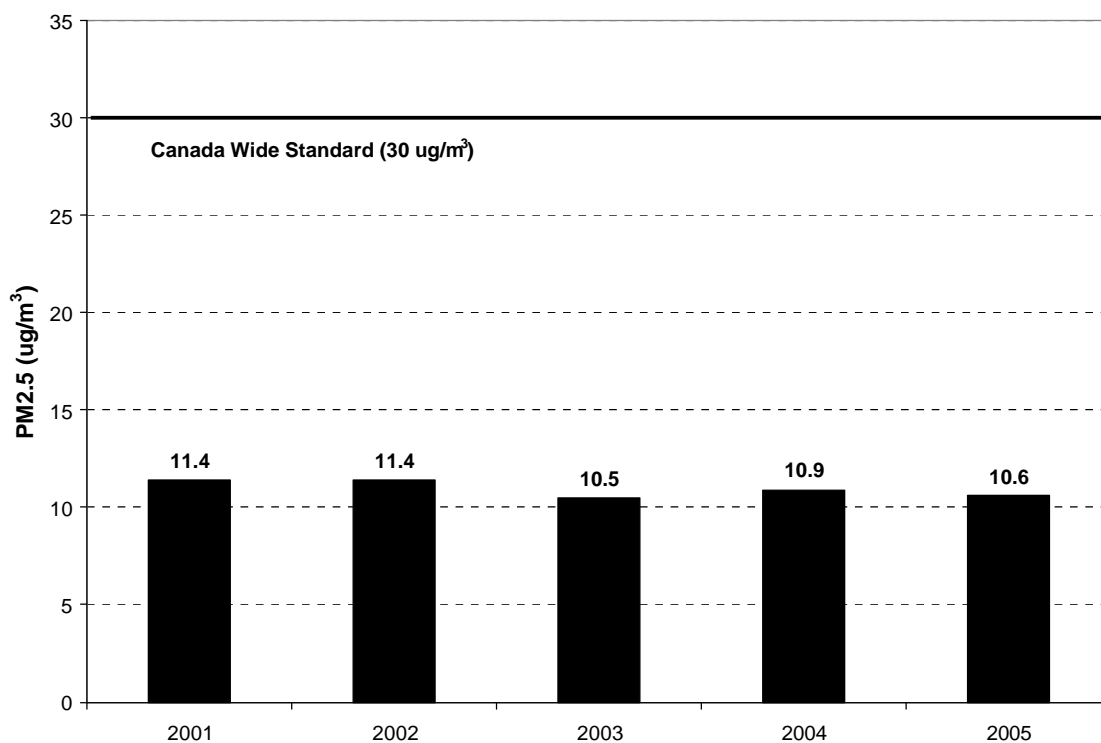
The Nanaimo monitoring station indicated that the PM<sub>2.5</sub> levels exceeded the health reference level 0.5 percent of the time or less.

**FIGURE 15 - PM<sub>2.5</sub> EXCEEDANCE OF HEALTH REFERENCE LEVELS IN NANAIMO (1999 - 2004)**



Source: BC Ministry of Water Land and Air Protection

Data from the Nanaimo monitoring site do not exceed the Canada Wide Standard for PM<sub>2.5</sub>. The PM<sub>2.5</sub> levels have generally been decreasing since 2001. The next figure identifies the average PM<sub>2.5</sub> levels since 2001. The highest recorded PM<sub>2.5</sub> levels, which have remained less than 20µg/m<sup>3</sup> since 2001, are less than the Canada Wide Standard and the health reference level.

FIGURE 16 - CWS DETERMINATION DAILY PM<sub>2.5</sub> LEVEL IN NANAIMO (2001 – 2005)

Note: Annual data are actually a three-year average of the 98<sup>th</sup> percentile data.

Source: BC Ministry of Water, Land and Air Protection

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### 5.3.5 Are there any limitations for this indicator?

There are several limitations for this indicator, including:

- It is not possible to determine the source of the fine particulate matter, whether from the region, or transported into the region from elsewhere.
- The data for this indicator are collected at one location in the region, at a monitoring station located on Labieux Road in Nanaimo (monitoring station ID E229797). Consequently, the data may be more reflective of activities in Nanaimo rather than the entire region.

### 5.3.6 Assessment

The amount of fine particulate matter is within the Canada Wide Standard but slightly exceeds the health reference levels. Although the data may not accurately reflect PM<sub>2.5</sub> in the region, it does provide indication of the general trend.

The Canada Wide Standard of 30 µg/m<sup>3</sup> is well above Nanaimo's average, which are historically less than 12 µg/m<sup>3</sup>. Since the Canada Wide Standard may not be sufficient to

achieve the level of air quality desired by the region, being within that standard is not necessarily sustainable.

The region should continue to monitor its levels of  $PM_{2.5}$ , and make efforts to reduce sources of  $PM_{2.5}$ .

Grade: ?

Trend: Uncertain

Indicator: Fine Particulate Matter ( $PM_{2.5}$ )

Rationale: The monitoring for this indicator is insufficient to determine the state of air quality in the region.

#### 5.4 SUMMARY

The air in the Regional District of Nanaimo is clean and safe to breathe according to the Canada Wide Standards; however, the air is not always clean and safe to breathe according to the established health reference levels.

##### Ground Level Ozone

- Since 1999, Nanaimo has exceeded the health reference level for ozone between 37 and 51 percent of the time, annually.
- There is a slightly increasing trend in the percent of time that ozone exceeds the health reference level.
- Ground level ozone levels have been less than  $95.0 \mu\text{g}/\text{m}^3$ , well under the Canada Wide Standard since 2001, but appear to be slightly increasing over time.

##### Fine Particulate Matter ( $PM_{2.5}$ )

- Since 1999, Nanaimo has exceeded the health reference level less than 0.5 percent of the time, annually. In 2003, Nanaimo did not exceed the health reference level at the Labieux Rd. monitoring site.
- The Canada Wide Standard for  $PM_{2.5}$  was not exceeded in Nanaimo between 2000 and 2005, and the 98<sup>th</sup> percentile has decreased slightly.

## 6.0 ALL NATURAL RESOURCES ARE CONSERVED, AND RENEWABLE RESOURCES ARE AVAILABLE IN PERPETUITY

### 6.1 INTRODUCTION

In a sustainable region, all natural resources are conserved, and renewable resources are available in perpetuity. The indicators that describe the region's progress towards this characteristic include:

- Current and projected age class distribution for Arrowsmith Timber Supply Area;
- Managed forest lands/ resource lands and open space subdivisions;
- Amount of Agricultural Land Reserve (ALR);
- Sustainable farming practices;
- Proportion of farmland in crops; and
- Number of farms reporting sale of organic crops.

The indicators describe the type and amount of natural and renewable resources in the region including forest and agriculture. As well, these indicators provide information on the quality of the forests, efforts to build soil health naturally instead of relying on potentially environmentally harmful chemical products, and the ability of the region to meet demands for forest and agricultural products.

### 6.2 MANAGED FOREST LANDS/ RESOURCE LANDS AND OPEN SPACE SUBDIVISIONS

#### 6.2.1 What does this indicator tell us?

This indicator describes the amount of managed forest lands/ resource lands and open space subdivisions within the RDN. A managed forest is defined as land that is "at least 25 hectares and will be managed as a single unit. The property may consist of more than one parcel provided the parcels are contiguous (Private Managed Forest Land Council, 2006). If the land measures 50 hectares or less, at least 70 percent of the land must be productive. If the land measures more than 50 hectares, at least 50 percent of the land must be productive during the year ending on October 31. Owners of managed forests must commit to good forest practices and comply with the legislated requirements of the Private Managed Forest Land Act" (BC Assessment). This Act applies to private managed forestland other than land within a tree farm licence, a woodlot licence, or community forest agreement areas.

Resource Lands and Open Space (RLOS) Subdivisions refer to that land designated as RLOS in the Regional District of Nanaimo's Regional Growth Strategy Bylaw No. 1309 (2003); according to the Growth Strategy, RLOS includes:

- Land that has a primary value for resource uses such as agriculture, forestry, aggregate and other resource development, and
- Land that has been designated for long-term open space uses.

This designation includes:

- All land that is in the Agriculture Land Reserve;
- All Crown land;
- Land designated for resource management or resource use purposes in official community plans;
- Recognized ecologically sensitive conservation areas;
- Provincial parks;
- Regional parks;
- Large community and regional parks;
- Cemeteries;
- Existing public facilities outside of areas planned for nodal development; and
- Golf courses.

### 6.2.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability as it measures the amount of land available for production, such as agriculture, forestry and other resource uses, as well as land available for public recreation and environmental preservation. This land directly supports the region's economic potential to produce goods, employ residents, support recreation opportunities and provide environmental stability.

Preservation and increase of forestland areas provide environmental stability since large land tracts represent areas that offer habitat for plants and wildlife, and stability of watercourses. The introduction of Sustainable Forest Management Plans and Sustainable Forest Management Certification, along with public education to raise awareness of sustainable forest management may help stabilize and/or increase the area of managed forestlands.

### 6.2.3 Where do we want to go?

The RDN's Regional Growth Strategy goals that apply to this indicator include:

Goal 1: Strong Urban Containment - to limit sprawl and focus development within well defined urban containment boundaries.

Goal 3: Rural Integrity - to protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection - to protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy - to support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

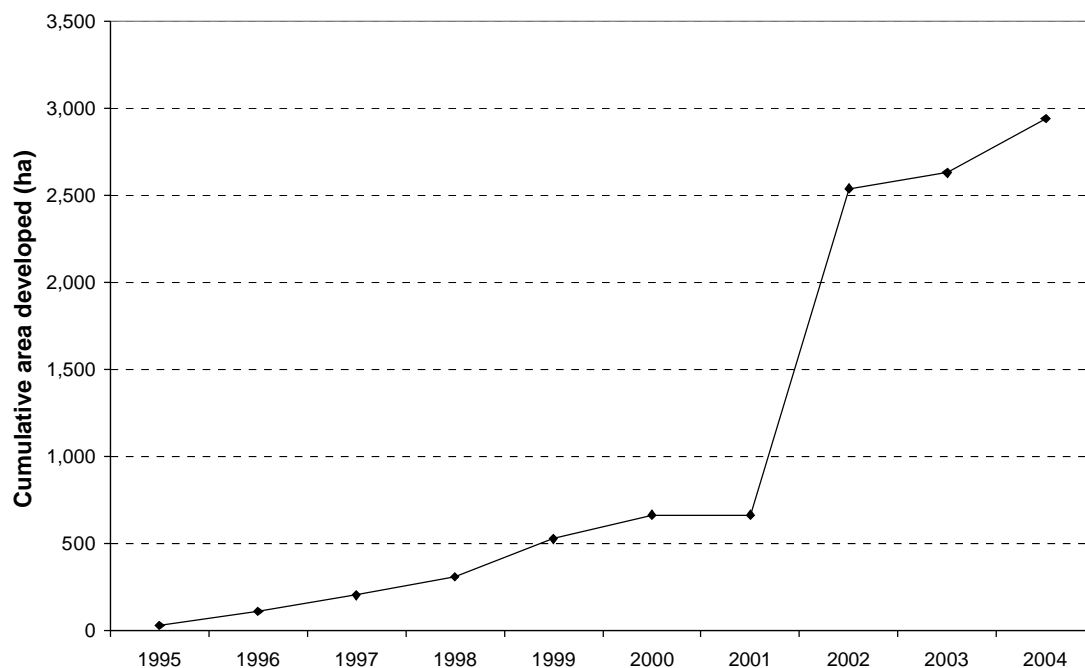
As such, a sustainable region will maintain or increase managed forest/ resource lands and open space subdivisions.

6.2.4 Where are we right now?

As of 2005, the majority of the RDN's land base is designated managed forests. There are 152,902 hectares of managed forest, or 73 percent of the RDN's 208,410 hectare land base. Nearly all of the managed forestland is in the RDN's designated RLOS.

A total of 2,942 hectares of RLOS have been developed from 1994 to 2005, representing over 1.4 percent of the RDN's overall land base. The development trend is illustrated in Figure 17. The amount of land developed per year has fluctuated between 0 hectares in 2001 and 1,876 hectares in 2002; without either extreme, the average area developed per year is 133 hectares. There is no information available to account for the two extremes of no development in 2001 and much development in 2002.

FIGURE 17 - CUMULATIVE AREA OF RESOURCE LANDS AND OPEN SPACE DEVELOPED PER YEAR (1995 - 2004)



Source: RDN and Ministry of Community Services

### 6.2.5 Are there any limitations for this indicator?

The limitations for this indicator include:

- Data do not differentiate between managed forests and resource lands and open space.
- Data do not describe the type of development that occurred, and the pre-development type of land it occurred on (forest, agriculture, parks, etc).
- It is not clear if developed RLOS land is still considered RLOS land.
- It is unclear if the managed forest includes the Arrowsmith TSA forest, and if the managed forest area is also within the ALR. This may be resolved by providing a breakdown of land designations in the RDN. For example, list the area of land designated managed forest, TSA forest, ALR, within urban containment boundaries, waterbodies (freshwater), etc.

### 6.2.6 Assessment

The majority of the region's land base is designated managed forestland, which is primarily within the designated Resource Land and Open Space area. Over the past 10 years, more than 1.4 percent of the RDN's land base has been developed within the RLOS designated areas. Since there are no provincial or regional comparisons, it is not possible to accurately assess the current state of sustainability; however, in a sustainable region, the RLOS land would be maintained. Therefore, the region is moving away from sustainability.

In 2006, the RDN adopted an amendment to its zoning bylaws that increased the minimum permitted parcel size for forest land in the RGS RLOS land use designation to 50 hectares, and this is anticipated to result in a significant reduction in the amount of subdivision activity taking place on lands within resource values.

Grade: ?

Trend: Getting Worse

Indicator: Managed Forest Lands/ Resource Lands and Open Space Subdivisions

Rationale: The region's managed forests/ Resource Lands and Open Spaces are being developed over time.

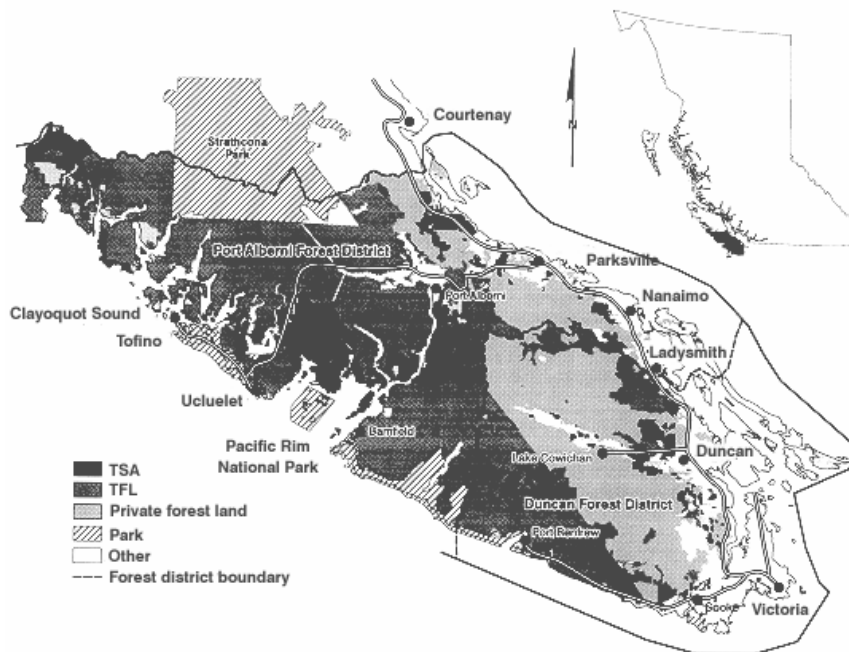
## 6.3 CURRENT AND PROJECTED AGE CLASS DISTRIBUTION FOR ARROWSMITH TIMBER SUPPLY AREA

### 6.3.1 What does this indicator tell us?

This indicator describes the current and projected age class distribution for the Arrowsmith Timber Supply Area (TSA). The Arrowsmith TSA is composed of the South Island Forest District, previously the Duncan and Port Alberni Forest Districts. Only a small portion,

approximately 13 percent, is located in the RDN. Quite fragmented, it consists of 168,000 hectares distributed amongst private land, tree farm licences (TFL), parks and other areas.

FIGURE 18 – ARROWSMITH TIMBER SUPPLY AREA



Source: Ministry of Forests and Range

The total Crown forested land base within the Arrowsmith TSA analysis area is approximately 127,000 hectares. Of this, 60,097 hectares (46 percent) is the “timber harvesting land base”, defined as Crown forestland where timber harvesting is considered both acceptable and economically feasible, given the objectives for timber quality, market values, and applicable technology. The forested non-timber harvesting land base (54 percent) includes land set aside for parks, protection of wildlife habitat, utility and transportation corridors, and residential and industrial development. Of the TSA area within the RDN, 73 percent is designated for timber harvesting and 27 percent is forested non-timber harvesting land base.

Ministry of Forests and Range is able to interpret current age class distribution by regional district by cross-referencing maps.



### 6.3.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability as it compares the current and projected age class distribution of trees in the timber harvesting land base and forested non-timber harvesting land base, for the whole TSA. This age class distribution can then be compared to the current age class distribution in the RDN.

Age class distribution affects the forest industry (and thereby employment) and biodiversity. According to the Ministry of Forests (1997), "an imbalance in age class distribution can lead directly to a timber supply shortfall. In a regulated forest each age class group or cohort, occupying the same number of hectares of land, contributes to the harvest in its turn as it becomes mature. In this scenario the harvest level remains constant over time. In a constrained timber supply situation, and if one age class group has significantly less area and therefore less volume at maturity, a fall down in harvest level will be necessitated until the next cohort becomes mature." A decrease in harvestable timber will affect the forest industry and local employment.

As well, the forest age class for both the timber harvesting land base and forested non-timber harvesting land base has a direct impact on the biodiversity of the region. BC's Forest Practices Code Biodiversity Handbook recommends "minimum values for the amount of mature and old forest to be maintained in a landscape unit under the high, intermediate and low biodiversity emphasis options." That is, the proportion of age distribution directly affects the amount of biodiversity.

### 6.3.3 Where do we want to go?

The RDN's Regional Growth Strategy has three goals that impact this indicator. They include:

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Therefore, a sustainable region will have a balanced age class distribution to protect the forest industry, employment and biodiversity and support the region's timber needs.

### 6.3.4 Where are we right now?

The Arrowsmith TSA within the RDN has an uneven age class distribution for both the timber and the forested non-timber harvesting land bases. Within the RDN, 93 percent of trees are less than 120 years old. Table 12 identifies the current and projected age class distribution, per land base type.

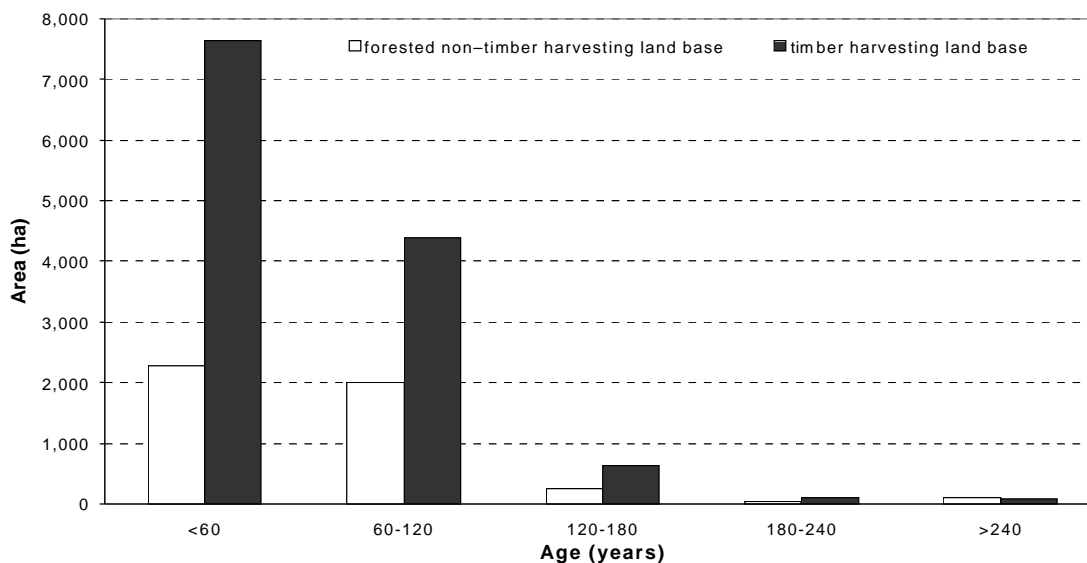
**TABLE 12 – CURRENT AND PROJECTED<sup>23</sup> AGE CLASS DISTRIBUTION, PER LAND BASE TYPE**

Area	Year	Land Base	Age Class				
			<60	60-120	120-180	180-240	>240
Arrowsmith TSA within the RDN	2000	forested non-timber harvesting	13.0%	11.4%	1.5%	0.2%	0.5%
		timber harvesting	43.6%	25.1%	3.6%	0.5%	0.5%
Entire Arrowsmith TSA	2000	forested non-timber harvesting	9.5%	3.0%	0.8%	8.9%	31.1%
		timber harvesting	28.9%	3.9%	0.5%	4.6%	8.9%
	2100	forested non-timber harvesting	7.3%	6.0%	7.3%	1.3%	31.7%
		timber harvesting	26.3%	13.7%	4.4%	0.8%	1.1%
	2200	forested non-timber harvesting	7.3%	5.5%	5.6%	8.2%	27.1%
		timber harvesting	31.5%	3.8%	5.0%	3.4%	2.3%

Source: Ministry of Forests and Range

Figure 19 illustrates the current age class distribution of the TSA within the RDN, per land base type. More area is allocated to the timber harvesting land base and, of the two land bases, both have an unequal age class distribution, with the majority of trees aged 120 years or less.

**FIGURE 19 - AGE CLASS DISTRIBUTION OF TREES IN THE ARROWSMITH TSA IN THE RDN (2000)**

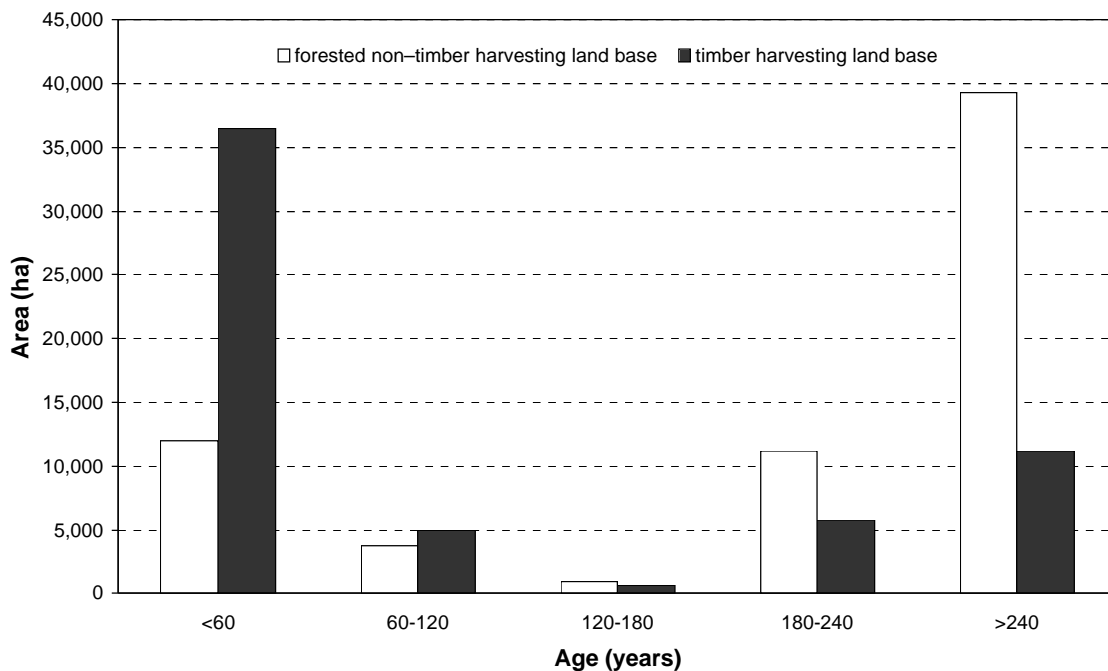


Source: Ministry of Forests and Range

<sup>23</sup> The Ministry of Forests is unable to project the age class distribution of the TSA in the RDN because projections are not spatially made.

The Arrowsmith TSA (as a whole) has a markedly different age class distribution than the TSA within the RDN. This is illustrated in Figure 20, which describes the age class distribution per land base type. The figure shows that 38 percent of trees are less than 60 years old and 40 percent of trees are greater than 240 years old, with a much smaller proportion of trees between the age of 60 and 240 years.

**FIGURE 20 – AGE CLASS DISTRIBUTION OF TREES IN THE ENTIRE ARROWSMITH TSA (2000)**

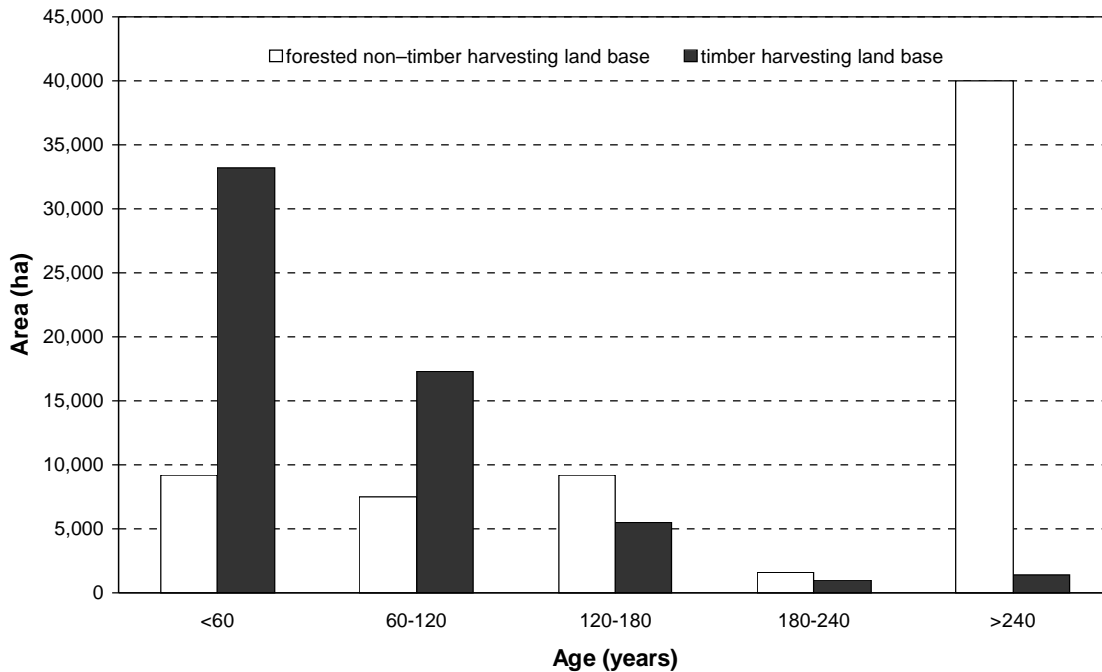


Source: Ministry of Forests and Range

The Ministry of Forests and Range also projects the various age class distributions for the next 100 and 200 years; however, data are only available for the entire Arrowsmith TSA, and are not representative of the TSA within the RDN.

In 2100, the projected age class distribution within the entire Arrowsmith TSA is expected to become slightly more balanced with increased distribution within the age class of 60 to 180 years, as shown in Figure 21. The figure illustrates that over time, the timber harvesting land base’s trees aged 180 and older will be reduced. Likewise, the forested non-timber harvesting land base will have less trees between 180 and 240 years old, with the vast majority of trees aged 240 years or older.

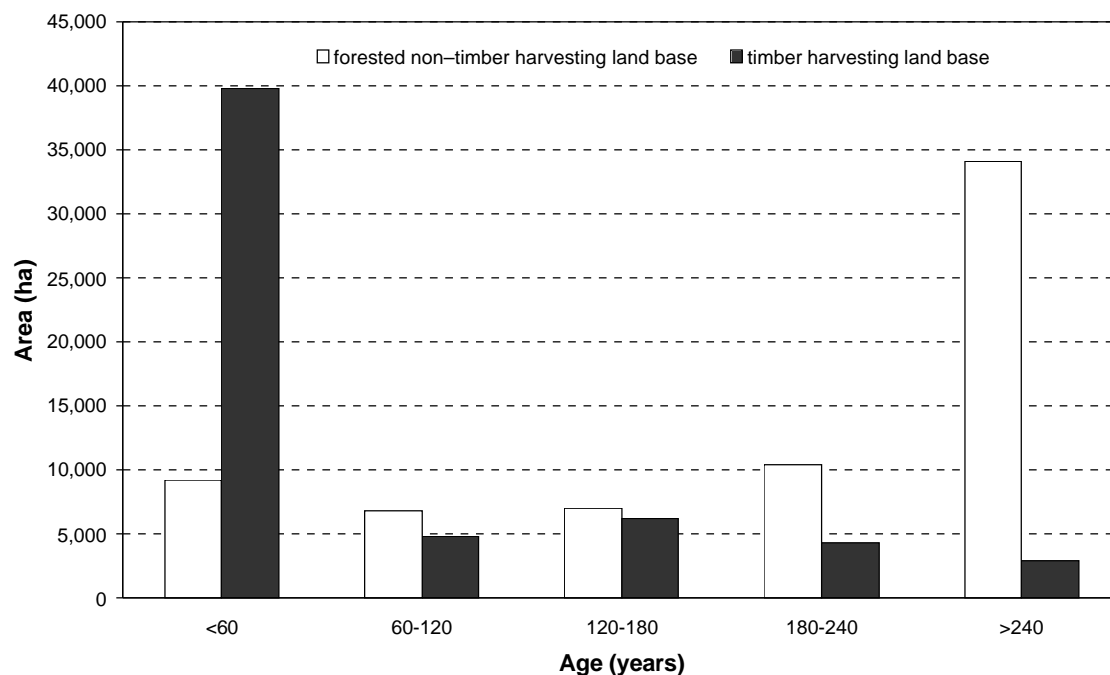
**FIGURE 21 – 100 YEAR PROJECTION OF ARROWSMITH TSA AGE CLASS DISTRIBUTION (2100)**



Source: Ministry of Forests and Range

In 2200, the age class distribution is expected to return to its current (2000) age class distribution with the majority of trees being less than 60 years old and greater than 240 years old. However, there is a slight increase and more equitable distribution of trees between 60 and 240 years old. The majority of the timber harvesting land base will be less than 60 years old. The forested non-timber harvesting land base will have a slightly more equitable age class distribution, with the majority of trees over 240 years old.

FIGURE 22 – 200 YEAR PROJECTION OF ARROWSMITH TSA AGE CLASS DISTRIBUTION (2200)



Source: Ministry of Forests and Range

The general trend is that old growth forests (greater than 240 years old) in the entire Arrowsmith TSA, currently represents less than half (40 percent) of the total land base, in both the timber harvesting and forested non-timber harvesting land base. It is projected that old growth forest will represent 33 percent of the total land base in 100 years and 29 percent in 200 years. Old growth will be nearly eliminated from the TSA's harvesting land base in the next 100 years; it is already virtually eliminated from the TSA within the RDN.

### 6.3.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The Ministry of Forests and Range was unable to provide projected age class distributions for the TSA within the RDN because the projections were not made spatially.
- The examination of changing age distributions is only looking at a small part of the total forest in the RDN; that is, the portion of trees within the Arrowsmith TSA versus the managed forest lands. Most of the forest within the RDN is on private land.

- The data refer only to timber and not other forest values, such as fish, wildlife, recreation, viewscapes, etc.
- It is unclear if the managed forest includes the TSA forest, and if the managed forest area is also within the ALR. This may be resolved by providing a breakdown of land designations in the RDN. For example, list the area of land designated managed forest, TSA forest, ALR, within urban containment boundaries, waterbodies (freshwater), etc.

### 6.3.6 Assessment

The portion of the Arrowsmith TSA within the RDN has an unbalanced age class distribution, with a noticeable lack of trees over the age of 120 years old, in both the timber and forested non-timber harvesting land bases, and there are no projections available for this area. However, it is expected that over time the forested non-timber harvesting land base's trees will age, while more trees on the timber harvesting land base will continue to be harvested. It is not clear from these data how the current and projected age class distributions has affected, or will affect, the region's biodiversity. As well, there are no historical data to indicate whether the region is moving towards or away from sustainability.

In comparison, the entire Arrowsmith TSA has a small distribution of trees aged 60 to 240, contrasted by a large percentage of area with trees less than 60 years in the timber-harvesting land base and a large percentage of area with trees older than 240 years in the forested non-timber harvesting land base. It is projected that in the next 100 and 200 years, that the age class distribution will fluctuate slightly, then return to a similar distribution pattern to the current age class distribution. From the current and projected data for the entire Arrowsmith RDN, the older trees in the timber harvesting land bases are continuously harvested, with a majority of trees younger than 60 years. The opposite is true for the forested non-timber harvesting land base. The majority of area within the forested non-timber harvesting land base has trees older than 240 years. However in 2200, the area with trees younger than 240 years and area with trees older than 240 years will approximately equal.

Grade: \*

Trend: Stable

Indicator: Current and Projected Age Class Distribution for Arrowsmith Timber Supply Area

Rationale: The age class distribution in the Arrowsmith TSA is unbalanced currently and will remain unbalanced as per projections.

## 6.4 AMOUNT OF AGRICULTURAL LAND RESERVE (ALR)

### 6.4.1 What does this indicator tell us?

The amount of Agricultural Land Reserve (ALR) identifies the amount of land with potential for agricultural production. The ALR is a provincial zone in which agriculture is recognized as the priority use. According to the Provincial Agricultural Land Commission (2002) farming is encouraged and non-agricultural uses are controlled. It includes private and public lands that may be farmed, forested or vacant land. "Agricultural activities are undertaken upon agricultural land to produce agricultural products. Although agricultural land is primarily required for the production of food for human and animal consumption, agricultural activities also include the growing of plants for fibre and fuels (including wood), and for other organically derived products (pharmaceuticals, etc)" (Provincial Agricultural Land Commission, 2002).

### 6.4.2 Why is this indicator important to our sustainability?

The amount of agricultural land reserve is important to the region's sustainability as locally grown or raised agricultural products support a local food supply and potentially decrease the demand for imported food products. Agriculture directly and indirectly benefits the region as it provides employment, produces food for human and animal consumption, maintains relatively undeveloped land, and provides spin-off employment in the transportation, wholesale, retail and tourism (e.g., wineries) sectors.

Depending on the type of agriculture, it may also promote tourism. For instance, wineries are an increasingly tourism-oriented industry.

Agricultural land that is primarily undeveloped also benefits local ecosystems, when properly maintained. Crop growth assists the oxygen and carbon dioxide exchange, while the land base filters water and allows surface water to infiltrate to aquifers.

The agricultural industry also promotes cultural values and supports social activities. Examples of social clubs and activities include Nanaimo-Cedar Farmers' Institute, 4-H Clubs for youth, Harvest Bounty Festival, and several others.

### 6.4.3 Where do we want to go?

The RDN's Regional Growth Strategy states the following goals that pertain to this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

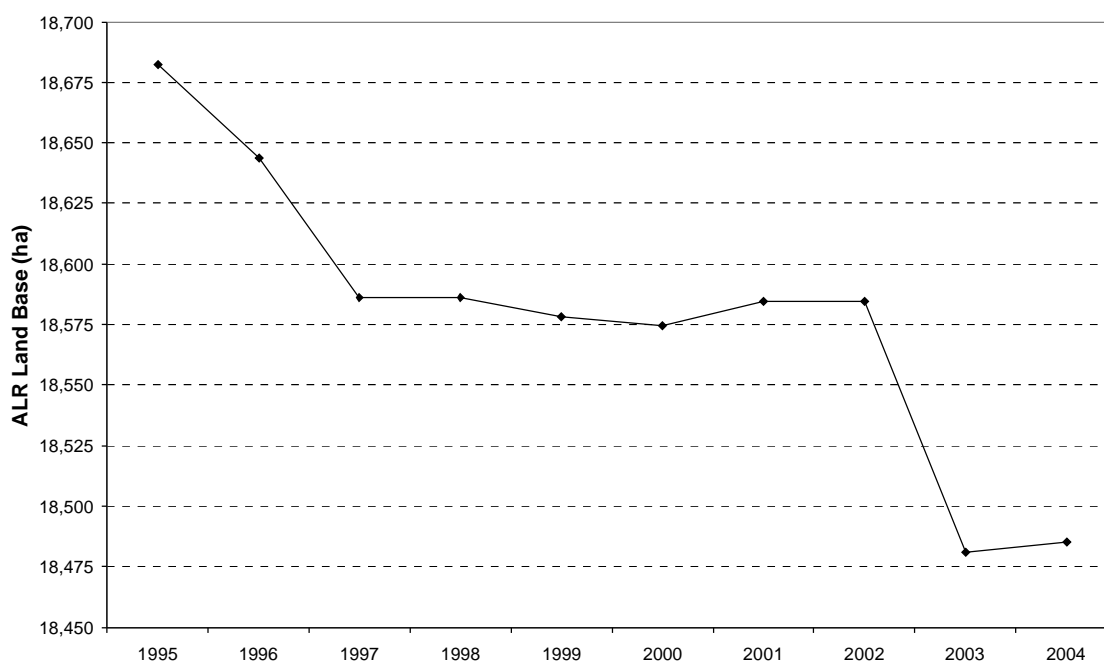
Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Therefore, a sustainability goal is to maintain or increase the amount of ALR in the region in order to preserve the agricultural land base in the region.

#### 6.4.4 Where are we right now?

The amount of ALR in the RDN has been declining since the creation of ALR in 1974. In 1974, 21,053 hectares were designated ALR in the RDN. Between 1974 and 2004, 2,568 hectares, or 12.2 percent, of land were excluded from the ALR in the RDN. The majority of exclusions (11.3 percent) occurred between 1974 and 1994. In 2004, the amount of ALR in the region was 18,485 hectares. Figure 23 illustrates the change in ALR since 1995.

FIGURE 23 – CHANGE IN AGRICULTURAL LAND RESERVE AREA IN THE RDN (1995 – 2004)



Source: Agricultural Land Commission

The Provincial Agricultural Land Commission (2002) states “despite boundary changes over the decades, [ALR] area remains approximately the same.” Approximately five percent of British Columbia’s land is designated ALR.

#### 6.4.5 Are there any limitations for this indicator?

One limitation for this indicator is that the municipalities and the RDN have different policies and methods for processing zoning and subdivision applications on ALR lands.



However, the municipalities and the RDN are harmonized in their support of the Regional Growth Management Strategy and its support for agriculture and protection of farmland.

Another limitation is that land has varying classifications of agricultural potential and the amount of ALR does not discern that.

#### 6.4.6 Assessment

Over time the amount of land in the ALR has decreased by more than 12 percent since 1974. The majority of the land was excluded between 1974 and 1995, with less than one percent excluded from the ALR since that time. The area of land in the region's ALR is continuing to shrink, although the rate of loss has slowed considerably since 1995.

Grade: \*

Trend: Getting Worse

Indicator: Amount of Agricultural Land Reserve (ALR)

Rationale: The amount of land within the ALR is declining, albeit at a slower rate since 1995.

### 6.5 PROPORTION OF FARMLAND IN CROPS

#### 6.5.1 What does this indicator tell us?

This indicator describes the proportion of farmland devoted to crop production in the RDN. Land in crops specifically excludes Christmas tree production, summerfallow and pasture.

#### 6.5.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability as crop production is integral to a sustainable region as a local food source. In addition, locally grown and consumed crops are more sustainable in that they reduce the need for transportation and associated energy costs. As well, it supports local employment and the local economy.

#### 6.5.3 Where do we want to go?

The RDN's Regional Growth Strategy states the following goals that pertain to this indicator:

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

A sustainable region is self sufficient in terms of food production, and that while that is a challenge for many areas of the world, including the RDN, a sustainability goal is to pursue increases in the region's ability to provide food for the region, from within the region (by increasing the amount of farmland in crops and by fully and efficiently utilizing the farm land that is in crops) and to consume the food that is produced locally.

Therefore, changes to the proportion of farm use are important and should be identified. Land used for crops could be converted to another farm use such as buildings to house livestock, fish farming, etc, or conversely, if the amount of farmland in crops were to increase, it could be assumed that the amount of farmland used for another purpose has decreased.

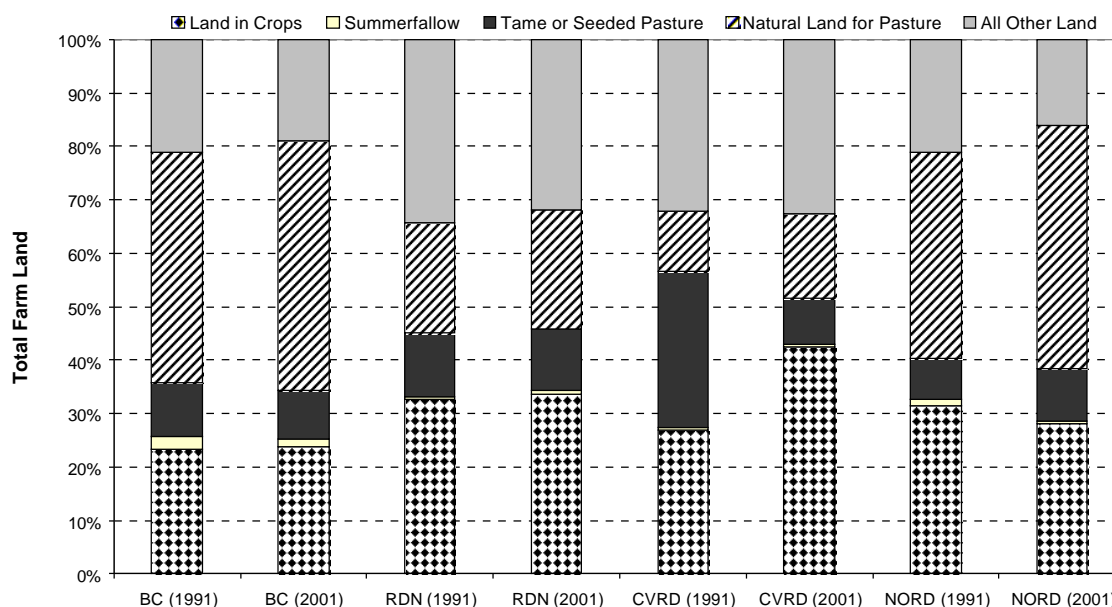
#### 6.5.4 Where are we right now?

The RDN has a higher proportion of agricultural land in crops than the provincial average. In 2001, the RDN had approximately 33 percent of land in crops compared to the provincial average of 23 percent of land in crops. Between 1991 and 2001, the proportions of land in crops increased slightly within the RDN and the province; as well, the total amount of farmland increased in the RDN by 63 percent and the province by nine percent. In 1991, the RDN had 2,508 hectares in land in crops compared to 4,050 hectares in 2001.

Over the same period of time, there was an increase in summerfallow land and natural land for pasture, while the tame or seeded pasture and all other land (including Christmas tree farms) decreased slightly. Overall, the region has generally maintained its proportions.

In comparison to the provincial average, there was an increase in natural land for pasture, and a decrease in summerfallow, tame or seeded pasture and all other land. The Cowichan Valley Regional District (CVRD) and North Okanagan Regional District (NORD) also increased their natural land for pasture from 1991 to 2001.

FIGURE 24 – COMPARISON OF AGRICULTURAL LAND USE PROPORTIONS\* (1991, 2001)



\*Notes: 'Land in Crops' excludes Christmas tree farms; 'All Other Land' includes Christmas tree farms. Also, 1996 data were excluded due to recording gaps in the agricultural census.

Source: Statistics Canada Agricultural Census

### 6.5.5 Are there any limitations for this indicator?

The limitations associated with this indicator are:

- The total farmland areas in the data are not consistent with the designated Agricultural Land Reserve within the RDN.
- The Agricultural Land Commission could not provide information related to the amount of Agricultural Land Reserve (ALR) land in crops.
- The data do not acknowledge differences in soil and weather conditions that may affect the proportion of land in crops in other regional districts and the province as a whole.
- As data are collected every five years, the last sets of data are from 2001. Therefore, the data do not accurately assess the current state of sustainability.

### 6.5.6 Assessment

Overall, the region's land in crops is increasing in hectares and in proportion to the total farmland. The proportions of farmland use (i.e., land in crops, summerfallow, tame or seeded pasture, natural land for pasture and all other land) remain relatively constant, and the proportion of land in crops is above the provincial average.

**Grade:** \*\*\***Trend:** Getting Better**Indicator:** Proportion of Farmland in Crops**Rationale:** The RDN's land in crops is increasing, both in hectares and in proportion to the total farmland. It is consistently above the provincial average.

## 6.6 SUSTAINABLE FARMING PRACTICES

### 6.6.1 What does this indicator tell us?

This indicator describes the amount of farming practiced without the use of insecticides or fungicides. There are several definitions of sustainable farming. The Alliance for Sustainability states that sustainable farming is ecologically sound, economically viable, socially just and humane during all aspects of farming, from production and marketing to processing and consumption. Wendell Barry states "sustainable agriculture does not deplete soils or people" (Jackson et al, 1984). This indicator measures sustainable farming by the amount of area that is applied with insecticides and fungicides compared to total land in crops.

### 6.6.2 Why is this indicator important to our sustainability?

Sustainable farming incorporates preservation of the environment and economic and social viability through building healthy soils, adding value to products and reducing operating costs. By protecting the environment and building healthy soils through natural solutions, there is also an opportunity to increase the value of the products. In addition, reducing the use of insecticides and fungicides reduces the amount of chemical exposure to the ecosystem, employees and consumers. The economic cost of agricultural inputs can be reduced by not using pesticides and fungicides, while increasing natural solutions, such as using animal wastes to fertilize. However, sustainable farming must also attempt to mitigate the potential impacts of farming on water quantity and quality, air quality, soil erosion and energy inputs.

### 6.6.3 Where do we want to go?

The RDN's Regional Growth Strategy states the following goals that pertain to this indicator:

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

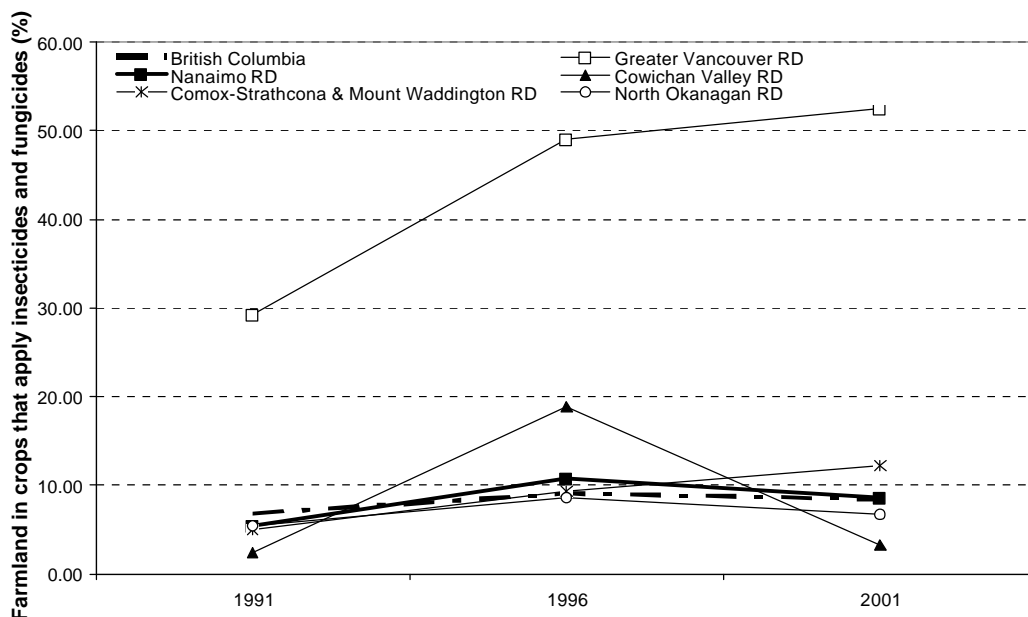
In a sustainable region, the amount of farmland in crops with applied insecticides or fungicides is decreasing.

#### 6.6.4 Where are we right now?

In 2001, insecticides and fungicides were applied to 8.62 percent of the RDN's farmland in crops. This is less than the GVRD and the Comox-Strathcona/ Mount Waddington Regional Districts, but slightly higher than the provincial average of 8.45 percent. This may be largely due to the fact that substantial areas of farmland are used for forage production, which generally requires little or no insecticides or fungicides. The Fraser Valley in the GVRD, by comparison, produces many berry and other high-value fruit and vegetable crops, on which chemicals are commonly applied.

In general, the amount of farmland in crops that used insecticides and fungicides increased in British Columbia between 1991 and 2001. The RDN's farmland in crops that used chemicals also increased between 1991 and 1996, but then declined slightly between 1996 and 2001. In comparison, chemical application to the Greater Vancouver Regional District's farmland increased in area by over 20 percent from 1996 to 2001.

**FIGURE 25 - FARMLAND IN CROPS\* THAT APPLY INSECTICIDES AND FUNGICIDES (1991 – 2001)**



\*Note: excludes Christmas tree farms

Source: Statistics Canada Agricultural Census

### 6.6.5 Are there any limitations for this indicator?

There are several limitations for this indicator.

- Data do not indicate the volume, toxicity, or necessity of application of insecticides and fungicides.
- Data are from 2001 and do not accurately assess the region's current state of sustainability.
- Data do not indicate what types of insecticides and fungicides are used. Pesticides include insecticides, fungicides, and herbicides and they range from toxic to non-toxic. For example, non-toxic pesticides include those that repel insects (kaolin clay sprays) as well as those that kill insects by drying them up (silicon dioxide) or by infecting them with bacterial diseases. These are all approved for use by organic growers; therefore, the application of certain insecticides and fungicides may actually be considered sustainable (Gilkeson, 2006).
- Additional indicators may include Environment Canada's target list of chemicals for the Georgia Basin that it wants to see reduced/ eliminated.
- Difficult to interpret trends as weather is a large determinant of the amount of fungicide applied in a given year; therefore, trends for fungicide use may reflect only the weather patterns.

### 6.6.6 Assessment

The RDN's farmland in crops applied with insecticides and fungicides still remains slightly above the provincial average and has increased slightly since 1991, but since 1996, the amount applied has been declining at a faster rate than the provincial average. Productive and profitable farming currently relies on the continued use of insecticides and pesticides. If technological advances introduce products to control pests and diseases in farm products in a more environmentally friendly way, the use of insecticides and pesticides may be reduced or eliminated.

Grade: \*\*

Trend: Getting Better

Indicator: Sustainable Farming Practices

Rationale: The percent of farmland in crops applying insecticides and fungicides in the RDN is declining, but remains slightly above the provincial average.

## 6.7 FARMS REPORTING SALE OF ORGANIC PRODUCTS

### 6.7.1 What does this indicator tell us?

This indicator identifies the number of farms reporting sale of organic crops, and the change in number over time. It also infers the market demand for organic products. The number of farms reporting sale of organic crops are certified producers of organic products. This indicator supports the 'Sustainable Farming Practices' indicator.

### 6.7.2 Why is this indicator important to our sustainability?

The sustainability of the region is partially dependent on the number and proportion of farms reporting sale of organic crops. As discussed in the Sustainable Farming Practices indicator, chemical use in food production may impact human and ecosystem health. Therefore, farms that reduce or eliminate the use of chemicals when producing crops or raising livestock is essential to a healthy region. In addition, organic crops add value to the produce and may increase the economic profitability of the farm.

### 6.7.3 Where do we want to go?

The indicators related to the RDN's Regional Growth Strategy include:

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

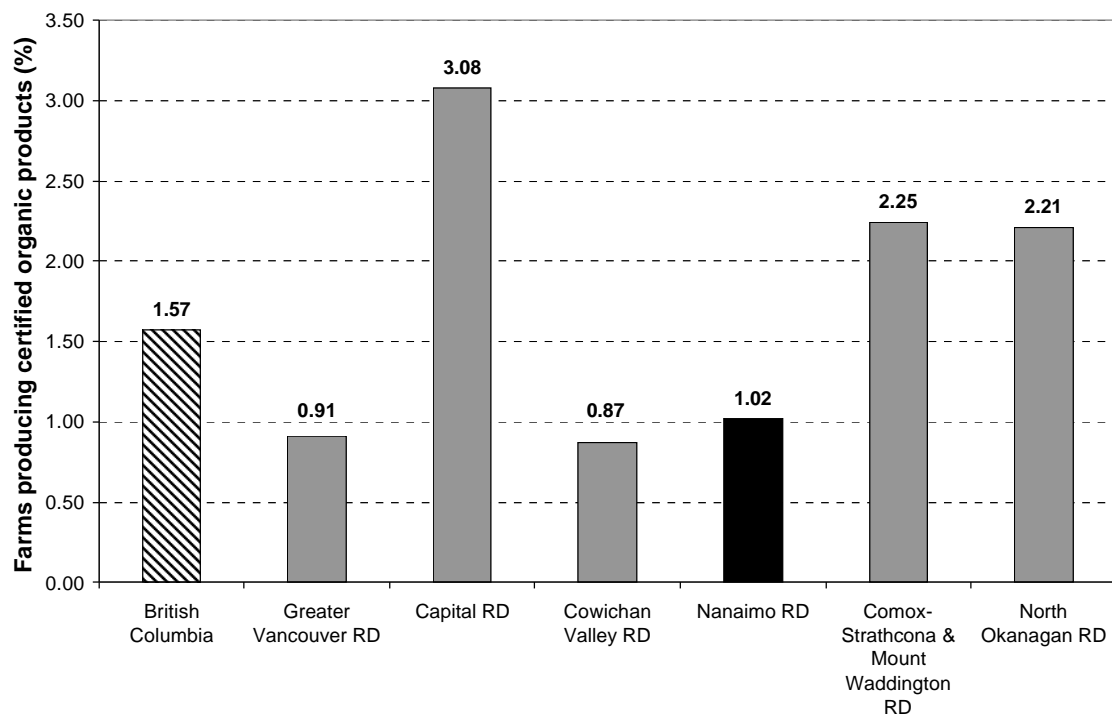
Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

That is, the region supports agricultural production that is environmentally friendly and contributes to the local economy. To that end, a sustainability goal is to increase the number of farms in the region that produce organic crops.

### 6.7.4 Where are we right now?

The number of farms reporting sale of organic crops is low, both in the RDN and across the province. In 2001, five farms (or 1.02 percent of all farms) in the RDN reported the production of certified organic products. The RDN has a lower percentage of farms reporting sale of organic products than other regions and the provincial average. The region with the highest percent is Capital Regional District with 3.08 percent, while the provincial average is 1.57 percent. The RDN remains above the CVRD at 0.87 percent. These results reveal the substantial potential for increased organic farm production.

FIGURE 26 – PROPORTION OF FARMS PRODUCING CERTIFIED ORGANIC PRODUCTS (2001)



Source: Statistics Canada Agricultural Census

#### 6.7.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Data are only available for 2001, so no trend can be identified.
- Data are outdated and do not accurately describe the current level of farms reporting sale of organic crops.
- Data do not confirm if the sale of the products is to regional consumers.
- Data do not include amount of farm products produced.
- Data do not identify the criteria required for “organic” designation by the certifying agency, nor how changes to criteria over time have or will affect the number of farms certified.
- Production is also determined by demand; although there is no information on demand.
- The BC Milk Marketing Board is the best source of statistics in terms of milk production and sales, rather than Statistics Canada Agricultural Census.



### 6.7.6 Assessment

The RDN has a very low percentage of farms producing certified organic products, less than the provincial average and other comparative regional districts. The data used to assess this indicator are from 2001, and there are no historical or updated data to produce a trend.

**Grade: \*** **Trend: Uncertain**

**Indicator:** Farms Reporting Sale of Organic Crops

**Rationale:** The proportion of farms in the RDN producing certified organic products is less than the provincial average. There are no historical data available to identify if the region is moving towards or away from the stated goal.

## 6.8 SUMMARY

### Managed Forest Lands/ Resource Lands and Open Space Subdivision

- In 2005, 152,902 hectares are managed forests within the RDN, representing 73 percent of the RDN land base. Most of the managed forests are within the Resource Lands and Open Space areas.
- Between 1995 and 2004, 2,942 hectares of managed forests lands/ Resource Lands and Open Space have been developed.

### Current and Projected Age Class Distribution for Arrowsmith Timber Supply Area

- The portion of the Arrowsmith TSA within the RDN has an unbalanced age class distribution, with a noticeable lack of trees over the age of 120 years old, in both the timber and forested non-timber harvesting land bases.
- There are no projections for the TSA within the RDN.
- In comparison, the entire Arrowsmith TSA currently has a small distribution of trees aged 60 to 240, contrasted by a large percentage of trees less than 60 years and older than 240 years (for both the timber and forested non-timber harvesting land bases).
- It is projected that in the next 100 and 200 years, that the age class distribution will fluctuate slightly, then return to a similar distribution pattern to the current age class distribution.
- From the current and projected data for the entire Arrowsmith TSA, the older trees in the timber harvesting land bases are continuously harvested, with a majority of area with trees younger than 60 years.

- From the current and projected data for the entire Arrowsmith TSA, the majority of area within the forested non-timer harvesting land base has trees older than 240 years. However in 2200, the area with trees younger than 240 years and area with trees older than 240 years will approximately equal.

#### Amount of Agricultural Land Reserve

- In 1974, 21,053 hectares of land was designated ALR in the RDN.
- By 1994, the amount of land in the ALR had declined to 18,682.
- The rate of decline has slowed since 1994, and in 2004, 18,485 hectares remained in the ALR.

#### Proportion of Farmland in Crops

- In 2001, the RDN has approximately 33 percent of land in crops compared to the provincial average of 23 percent.
- Between 1991 and 2001, the proportion of land in crops increased slightly.
- Total amount of land in crops in the RDN increased by 63 percent compared to the provincial average of nine percent, from 2,508 hectares in 1991 to 4,050 hectares in 2001.

#### Sustainable Farming Practices

- In 2001, 8.62 percent of farmland in crops in the RDN applied insecticides and fungicides compared to the provincial average of 8.45 percent.
- The amount of farmland in crops applied with insecticides and fungicides has decreased since 1996 at a faster rate than the provincial average.

#### Farms Reporting Sale of Organic Crops

- In 2001, the RDN had five farms, or 1.02 percent of all farms, reporting production of certified organic products. The provincial average is 1.57 percent of farms.

## 7.0 ENERGY REQUIREMENTS ARE REDUCED/ ENERGY IS OBTAINED IN WAYS THAT MINIMIZE NEGATIVE IMPACTS ON THE ENVIRONMENT AND GREENHOUSE GASES ARE MINIMIZED

### 7.1 INTRODUCTION

A characteristic of a sustainable region is that energy requirements are reduced and/or energy is obtained in ways that minimize negative impacts on the environment and greenhouse gases are minimized. Several indicators provide information on this characteristic:

- Amount of electricity and gas consumed;

- Greenhouse gas emissions;
- Mode of transportation to work and location of work;
- Bus rides per capita per year;
- Residences within walking distance of amenities;
- Residents inside urban containment boundaries within walking distance of a bus stop; and
- Vehicles per household.

The indicators describe the amount of energy consumed for electricity and natural gas as well as the greenhouse gas emissions arising from this consumption, while the other indicators describe the indirect demand for gasoline and diesel for vehicle operations, which negatively impact the environment. The remainder of indicators describe the potential for reduced dependence on gasoline and diesel through alternative modes of travel.

## 7.2 AMOUNT OF ELECTRICITY AND NATURAL GAS CONSUMED

### 7.2.1 What does this indicator tell us?

This indicator identifies the amount of electricity and natural gas consumed in the region. Electricity and natural gas are primary fuel sources used to heat homes and operate household and business appliances.

The data for this indicator exclude larger industrial consumers. Data are based on the administrative areas for BC Hydro and Terasen Gas, which are not entirely consistent with the RDN boundaries. Data from other private service providers, if any, are not included in this report.

### 7.2.2 Why is this indicator important to our sustainability?

The amount of electricity and natural gas consumed are important to the region's sustainability as electrical and natural gas production and consumption are unsustainable. Electricity is produced in several ways, although the primary source of electricity in the province is from hydro dams. Dams impact their local environment, and much infrastructure is required to supply electricity from the dam site to individual homes and businesses. Infrastructure includes hydro towers, clear-cut areas under the hydro lines, extensive cable systems (above or below ground) and stream crossings. However, there are alternative methods of producing electricity and heat through harnessing wind, geothermal, solar and biomass energy that may have less severe impacts to the local environment.

Natural gas is a non-renewable fossil fuel; therefore, consumption of natural gas reduces the amount of natural gas available in the future. The production of gas also requires extensive infrastructure, such as pipelines to supply consumers. Gas emissions also contribute to greenhouse gas emissions and global warming. According to an International Energy Agency report, World Energy Outlook, greenhouse gas emissions will rise by 52 percent by

2030 unless action is taken to reduce consumption. The same study indicates that energy demand trends will increase by more than 50 percent over that same period (BBC, 2005). The economic consequences of importing and consuming electricity and natural gas are also high.

There is usually a link between consumption and production. Energy has been regarded as an engine of economic progress. Therefore, there is a need to increase energy efficiency without reducing economic growth. Some of the region's energy demands can be curbed through energy efficient appliances and conservation measures.

### 7.2.3 Where do we want to go?

Two of the RDN's Regional Growth Strategy's goals pertain to this indicator. They are:

Goal 4: Environmental Protection – to protect the environment and minimize ecological damage related to growth and development.

Goal 7: Efficient Services – to provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

A sustainability goal is to reduce the amount of electricity and natural gas consumed in the region per capita. Ideally, this would occur through conservation or energy efficiency, in order to not impact economic growth and prosperity in the region.

### 7.2.4 Where are we right now?

Overall annual residential and commercial electricity consumption in the RDN<sup>24</sup> has increased during the past 10 years. In 1994, the region used 1.12 billion kilowatt hours (kWh) compared to 1.38 billion kWh in 2004, representing an increase of 19 percent. Residential electricity consumption fluctuated over the past ten years, but increased overall from 705 million kWh in 1994 to 851 million kWh in 2004, an increase of 17 percent. Commercial electricity consumption increased steadily from 1994 to 2001, increasing from 421 million kWh in 1994 to 534 million kWh in 2004, an increase of 21 percent.

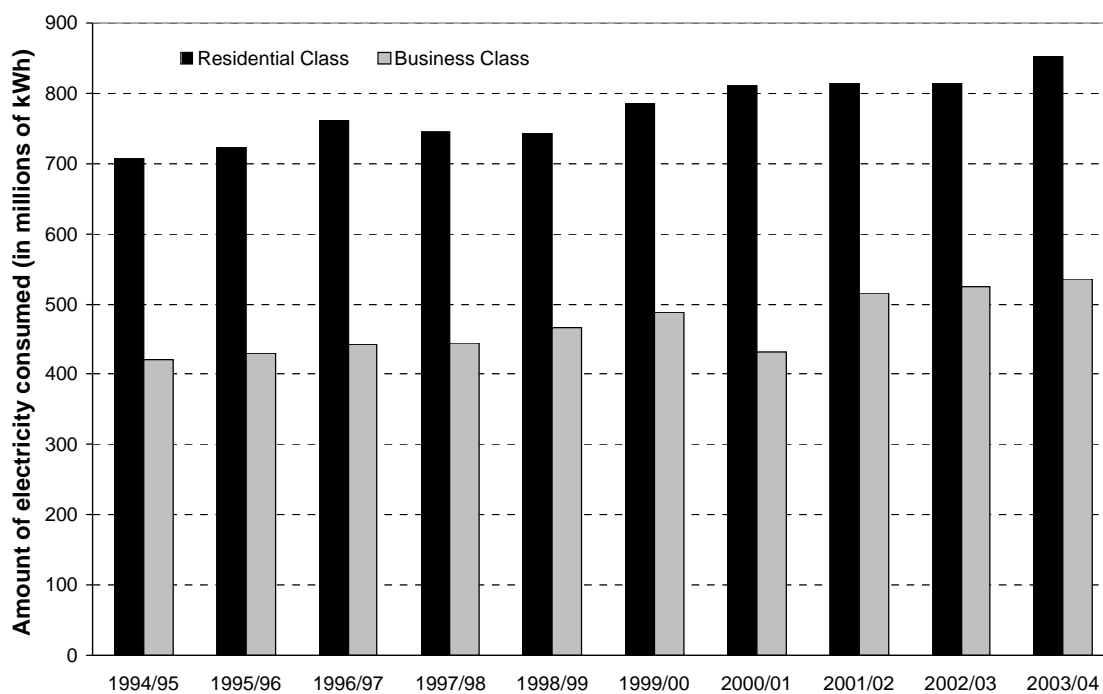
Per capita annual electricity consumption rose from 9,137 kWh in 1994 to 10,078 kWh in 2004, increasing by nine percent. The RDN's per capita electricity consumption is above the per capita consumption levels in both the Lower Mainland (9,789 kWh) and the Victoria

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<sup>24</sup> Data were provided for the BC Hydro Nanaimo Area, and other comparative districts. The data may be slightly inaccurate due to the slight differentiations in regional district and BC Hydro administrative boundaries.

area (9,325 kWh), but remains less than the per capita electricity consumption of Vancouver Island (15,337 kWh)<sup>25</sup>.

**FIGURE 27 - RESIDENTIAL AND COMMERCIAL ELECTRICITY CONSUMPTION IN THE NANAIMO AREA\* (1994 – 2004)**

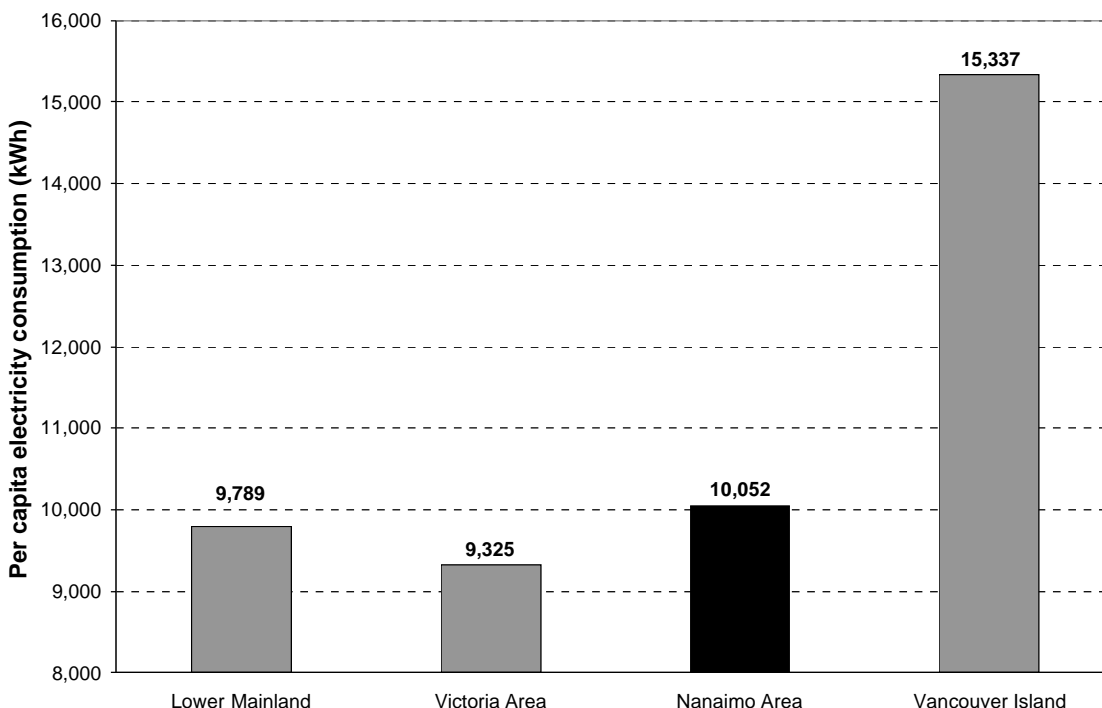


\*Note: The Nanaimo Area refers to the areas within the City of Nanaimo, City of Parksville Nanaimo Unincorporated Area (area outside of city limits but within School District 68), Town of Qualicum Beach, Qualicum Unincorporated Area, Nanaimo Town and River Bands. Data do not include industrial customers.

Source: BC Hydro billing data

<sup>25</sup> Natural gas is more readily available as an alternative to electrical heating in the Lower Mainland, Victoria area, and the Regional District of Nanaimo, whereas western and northern areas of Vancouver Island depend primarily on electricity to heat their homes and businesses.

FIGURE 28 – COMPARISON OF PER CAPITA ELECTRICITY CONSUMPTION (2003/2004)



Note: Nanaimo Area refers to the areas within the City of Nanaimo, City of Parksville Nanaimo Unincorporated Area (area outside of city limits but within School District 68), Town of Qualicum Beach, Qualicum Unincorporated Area, Nanaimo Town and River Bands. Lower Mainland extends from Greater Vancouver area to the Town of Hope. Victoria Area includes the Cities of Victoria, Oak Bay, Esquimalt and Saanich. Data do not include industrial customers.

Source: BC Hydro billing data, BC Statistics (<http://www.bcstats.gov.bc.ca/data/pop/pop/mun/Mun9604e.htm>)

Total annual residential and commercial natural gas consumption increased by more than 14 percent between 2003 and 2004 in the RDN<sup>26</sup>. In 2003, 2.08 million gigajoules (GJ) was consumed; this increased to 2.38 million GJ in 2004. The number of residential and commercial natural gas customers increased by nearly six percent between 2003 and 2004, from 18,734 to 19,815 customers, respectively. The amount of natural gas consumed per customer per day also increased from 304,212 kilojoules (KJ) to 329,680 KJ, an increase of more than eight percent per customer per day. Therefore, the increase in natural gas consumption is attributed both to an increase in customers as well as an increase in customer consumption.

<sup>26</sup> Data were provided for the Terasen Gas Nanaimo Service Region (just north of the Malahat to Port Alberni) and extracted for the RDN based on BC Stats communities. Therefore, the data may be slightly inaccurate.

Several factors are attributed to the increasing natural gas consumption, including increasing number of customers/ population growth, increasing number of houses, conversion from other energy sources (e.g., oil), economic growth (e.g., existing customers expanding operations and/or new businesses) and weather. Terasen Gas stated that the weather in the RDN in 2003 was slightly colder than average, while 2004 was much warmer than average. There are no standards for average use per household due to the varying factors and personal and commercial heating needs.

#### 7.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator, including:

- Industrial customers were not included in the electricity consumption data.
- Electricity and natural gas consumption data are not weather adjusted.
- Regional district areas are approximated based on BC Hydro and Terasen Gas administrative areas, which may slightly skew results and comparisons.
- Terasen Gas was only able to provide data for two years due to lack of available resources, which does not accurately define a trend in the data.

#### 7.2.6 Assessment

The regional consumption of electricity and natural gas is rising over time and there is no energy manufactured in the region. The increase in consumption is attributed to personal consumption as well as population growth. Several factors influence the amount of electricity and natural gas consumed including the weather and economic growth. However, conservation measures combined with eco-efficient products will help curb the region's increasing consumption of energy resources. Due to the lack of comparative electricity and natural gas data, it is not possible to accurately assess the indicator's sustainability, although the consistent increase in electricity and natural gas (between 2003 and 2004 only) indicate that the region is moving away from sustainability.

Grade: \*

Trend: Getting Worse

Indicator: Amount of Electricity and Natural Gas Consumed

Rationale: The region is increasing its consumption of electricity and natural gas and there is no energy manufactured in the region.

## 7.3 GREENHOUSE GAS EMISSIONS

### 7.3.1 What does this indicator tell us?

This indicator provides a baseyear inventory of greenhouse gas (GHG) emissions from residential buildings, commercial buildings, industrial buildings, transportation and solid waste for the year 2002. The origin of the emission is attributed to the type of fuel burned in each sector. Major sources of GHG emissions include burning of natural gas, diesel fuel and gasoline for transportation, home heating and electrical production. Methane from the decomposition of waste in landfills is also major source of GHG emissions.

The mass of GHG emissions are calculated based on the energy consumed from each sector. This information forms the data for the development of an energy and emissions management plan and upon which evaluation of progress can be measured in the future.

### 7.3.2 Why is this indicator important to our sustainability?

Our climate is changing as a result of human caused GHG emissions. Carbon dioxide is a naturally occurring GHG that, in conjunction with naturally occurring water vapour, methane and nitrous oxide, traps the sun's heat energy as it reflects from the surface of the earth. This phenomenon, known as the "greenhouse effect", allows life to thrive on the majority of the planet by stabilizing global temperature. Conversely man-made GHG emissions have been strongly linked to the rapid and continual increase in the earth's atmospheric temperature. This change is predicted to bring climate variability and extreme weather, causing unusual floods, droughts and storms that will affect local government services, assets and infrastructure. Adaptation to these changes will be required.

All Canadian communities are faced with tough challenges in responding to the need to curb GHG emissions and adapt to the environmental changes that will result from climate change. In the RDN, the impacts of climate change will manifest themselves in a number of ways that will present both new challenges and opportunities

### 7.3.3 Where do we want to go?

The RDN's Regional Growth Strategy contains a goal that pertains to this indicator:

Goal 4: Environmental Protection – to protect the environment and minimize ecological damage related to growth and development.

The RDN recognizes climate change as a global issue that can be addressed at the local level if all local governments in Canada begin to effectively manage their emissions through responsible energy management. By developing corporate and community energy and emissions reduction plans and reducing GHG emissions, based on realistic reduction targets, the region will continue working towards sustainability.



### 7.3.4 Where are we right now?

The Regional District of Nanaimo became a member of the Federation of Canadian Municipalities Partners for Climate Protection (PCP) Program in 2002. The PCP is an umbrella initiative that fosters municipal participation in GHG emission reduction initiatives and overall sustainability. Its goal is to assist municipalities with their GHG management initiatives by providing tools and logistical support.

With assistance from PCP, the RDN is currently developing corporate and community energy and emissions management plans for the region. These plans will not only focus on reducing existing GHG emissions, but will also provide the necessary leadership to influence future GHG emissions through a variety of sustainable mechanisms such as land use and transportation planning, building codes, permitting, education, and continuous monitoring that will allow for effective emissions management.

In order to implement an effective strategy to reduce GHG emissions it is necessary to develop an inventory of the emissions. In 2002 the region produced approximately 667,769 tonnes of carbon dioxide emissions (eCO<sub>2</sub>). The transportation sector emitted the greatest volume of emissions in 2002, having produced 63 percent of total community emissions, followed closely by the residential sector, which contributed 11 percent of total emissions (Table 13). On average, each person in the RDN produces 4.98 tonnes of carbon dioxide emissions. It should be noted that Pope and Talbot's Harmac Pulp Mill is not included in this inventory.

TABLE 13 – CARBON DIOXIDE EMISSIONS IN THE RDN, BY SOURCE (2002)

Source of Emissions	Emissions (tonne)	Percent (%)
Residential Buildings	73,929	11
Commercial Buildings	46,515	7
Industrial Buildings	32,913	5
Transportation Emissions	422,929	63
Solid Waste	91,483	14
TOTAL	667,769	
Per Capita Emissions	4.98	

\*Note: Baseyear population (2002) is 134,011.

Source: RDN

### 7.3.5 Are there any limitations for this indicator?

The limitation for this indicator is that limited data do not yet produce a trend.

### 7.3.6 Assessment

The RDN is currently preparing a corporate and community energy and emissions management plan for the region, in unison with other communities. As well, there are baseline data that will enable assessment in future years.

Grade: ?

Trend: Uncertain

Indicator: Greenhouse Gas Emissions

Rationale: The RDN is currently preparing a corporate and community energy and emissions plan to reduce emissions; however, there are no comparable data to assess the region's grade. There are not enough data to determine if the region is reducing or increasing its GHG emissions.

## 7.4 MODE OF TRANSPORTATION TO WORK, AND LOCATION OF WORK

### 7.4.1 What does this indicator tell us?

The mode of transportation to work and the location of work are important indicators of the level that residents rely on their vehicles for travel to work, instead of walking, cycling, using public transit, or other alternatives. The location of work places may also be a factor in determining the type of transportation that people use. This information then provides an indication of individual travel mode preferences, and the impact of location of work on automobile use.

### 7.4.2 Why is this indicator important to our sustainability?

The region's sustainability is partially determined by both the mode of transportation and the location of work because of the social, environmental and economic impacts of the automobile to our region. Vehicles support sprawling, low density communities and require large amounts of parking. A reduction in automobile dependence is a result of more compact, walkable communities within the region. This especially benefits people with mobility issues or without access to a car, such as seniors who are no longer able to drive vehicles, but have access to an electric scooter. As well, walking and cycling contribute to the physical health of the population and the environmental health of the region. According to Skelton (2006), "people who live in high-density core cities are significantly healthier than residents of sprawling suburbs." He suggests that this is due to the extra time that suburbanites spend in their cars makes them gain weight and increases their risk of

chronic disease. As well, the Sightline Institute has released a report stating that people who walk are more fit and less likely to die in a motor vehicle accident.

Vehicles typically rely on gasoline or diesel consumption and results in emissions of greenhouse gases and other polluting substances into the environment. Pollutants released into the atmosphere from vehicles can have a negative impact on the health of residents, other living beings and the environment. Another impact of automobile use is the number of motor vehicle accidents. The development and maintenance of infrastructure to support an increasing number of vehicles represents a significant economic investment that will compete with other societal priorities, including better public transit.

#### 7.4.3 Where do we want to go?

The RDN's Regional Growth Strategy outlines several goals that relate to this indicator:

Goal 1: Strong Urban Containment - to limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure - to encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection - to protect the environment and minimize ecological damage related to growth and development.

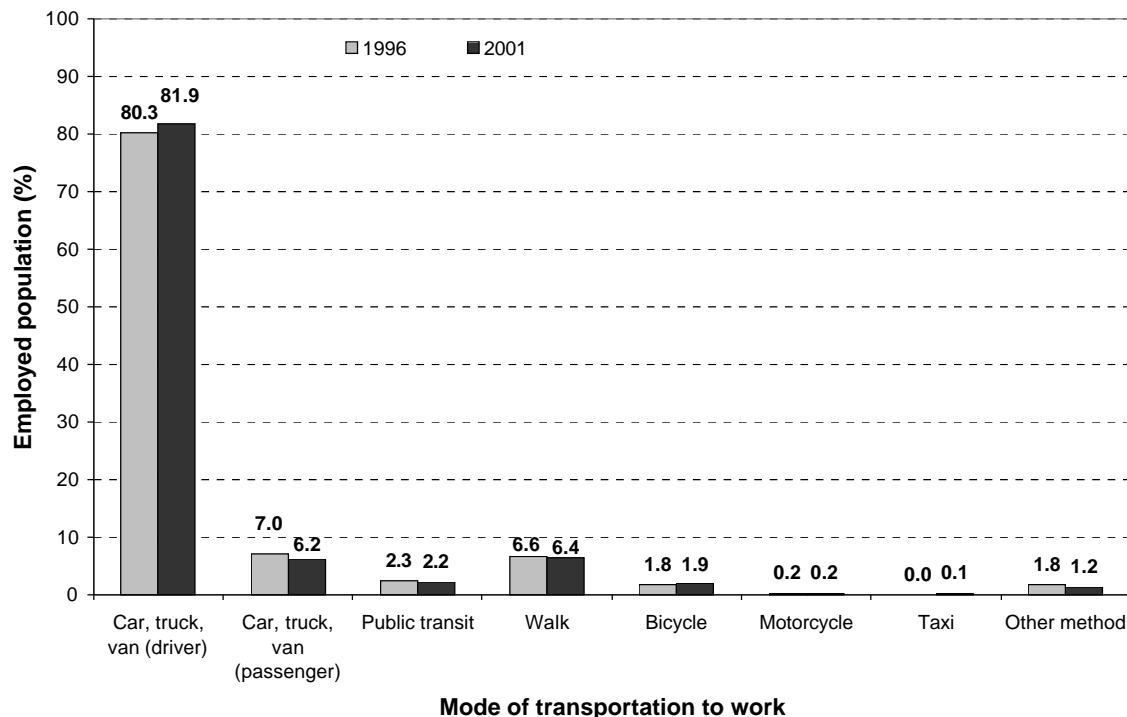
Goal 5: Improved Mobility - to improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Therefore, a sustainability goal is to decrease the amount of travel to work by automobile by increasing the amount of travel to work by other modes such as walking, cycling and public transit through reducing the distance between places of employment and residences.

#### 7.4.4 Where are we right now?

Residents of the RDN rely primarily on vehicles to commute to work. In 2001, approximately 88 percent of RDN residents commuted to work in private vehicles, as either driver or passenger. In fact, there has been an increase in the number of people commuting to work as drivers and a reduction in the number of people commuting to work as passengers. Second to private vehicles, approximately eight percent of RDN residents choose to commute to work by walking and cycling; this has reduced slightly since 1996. Finally, two percent of residents commute to work using public transit. This proclivity to driving to work persists despite high proportions of RDN residents who live and work in the same census subdivision (municipality, town, electoral area).

**FIGURE 29 - MODE OF TRANSPORTATION TO WORK BY EMPLOYED RESIDENTS IN THE RDN (1996 - 2001)**



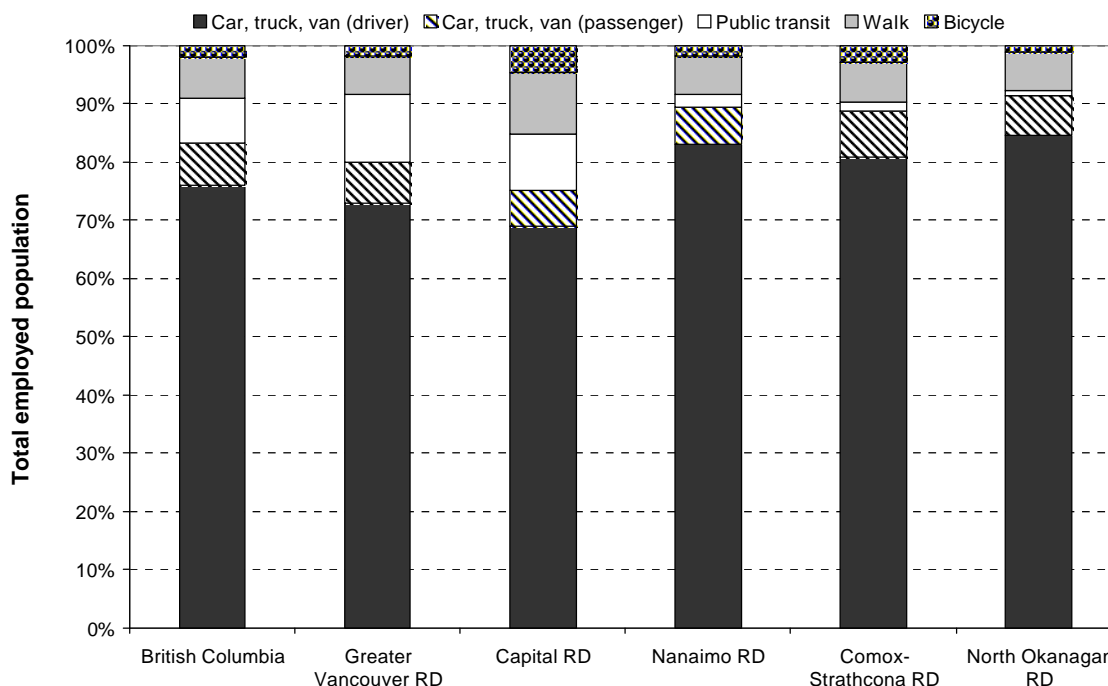
Source: Statistics Canada

The RDN exceeds the provincial average of 82 percent in use of cars and trucks (including both drivers and passengers). However, it is generally consistent with several other regional districts. Of exception are the Greater Vancouver Regional District (GVRD) and Capital Regional District (CRD), which have lower percentages of working residents commuting by car or truck (79 and 73 percent respectively).

The percent of RDN employed residents who use public transit is less than the provincial average. Comparatively, the percent of employed residents using public transit in GVRD and CRD is greater than the RDN; however, the Comox-Strathcona Regional District (CSRD) and North Okanagan Regional District (NORD) employed residents use public transit less than RDN residents. This is primarily due to increased population density, location of work in close proximity to residences, increased accessibility to public transit and increased cost of parking that acts as a deterrent.

Overall, the automobile continues to be the most common form of transportation to work for residents in the RDN and British Columbia.

FIGURE 30 – COMPARISON OF MODES OF TRANSPORTATION TO WORK (2001)

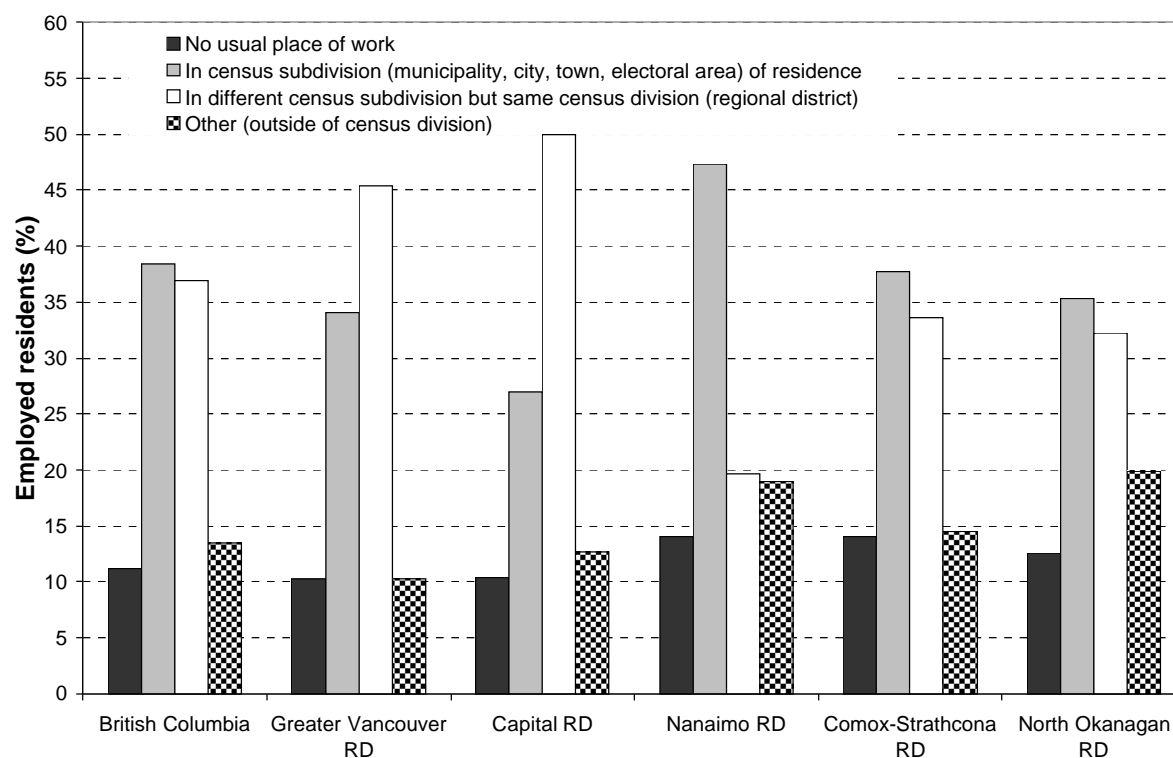


Source: Statistics Canada

Since 1991, the percentage of employed residents in the RDN who live and work in the same census subdivision (municipality, town, city, electoral area) has decreased from 55 to 47 percent. There has also been a very slight decline in the percentage of employed residents who work in a different census subdivision within the same census division (regional district), from 22 percent in 1991 to 20 percent in 2001. The percentage of employed residents who travel outside of the census division (regional district) is approximately the same as those who travel to other census subdivisions. The percentage of employed residents with no usual place of work has increased significantly, from three percent in 1991 to 14 percent in 2001.

Despite this, the RDN has more employed residents who live and work in the same census subdivision than in any of the other regional districts compared, and the provincial average. This result suggests that more residents are living closer to work, with shorter commute times and more opportunity for alternative modes of transportation.

FIGURE 31 - COMPARISON OF WORK LOCATIONS (2001)



Source: Statistics Canada

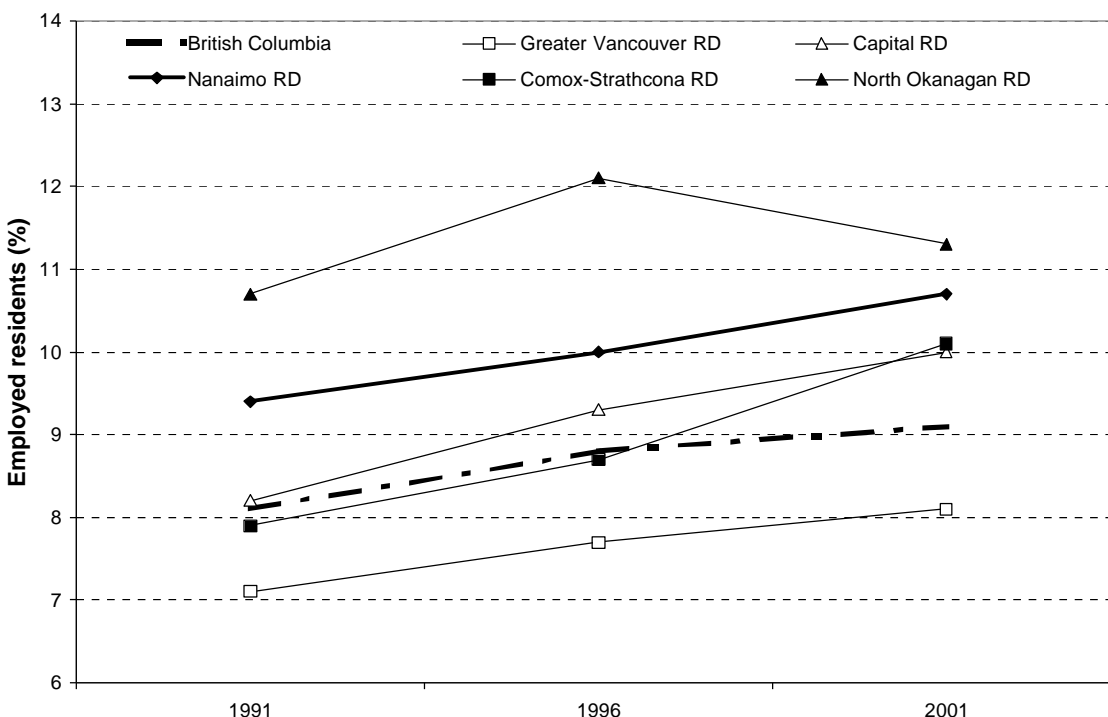
There is a clear trend among the regional districts. In more populated regional districts, such as the CRD and GVRD, many more residents live and work in different census subdivisions than compared to the RDN and CSRD. The results may be influenced by the large number of municipalities in the CRD (13) and GVRD (30), compared to the RDN (3). Despite this, the CRD and GVRD rely on vehicles to a lesser extent as a mode of transportation to work.

The number of employed residents who leave the RDN to work is relatively high in comparison to the other regional districts. This may suggest two things.

- Travel time and distances to neighbouring regional districts, such as CVRD and CSRD, are relatively short compared to other locations in the province (depending on the size of the regional district); and
- The RDN's relatively small geographic size compared to other regional districts, such as CSRD and CVRD, provides RDN residents access to employment in neighbouring regional districts.

The percentage of residents working at home in the RDN is higher than the provincial average and other compared regional districts with the exception of NORD.

FIGURE 32 - PERCENTAGE OF EMPLOYED RESIDENTS WORKING AT HOME (1991-2001)



Source: Statistics Canada

#### 7.4.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Data do not differentiate vehicles that are more environmentally friendly, such as hybrids or SMART cars.
- Data do not factor in the availability or accessibility of infrastructure for other modes of transportation, such as public transit, walkways and cycling pathways.
- Location of work does not factor in the distance of travel within the census subdivision.
- Mode of transportation does not reflect the physical ability of people to travel to work by walking or cycling; for instance, if they are elderly or physically disabled.
- Other factors that influence choice of transportation may relate to housing affordability. For example, some residents may wish to live near their work, but cannot afford to own or rent in the area.

- Data cannot reflect the personal choices and preferences of people, for either mode of transportation or location of their home or work.
- Data do not reflect the number of employed residents who work at home.
- Data do not reflect the geographic size, shape (long and narrow), or topography of the region and its impact on mode of travel.

#### 7.4.6 Assessment

Residents of the RDN increasingly use vehicles as their primary mode of transportation to access work, more than many other jurisdictions, even though a greater percentage of RDN residents work closer to home, or at home. There is significant opportunity to decrease reliance on vehicles. Overall, the region's reliance on vehicles is greater than the provincial average and continues to increase over time, although updated data are required to provide an accurate assessment of the region's movement toward or away from sustainability.

Grade: *	Trend: Getting Worse
Indicator:	Mode of Transportation to Work, and Location of Work
Rationale:	Employed residents are increasingly reliant on vehicles as their primary mode of transportation to and from work, despite living closer to work than those in other regions.

## 7.5 BUS RIDES PER CAPITA

### 7.5.1 What does this indicator tell us?

The number of bus rides per capita indicates the efficiency of the public transit system, in terms of regional use and preferred mode of travel. Specifically, the indicator describes the number of transit trips per resident per year. Ridership may indicate trends in urban development, such as increased density and nodal development, and affordability of transit compared to operating a car.

### 7.5.2 Why is this indicator important to our sustainability?

The number of bus rides per capita is important to the region's sustainability in that buses provide a more energy efficient and environmentally friendly mode of transportation than automobiles. Public transit is efficient in that it provides an alternative to personal vehicles and one bus carries several passengers, thereby reducing the amount of fuel consumed per person. By decreasing the amount of emissions, public transit effectively improves overall environmental health and air quality, and therefore, human health. Financially, public



transit is more accessible to residents of all abilities, ages, and income levels than personal automobile travel, while not always being accessible for certain physical handicaps. Public transit provides a less costly method of transportation, without significant personal investment in a vehicle and its maintenance. As well, improved ridership improves transit efficiency and the ability to expand services. Public choices to use transit often reflect the growing awareness of the benefits of transit versus personal vehicles as a primary mode of transportation. It is expected that the rate of ridership should parallel population growth in urban areas.

### 7.5.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

The sustainability goal is to increase the number of bus rides per capita. This will not only reduce the number of personal vehicles, but it will increase the economic efficiency of operating transit services.

### 7.5.4 Where are we right now?

Since 1998, the number of bus rides has increased in the region. In 1998, just over 1.5 million bus rides were taken in the RDN; this increased nearly 45 percent by 2004 to over 2.2 million bus rides. Per capita, the number of bus rides has also steadily increased by 39 percent. Figure 33 illustrates the increase in bus rides per capita since 1998.

FIGURE 33 - BUS RIDES PER CAPITA IN THE RDN (1998 - 2004)



Source: BC Transit

While the increased bus ridership indicates a positive trend, there is still need for improvement. Improvement may occur through increased ridership in existing transit service areas through education and advertising programs and by improving transit service in specific high opportunity areas such as Nanaimo, Parksville and Qualicum Beach. However, the social benefits must be compared with the economic impacts that increased services would have. Increasing transit service implies increased demand for provincial grants for acquisition of vehicles and equipment as well as operating deficits.

#### 7.5.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The data do not reveal if public transit is used as an alternative to personal vehicles, or if it is used because there are no other options, financially or physically, for the rider.
- The data do not reveal the demographics (age, economic status, etc) of people who use public transit.

- The data do not reveal factors that influence a change in bus ridership, such as addition of new transit routes, change to the frequency of service on transit routes, or other changes to the transit/transportation system, that might increase or decrease its desirability as a transportation choice (e.g. fare price, free newspapers, employer transit incentives, hours of operation, increased cost of gas, etc.).
- The 2001 ridership indicator was based on 1996 census population data. Actual population growth during 1996-2001 (based on the 2001 census) was significantly less than the projections from 1996 data. As a result, the 2001 and 2005 ridership indicators are not comparable. Based on the 2001 census the population served has been recalculated back to 1998 by BC Transit and included in the analysis for the 2005 indicator.

#### 7.5.6 Assessment

Bus rides per capita in the RDN has increased significantly since 1998. However, there are no data to compare the ridership in the RDN to other regional districts or the province. As such it is not possible to assess the region's comparative sustainability; however, the data indicate progress towards increased transit ridership.

Grade: ?

Trend: Getting Better

Indicator: Bus Rides Per Capita

Rationale: The number of bus rides per capita is increasing in the region.

## 7.6 RESIDENCES WITHIN WALKING DISTANCE OF AMENITIES

### 7.6.1 What does this indicator tell us?

This indicator tells us how many residences are within walking distance (i.e., 400 metres) of one or more of the following: a school, retail space, green space, recreation facility, or a service, such as government office, post office, or medical office. The general walking distance guideline of 400 metres, or a five minute walk, was used for this indicator. This guideline is commonly used to determine walking distance to public transit (O'Sullivan and Morrall, 1996).

### 7.6.2 Why is this indicator important to our sustainability?

The proportion of residences within walking distance of amenities is important to the region's sustainability in that it measures the opportunity for people to walk or cycle to their destination, and not rely on personal vehicles. This not only improves the health of residents, but it reduces the need for road and highway infrastructure and maintenance.

Studies indicate that people who live in settlement forms that lend themselves to walking and cycling transportation methods are healthier and less likely to suffer from obesity; obesity has been linked with people who live in settlement forms characterized as sprawl. According to Skelton (2006), "people who live in high-density core cities are significantly healthier than residents of sprawling suburbs." Finally, by reducing the use of personal vehicles, it also reduces the amount of exhaust emissions that enter the environment.

### 7.6.3 Where do we want to go?

The RDN's Regional Growth Strategies has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

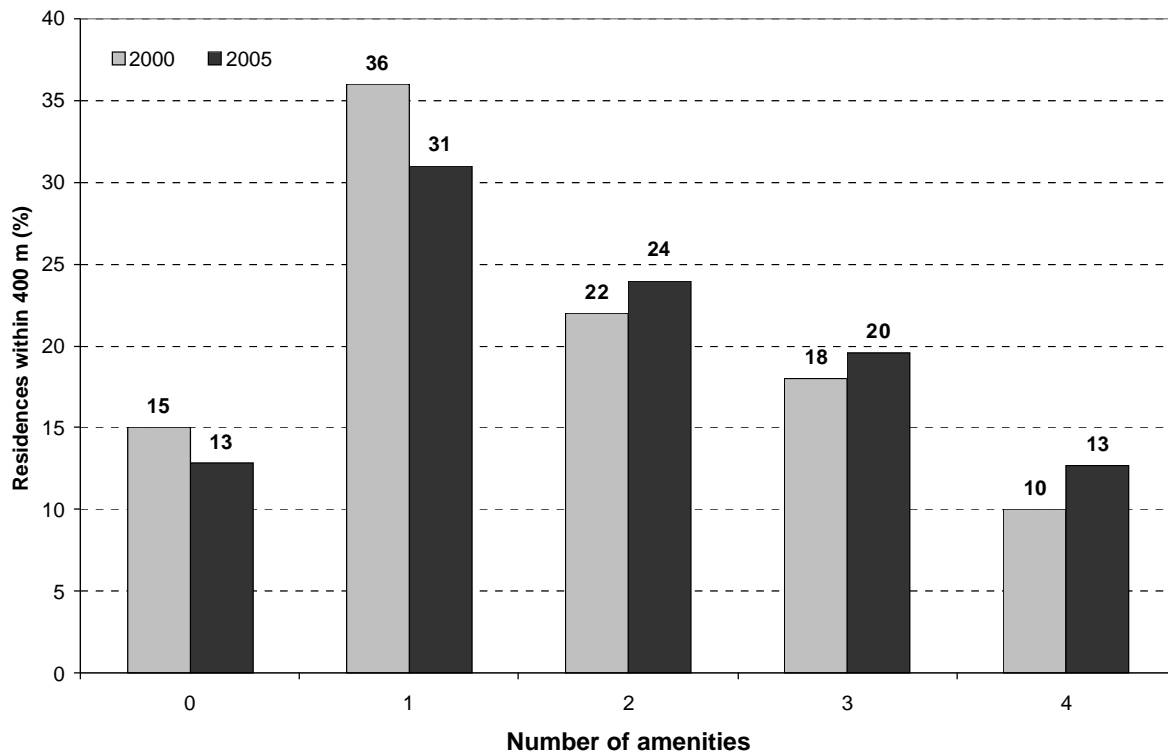
Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

The region's goal is to increase the percentage of residences within walking distance of amenities through the development of nodes, or complete communities. This is indicated in the Regional Growth Strategy.

### 7.6.4 Where are we right now?

Within the RDN, the percentage of residences within walking distance of amenities has increased. There are two likely reasons for this success. The first is the creation of amenities closer to residences; the second is the construction of residences closer to amenities. A combination of both factors has led to an overall increase in percent of residences within 400 m of multiple amenities between 2000 and 2005. This confirms that nodal development is occurring, which is in accordance with the Regional Growth Strategy and which favours complete communities with residences and amenities in proximity to each other.

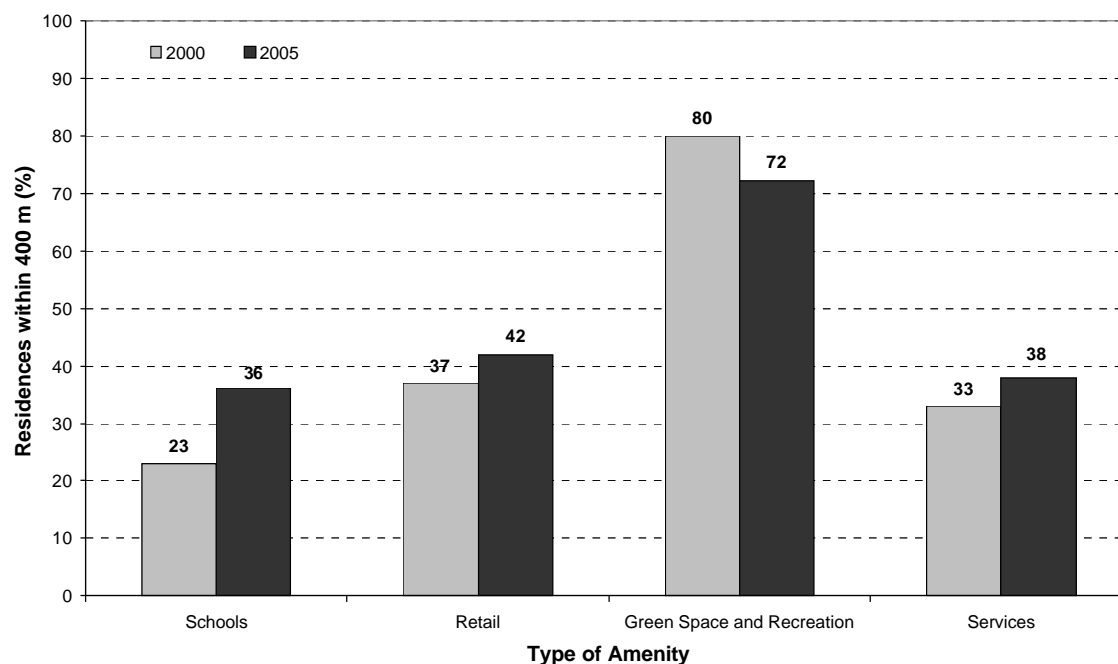
**FIGURE 34 - PERCENT OF RDN RESIDENCES WITHIN 400 METRES OF AMENITIES (2000 - 2005)**



Source: British Columbia Assessment Authority; RDN GIS Department

There has been an increase in percentage of residences within 400 m of schools, retail, and services. Since 2000, there has been a decrease in percentage of residences within walking distance to green space and recreation. This may be partially due to the conversion of green space to residences or amenities. The following figure describes the proximity of residences to specific amenities.

FIGURE 35 - PERCENT OF RDN RESIDENCES WITHIN 400 METRES PER TYPE OF AMENITY (2000 - 2005)



Source: British Columbia Assessment Authority; RDN

This figure illustrates the region's increased potential for less reliance on personal vehicles and progress towards sustainability. However, the proximity of residences to green space and recreation is evidently being eroded over time. This may suggest that green space needs to be protected in areas of designated growth and nodal development.

#### 7.6.5 Are there any limitations for this indicator?

The limitations to this indicator are that there are not data on whether residents actually walk or cycle to the nearby amenities, or if the amenities appeal to, or are of regular use to, the residents who live in close proximity to them.

#### 7.6.6 Assessment

There has been an increase in residences within walking distance of amenities, and therefore, an increase in potential for people to reduce their reliance on vehicles. This may be due to increased construction of amenities, or construction of residences closer to amenities. Overall, this result suggests that nodal development is occurring, which is in accordance with the Regional Growth Strategy. However, the number of vehicles is

increasing in the region, and there are no data to support whether residents actually walk or cycle to amenities. Although there are no comparative data available to accurately assess the indicator's sustainability, the data suggest movement towards the sustainability goal.

**Grade: \*** **Trend: Getting Better**

**Indicator:** Residences Within Walking Distance of Amenities

**Rationale:** There has been an increase in the proportion of residences within walking distance to two or more amenities.

## 7.7 RESIDENTS INSIDE URBAN CONTAINMENT BOUNDARIES LIVING WITHIN WALKING DISTANCE OF A BUS STOP

### 7.7.1 What does this indicator tell us?

This indicator tells us the number of people residing inside the urban containment boundary that live within walking distance (i.e., 400 metres) of a bus stop. The proximity of residents' homes to bus stops could impact their use of transit service; that is, residents who live in close proximity to bus stops could be expected to take the bus more often. However, this expectation is often not realized due to increased transit travel time or lack of transit services to a destination.

The general walking distance guideline of 400 metres, or a five minute walk, was used for this indicator. This guideline is commonly used to determine walking distance to public transit (O'Sullivan and Morrall, 1996).

### 7.7.2 Why is this indicator important to our sustainability?

This indicator is important to our sustainability in that it measures the potential for people to use public transit, and rely less on personal vehicles. Socially, buses provide people with access to transportation that may otherwise be limited by age, abilities and income levels. Environmentally, a reduction in personal vehicle use will reduce the amount of emissions and improve environmental health and air quality; this in turn may lead to improvements in human health. By reducing the number of personal vehicles, it may also reduce the number of motor vehicle accidents. Economically, public transit provides a less costly method of transportation, without significant personal investment in a vehicle and its maintenance or public investment in road and highway infrastructure and maintenance. An increase in transit use will improve the cost efficiency of existing transit services or additional transit routes to other parts of the region.

### 7.7.3 Where do we want to go?

The RDN's Regional Growth Strategies has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

The region's target is to increase the number of people residing inside the urban containment boundary that live within 400 metres of a bus stop.

### 7.7.4 Where are we right now?

In 2001, 89 percent of the RDN's 90,345 residents within the urban containment boundary lived within 400 metres of a bus stop. This suggests that a high percentage of people have access to public transportation. According to Murray (2006), approximately 94,900 residents lived within 400 metres of a bus route in 2005<sup>27</sup>.

The proportion of regional residents living within walking distance of a bus stop is a result of settlement location both within a community, and in the region. There are 12 transit routes in the City of Nanaimo and three transit routes servicing Parksville-Qualicum Beach. Therefore, if growth occurs within Nanaimo, there is greater opportunity to live within walking distance of a bus stop; there is less opportunity within Parksville or Qualicum Beach. Finally, there are limited transit services within electoral areas.

### 7.7.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The data do not reflect the reasons why people who live close to a bus stop do not choose to take public transportation. Reasons may include the frequency of transit service, length of time to travel to destination via transit, location of destination in relation to transit route, number of bus transfers required, comfort, and perceptions regarding safety.

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<sup>27</sup> Murray's data do not indicate the location of residents, whether inside or outside of the urban containment boundaries.



- There is only one year's data, so it is impossible to determine a trend.
- Data may be limited by the lack of information on the number of bus stops within the urban containment boundaries, and if that changes over time. If the number of bus stops is reduced, it may reduce the number of residents living in close proximity to a bus stop.
- Data do not include evidence of the difference in people's willingness to walk to bus stops if the distance is less than 400 m, 400 m or greater than 400 m.

### 7.7.6 Assessment

The majority of residents within the urban containment boundary live within 400 metres of a bus stop. Since there are no multi-year data, it is impossible to determine if there is an increasing or decreasing trend. Although with the recent increase in residential construction within the RDN, it is presumed that this indicator will progress towards its target unless the number of bus stops is reduced. Until another set of data are present, it is not possible to accurately assess the region's movement towards or away from sustainability.

Grade: \*\*

Trend: Uncertain

Indicator: Residents Inside Urban Containment Boundaries Within Walking Distance of a Bus Stop

Rationale: There are an increasing number of residents within walking distance of bus stops; however, there are no data regarding change in proportion of residents within the urban containment boundaries.

## 7.8 VEHICLES PER HOUSEHOLD

### 7.8.1 What does this indicator tell us?

This indicator describes the average number of vehicles owned per RDN household.

### 7.8.2 Why is this indicator important to our sustainability?

The average number of vehicles per household is directly related to the number of vehicles on the road, thus contributing information regarding energy use, air pollution, and motor vehicle accidents. Vehicles utilize several imported non-renewable energy sources, such as gasoline, diesel and oil, for their operation. Using this type of energy is unsustainable, as these products are non-renewable.

Personal automobile use contributes to air pollution and non-point source soil and water pollution, which affects human health as well as the environment. According to the BC Lung Association (2002), "while air quality has improved in some areas – due to less

industry and better pollution controls on cars – the growing rate of vehicle purchases and kilometres driven are leading to declining air quality in large cities in Canada and across the world.” The Government of Canada also states, “transportation is the single largest source of GHG [Greenhouse Gas] emissions in Canada, accounting for about 25percent of Canada’s total emissions in 1997. The sector also accounted for the largest share of the growth of emission between 1990 and 1997.” Emissions also contribute to ground level ozone and fine particulate matter (PM<sub>2.5</sub>).

Reduced air quality has significant health impacts. The Chief Medical Officer for Vancouver and Richmond states “15-150 people die every year in the Lower Mainland from air pollution” (CBC British Columbia News Online, 2001). In addition, the number of vehicles is related to the number of motor vehicle accidents. The Sightline Institute has released a report stating that people who walk are more fit and less likely to die in a motor vehicle accident. According to Skelton (2006), “people who live in high-density core cities are significantly healthier than residents of sprawling suburbs.” He suggests that this is due to the extra time that suburbanites spend in their cars makes them more obese and increases their risk of chronic disease.

The number of vehicles also contributes to increased road congestion, increased travel times and increased infrastructure costs to build and maintain road networks, generally leading to a decreased quality of life. The development and maintenance of infrastructure, including roads and parking structures, to support an increasing number of vehicles represents a significant economic investment that will compete with other societal priorities. Therefore, the reduction of vehicles may allow a shift in funding priorities.

### 7.8.3 Where do we want to go?

The RDN’s Regional Growth Strategy has two goals that support this indicator:

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

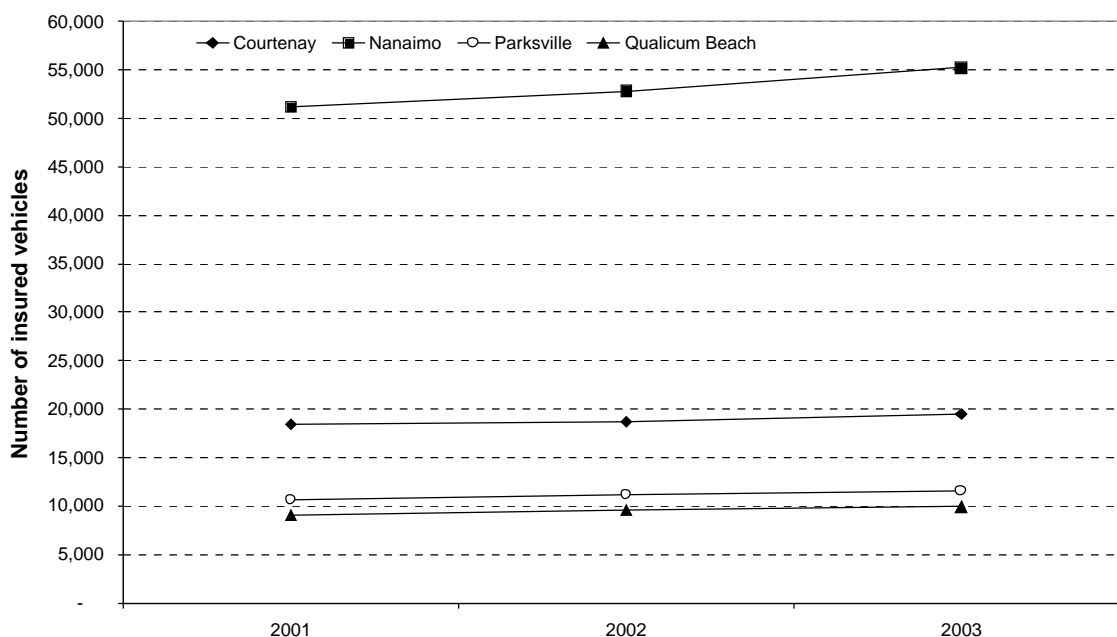
Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

The sustainability target is to reduce the average number of vehicles per household.

### 7.8.4 Where are we right now?

The region and its communities have experienced an increase in population size, number of households and number of vehicles. The next figure describes the increase of vehicles in each community as an overall trend in the RDN. The number of insured vehicles increased in Nanaimo, Parksville and Qualicum Beach from a combined total of 70,886 vehicles in 2001 to 76,747 vehicles in 2003.

**FIGURE 36 - TOTAL NUMBER OF INSURED VEHICLES PER COMMUNITY (2001-2003)**

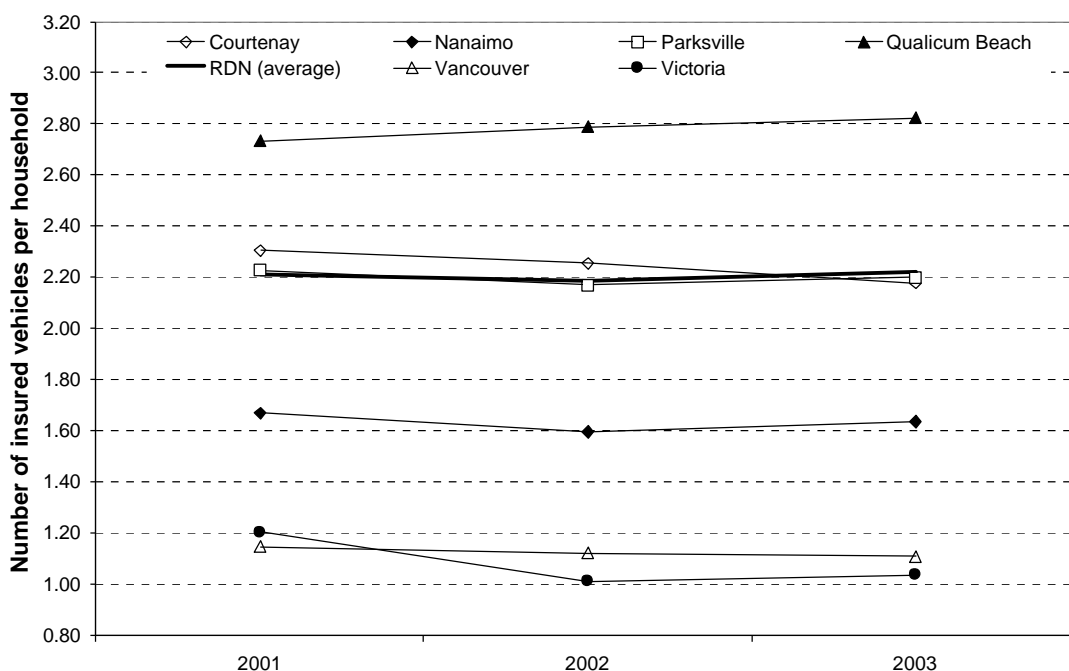


\*Includes commercial vehicles, passenger vehicles, motorcycles, and motor homes

Source: Insurance Corporation of British Columbia

The number of insured vehicles per household increased slightly in the RDN between 2001 and 2003, from 2.21 to 2.22 vehicles per household. The greatest number of insured vehicles per household was in Qualicum Beach with an increase from 2.73 in 2001 to 2.82 in 2003. Besides Qualicum Beach, each of the urban centres has shown a decline in the number of insured vehicles per household during this period. Vancouver and Victoria have significantly fewer vehicles per household than the RDN.

**FIGURE 37 - NUMBER OF INSURED VEHICLES PER HOUSEHOLD (2001 – 2003)**



\*includes commercial vehicles, passenger vehicles, motorcycles, and motor homes  
Source: Insurance Corporation of British Columbia, Statistics Canada

As a part of a current RDN project to develop a greenhouse gas emissions reduction plan, a calculation was performed using the number of insured vehicles in the region and estimated number of vehicle kilometres traveled in the region. These data indicate that there are 82,287 vehicles registered in the Regional District of Nanaimo in 2002. According to Hyla (2006) vehicle travel was responsible for 63 percent of the greenhouse gas emissions in the region in 2002.

### 7.8.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Data do not reflect the amount that a vehicle is driven in comparison to other vehicles in the same household.
- Data do not differentiate between domestic, commercial and recreational vehicles.
- Data do not differentiate between the amount of energy consumed or pollution emitted that may differ between types of vehicle. For instance a motor home will consume more non-renewable resources per kilometre than a motorcycle.
- Data were only available for the three primary communities of Nanaimo, Qualicum Beach and Parksville, and not the RDN as a whole.
- Data for insured vehicles represent vehicles that were insured in municipalities, although the vehicle owners may reside outside of that municipality. For the purpose of this indicator, it is assumed that individuals living in these urban centres operate vehicles insured in these locations. This may impact some data shown here. For example, Qualicum Beach's data may include vehicles outside of the municipality.
- Data do not reflect the reasons for driving. One such reason may be safety. It may not be perceived as safe to walk or cycle to a certain destination, based on the location or the time of travel. For instance, many school children are driven to school even though their homes are within walking distance to schools; they are driven based on fear of abduction.
- Data do not reflect the impact of institutional decisions on the RDN. For instance, the school district's decision to increase the cost of providing buses for school children may provide incentive for parents to drive their children to school instead of take the bus, if the costs are similar.
- The number of vehicles per household data may be skewed if secondary suites or boarders are not separated from the primary household.

### 7.8.6 Assessment

Although there are no direct regional or provincial comparisons of the number of vehicles per household, the data suggest that the municipalities within the region have a higher number of insured vehicles per household. As well, there has been an increase in the number of vehicles in the region, and a slight increase in the number of vehicles per household. The increasing number of vehicles impacts the region's environment, economy and society. This indicates a movement away from sustainability.

Grade: \*                      Trend: Getting Worse

Indicator:    Vehicles per Household

Rationale:    The number of vehicles per household is increasing in the region.

## 7.9 SUMMARY

### Amount of Electricity and Natural Gas Consumed

- The region's total electricity consumption increased from 1.12 billion kWh in 1994 to 1.38 billion kWh in 2004, an increase of 19 percent.
- Residential electricity consumption increased from 705 million kWh in 1994 to 851 million kWh in 2004, an increase of 17 percent.
- Commercial electricity consumption increased from 421 million kWh in 1994 to 531 million kWh in 2004, an increase of 21 percent.
- Per capita consumption increased from 9,137 kWh in 1994 to 10,078 kWh in 2004, an increase of nine percent.
- The region's total natural gas consumption increased from 2.08 million GJ in 2003 to 2.38 million GJ in 2004, an increase of 14 percent.
- Natural gas consumption increased by eight percent per customer per day between 2003 and 2004.

### Greenhouse Gas Emissions:

- In 2002, an estimated total amount of community greenhouse gas emissions was 667,769 tonnes. Of this, 63 percent or 422,929 tonnes were emitted from transportation sources.
- In 2002, the community emissions per capita were 4.98 tonnes.

### Mode of Transportation to Work and Location of Work:

- In 2001, 88 percent of RDN residents commute to work in private vehicles (as driver or passenger), which exceeds the provincial average of 82 percent.
- Eight percent of RDN residents walk or cycle to work.
- Two percent of RDN residents use public transit; this is less than the provincial average.
- There is an increasing reliance on vehicles for commuting to work.

- The RDN has more employed residents who live and work in the same census subdivision and at home than the provincial average.

#### Bus Rides Per Capita

- In 1998, there were 1.5 million bus rides in the RDN; this increased by 45 percent to 2.2 million in 2004.
- Ridership increased by 39 percent per capita between 1998 and 2004.

#### Residences within Walking Distance of Amenities

- Between 2000 and 2005, the percent of residences within walking distance of schools, retail and services increased; there was a decrease in number of residences within walking distance to green space and recreation.
- Overall increase in percent of residences within 400 m of multiple amenities between 2000 and 2005.

#### Residents Inside Urban Containment Boundaries Living Within Walking Distance of a Bus Stop

- In 2001, 89 percent or 80,407 RDN residents within the UCB lived within walking distance of a bus stop.
- In 2005, 94,900 residents lived within walking distance (i.e., 400 m) of a bus stop (although it was not clear what portion of those residents lived within the UCB).
- There are 12 transit routes in the City of Nanaimo and three transit routes servicing Parksville-Qualicum Beach. There are limited transit services within electoral areas.

#### Vehicles per Household

- Between 2001 and 2003, there was an increase in the number of vehicles in each municipality in the RDN.
- There was a slight increase in the average number of vehicles per household, from 2.21 in 2001 to 2.22 in 2003; compared to Vancouver and Victoria of less than 1.11 vehicles per household.
- It is estimated that vehicle travel accounts for 63 percent of the greenhouse gas emissions in the region.

## 8.0 LAND AND RESOURCES ARE EFFICIENTLY USED, AND NEGATIVE IMPACTS OF LAND USE AND DEVELOPMENT ARE MINIMIZED

### 8.1 INTRODUCTION

A characteristic of a sustainable region is that land and resources are efficiently used, and negative impacts of land use and development are minimized. Two indicators provide information on this characteristic:

- Population growth and density, and amount of land in urban containment boundaries; and
- Amount of land outside urban containment boundaries that may be subdivided into parcels smaller than 4 or 10 hectares.

The indicators describe the amount and location of population growth, the population density in designated and non-designated growth areas, and the potential for increased density in areas not designated for growth.

### 8.2 POPULATION GROWTH AND DENSITY, AND AMOUNT OF LAND IN URBAN CONTAINMENT BOUNDARIES

#### 8.2.1 What does this indicator tell us?

This indicator describes population growth and population density per land designation. Population growth describes how fast the population size is changing. Population density is the concentration of human population in reference to space, or in this case, designated growth and non-growth areas. According to the RDN's Regional Growth Strategy, designated growth areas are located within the urban containment boundary and areas not designated for growth are areas outside the urban containment boundary. Therefore, the population density within designated growth areas identifies the degree of urbanization.

According to the RDN (2003: 23), an urban containment boundary is defined as "a line that defines urban versus rural areas. The urban containment boundary is intended to control urban sprawl and to encourage the development of compact, complete communities. The intention is not necessarily to develop all land inside the urban containment boundary; it is also important to retain areas of green space inside the urban containment boundary."

The urban containment boundary includes:

- Bowser Village Centre;
- Qualicum Bay Village Centre;
- Dunsmuir Village Centre;
- Hilliers Village Centre;
- Qualicum River Estates Village Centre;



- Errington Village Centre;
- Bellevue/ Church Road Rural Separation Area;
- Coombs Village Centre;
- Qualicum Beach Area;
- Parksville Area;
- Red Gap Village Centre;
- Fairwinds;
- Nanaimo Area;
- Lantzville Village Centre;
- Extension Village Centre;
- Cedar Village Centre; and
- Cassidy Village Centre.

### 8.2.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability as it indicates the region's effectiveness in trying to live within the region's carrying capacity, containing sprawl, and balancing rural/ urban quality of life. Population growth is a crucial element affecting long term sustainability. "Rapid population growth can place strains on a country's capacity for handling a wide range of issues of economic, social and environmental significance, particularly when rapid population growth occurs in conjunction with poverty and lack of access to resources, or unsustainable patterns of production and consumption, or in ecologically vulnerable zones" (United Nations, 1996).

Population growth affects education, infrastructure, employment, human settlement, and use of natural resources. There are also impacts from population density. According to the United Nations (1996) "high concentration of population means more local demand for employment, housing, amenities, social security and services, and environmental infrastructure for sanitation and waste management, which may tax governments' management ability", although it may also increase efficiency in providing these services. Higher population densities generally mean increased reliance on resource imports and the export of goods, as well as environmental impacts such as solid waste disposal and emissions to air and water (United Nations, 1996). However, "urbanization is recognized as an intrinsic dimension of economic and social development... urban areas have distinctive characteristics reflecting the social fabric and density of their population, and the nature and scale of economic activities. Urbanization has profound social and economic implications that extend beyond the urban boundaries" (United Nations, 1996).

Targeting population growth in designated growth areas limits sprawl, contributes to mixed-use communities and cost effectiveness of services and infrastructure, and protects rural lifestyles, agriculture, forests and ecosystems. Compact, mixed use communities also encourage walking and cycling and, therefore, contribute to the physical health of the population and the environmental health of the region. According to Skelton (2006), "people who live in high-density core cities are significantly healthier than residents of sprawling suburbs."

### 8.2.3 Where do we want to go?

There are four RDN Regional Growth Strategy goals that pertain to this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

To achieve these goals, the Regional Growth Strategy establishes a goal of focusing the majority of new growth and development within the urban containment boundary. Therefore, a sustainable goal is to increase the population density within designated growth areas.

### 8.2.4 Where are we right now?

The population of the Regional District of Nanaimo is increasing. Table 14 illustrates the population growth over five year spans from 1971 to 2005 (estimated). Since 1971, the population of the region has increased from 48,005 to approximately 141,080 people in 2005.

Year	Population
1971	48,005
1976	61,879
1981	77,624
1986	82,714
1991	102,411
1996	121,783
2001	127,016
2005 (Estimate)	141,080

Source: Statistics Canada Censuses (for population figures for 1971 – 2001), BC Statistics “Community Facts: Nanaimo Regional District” <http://www.bcstats.gov.bc.ca/data/dd/facsheet/cf230.pdf> (for 2005 estimate).

The population growth rate in the region has fluctuated, with periods of rapid population growth interspersed by periods of more modest population growth, as shown in Table 15. The RDN experienced greater population growth than the CRD, the GVRD, and the provincial average. Specific periods of growth occurred in 1976 to 1981 and 1986 to 1996.

TABLE 15 - COMPARISON OF POPULATION GROWTH RATES (1976 – 2001)				
Census Period	RDN Growth Rate (%)	CRD Growth Rate (%)	GVRD Growth Rate (%)	BC Growth Rate (%)
1976-1981	25	8	8	12
1981-1986	8	8	10	6
1986-1991	23	12	20	12
1991-1996	21	8	20	15
1996-2001	7	1	5	5

Source: BC Statistics Population Estimates for Regional Districts as quoted in May 2001 RDN report “Demographic and Socio-economic Trends in the Regional District of Nanaimo.”

The RDN is prone to economic ‘boom and bust’ events. The economic bust of the early 1980s had a dramatic effect on the RDN, with the growth rate dropping from 25 to eight percent, while the urban centres of the CRD and GVRD were not affected at all. Economic recovery after 1986 benefited all areas, although the growth rate in the RDN again almost doubled those in the CRD and the province. During the economic downturn between 1996 and 2001, growth rates fell to their lowest point since 1976. It is expected that the period from 2001 to 2006 will indicate significant growth in the region.

Although the growth rate in the RDN has fluctuated according to economic conditions, many people are moving to the area to retire, which is independent of local economic conditions. Therefore, a strong economy coupled with migrating retirees will cause a surge in growth in the region.

Population density is greater on land in the urban containment boundary. Within the urban containment boundary<sup>28</sup>, the population density is 8.62 persons per hectare in 2001, as compared to 0.19 persons per hectare outside the urban containment boundary. In actuality, the population within the urban containment boundary decreased by

<sup>28</sup> The urban containment boundary did not exist until 1997. The figures provided for 1991 and 1996 are based on the designation of an urban containment boundary as per the 1997 Regional Growth Strategy. The figures provided for 2001 are based on the applicable urban containment boundary designation at that time.

approximately 900 people between 1996 and 2001, whereas, the population outside the urban containment boundary increased by approximately 3,900 people or 12 percent.

Table 16 reveals that population density inside and outside of the urban containment boundary is increasing. Between 1991 and 2001, the population density for land inside the urban containment boundary (which was designated in 1997) increased by 1.32 persons per hectare, compared to the population outside the urban containment boundary which increased by 0.06 persons per hectare.

TABLE 16 - POPULATION DENSITY INSIDE AND OUTSIDE THE URBAN CONTAINMENT BOUNDARY (1991 – 2001)		
Year	Inside UCB (Persons Per Hectare)	Outside UCB (Persons Per Hectare)
1991	7.30	0.13
1996	8.71	0.16
2001 <sup>29</sup>	8.62	0.19

Source: RDN, Statistics Canada, Regional Growth Strategy for Regional District of Nanaimo, 2000 Annual Report on Growth Management Plan

This may be partially due to the fact that the amount of land designated for growth, within the urban containment boundary, has fluctuated<sup>30</sup> and increased since 1991. Table 17 indicates the change in area and designation.

TABLE 17 – AREA AND POPULATION IN RELATION TO URBAN CONTAINMENT BOUNDARY				
Year	Inside Urban Containment Boundary		Outside Urban Containment Boundary	
	Area (Land & Water) (ha)	Population	Area (Land & Water) (ha)	Population
1996		NA		NA
1997	10,394		200,239	
1999	10,450		190,641	
2001	10,457	90,135	190,659	35,940
2003	10,430		190,661	

Source: RDN, Statistics Canada, Regional Growth Strategy for Regional District of Nanaimo

<sup>29</sup> Population data are for 2001, areas inside and outside of urban containment boundary taken from 2003 data.

<sup>30</sup> In 1997, the Regional Growth Strategy designated urban containment boundaries in Nanaimo, Parksville, Qualicum Beach, and Fairwinds Area. In 1999, additional urban containment boundaries were designated for each Village Centre. In 2003, small changes were made to some urban containment boundaries. In 2004 and 2005, additional properties were added to the Nanaimo urban containment boundary.

### 8.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator, including:

- The census data used for the comparison of population growth between regional districts and the province are outdated.
- The population density data are calculated using a variety of sources, which allows for some error.
- No data are provided as to the population inside and outside of the urban containment boundary for 1997, 1999 and 2003.

### 8.2.6 Assessment

Population density inside the urban containment boundary is greater than the population density outside the urban containment boundary and is increasing over time. Although the density outside of the urban containment boundary continues to grow, it will eventually plateau as the Regional Growth Strategy policies permits only a specified amount of new development on land outside the urban containment boundary. It is expected that as the development capacity of land outside the urban containment boundary diminishes, leaving only the most difficult to develop properties behind, and as the development community and residents really 'buy-in' to the positive aspects of the Regional Growth Strategy, the amount of development and redevelopment taking place on land inside the urban containment boundary will increase substantially. This projected future development is anticipated to result in more dramatic population density increases for land inside the urban containment boundary than for land outside the urban containment boundary.

At present, however, there are a few factors that affect new development on land outside the urban containment boundary. The first is that land is typically less expensive and less complicated to develop in unincorporated areas outside the urban containment boundary. Other factors include the minimum permitted parcel size allowed by the current zoning regulations, official community plan policy in place when the Regional Growth Strategy was adopted, and whether the property was in a community water service area in 2003. As a result, land outside the urban containment boundary may be developed first, or at a faster rate, than land inside the urban containment boundary leading to more rapid population growth and density increases on land outside the urban containment boundary than on land inside the urban containment boundary.

The amount of land within the designated growth areas has increased since 1991. Although increasing the areas reflects the demands for development, it also removes the area from rural resource areas, and allows for greater sprawl.

**Grade: \*\*****Trend: Getting Better**

Indicator: Population Growth & Density and Amount of Land in Urban Containment Boundaries

Rationale: Population density within the urban containment boundary is greater than outside the urban containment boundary, yet population growth is more rapid outside of the urban containment boundary.

### 8.3 AMOUNT OF LAND OUTSIDE URBAN CONTAINMENT BOUNDARIES THAT MAY BE SUBDIVIDED INTO PARCELS SMALLER THAN 4 OR 10 HECTARES

#### 8.3.1 What does this indicator tell us?

The amount of land outside of urban containment boundaries or designated industrial areas with subdivision minima of less than 4 and 10 hectares describes the potential for increased density outside of urban containment boundaries.

#### 8.3.2 Why is this indicator important to our sustainability?

A sustainable region has increased density within its urban containment boundaries, and less density outside of those boundaries. Density is a product of population concentration and residential development in an area. Areas that may be subdivided into parcels of less than four hectares will have greater density than areas subdivided into less than 10 hectare parcels. The subdivision of large tracts of land also limits or removes the potential for resource production, depending on the type of development.

#### 8.3.3 Where do we want to go?

The RDN's Regional Growth Strategy (2003) has the following goals that pertain to this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed

to address environmental or public health issues and the provision of the service will not result in additional development.

By limiting the potential for densification outside of urban containment boundaries, the region is promoting strong urban containment, protecting rural integrity and the environment, and promoting efficient service provision. Therefore, a sustainability goal is to maintain or decrease the amount of land outside of urban containment boundaries that may be subdivided into parcels smaller than four or ten hectares.

#### 8.3.4 Where are we right now?

More than half of the lands outside of urban containment boundaries that permit subdivisions less than ten hectares allow subdivisions less than four hectares in size. Of the total 41,686 hectares available for subdivision less than ten hectares, 22,974 hectares permit subdivision of less than four hectares. Table 18 describes the breakdown of land outside the urban containment boundary that permit subdivisions less than four hectares in size and between four and ten hectares in size, per municipality or region.

TABLE 18 - AMOUNT OF LAND OUTSIDE URBAN CONTAINMENT BOUNDARIES THAT MAY BE SUBDIVIDED INTO PARCELS SMALLER THAN 4 OR 10 HECTARES (2005 <sup>31</sup> )					
Subdivision Minima	RDN & Lantzville (ha)	Parksville (ha)	Qualicum Beach (ha)	Nanaimo (ha)	Total (ha)
0-3.99 ha	20,176	99	282	2,417*	22,974
4-9.99 ha	18,712	0	0	0	18,712
TOTAL	38,888	99	282	2,417	41,686

\*Note: The area in Nanaimo includes 384 ha in Agricultural Land Reserve and 324 ha in Provincial Park.

Source: RDN GIS Department and RDN subdivision file information.

#### 8.3.5 Are there any limitations for this indicator?

The limitations for this indicator are that there are no historical data to identify changes over time and there are no data available on the total amount of land available to subdivide (greater than ten hectares), if any.

#### 8.3.6 Assessment

Of the land outside of the urban containment boundary that permits subdivision minima of less than ten hectares, the majority is available for subdivision of less than four hectares. This provides potential for increasing density outside of the urban containment boundary. There are no comparative data to assess the sustainability of this indicator, nor are there historical data provided to identify changes in the amount of land over time.

<sup>31</sup> Data collected June 2005, before the RDN Board adopted amendments to its zoning bylaw.

In February 2006 the RDN Board adopted amendments to its zoning bylaw for lands in the electoral areas to establish a larger, 50 hectare minimum parcel size for forest resource lands. The forest resource lands are primarily comprised of lands that were in the old Forest Land Reserve. Prior to the enactment of this bylaw these lands could be subdivided into parcels ranging in size from approximately 2 hectares to 20 hectares.

Data for this indicator were collected prior to this amendment; therefore, it is expected that the indicator will improve during the next assessment period.

Grade: ?

Trend: Uncertain

Indicator: Amount of Land Outside Urban Containment Boundaries that may be Subdivided into Parcels Smaller than 4 or 10 hectares

Rationale: There are no comparative data to assess the current sustainability of this indicator, nor is there information to provide evidence of movement towards or away from sustainability.

#### 8.4 SUMMARY

##### Population Growth and Density and Amount of Land in Urban Containment Boundaries

- The regional population has nearly tripled since 1971.
- In 1971, population was 48,005; the 2001 census revealed the regional population was 127,016; recent estimates indicate the population has increased to 141,080 in 2005.
- Density has increased within the urban containment boundary, from 7.30 people per hectare in 1991 to 8.62 people per hectare in 2001, an increase of 18 percent.
- Density has increased outside the urban containment boundary, from 0.13 people per hectare in 1993 to 0.19 people per hectare in 2001, an increase of 46 percent.

##### Amount of Land Outside Urban Containment Boundaries that may be Subdivided into Parcels Smaller than 4 or 10 hectares

- In 2005, there were 22,974 hectares available for subdivision of less than four hectares outside the urban containment boundaries.
- In 2005, there were 18,712 hectares available for subdivision of less than ten hectares outside the urban containment boundaries.



## 9.0 WASTE IS MINIMIZED, TREATED AND DISPOSED USING ENVIRONMENTALLY SOUND METHODS

### 9.1 INTRODUCTION

In a sustainable RDN, waste is minimized, treated and disposed of using environmentally sound methods. The following indicators assess the minimization, treatment and disposal of waste using environmentally sound methods:

- Amount of waste to landfill, amount of waste diverted, and amount of waste recycled; and
- The quality of biosolids from wastewater treatment plants.

### 9.2 AMOUNT OF WASTE TO LANDFILL, AMOUNT OF WASTE DIVERTED, AND AMOUNT OF WASTE RECYCLED

#### 9.2.1 What does this indicator tell us?

This indicator describes how much waste is created and how it is disposed. The majority of the waste generated in the region is disposed in the region. Only recycled goods and some organic and construction/demolition wastes are sent outside of the region for processing and marketing for sale.

#### 9.2.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability for several reasons. Waste is a growing problem in British Columbia. Many landfills have reached, or are nearing, capacity and it is becoming increasingly difficult to locate new landfill locations, due to public perceptions and resistance as well as appropriate environmental conditions. As a result, several municipalities and regions have resorted to exporting their waste to other locations in the province, or even in the United States, an expensive and unsustainable practice. In addition, landfills are a significant source of greenhouse gas. As well, it is expensive to manage waste. Costs include purchasing land, constructing facilities, operating and closing facilities, waste collection and transportation, environmental monitoring, labour and administration. Hidden costs include lost resources that are disposed (rather than recycled or reused) and replaced with new materials. Therefore, the amount of waste sent to the landfill directly impacts the landfill's lifespan, the amount of greenhouse gases emitted and the life-cycle economic costs to locate, prepare, service and close a landfill.

The amount of waste diverted from a landfill to composting or recycling indicates the region's effort to minimize the amount of waste entering the landfill and to divert the waste to more appropriate methods of disposal. Waste composting programs can return valuable nutrients and fibre to our soils and reduce the need for chemical fertilizers. The amount of waste recycled indicates the amount of waste that may be processed and re-used, which ultimately reduces the demand on non-renewable resources such as plastics and metals.

To be truly sustainable, a community should process its waste within its boundaries.

### 9.2.3 Where do we want to go?

The RDN's Regional Growth Strategy has two goals that support this indicator.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

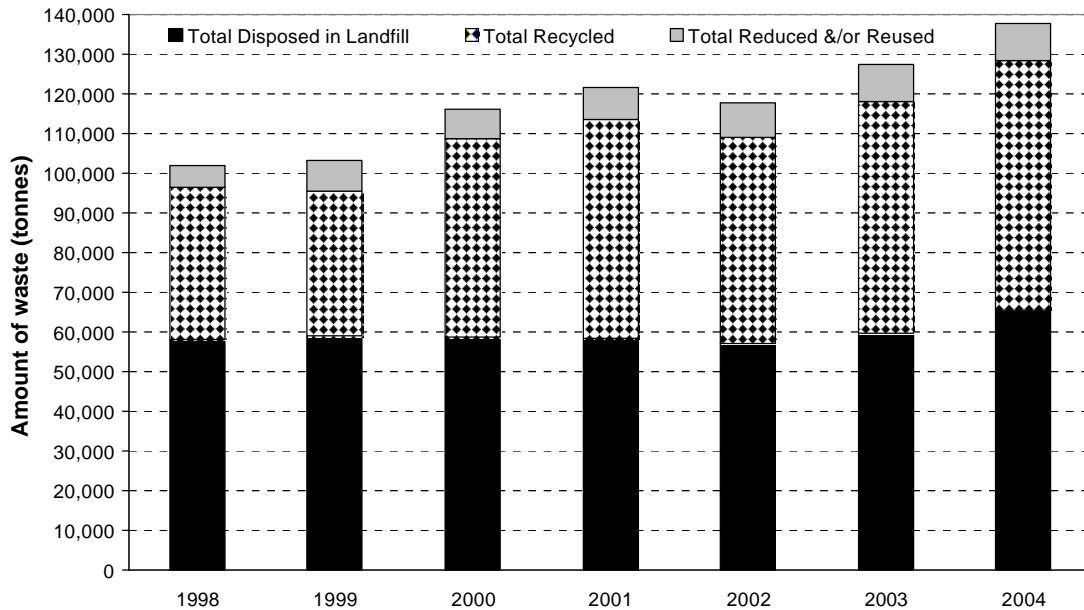
Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

Specifically, the RDN's Zero Waste Plan specifies diverting 75 percent of the solid waste through redesign, reduction, reuse, repair, reclaiming, recycling, composting and other activities. In essence, this goal requires a reduction in the amount of waste sent to the landfill. Reducing the amount of waste generated, increasing the amount of waste diverted from the landfill, and/or increasing the amount of waste recycled can accomplish this.

### 9.2.4 Where are we right now?

Since 1998, the total amount of waste (in tonnes) generated in the region has increased by 27 percent from 101,795 tonnes in 1998 to 137,826 tonnes in 2004. In comparison, the total amount of waste disposed to the landfill in the RDN has increased by 13 percent from 58,057 tonnes in 1998 to 65,666 tonnes in 2004. The total amount of waste recycled increased 63 percent, from 38,362 tonnes in 1998 to 62,762 tonnes in 2004. The total amount of waste reduced and/or reused increased by 75 percent, from 5,376 tonnes in 1998 to 9,398 tonnes in 2004. Figure 38 illustrates the changes over time.

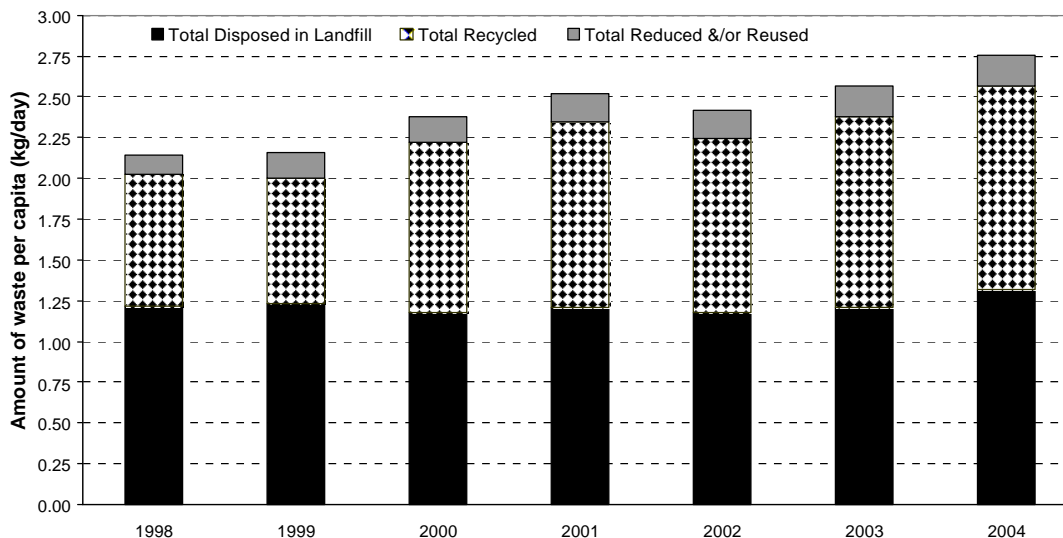
**FIGURE 38 - TOTAL AMOUNT OF WASTE DISPOSED, RECYCLED AND REDUCED/ REUSED IN THE RDN (1998 - 2004)**



Source: RDN (2004)

The amount of waste generated per person per day in the RDN increased by nearly 29 percent from 1998 to 2004. Figure 39 illustrates the total amount of waste generated and the amount disposed, recycled, reduced/reused per person in the RDN. While the amount of waste disposed in the landfill per person increased by eight percent, from 1.22 kg/day in 1998 to 1.32 kg/day in 2004; the majority of the increased waste was recycled, an increase of 54 percent from 0.81 kg/day to 1.25 kg/day. Similarly, the amount of waste reduced or reused also increased by nearly 73 percent from 0.11 kg/day to 0.19 kg/day. However, the volume of waste entering the landfill still needs to be reduced.

FIGURE 39 - AMOUNT OF WASTE DISPOSED, RECYCLED AND REDUCED/ REUSED PER CAPITA IN THE RDN  
(1998 - 2004)



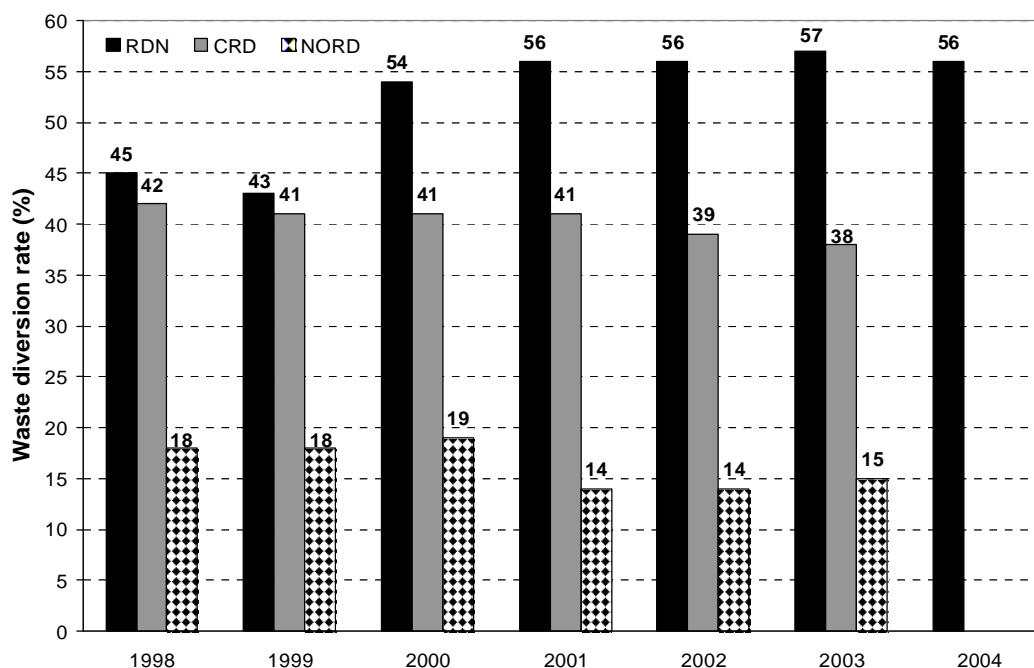
Source: RDN (2004)

The diversion rate increased between 1998 and 2001, but remained relatively steady from 2001 until 2004. The total amount of waste diverted from the landfill through recycling, reduction and reuse<sup>32</sup> programs increased 65 percent, from 43,776 tonnes in 1998 to 72,206 tonnes in 2004.

Figure 40 illustrates the RDN's improved diversion rate and compares it to the Capital Regional District and North Okanagan Regional District's diversion rates. While the RDN's diversion rate continues to increase, the other two regional districts have a decreasing diversion rate.

<sup>32</sup> Reduction and reuse programs are activities that remove materials before they enter the formal recycling and disposal systems. In this sense, materials managed through reduction and reuse activities are never 'generated' and are, therefore, not directly recorded by solid waste tracking systems.

FIGURE 40 – COMPARISON OF WASTE DIVERSION RATES\* (1998 – 2004)



\*Note: Waste diversion rate = total waste diverted/ total waste generated.

Source: RDN (2004), CRD (2003) and NORD (2003)

The RDN can attribute the increasing diversion rates to its Zero Waste program that includes disposal bans on cardboard, paper, tires, metals and drywall, residential curbside garbage and recycling collection, yard waste composting, recycling at RDN disposal facilities, education and illegal dumping programs (Regional District of Nanaimo, 2006).

### 9.2.5 Are there any limitations for this indicator?

There are two limitations for this indicator. Although tonnages of waste disposed at RDN disposal facilities is accurate, the tonnage of waste recycled from the private sector is limited to those companies that agree to provide data. Furthermore, not all waste generated is delivered to RDN disposal facilities. A significant amount of demolition, construction and landclearing waste may be going to facilities outside of RDN boundaries. However with the adoption of the Waste Stream Management Licensing Bylaw in 2005, the RDN will be regulating all waste management facilities in the region and will be receive accurate data as a condition of facility licensing.

### 9.2.6 Assessment

There is an increasing amount of waste generated in the RDN. The total and per capita amount of waste disposed at the landfill have increased slightly since 1998. However, the majority of the increasing amount of waste is increasingly diverted from the landfill and either recycled or reduced/reused.

The total amount of waste disposed at the landfill is increasing in greater proportion than the per capita amount of waste disposed at the landfill. This increase is due to population growth as well as economic growth, particularly in the new construction and renovation sectors. In order to reduce the amount of waste entering the landfill, more effort needs to be devoted to waste diversion to compensate for the increasing population base and growing economy in the region.

Although there is an increasing amount of waste to landfill, there is also an increasing amount of waste diverted and recycled. Therefore, the region is doing well, and is improving overall, especially in comparison to other regional districts.

Grade: \*\*\*

Trend: Getting Better

Indicator: Amount of Waste to Landfill, Amount of Waste Diverted, Amount of Waste Recycled

Rationale: Although there is an increasing amount of waste generated and disposed at the landfill, there is a greater increase in the amount of waste diverted and recycled.

## 9.3 QUALITY OF BIOSOLIDS FROM WASTEWATER TREATMENT PLANTS

### 9.3.1 What does this indicator tell us?

This indicator describes the effectiveness of the region's wastewater treatment plants in treating sewage. Biosolids are defined by the Government of British Columbia (2002) as "stabilized municipal sewage sludge resulting from a municipal waste water treatment process or septage treatment process which has been sufficiently treated to reduce pathogen densities and vector attraction to allow the sludge to be beneficially recycled in accordance with the requirements of this regulation." Biosolids that meet specific requirements for pathogen reduction processes, vector attraction reduction, pathogen reduction limits, quality criteria, sampling and analyses, and record keeping according to the Government of British Columbia's Organic Matter Recycling Regulation (OMRR) may be applied to land as fertilizer, in accordance with their specifications.

Arsenic, cadmium, copper, lead and mercury were chosen as parameters for this indicator because they are the heavy metals with most significance to the environment as they tend to bioaccumulate and can be poisonous at low doses.

### 9.3.2 Why is this indicator important to our sustainability?

The quality of biosolids produced from the region's wastewater treatment facility (or pollution control centres) determines if the biosolids are suitable for use as soil amendments and fertilizers for landscaping, landfill closure, and forestry. This is important to the region's sustainability in that it reduces the human impact on the environment through recycling the waste into a reusable product.

### 9.3.3 Where do we want to go?

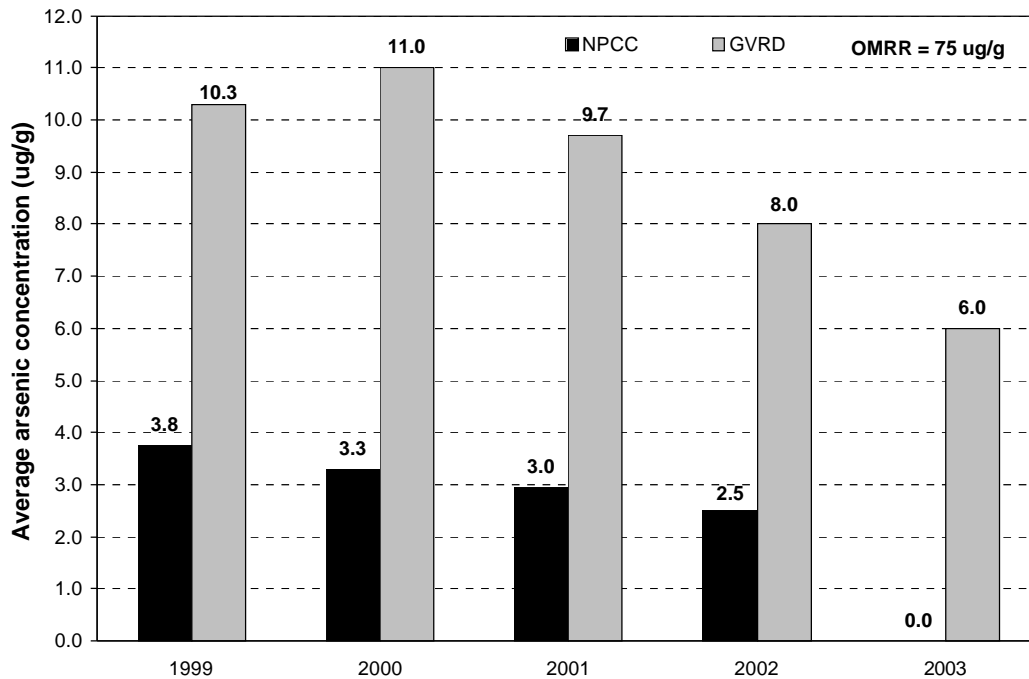
In a sustainable region, all biosolids from all wastewater treatment plants would meet the Provincial Organic Matter Recycling Regulation requirements for Class A and Class B Biosolids.

### 9.3.4 Where are we right now?

There are two pollution control centres in the region that process biosolids, the Greater Nanaimo Pollution Control Centre (NPCC) and the French Creek Pollution Control Centre (FCPCC). However, arsenic and cadmium levels are not measured at the FCPCC. Concentrations of all biosolid parameters at both centres are well within the provincial Organic Matter Recycling Regulation (OMRR) limits.

At the NPCC, biosolid arsenic concentrations have decreased since 1999 and are less than arsenic concentrations found at the Annacis Island Wastewater Treatment Plant (WWTP) in the Greater Vancouver Regional District (GVRD). Arsenic data for the FCPC are not available.

**FIGURE 41 – ARSENIC CONCENTRATIONS IN NPCC AND GVRD BIOSOLIDS (1999 – 2003)**



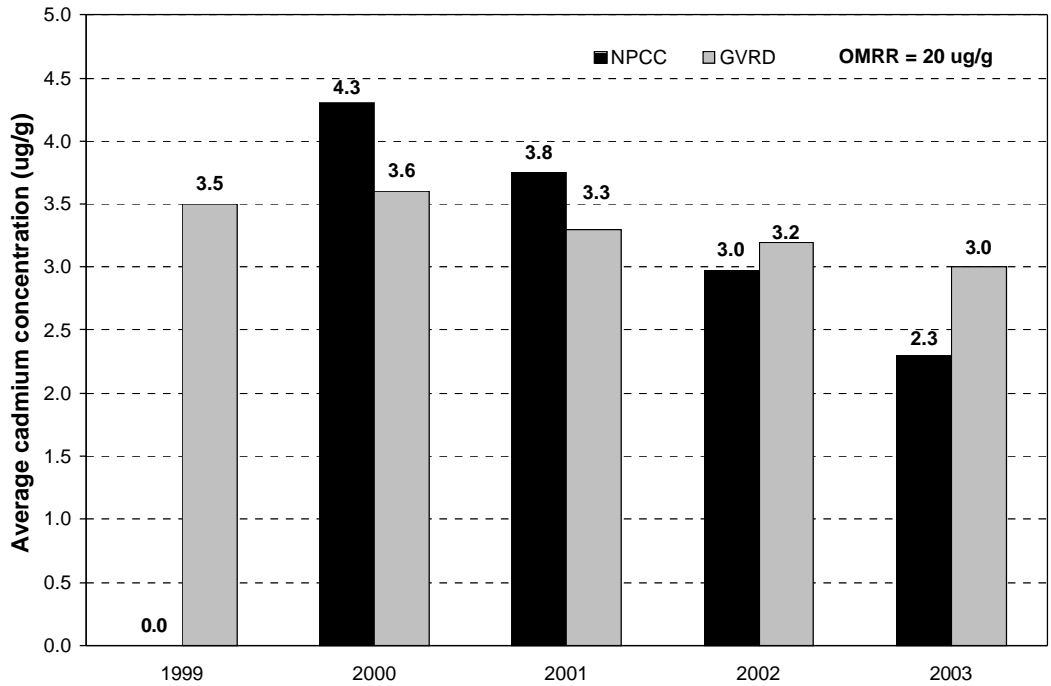
\*Note: OMRR refers to the Provincial Organic Matter Recycling Regulation requirements for specific parameters to meet requirements for Class A and Class B Biosolids.

Source: RDN, GVRD (2004)



Cadmium concentrations at the NPCC have also decreased since 2000 and are approximately the same as biosolid cadmium concentrations from the Annacis Island WWTP.

**FIGURE 42 – AVERAGE CADMIUM CONCENTRATION IN NPCC AND GVRD BIOSOLIDS(1999 – 2003)**

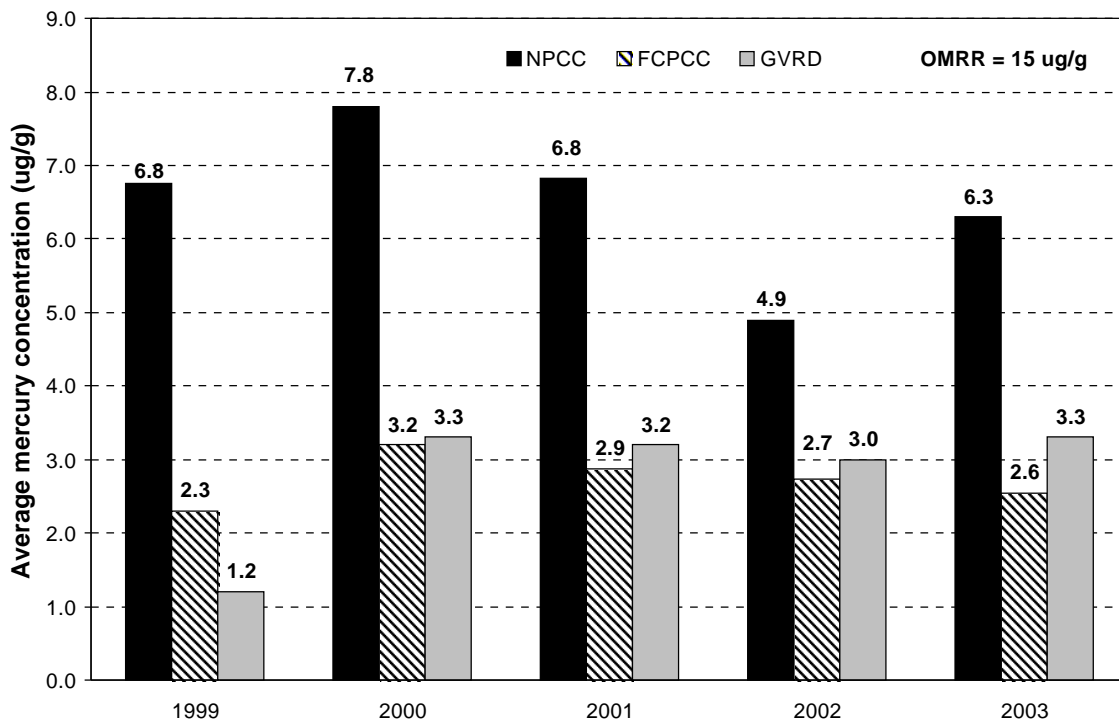


\*Note: OMRR refers to the Provincial Organic Matter Recycling Regulation requirements for specific parameters to meet requirements for Class A and Class B Biosolids.

Source: RDN, GVRD (2004)

Biosolid mercury concentrations at the NPCC have remained approximately the same since 2000, but are greater than mercury concentrations from the FCPCC and the Annacis Island WWTP. It is unknown why the concentrations are higher, but typical sources of mercury releases are waste incineration, coal combustion, base metal smelting, dental offices and the chlor-alkali industry.

**FIGURE 43 – AVERAGE MERCURY CONCENTRATIONS IN NPCC, FCPCC AND GVRD BIOSOLIDS(1999 – 2003)**

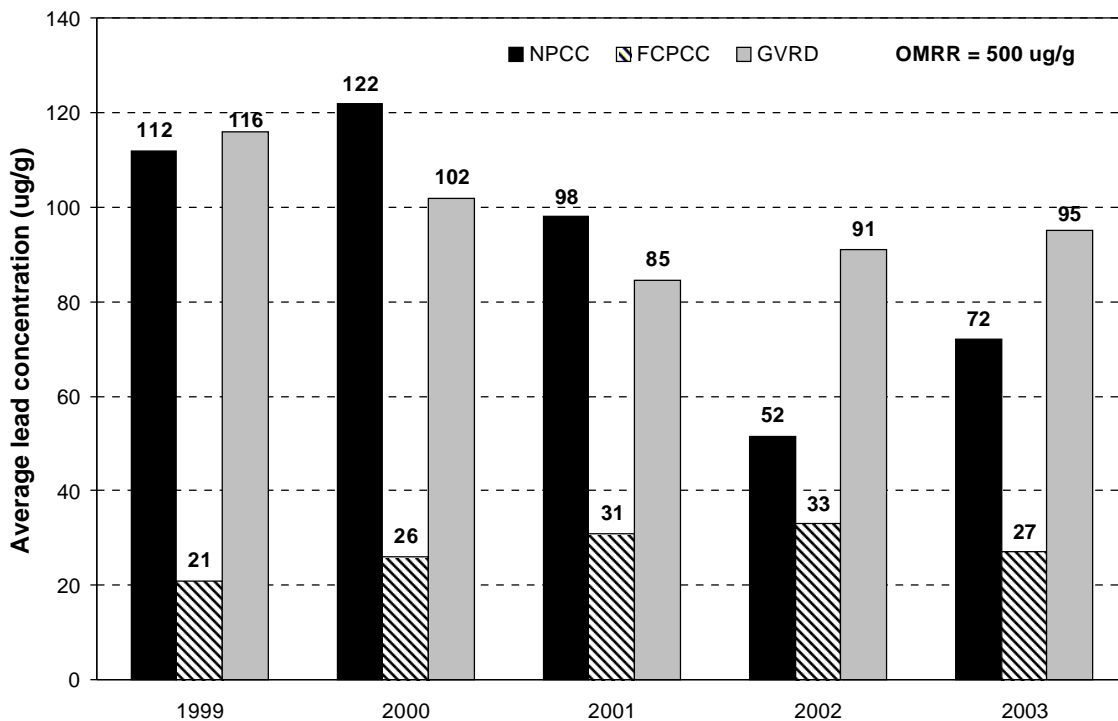


\*Note: OMRR refers to the Provincial Organic Matter Recycling Regulation requirements for specific parameters to meet requirements for Class A and Class B Biosolids.

Source: RDN, GVRD (2004)

Lead concentrations at the NPCC have decreased since 1999 and are approximately the same as lead concentrations in biosolids from the Annacis Island WWTP. Lead concentrations at the FCPCC have remained approximately the same since 1999, and are lower than the NPCC and the Annacis Island WWTP.

**FIGURE 44 – AVERAGE LEAD CONCENTRATIONS IN NPCC, FCPCC AND GVRD BIOSOLIDS (1999 – 2003)**



\*Note: OMRR refers to the Provincial Organic Matter Recycling Regulation requirements for specific parameters to meet requirements for Class A and Class B Biosolids.

Source: RDN, GVRD (2004)

**9.3.5 Are there any limitations for this indicator?**

There are several limitations for this indicator:

- This indicator does not provide information about the quality of wastewater treatment from private facilities.
- Data do not clarify the reason for the difference in property levels between the NPCC and the FCPCC.
- Nanoose and Duke Point Pollution Control Centres truck their sludge to the French Creek and Greater Nanaimo Pollution Control Centres, respectively. Therefore, the

data presented in this report are indicative of the quality of biosolids produced at all four wastewater treatment plants in the RDN.

- Data do not include parameters for pharmaceuticals, pesticides, toxins, and nutrients.
- This indicator does not measure the quality of liquid effluents from wastewater treatment plants. It is acknowledged that domestic sewage contains heavy metals, pathogens, pharmaceuticals, and nutrients, and that the best, most sustainable, method of treating contaminated wastewater is through preventing contamination of water in the first place.

### 9.3.6 Assessment

The biosolids from the Greater Nanaimo Pollution Control Centre (NPCC) and French Creek Pollution Control Centre (FCPCC) are well within the Government of British Columbia's Organic Matter Recycling Regulations. Furthermore, the NPCC has decreasing trends in arsenic, cadmium, mercury and lead, while the FCPCC has generally stable mercury levels but is increasing its lead contents. Generally, the data indicate that the region is well within stated guidelines and the majority of the parameter levels are declining in the region.

Grade: \*\*\*\*

Trend: Getting Better

Indicator: Quality of Biosolids from Wastewater Treatment Plants

Rationale: The region is well within stated guidelines and the majority of parameter levels are declining in the region.

## 9.4 SUMMARY

Amount of Waste to Landfill, Amount of Waste Diverted, and Amount of Waste Recycled

- Since 1998, waste generated in the region has increased by 27 percent from 101,795 tonnes in 1998 to 137,826 tonnes in 2004.
- Total amount of waste to landfill has also increased by 13 percent from 58,057 tonnes in 1998 to 65,666 tonnes in 2004.
- Total amount of waste recycled increased by 63 percent from 38,362 tonnes in 1998 to 62,762 tonnes in 2004.
- Total amount of waste reduced and/or recycled increased by 75 percent from 5,376 tonnes in 1998 to 9,398 tonnes in 2004.

- Per person waste generated increased by 29 percent between 1989 and 2004, due to a growing economy.
- Per person waste disposed to landfill increased by eight percent, from 1.22 kg/day in 1998 to 1.32 kg/day in 2004.
- Per person waste recycled increased by 54 percent, from 0.81 kg/day in 1998 to 1.25 kg/day in 2004.
- Per person waste reduced and/or reused increased by 73 percent from 0.11 kg/day in 1998 to 0.19 kg/day in 2004.
- There were greater waste diversion rates in the RDN compared to the CRD and NORD.

#### Quality of Biosolids from Wastewater Treatment Plants

- Concentrations of arsenic, cadmium, mercury and lead parameters are within the Province's Organic Matter Recycling Regulation (OMRR) limits.
- Arsenic (OMRR = 75 µg/g). Greater Nanaimo Pollution Control Centre (NPCC) measured 6.0 µg/g in 2003.
- Cadmium (OMRR = 20 µg/g). NPCC measured 2.3 µg/g in 2003.
- Mercury (OMRR = 15 µg/g). NPCC measured 6.3 µg/g; French Creek Pollution Control Centre (FCPCC) measured 2.6 µg/g.
- Lead (OMRR = 500 µg/g). NPCC measured 72 µg/g; FCPCC measured 27 µg/g.
- The majority of parameters measured indicate declining trends in the region.

## 10.0 ENVIRONMENTAL CAPITAL CONCLUSION

There are 27 indicators within seven sustainability characteristics that determine the region's environmental capital. Of the 27 indicators, eight are not graded (?), 15 indicators are below to slightly below comparable averages (\* or \*\*) and four indicators are above to well above comparable averages (\*\*\*) or \*\*\*\*). Of the non-graded indicators, four do not have a discernible trend, two indicate declining trends, one is stable to declining, and one indicates an improving trend. Of the 15 below average indicators, three indicate improving trends. Below average indicators occur in all but one characteristic: waste is minimized, treated and disposed using environmentally sound methods.

In the Environmental Capital section of this report, the overall grading and identification of trends was limited by lack of indicator data or lack of comparable data. It is expected that subsequent reports will be able to build upon these baseline data and indicate, more accurately, grades and trends for each indicator and sustainability characteristic.

The following table provides an overview of the assessments for all indicators.

## ENVIRONMENTAL CAPITAL PROGRESS REPORT

Characteristic	Indicator	Grade	Trend
There is a Safe, Sufficient Supply of Water	Water Consumption Trends	*	Getting Worse
	Groundwater Elevation	?	Stable to Getting Worse
	Groundwater Quality	?	Getting Worse
	Impermeable Surface Area	*	Getting Worse
	Volume of Water Extracted	*	Uncertain
	Stream Temperature	***	Stable to Getting Worse
Important Ecosystems and Ecological Features are Protected, Healthy and Productive	Water Quality in Selected Lakes and Rivers	*	Uncertain
	Amount of Land and Length of Watercourses Protected by Park or Development Permit Area Designation	?	Uncertain
The Air is Clean and Safe to Breathe	Ground Level Ozone	*	Stable
	Fine Particulate Matter (PM <sub>2.5</sub> )	?	Uncertain
All Natural Resources are Conserved, and Renewable Resources are Available in Perpetuity	Managed Forest Lands/ Resource Lands and Open Space Subdivisions	?	Getting Worse
	Current and Projected Age Class Distribution for Arrowsmith Timber Supply Area	*	Stable
	Amount of Agricultural Land Reserve (ALR)	*	Getting Worse
	Proportion of Farmland in Crops	***	Getting Better
	Sustainable Farming Practices	**	Getting Better
	Farms Reporting Sale of Organic Products	*	Uncertain

ENVIRONMENTAL CAPITAL PROGRESS REPORT			
Characteristic	Indicator	Grade	Trend
Energy Requirements are Reduced/ Energy is Obtained in Ways that Minimize Negative Impacts on the Environment and Greenhouse Gases are Minimized	Amount of Electricity and Natural Gas Consumed	*	Getting Worse
	Greenhouse Gas Emissions	?	Uncertain
	Mode of Transportation to Work, and Location of Work	*	Getting Worse
	Bus Rides Per Capita	?	Getting Better
	Residences Within Walking Distance of Amenities	*	Getting Better
	Residents Inside Urban Containment Boundaries Within Walking Distance of a Bus Stop	**	Uncertain
	Vehicles per Household	*	Getting Worse
Land and Resources are Efficiently Used, and Negative Impacts of Land Use and Development are Minimized	Population Growth and Density, and Amount of Land in Urban Containment Boundaries	**	Getting Better
	Amount of Land Outside Urban Containment Boundaries that may be Subdivided into Parcels Smaller than 4 or 10 hectares	?	Uncertain
Waste is Minimized, Treated and Disposed Using Environmentally Sound Methods	Amount of Waste to Landfill, Amount of Waste Diverted, and Amount of Waste Recycled	***	Getting Better
	Quality of Biosolids from Wastewater Treatment Plants	****	Getting Better

? – the data cannot be assessed.

\* - the region is well below average.

\*\* - the region is slightly below average.

\*\*\* - the region is meeting the average.

\*\*\*\* - the region is exceeding the average

Getting Worse - the trend indicates movements away from the goals of 'Where do we want to go?'

Stable – the trend indicates no discernible movement towards or away from the stated goal.

Getting Better – the trend indicates movement towards or exceeding the stated goal.

Uncertain – there are not enough data or historical depth to accurately identify the indicator's trend.

# SOCIAL CAPITAL



## 11.0 SOCIAL CAPITAL INTRODUCTION

Social capital, within the context of sustainability, refers to conditions that support our communities. By identifying key indicators of social capital, it is possible to understand how the social resources are developed, accessed and benefit society. According to Robert Putnam (Putnam, 2003: 3), "social capital [is] a key factor in explaining the persistence of localized economies in the face of globalization, and presents evidence that social capital is more important than income as a determinant of subjective well-being."

There is no one definition of social capital, but the primary components include citizenship, neighbourliness, social networks and civic participation. According to the United Kingdom's National Statistics (2003), "Research has shown that higher levels of social capital are associated with better health, higher educational achievement, better employment outcomes, and lower crime rates. In other words, those with extensive networks are more likely to be 'housed, healthy, hired and happy'. All of these areas are of concern to both policy-makers and community members alike."

## 12.0 RESIDENTS ARE HEALTHY, AND HEALTHCARE SERVICES AND FACILITIES ARE AVAILABLE WHEN NEEDED

### 12.1 INTRODUCTION

One of the characteristics for social capital is the residents' health and the availability of health care services when needed. In order to assess this characteristic, several indicators have been identified that provide information on:

- Birth weight;
- Life expectancy at birth;
- Live births to teenage mothers; and
- Motor vehicle accident rates.

These indicators are important because they are factors that can be influenced by prevention and therefore have an impact on the cost of medical services and the demand on the services. Healthier babies are reflected in the birth weight and the health of the newborn reflected in the life expectancy at birth. A healthy baby will place fewer demands on the medical system (e.g., healthy babies do not require incubators and special doctors or nurses with additional skills) and lower social service demands on the families to deal with the sickly babies. Motor vehicle accidents again are largely preventable and yet, when they occur they place a huge strain on the medical, emergency services and police services, along with the social services for rehabilitation, dealing with family loss and often re-education and re-training. Teen pregnancy is preventable; although some pregnancies are planned, unplanned teen live births place a heavy burden not just on the young mother, but also on society and the services. Because all of these are largely preventable through education,

community support and care and attention, they are seen as indicators of a healthy community.

A recent socio-economic index produced by BC Stats (Vancouver Island Health Authority, 2006) measures several factors including economic hardship, crime, health, education, children-at-risk and youth-at-risk. A standardized score was calculated for each local health area in the province. For comparison purposes, Table 19 reveals the results for those local health areas located on Vancouver Island only. BC Stats identified the Local Health Areas in the RDN as mediocre performing areas in the province in terms of health, children-at-risk and youth-at-risk.

TABLE 19 – LOCAL HEALTH AREA HEALTH AND AT-RISK RANKING (2004)			
Local Health Area	Health	Children-at-Risk	Youth-at-Risk
Saanich	2	1	1
Sooke	1	2	2
Gulf Islands	4	1	1
Ladysmith	1	2	2
Qualicum Beach	3	2	2
Greater Victoria	2	2	3
Courtenay	2	3	3
Cowichan	3	3	3
Vancouver Island North	3	4	3
Nanaimo	3	4	4
Campbell River / VI West	2	3	4
Lake Cowichan	4	4	4
Alberni	4	4	4

1 = Best Quartile, 4 = Worst Quartile

Source: Vancouver Island Health Authority (2006)

Healthcare services and facilities are important to the health and sustainability of the region; however, at this time, there are no indicators developed, nor information collected.

## 12.2 BIRTH WEIGHT

### 12.2.1 What does this indicator tell us?

A healthy birth weight is defined as “equal to or greater than 2,500 grams, the measurement being taken within the first hours of life, before significant postnatal weight loss has occurred” (United Nations, 1996). The indicator is measured as the number of low weight births divided by the number of live births and converted to a rate per 1,000 live births. The purpose of this indicator is to monitor the percentage of underweight newborns in a community (United Nations, 1996).

If a child is born with low birth weight, less than 2500 grams, it may reflect the mothers' health and nutritional status before, during and after pregnancy as well as other social issues such as smoking. Low birth weight is also a measure of the infant population that is disproportionately prone to perinatal and infant mortality (Natural Resources Canada, 2004). Therefore, a high proportion of low birth weight babies may indicate broader social and economic trends and demands on the medical system for the long term health of the child.

### 12.2.2 Why is this indicator important to our sustainability?

Birth weight is a basic proxy variable reflecting social and economic conditions of a community. Several factors contribute to low birth weight; factors are modifiable and/or genetic. According to Natural Resources Canada (2003), the modifiable factors that increase the risk of low birth weight include:

- Poverty;
- Single parent;
- Teenage parent;
- Little or no pre-natal care;
- Living with a violent partner;
- Generally stressful life;
- Workplace conditions;
- Types and amount of work;
- Smoking;
- Drug and alcohol use;
- Poor nutrition before and during pregnancy; and
- Limited stress relief strategies.

Therefore, a high incidence of low birth weights would imply that a number of measures are needed to have an impact on it, as low birth weight incidence is not directly actionable. Low birth weight records may provide an indication of the success of these measures.

There are also several social effects attributed to low birth weight infants. According to Statistics Canada (2000), "low birth weight is a key determinant of infant survival, health and development." Low birth weight infants generally have more health problems than healthy weight infants; in particular, low birth weight infants have a "greater risk of having a disability and for diseases such as cerebral palsy, visual problems, learning disabilities and respiratory problems" (Statistics Canada, 2000). According to Natural Resources Canada (2003), an estimated 75 percent of all newborn deaths and illnesses occur in low birth weight infants.

In addition to the effect of low birth weight on the infants, there is a corresponding effect on the families. The Ottawa Coalition for the Prevention of Low Birth Weight Babies (2005) says that “having a Low Birth Weight (LBW) baby can cause emotional, social and financial stress for families,” that “mothers of LBW babies have greater chance of having post partum depression”, “parents of LBW babies report difficulties in their marital relationship,” and “mothers of LBW babies need a longer time before returning to work and take more days off, once they have returned to work, to care for their children’s health needs.” All of these indicators have a high impact on the overall socio economic health of the community.

### 12.2.3 Where do we want to go?

One indicator of a healthy population is a decreasing proportion of babies born weighing less than 2500 grams. The BC government adopted a target of reducing the percentage of all live births weighing below 2,500 grams from the 2000 baseline of 5.1 percent (British Columbia Government, 2002).

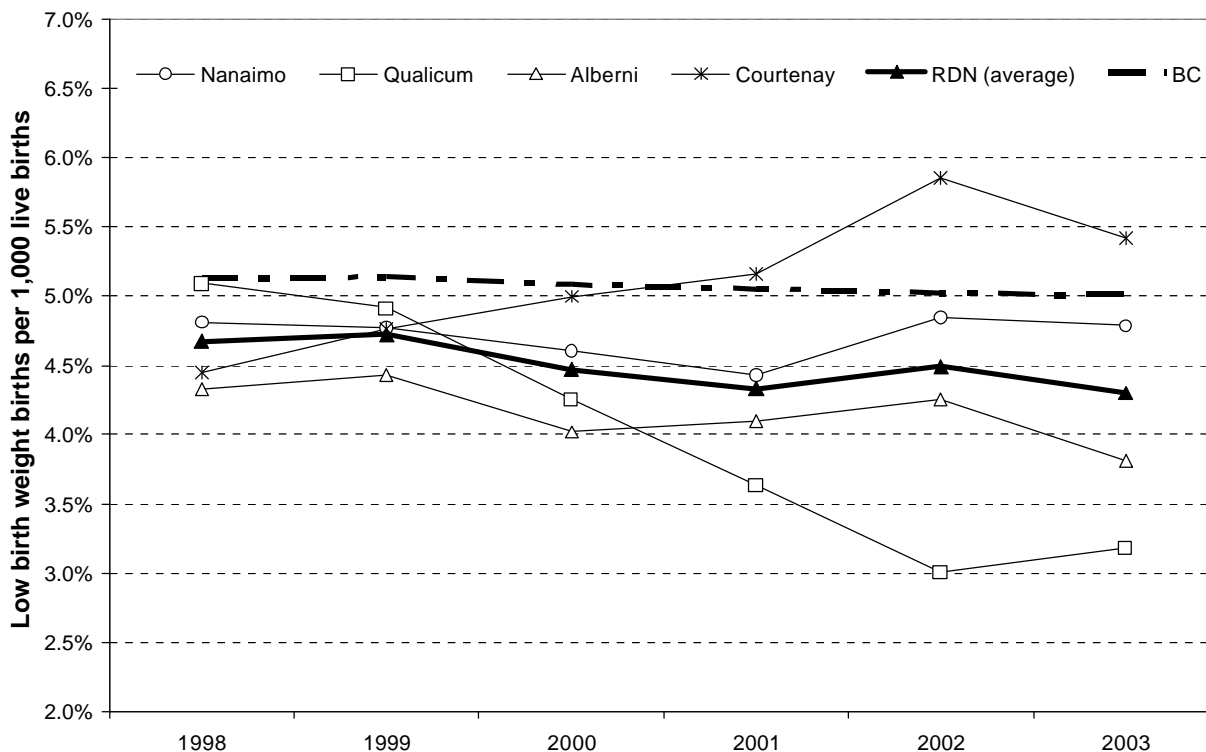
### 12.2.4 Where are we right now?

The Regional District of Nanaimo spans four Local Health Areas, Nanaimo, Qualicum, Alberni and Courtenay. The results for each Local Health Area, between 1998 and 2003, are indicated below:

- Nanaimo – Rates have remained relatively stable, and in keeping with the provincial trend, of between 45 to 49 occurrences of low birth weight per 1,000 births, or 4.5 to 4.9 percent.
- Qualicum – Rates have decreased from 50 to 32 occurrences of low birth weight per 1,000 births, or 5.0 to 3.2 percent.
- Alberni - Rates have decreased from 43 to 38 occurrences of low birth weight per 1,000 births, or 4.3 to 3.8 percent.
- Courtenay – Rates have increased from 44 to 54 occurrences of low birth weight per 1,000 births, or 4.4 to 5.4 percent.

In general, the Nanaimo, Qualicum and Alberni low birth weight rates are below the average provincial rate of 50 occurrences per 1,000 births, or 5.0 percent of births. The following figure illustrates the changes in rates over time.

**FIGURE 45 – OCCURRENCES OF LOW BIRTH WEIGHT PER LOCAL HEALTH AREA (1998 - 2003)**



\* Note: data are an average of five years (e.g., 1999 represents an average from 1994-1998)  
Source: BC Stats

**12.2.5 Are there any limitations for this indicator?**

There are no data limitations for this indicator.

**12.2.6 Assessment**

Overall, the average rate of low birth weight of all four local health areas has decreased from 46 to 43 occurrences per 1,000 women, or 4.6 to 4.3 percent. This is below the provincial average and the provincial target and indicates a decreasing trend in the occurrences of low birth weight. This would also indicate that women in the region have been able to mitigate some of the factors that cause low birth weight.

**Grade:** \*\*\***Trend:** Getting Better**Indicator:** Birth Weight**Rationale:** The rate of low birth weight in the Regional District is declining and is below the provincial average.

## 12.3 LIFE EXPECTANCY AT BIRTH

### 12.3.1 What does this indicator tell us?

Life expectancy at birth is the number of years a person is expected to live on the basis of the mortality statistics for a given observation period (Statistics Canada, 2005) or the “average number of years that a newborn could expect to live, if he or she were to pass through life subject to the age-specific death rates of a given period” (United Nations, 2001). Life expectancy is determined based on mortality statistics at the time and is a widely used health indicator, measuring the quantity of life rather than the quality of life.

### 12.3.2 Why is this indicator important to our sustainability?

Life expectancy is an indicator of health and social development (United Nations, 2001). Several factors influence life expectancy, including education, social (e.g., marital status) status, economic status (e.g., income), gender, diet, geographic location, health system performance, and environmental factors. Although individuals have control over some factors, such as geographic location and personal health, several factors are controlled through the public domain, such as environmental controls (e.g. amount of acceptable pollution) and health system performance. Life expectancy changes affect the demand for social infrastructure, such as health care, housing and education.

Increased life expectancy affects social and economic capital. Society is affected by the increased number of retirees through its burden on the ‘sandwich generation’ (people taking care of children and parents) health care system and pension plans. Other social issues appear, as women tend to outlive their male partners. Economic capital is also affected due to the increased public burden of financing the health system and pension plan for more people over longer spans of time.

### 12.3.3 Where do we want to go?

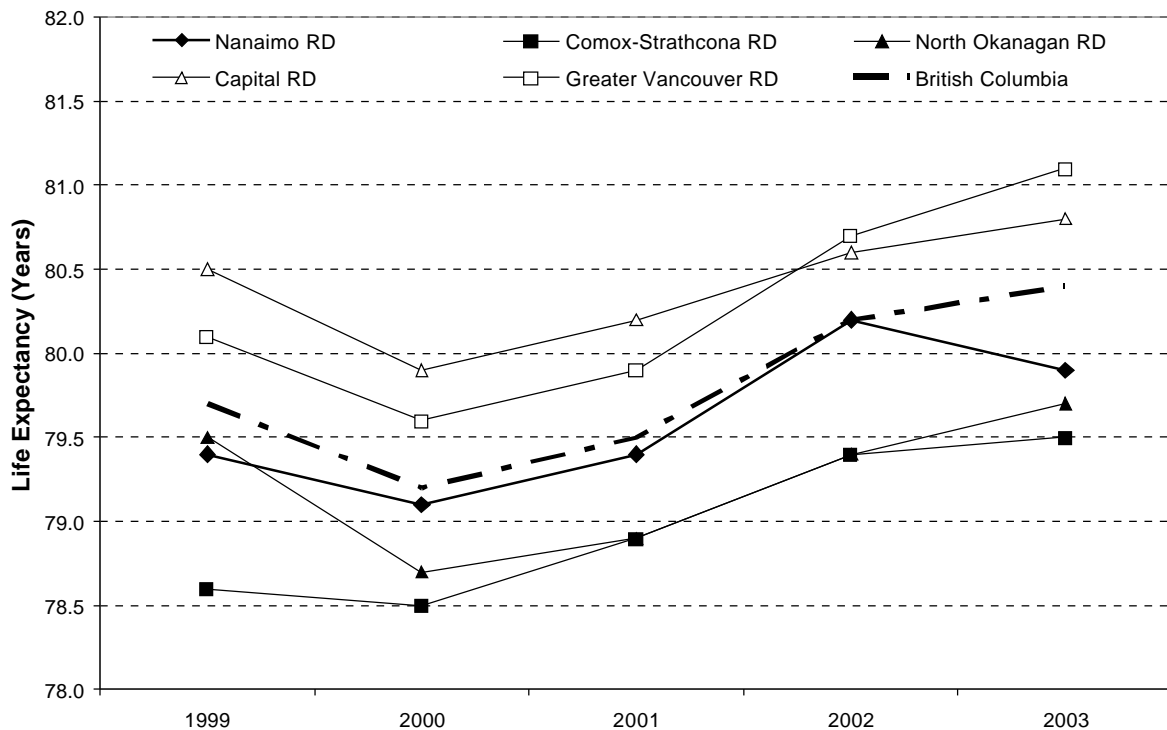
A general, worldwide target is to increase average life expectancy at birth. Historically, Canada has been achieving this target.

### 12.3.4 Where are we right now?

Between 1999 and 2003, life expectancy in the RDN increased from 79.4 years to 79.9 years, respectively. In 2002, the life expectancy at birth reached a peak of 80.25, the provincial average at that time; however, the regional rates have since diverged from the

provincial average and decreased to 79.9 years in 2003. The Regional District of Nanaimo's life expectancy at birth rate is less than the average Vancouver Island rate of 80.4<sup>33</sup> years, Vancouver Coastal rate of 82.0<sup>34</sup> years and the average provincial rate of 80.8<sup>35</sup> years (BC Stats, 2006). The following figure compares the Regional District of Nanaimo's life expectancy at birth to other regional districts and the provincial average.

**FIGURE 46 – LIFE EXPECTANCY AT BIRTH\* (1999 - 2003)**



\*Note: data are an average of five years (e.g., 1999 represents an average from 1994-1998)  
Source: BC Stats

### 12.3.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

<sup>33</sup> Average for 2001 to 2005 for both males and females.

<sup>34</sup> Average for 2001 to 2005 for both males and females.

<sup>35</sup> Average for 2001 to 2005 for both males and females.

- Life expectancy at birth does not factor in events such as wars and epidemics that may influence the life expectancy of a person.
- Data do not supply information on the quality of life, such as the presence of disease or disability within the population.
- Life expectancy at birth data cover only five years, making it difficult to accurately identify a trend.

### 12.3.6 Assessment

Although the Regional District's life expectancy decreased between 2002 and 2003, the general trend has been increasing since 1999. However, the RDN's life expectancy at birth remains below the provincial average.

Grade: \*

Trend: Getting Better

Indicator: Life Expectancy at Birth

Rationale: Average life expectancy in the Regional District is increasing, but remains below the provincial average.

## 12.4 LIVE BIRTHS TO TEENAGE MOTHERS

### 12.4.1 What does this indicator tell us?

The live birth rate to teenage mothers describes the number of live births by teenage mothers divided by the number of live births and compared and converted to a rate per 1,000 live births. Teenage mothers are defined as women aged 19 or younger. The indicator does not reflect marital status of the teenage parent.

### 12.4.2 Why is this indicator important to our sustainability?

The number of teen live births is an important indicator of the region's sustainability due to its social and economic impacts on the teen parent, their child and society. According to the Public Health Agency of Canada (2000),

teen parents are less likely to complete their education, more likely to experience isolation and homelessness, [and] less likely to develop good parenting skills... Babies of teen mothers face an increased risk of pre-term birth and low birth weight, early childhood injury and acute illness, mental health problems, and eventual involvement in the criminal justice system. Aboriginal teen mothers are more disposed to substance abuse while pregnant and are less likely to be properly nourished or to breast feed their babies. The social cost of teen pregnancy includes a higher rate of school drop-out, incarceration, poverty, child abuse, and children taken into care. All of these factors have lifelong impacts.



Teen mothers are more likely to suffer increased health risks, such as anemia, hypertension, renal disease, eclampsia and depressive disorders (Dryburgh, 2005). According to the Public Health Agency of Canada, “teenage mothers are less likely to complete their education and are more likely to have limited career and economic opportunities”.

Teen parents, in general, are often single without a partner to provide support, emotionally, socially or economically, for the child or mother. In the United States, almost 80 percent of teen parents rely on welfare. Due to their age, financial circumstance, and educational status, teen parents may not be able to provide adequate parental care for their child.

The teen’s child also faces increased risk of hardship. The babies are at increased risk of pre-term birth, low birth weights or death during infancy (Public Health Agency of Canada, 1999). When babies are born with low birth weights, they are also likely to suffer from associated illnesses, such as those listed in section 2.2 of this report. The Ministry of Health Services (2001) states, “early teenage childbearing is of particular concern, often beginning a cycle of poverty and dependence on social assistance. In addition, birth outcomes are generally poorer when the mother is a teen.” Children of teen parents are also more likely to become teen parents themselves, according to the Population Resource Center (2004).

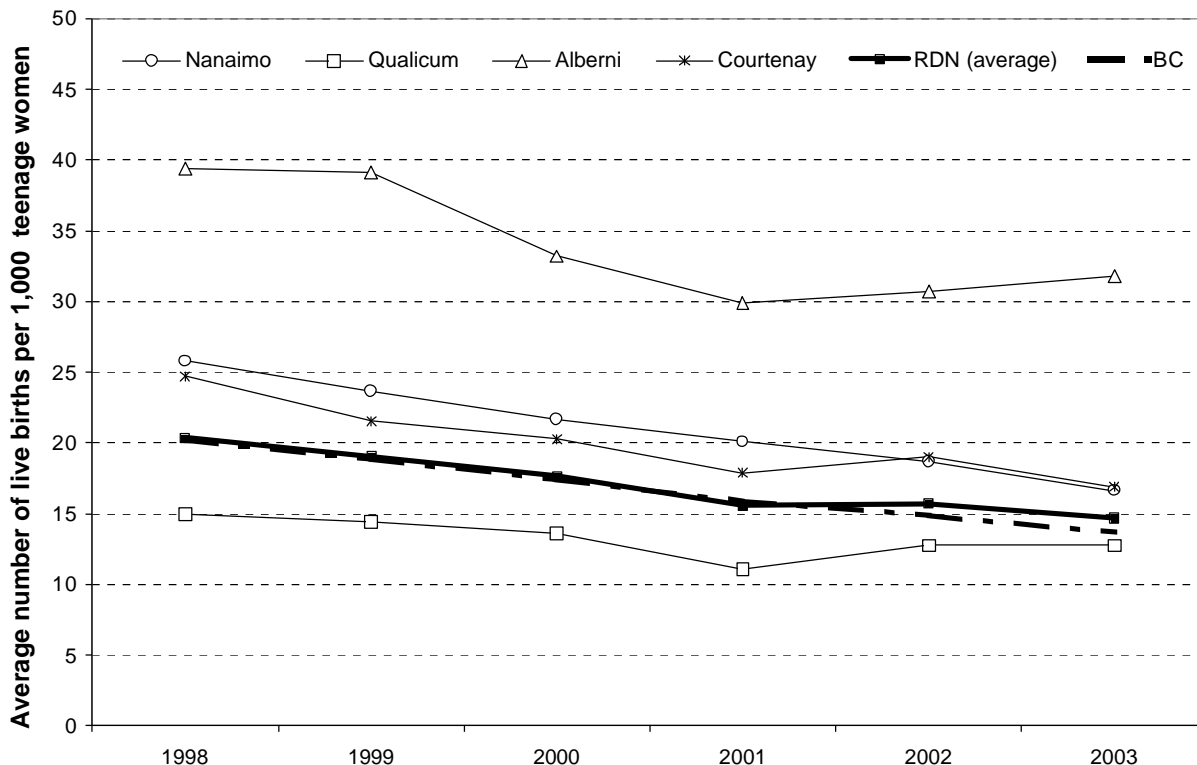
#### 12.4.3 Where do we want to go?

Due to the physical risk to teenage mothers, hardship for teenage parents, and social and health risks to children of teen parents, it is important as a society to try to reduce, and eventually eliminate, the number of teen pregnancies. In September 2000, the Public Health Agency of Canada produced Pro-Action, Postponement and Preparation/Support: A Framework for Action to Reduce the Rate of Teen Pregnancy in Canada. According to their research, “teen pregnancy prevention saves money by averting expenditures on health, welfare, and social service.” This educational program may assist young women in making better choices.

#### 12.4.4 Where are we right now?

The general trend in the RDN is a decline in teenage pregnancies; however, the average number of live births to teenage mothers in the RDN remains slightly above the provincial average. There are approximately 14.7 live births per 1,000 teenage women in the RDN; compared to a provincial average of 13.7 live births per 1,000 teenage women. Only Qualicum’s Local Health Area indicates rate below the provincial average. One factor may be the overall age structure (highest average age) of residents in the Qualicum Beach area, as compared to Port Alberni, Parksville and Nanaimo.

**FIGURE 47 – AVERAGE NUMBER OF LIVE BIRTHS PER 1,000 TEENAGE WOMEN \* (1998 – 2003)**



\*Teenage is defined as aged 15 to 19 years; Average of five years' data  
Source: BC Vital Statistics Agency; BC Stats

According to the Public Health Agency of Canada (2000), in 1995, Canada's rate was approximately 25 live births to teenage mothers, as compared with Japan and Switzerland that had an average of five live births to teenage mothers. In comparison, the United States had an average of 60 live births to teenage mothers in 1995. Dryburgh (1999) states that "During the last quarter century there has been an overall decline in the teenage pregnancy rate in Canada, perhaps reflecting the availability of contraceptives, and the increased awareness of the risks of unprotected sex brought about by the AIDS epidemic."

**12.4.5 Are there any limitations for this indicator?**

There are several limitations to the data, including:

- The data do not acknowledge the different implications that pregnancy has to a 15 year old versus a 19 year old.
- Much of the data only compare the number of live babies born to women aged 15 to 19, even though this only represents 51 percent of all pregnancies. Dryburgh (1999)

suggests “failure to accurately account for all teen pregnancies, including terminated pregnancies, may limit the interpretation of time trends and international comparisons.”

- The data do not factor in married teens that may have both social and financial support.
- The data do not factor in the number of wanted pregnancies, or the different reasons associated with that.

#### 12.4.6 Assessment

The teen pregnancy rate has decreased in the regional district since 1998 and indicates progress towards the goal of reducing unwanted teen pregnancy. However, the regional average remains slightly above the provincial average and the data indicate a recent trend of movement away from the provincial average.

**Grade: \*\***                      **Trend: Getting Better**

Indicator: Live Births to Teenage Mothers

Rationale: The teen pregnancy rate is declining in the region.

## 12.5 MOTOR VEHICLE ACCIDENT RATES

### 12.5.1 What does this indicator tell us?

The motor vehicle accident rate indicator describes the number of motor vehicle accidents<sup>36</sup> occurring within the region, including those resulting in injury or death.

### 12.5.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability due to its causes and effects. The majority of motor vehicle accidents are preventable, often caused by:

- Increased number of vehicles on roadways;
- Driver error;
- Undue care and attention;
- Drinking/ Substance abuse;

<sup>36</sup> The terms ‘accident’ and ‘crash’ are interchangeable within this report, as per a conversation with an ICBC representative on July 10, 2006. The term crash, however, is gaining in popularity in terms of use.

- Speed;
- Use of cellular phone while driving;
- Improper equipment;
- Inexperience;
- Health limitations; and/or
- Weather and road conditions.

These factors may be attributed to dependency on automobiles for transportation, urban sprawl, and social and age structure of population<sup>37</sup>.

Factors that influence changes to the number of motor vehicle accidents may include legislation, road and signage infrastructure, road maintenance, enforcement and improved automobile technology (e.g. child seats, lighting, etc).

Motor vehicle accidents negatively affect the region through:

- Social consequences related to injuries or death;
- Social and economic implications of lost wages, income, and productivity, particularly if it is a primary wage earner in a household;
- Financial cost to health system – emergency response, trauma care and rehabilitation;
- Financial cost to repair vehicles;
- Financial implications to insurance rates;
- Environmental cost to repair or dispose of parts or vehicles that are beyond repair; and
- Financial and environmental cost of purchasing a new vehicle.

There are some economic benefits to increased accidents, including business formations and growth in the automotive repair and car sales industries. However, the overall economic, environmental and social costs associated with accidents far outweigh these financial gains.

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<sup>37</sup> High traffic mortality rates are observed among young adult males (aged 15 to 34) and the socio-economically disadvantaged.

### 12.5.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

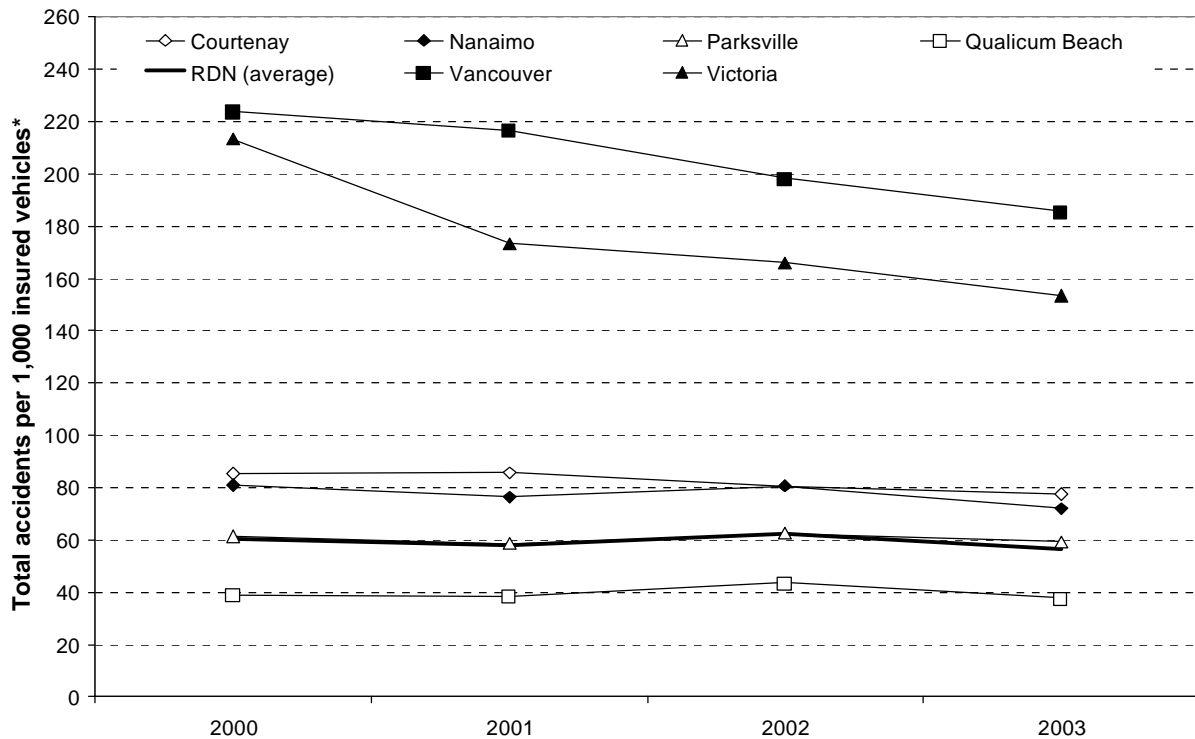
Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

A sustainability goal is to reduce the number of motor vehicle accidents. Transport Canada recently developed the Road Safety Vision 2010 – Making Canada's Roads the Safest in the World. Several strategic objectives and quantitative targets support the plan, including reduced fatalities and serious injuries associated with drinking drivers and excessive speed. According to Transport Canada (2004) "to have the safest roads in the world by 2010, Canada needs to reduce fatalities and serious injuries by 30 percent."

### 12.5.4 Where are we right now?

The number of motor vehicle accidents per 1,000 insured vehicles occurring in the region have fluctuated since 2000, but between 2002 and 2003 has declined slightly. In comparing the individual communities within the Regional District, there is almost double the number of accidents per 1,000 insured vehicles in Nanaimo compared to Qualicum Beach. Although each community within the RDN has lower accident rates than Victoria and Vancouver, Victoria and Vancouver's accident rates have shown a decline in past years, whereas the RDN's communities have remained relatively stable. An average of the RDN communities, Parksville, Nanaimo and Qualicum Beach was also prepared. The average indicates a slightly declining trend from 60.5 accidents per 1,000 insured vehicles in 2000 to 56.3 accidents per 1,000 insured vehicles in 2003; this closely follows Parksville's trend. Figure 48 illustrates the total accidents per 1,000 insured vehicles.

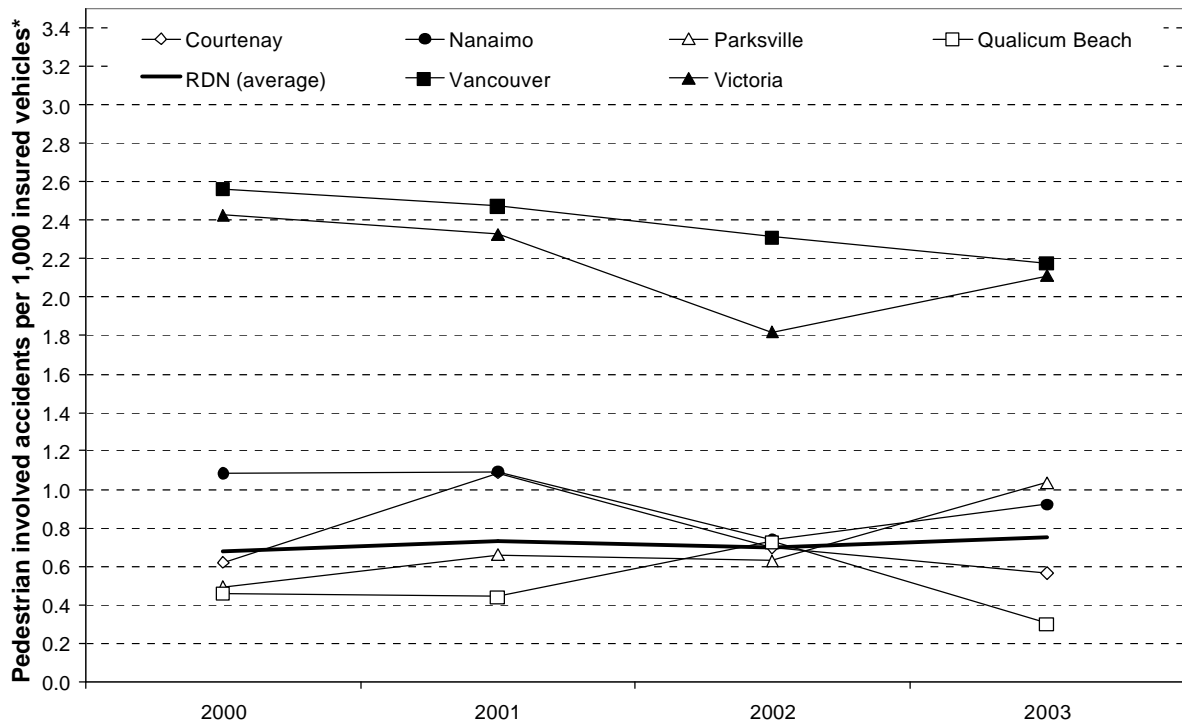
FIGURE 48 - TOTAL ACCIDENTS PER 1,000 INSURED VEHICLES\* (2000 – 2003)



\*includes commercial vehicles, passenger vehicles, motorcycles, and motor homes  
Source: ICBC

Motor vehicle accidents involving pedestrians and cyclists have increased slightly since 2000, but is much lower than in Victoria or Vancouver. Although this may be attributed to the increased volume of pedestrians and cyclists generally found in large urban centres. The total number of pedestrian related accidents in municipalities within the RDN between 2000 and 2003 ranged from 66 accidents (in 2002) to 87 accidents (in 2001) per 1,000 insured vehicles. The total number of cyclist related accidents increased from 32 accidents (2000) to 45 accidents (2003) per 1,000 insured vehicles. Some municipalities within the Regional District, such as the City of Nanaimo, have made a significant effort to create pedestrian and cyclist pathways that are separate from road traffic. This may be the reason why the number of accidents involving cyclists is lower in Nanaimo than in Parksville. The following figures illustrate the overall trends.

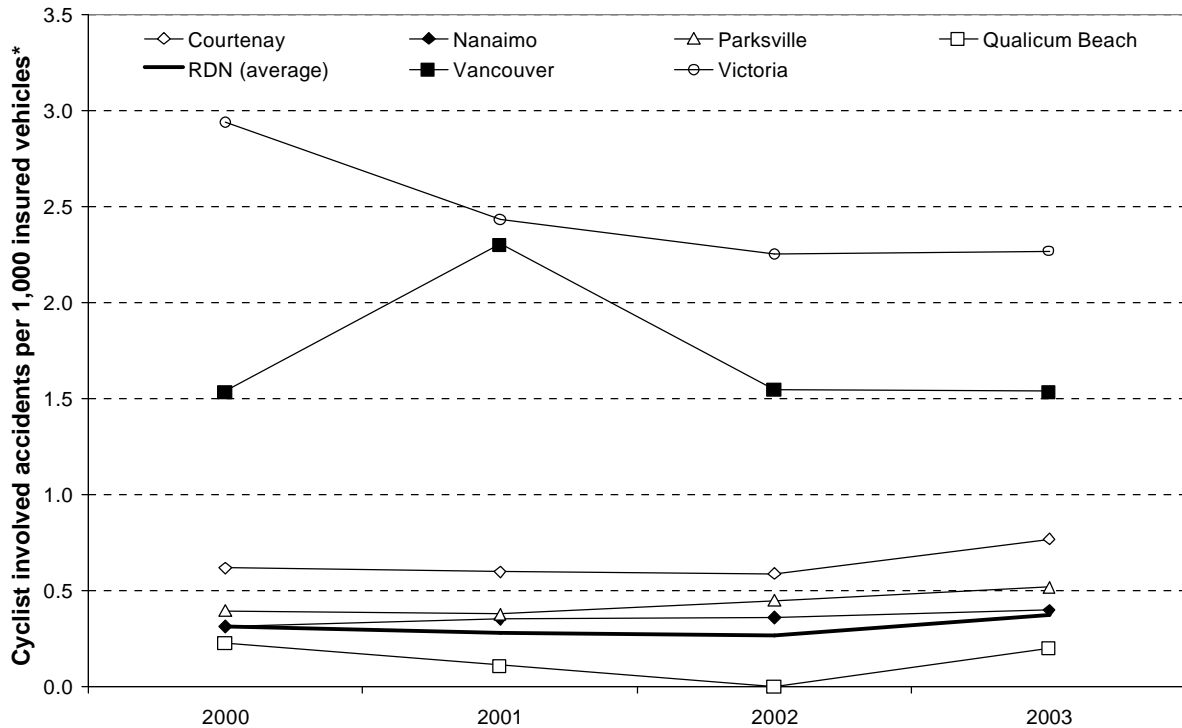
FIGURE 49 - ACCIDENTS INVOLVING PEDESTRIANS PER 1,000 INSURED VEHICLES (2000 – 2003)



\*includes commercial vehicles, passenger vehicles, motorcycles, and motor homes

Source: ICBC

FIGURE 50 - ACCIDENTS INVOLVING CYCLISTS PER 1,000 INSURED VEHICLES (2000 – 2003)



\*includes commercial vehicles, passenger vehicles, motorcycles, and motor homes  
Source: ICBC

### 12.5.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Data do not reflect the geographic size, shape (long and narrow), or topography of the region and its impact on mode of travel.
- Data were only available for the three primary communities of Nanaimo, Qualicum Beach and Parksville, and not the RDN as a whole.
- Data for insured vehicles represent vehicles that were insured in municipalities, although the vehicle owners may reside outside of that municipality. For the purpose of this indicator, it is assumed that individuals living in these urban centres operate vehicles insured in these locations. This may impact some data shown here. For example, Qualicum Beach’s data may include vehicles outside of the municipality.



### 12.5.6 Assessment

The motor vehicle accident rate has fluctuated slightly, but overall has remained relatively stable. The same may be said for the accident rate involving pedestrians and cyclists. Although the number of accidents per 1,000 insured vehicles is considerably less than Victoria and Vancouver, the fact that the rates are stable and not declining, indicate a standstill instead of progress towards improved sustainability. In order to address the rate of motor vehicle accidents, it is important to identify the cause of the accidents and then mitigate the factors.

Grade: \*\*

Trend: Stable

Indicator: Motor Vehicle Accident Rates

Rationale: The number of motor vehicle accidents is remaining relatively the same.

## 12.6 SUMMARY

### Birth Weight

- Nanaimo – Rates have remained relatively stable, and in keeping with the provincial trend, of between 45 to 49 occurrences of low birth weight per 1,000 births, or 4.5 to 4.9 percent.
- Qualicum – Rates have decreased from 50 to 32 occurrences of low birth weight per 1,000 births, or 5.0 to 3.2 percent.
- Alberni - Rates have decreased from 43 to 38 occurrences of low birth weight per 1,000 births, or 4.3 to 3.8 percent.
- Courtenay – Rates have increased from 44 to 54 occurrences of low birth weight per 1,000 births, or 4.4 to 5.4 percent.

### Life Expectancy at Birth

- Between 1999 and 2003, life expectancy in the RDN increased from 79.4 years to 79.9 years.
- The Regional District of Nanaimo's life expectancy at birth is less than the average Vancouver Island rate of 80.4 years, Vancouver Coastal rate of 82.0 years and the average provincial rate of 80.8 years.

### Live Births to Teenage Mothers

- There are approximately 14.7 live births per 1,000 teenage women in the RDN; compared to a provincial average of 13.7 live births per 1,000 teenage women.
- The rate of live births per 1,000 teenage women in the RDN is declining.

### Motor Vehicle Accident Rates

- An average of the motor vehicle accidents rates in RDN communities (Nanaimo, Parksville and Qualicum Beach) indicates a slightly declining trend from 60.5 accidents per 1,000 insured vehicles in 2000 to 56.3 accidents per 1,000 insured vehicles in 2003;
- The total number of pedestrian related accidents in municipalities within the RDN between 2000 and 2003 ranged from 66 accidents (in 2002) to 87 accidents (in 2001) per 1,000 insured vehicles.
- The total number of cyclist related accidents increased from 32 accidents (2000) to 45 accidents (2003) per 1,000 insured vehicles.

## 13.0 RESIDENTS ARE EDUCATED OR TRAINED SO THEY ARE QUALIFIED FOR EMPLOYMENT

### 13.1 INTRODUCTION

In a sustainable Regional District of Nanaimo, residents will be educated or trained so they are better qualified for a wide variety of employment opportunities. In addition, education and training usually improves wages, thereby increasing incomes and improving the region's standard of living. To help assess the education and training of Regional District of Nanaimo residents this section of the report provides information about the following indicator: educational attainment level.

A recent socio-economic index produced by BC Stats (Vancouver Island Health Authority, 2006) measures several factors including economic hardship, crime, health, education, children-at-risk and youth-at-risk. A standardized score was calculated for each local health area in the province. For comparison purposes, Table 20 reveals the results for those local health areas located on Vancouver Island only. BC Stats identified the Local Health Areas in the RDN as mediocre performing areas in the province in terms of education.

TABLE 20 – LOCAL HEALTH AREA EDUCATION RANKING (2004)	
Local Health Area	Education
Saanich	1
Sooke	2
Gulf Islands	1
Ladysmith	2
Qualicum Beach	2
Greater Victoria	1
Courtenay	2
Cowichan	1
Vancouver Island North	4
Nanaimo	3
Campbell River / VI West	3
Lake Cowichan	3
Alberni	4

1 = Best Quartile, 4 = Worst Quartile

Source: Vancouver Island Health Authority (2006)

## 13.2 EDUCATIONAL ATTAINMENT

### 13.2.1 What does this indicator tell us?

The level of educational attainment describes the highest level of school that was completed by the region's residents. It is an indicator of the human capital stock within the adult population (United Nations, 2001). According to the United Nations (2001) "those who have completed secondary education can be expected either to have an adequate set of skills relevant to the labour market or to have demonstrated the ability to acquire such skills"; thus, it may also reflect the socio-economic status of the region.

Education levels may include elementary, secondary, college or university. In general, the following categories are used to assess the indicator (Council of Ministers and Education and Statistics Canada, 2003):

- Less than high school: persons who did not graduate from high school;
- High school: high school graduates with no further education or with some post-secondary education but with no degree, certificate or diploma;
- Trade vocational: persons with a trade certificate or diploma from vocational or apprenticeship training;

- College: persons with a non-university certificate or diploma from a community college, or school of nursing<sup>38</sup>; and
- University: persons with a bachelor's degree, university degree, certificate above a bachelor's degree, or a certificate below a bachelor's degree.

The order of the categories indicates increasing time commitments to schooling. Each person is classified according to the highest level completed. This category usually measures the education of people aged 15 and over.

### 13.2.2 Why is this indicator important to our sustainability?

Educational attainment is important to the region's sustainability, in that education improves "the capacity of people to address environment and development issues. It facilitates the achievement of environmental and ethical awareness, values, and skills consistent with sustainable development and effective public participation in decision-making" (United Nations, 2001). Therefore, it is not just the ability to work, but also the ability to think and understand issues.

Educational attainment has direct impacts on the socio-economic status and health of the region's residents. Natural Resources Canada (2004) suggests that people with higher levels of education are more likely to have employment, jobs with higher social status, and stable incomes. These characteristics are also related to health. Higher levels of education "increases financial security, increases job security and satisfaction, equips people with the skills they need to identify and solve individual and group problems, increases the choices and opportunities available to people, and can unlock the innate creativity and innovation in people, and add to our collective ability to generate wealth" (Natural Resources Canada, 2004). The 1996 to 1997 National Population Health Survey illustrates the inter-relationships between education and health; people who have completed university self-rated their health status as better than people who have not completed university and a higher proportion of people in lower educational attainment categories indicated that they suffered from chronic health problems (e.g., chronic bronchitis, emphysema, heart disease, arthritis, diabetes) than people in the higher educational attainment categories (Natural Resources Canada, 2004). Higher education generally reflects that the individual can make better choices regarding nutrition, exercise, smoking and other factors that influence health.

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<sup>38</sup> There have been recent changes to nursing schools. Licensed Practical Nurses achieve their qualifications through college; whereas, Registered Nurses are required to complete a Bachelor of Science in Nursing degree from a recognized university or university-college.

### 13.2.3 Where do we want to go?

The RDN's Regional Growth Strategy has two goals that support this indicator:

**Goal 6: Vibrant and Sustainable Economy:** To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

**Goal 8: Cooperation Among Jurisdictions:** To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

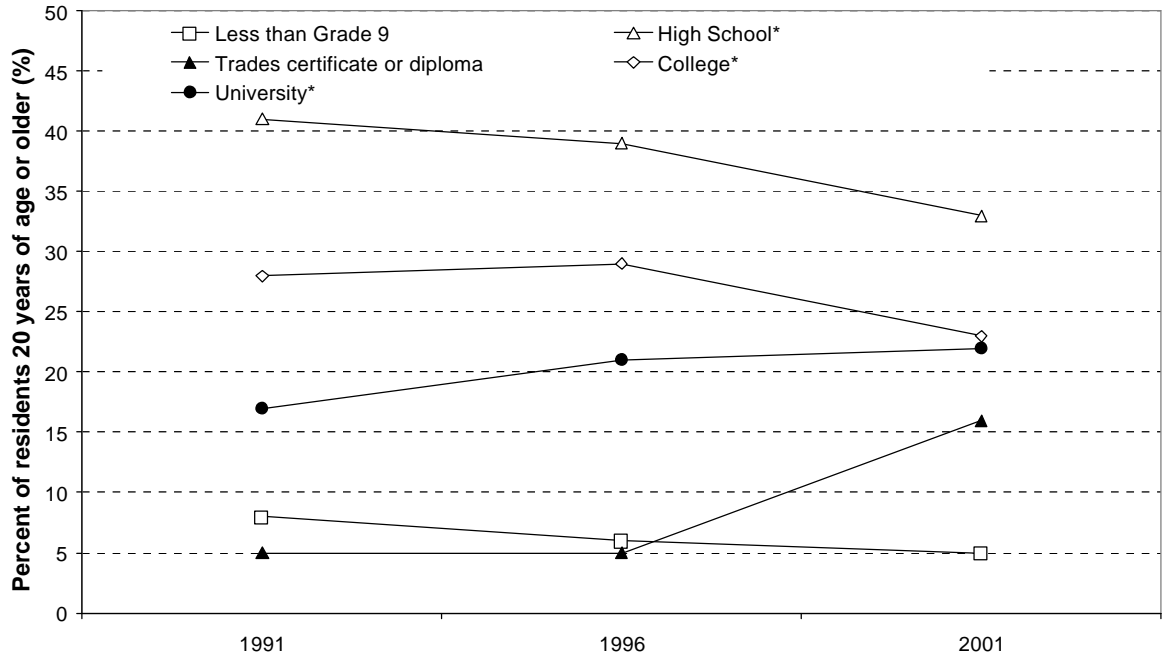
Within the region and across Canada, the goal is to increase the percentage of residents with a trade certificate, college diploma or university degree, while reducing the percentage of residents with a high school diploma or less. This increases the capacity of residents and their potential to contribute to society and the economy.

Some suggest that the educational attainment profile should 'mirror' the industry and employment structures of the economy. For example, if more jobs are generated in skilled service sectors such as plumbers and electricians, then the supply of people with trade certification and diplomas should increase to meet the demand. However, the surge in unskilled positions may also hurt the region. In the case of Alberta, many students quit high school early to work in the lucrative oil and gas industry; to many students in the RDN, the construction industry is currently an attractive alternative.

### 13.2.4 Where are we right now?

In the past few years, the region's residents have increased their educational attainment levels. The number of residents with a high school degree or less has decreased, while the number of residents with a trade certificate, diploma and university degree has increased. Since 1991, the percentage of residents with university level education has increased from 17 percent to 22 percent. This trend may reflect Malaspina's transition from a college to a university-college and the higher education level of new residents, including retirees. Malaspina issued its first degrees in 1998. The percentage of residents with trades certificates and diplomas has increased more dramatically from 1996 to 2001, from 5 percent to 16 percent. The decrease in people having, as their highest level of achievement, a high school diploma, some college, or a college degree may actually indicate a shift in students attaining a trades certificate or a university education instead; however, there is no accurate method of measuring this.

FIGURE 51 - EDUCATIONAL ATTAINMENT LEVELS IN THE REGION DISTRICT OF NANAIMO (1991 - 2001)

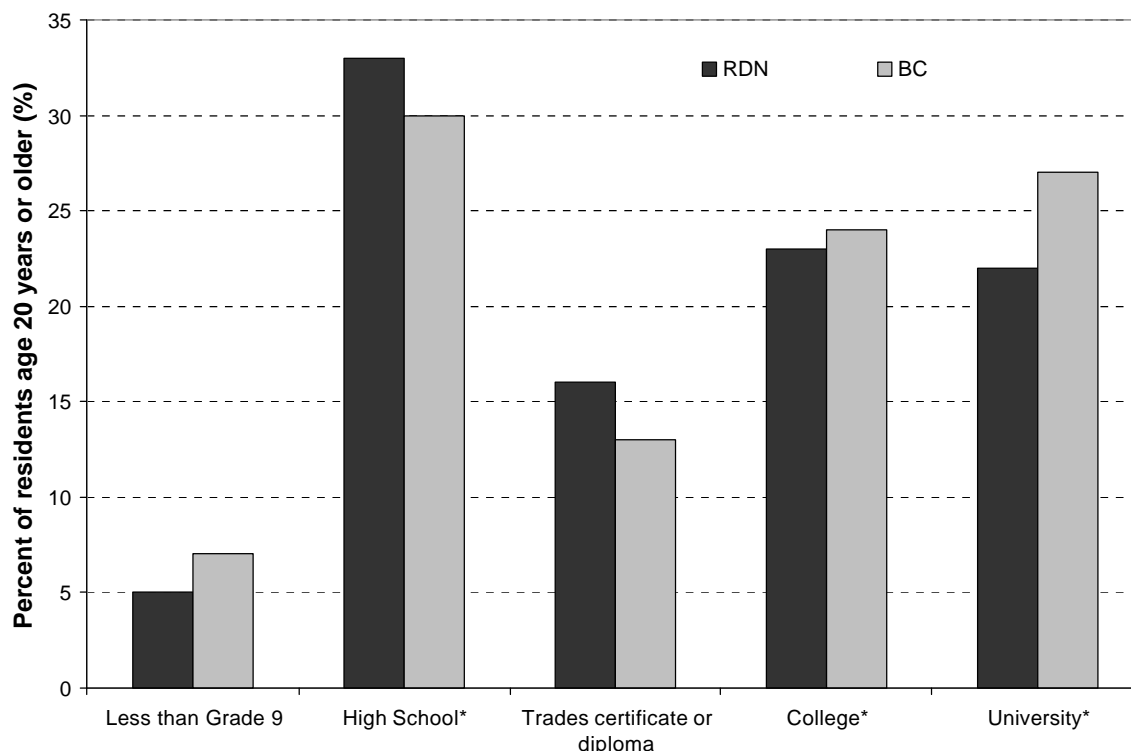


\*indicates some or completion of this level.

Source: BC Stats

The region’s residents exceed the provincial average for residents with high school and trades certificate or diploma; however, the region’s levels of university or other non-university education is below the provincial average. The following figure illustrates the comparison.

**FIGURE 52 - COMPARISON OF EDUCATIONAL ATTAINMENT LEVELS, RDN AND BC (2001)**

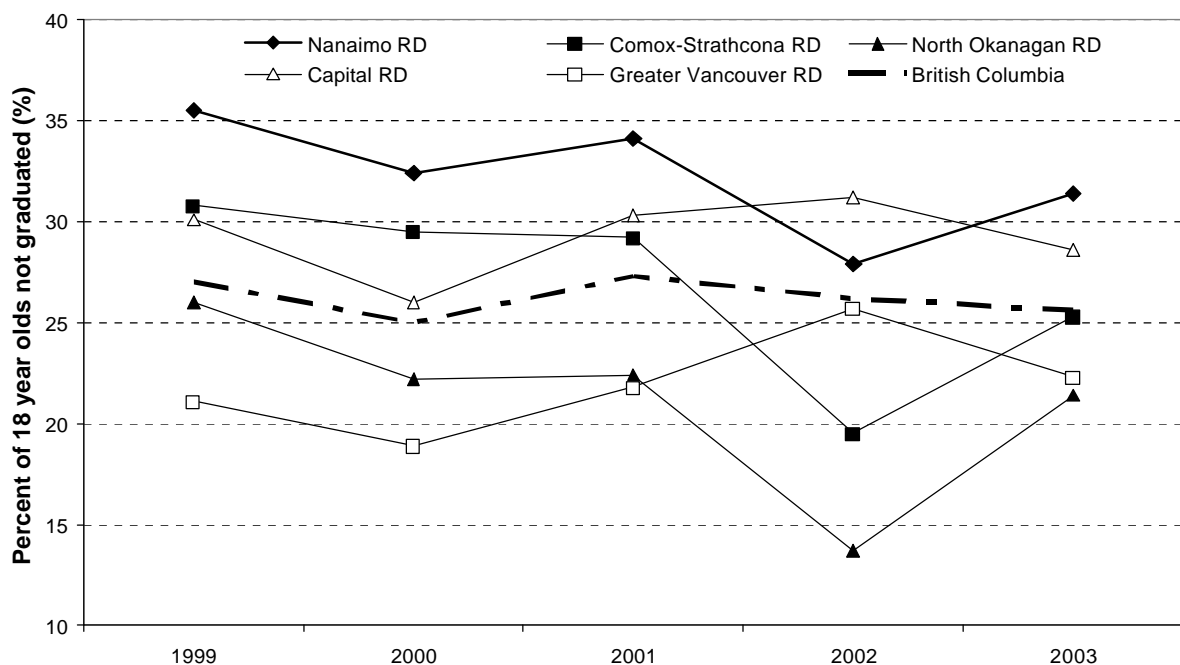


Source: BC Stats

In the RDN, approximately one out of every three 18 year-olds does not graduate from high school, as compared to the provincial average of one out of every four. The percent of students in the RDN not graduating from high school decreased from 35 to 32 percent between 1998 and 2003, but this is still significantly (six percentage points) higher than the provincial average. It is important to note that this statistic is derived from a survey of high school students, whereas the figure shown above applies to all residents<sup>39</sup>.

<sup>39</sup> It is not known whether the data for the educational attainment and percent graduates from high school included Aboriginal populations living On-Reserve.

FIGURE 53 - PERCENT OF 18 YEAR-OLDS NOT GRADUATING FROM HIGH SCHOOL (1999 – 2003)



Source: BC Stats

### 13.2.5 Are there any limitations for this indicator?

There are several limitations to the data.

- The data are not current. The latest data are from 2001 and 2003. Statistics Canada is scheduled to conduct the 2006 census, which should provide updated data (for BC Stats to compile regional information) although the information will not be available until 2007.
- Statistics Canada data are limited to a sample of 20 percent of the population, instead of 100 percent. Therefore, there is opportunity for some disparity in the data recorded versus the actual educational attainment levels of the region's residents.
- Information does not reflect whether or not there is a correlation between the type and amount of education that RDN residents have and the type and amount of employment opportunities presently available or expected to be available in the region.
- Data do not reflect the relationship between age of population and educational employment. It could be that the retired population has college and university



education; this in turn may not accurately reflect the educational attainment of the working population and its ability to meet the needs of the employers.

- Finally, it is not known if people are becoming educated in the RDN and then leaving the region for employment; or if people are educated elsewhere and then moving to the region for employment.

### 13.2.6 Assessment

The region has decreased the percent of 18 year olds not graduated from high school, yet the percentage remains significantly higher than the provincial average. However, the percentage of residents with a college, trades or university level of education has increased. This may reflect Malaspina University-College's transition to a degree granting university and the higher education levels of new residents, including seniors. Although the region does not meet the provincial educational attainment average, it has made progress towards achieving higher educational attainment levels.

Grade: \*

Trend: Getting Better

Indicator: Educational Attainment

Rationale: The Regional District is below the provincial average but progressing towards the goal of increasing the educational attainment level. With a fully accredited degree granting university within the RDN, it is anticipated that the education levels may increase.

## 13.3 SUMMARY

Residents are increasing their educational attainment level and therefore, their level of training and qualifications for employment.

### Educational Attainment

- The percent of students in the RDN not graduating from high school decreased from 35 to 32 percent between 1998 and 2003, but this is still significantly (six percentage points) higher than the provincial average.
- Since 1991, the percentage of residents with university level education has increased from 17 percent to 22 percent; however, the region's levels of university or other non-university education is below the provincial average.
- The percentage of residents with trades certificates and diplomas has increased from 1996 to 2001, from 5 percent to 16 percent.

- The number of residents with a high school degree or less has decreased. The region's residents exceed the provincial average for residents with high school degrees or less, trades certificates, and diplomas.

## 14.0 A WIDE VARIETY OF EMPLOYMENT OPPORTUNITIES EXIST, AND RESIDENTS ARE EMPLOYED

### 14.1 INTRODUCTION

The region's economic and social sustainability relies significantly on the employment of its residents.

### 14.2 UNEMPLOYMENT RATE

#### 14.2.1 What does this indicator tell us?

The unemployment rate is measured by Statistics Canada as "the percentage of the labour force that actively seeks work but is unable to find work at a given time." People who are not seeking work are not counted as unemployed, or as part of the labour force.

This indicator describes the "unutilized labour supply" (United Nations, 2001) of a region. According to the United Nations (2001) "unemployment rates by specific groups – such as by age, sex, occupation or industry – are also useful statistics in identifying groups of workers and sectors most vulnerable to joblessness."

It should be noted that the number of people unemployed is not the same as the number of people receiving employment insurance. Therefore, although the number of people receiving employment insurance is a reflection of the number of unemployed people, it does not accurately depict the number of unemployed people.

#### 14.2.2 Why is this indicator important to our sustainability?

The unemployment rate is a traditional measure of the economic health of the region. Unemployment can be a primary contributor to poverty in our region, that can affect people individually (socially, financially and mentally) and the region as a whole.

Historically, the Province has received Federal transfer payments, which includes Employment Income (income or insurance) payments. Therefore, a reduction in unemployment, and by proxy, employment insurance, reduces the region's dependence on social systems.

This indicator also reflects the transition of youth from school to work. Youth unemployment measures success in the transition from school to work (Statistics Canada, 2000), when the youth unemployment rate decreases, it indicates a successful transition, reflecting appropriate training and education.

### 14.2.3 Where do we want to go?

The RDN's Regional Growth Strategy Goal 6: Vibrant and Sustainable Economy supports this indicator - to support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

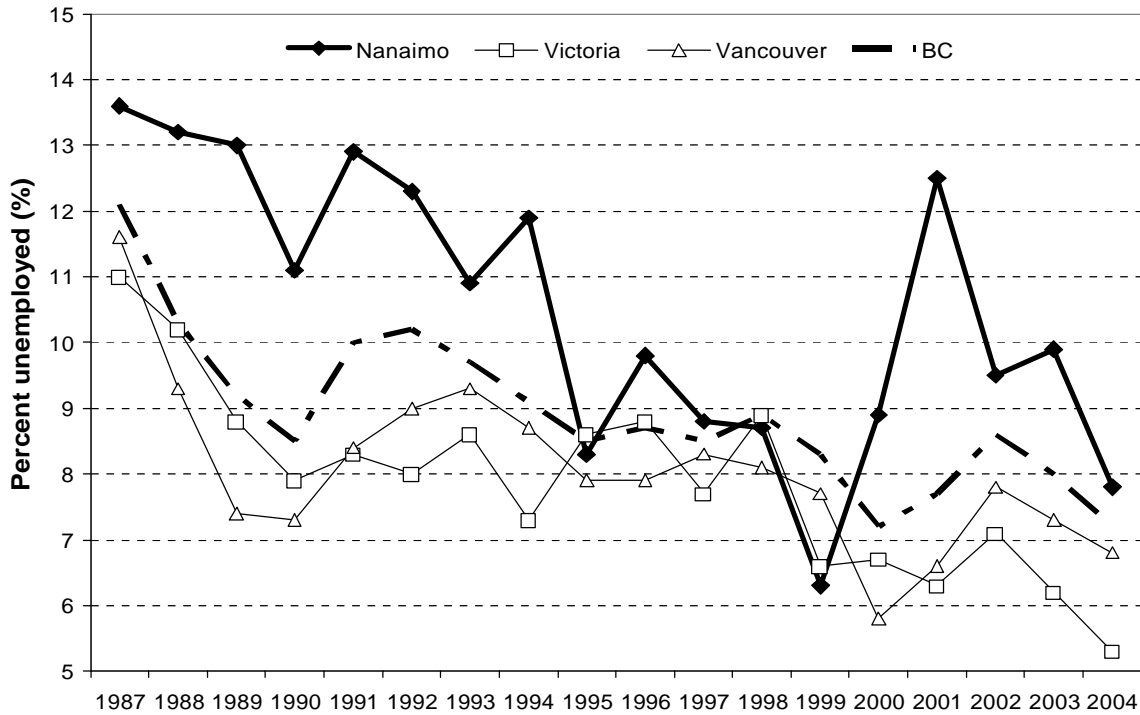
The regional, provincial and national goal is to reduce the unemployment rate, or eliminate unemployment altogether. A practical goal is to be less than or equal to the provincial unemployment rate.

The structural unemployment rate in Canada is around five percent. Figures above five percent signal that an economy is not able to sustain its current level of human resources and that there are likely to be hardships for the persons concerned. Four percent unemployment is considered by economists to reflect full employment (reflecting the fact that there are always a certain percentage of the population seeking work at any given time).

### 14.2.4 Where are we right now?

The unemployment rate within the City of Nanaimo has declined. Although the unemployment rate for the City of Nanaimo is not an indicator of the region, it provides a rough indication of regional unemployment. Since 1987, Nanaimo's unemployment rate steadily declined until its low in 1999 of 6.3 percent unemployment. After that, the unemployment rates increased dramatically to a high of 12.5 percent in 2001. Most recently, the unemployment rates have declined to 7.8 percent in 2004. The City of Nanaimo's unemployment rates remain higher than the provincial average. In comparison, Victoria and Vancouver have lower unemployment rates than the provincial average.

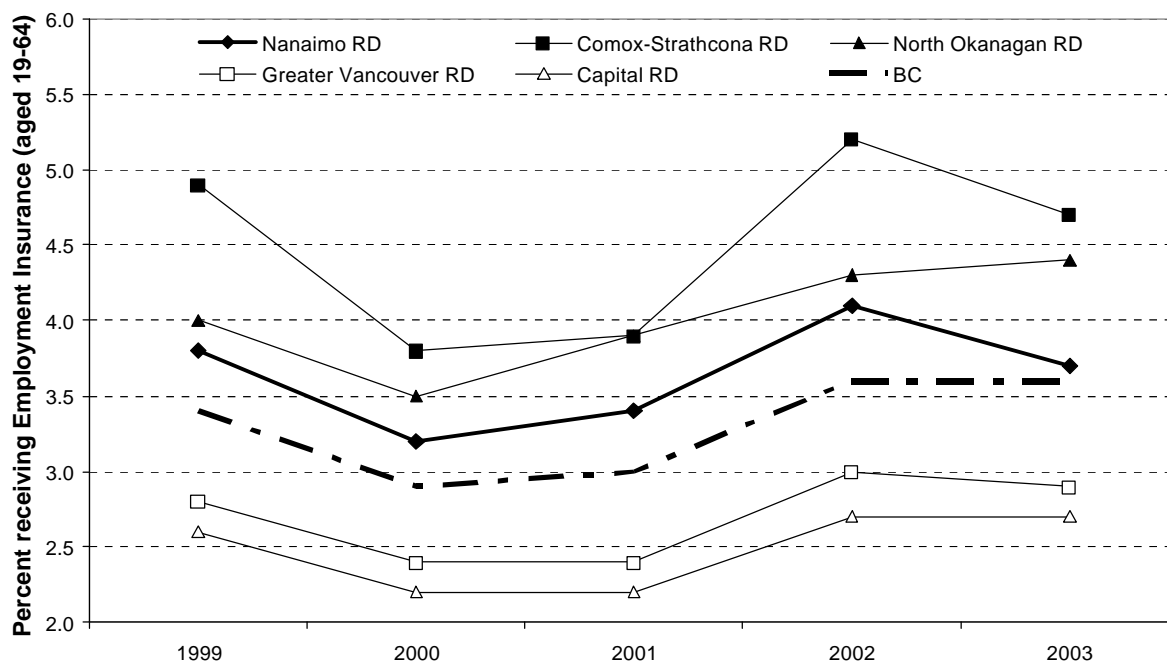
FIGURE 54 – COMPARISON OF UNEMPLOYMENT RATES (1987 – 2004)



Source: BC Stats

Although the percent of persons unemployed is not the same as the percent of persons receiving Employment Insurance, the percent of population receiving Employment Insurance does provide an indication of the unemployment rates for the region. Despite the fact the City of Nanaimo's unemployment rate peaked in 2002, the region's population receiving Employment Insurance followed a similar increase, but to a smaller extent. Overall, the percent of population receiving Employment Insurance benefits has remained relatively stable since 1999. Still, Employment Insurance rates in the RDN remain above the provincial average at 3.7 percent compared to the provincial average of 3.6 percent. There is no information about how Employment Insurance eligibility changes in the past five years have affected the percent of population receiving Employment Insurance.

FIGURE 55 - PERCENT OF POPULATION AGED 19 TO 64 RECEIVING EMPLOYMENT INSURANCE



\*Note: Data from fourth-quarter average for the reporting year.

Source: BC Stats

#### 14.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The unemployment rate is derived from the Labour Force Survey, which is a sample survey and is subject to sampling error (Statistics Canada, 2005).
- Data are not available for the entire region.
- There are no data on the average duration of unemployment in the region.

#### 14.2.6 Assessment

The City of Nanaimo's unemployment rate has sustained tremendous fluctuations in unemployment since 1987, with its most recent spike in unemployment in 2002. The fluctuations in unemployment may be attributed to the less diversified employment sectors that the region experienced between 1990 and 2000. In 2000, the diversification levels were almost equivalent to the provincial average.

Comparatively, the RDN's percent of population receiving Employment Insurance has also fluctuated, but to a smaller extent, and is considered relatively stable from 1999 to 2003. At present, the City of Nanaimo's unemployment rate is declining, as is the number of recipients of Employment Insurance in the region. This indicates a slight progression towards the goal of a declining unemployment rate; however, the unemployment rate remains above the provincial average.

<b>Grade:</b> *	<b>Trend:</b> Getting Better
<b>Indicator:</b> Unemployment Rate	
<b>Rationale:</b> The unemployment rate in the City of Nanaimo is declining, which indicates improvement; yet, the unemployment rate remains above the provincial average.	

### 14.3 SUMMARY

Improvement in the regional economy has provided more employment opportunities. The growth in the service and retail sector in the region over the past five years may be a factor for the decrease in unemployment.

#### Unemployment Rate

- The City of Nanaimo's unemployment rate has declined. Most recently, the unemployment rates have declined to 7.8 percent in 2004; however, the City of Nanaimo's unemployment rates remain higher than the provincial average.
- At present, the number of Employment Insurance recipients in the City of Nanaimo is declining. Employment Insurance rates in the RDN remain above the provincial average at 3.7 percent compared to the provincial average of 3.6 percent.

## 15.0 POVERTY IS MINIMIZED, AND RESIDENTS CAN MEET THEIR BASIC NEEDS

### 15.1 INTRODUCTION

It has been stated several times that income levels are related to education and health levels. Therefore, a reduction in poverty should increase the health of the community.

A recent socio-economic index produced by BC Stats (Vancouver Island Health Authority, 2006) measures several factors including economic hardship, crime, health, education, children-at-risk and youth-at-risk. A standardized score was calculated for each local health area in the province. For comparison purposes, Table 21 reveals the results for those local health areas located on Vancouver Island only. BC Stats identified the Local Health Areas

in the RDN as amongst the best and worst performing areas in the province in terms of economic hardship.

TABLE 21 – LOCAL HEALTH AREA ECONOMIC HARDSHIP RANKING (2004)	
Local Health Area	Economic Hardship
Saanich	1
Sooke	1
Gulf Islands	1
Ladysmith	1
Qualicum Beach	2
Greater Victoria	2
Courtenay	3
Cowichan	4
Vancouver Island North	2
Nanaimo	4
Campbell River / VI West	3
Lake Cowichan	4
Alberni	4

1 = Best Quartile, 4 = Worst Quartile

Source: Vancouver Island Health Authority (2006)

## 15.2 AVERAGE ANNUAL INCOME COMPARED TO COST OF LIVING (REAL INCOME PER CAPITA)

### 15.2.1 What does this indicator tell us?

Average annual income compared to cost of living is used as a proxy for real income growth and real income output. It describes the employment income of people who worked full time (30 hours or more per week for 49 weeks or more per year) and compares it with the average cost of living in the region. This indicator provides information on the residents' disposable income. Adjustments to the average annual income should keep pace with changes to the cost of living as measured by the Consumer Price Index (CPI), an index of movement in prices (Government of Canada, 2006).

### 15.2.2 Why is this indicator important to our sustainability?

This indicator identifies how residents are affected by the external forces that often change the cost of living. The indicator is important to our sustainability in that if the residents' average income is not keeping up with the cost of living, it may precipitate an out-migration of residents and may indicate an erosion of spending power – which would add to a declining economy.

In addition, the Canadian Council on Social Development states that “there are strong relationships between income levels and levels of health within communities. People living

with lower incomes face many challenges that their wealthier neighbours may not. They may be less healthy than people with higher incomes and are more likely to experience shorter... lives.”

### 15.2.3 Where do we want to go?

The RDN's Regional Growth Strategy supports this indicator through Goal 6: Vibrant and Sustainable Economy. The RDN supports strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

While there is no quantifiable goal for this indicator, it is clear that it is best if the change in average income meets or exceeds the change in cost of living. This would indicate that the region's residents are able to maintain their purchasing power.

The rate of change of both income and cost of living should not be too high, in order to be sustainable. When income grows too high, it signals a bubble and when the cost of living grows, it shows an erosion of wealth and savings. Negative income growth signals a declining economy, which is not sustainable.

### 15.2.4 Where are we right now?

The increase in cost of goods and services, or the cost of living, in the region has generally been greater than the increase in average income. Even during 1995 to 2000, when the cost of shelter declined due to falling interest rates, the cost of goods and services still rose due to increased cost of food, tuition and energy. The cost of goods and services, as measured by the CPI, rose by five percent; whereas, the average income rose by four and a half percent. Between 1995 and 2000, the RDN income growth lagged behind all CPI-monitored items except shelter. Table 22 describes the CPI change of select items and all items, as compared to the RDN's income change. Although the 2003 average gross income in the RDN is not known, it is evident that CPI has risen in the region by 6.3 percent since 2000.

Category	Item	1995*	2000	% Change (1995 – 2000)	2003	% Change (2000 – 2003)
CPI (Select Items)	Food	107.3	113.0	5.3	122.8	8.7
	Shelter	103.9	99.6	-4.1	103.7	4.1
	Tuition	122.3	138.9	13.6	183.6	32.2
	Energy	107.4	130.8	21.8	144.9	10.8
CPI	All Items	107.9	113.3	5.0	120.4	6.3
RDN	Average Gross Income	\$22,968.26	\$23,998.23	4.5	NA	NA

\*Base year = 1992

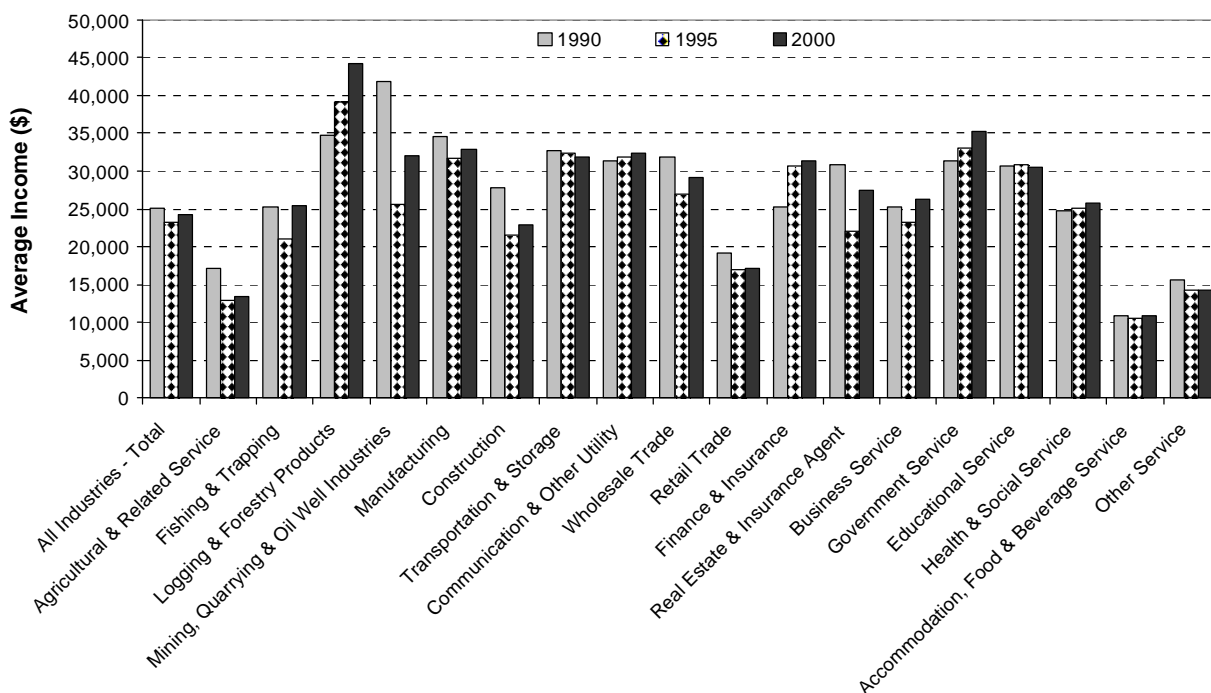
Source: BC Stats



Figure 56 illustrates the change in income over time, per sector, as well as an average of all sectors. Between 1990 and 1995, the average income dropped by almost \$2,000 per year. By 2000, the average income had increased, but remained less than 1990 levels. Of the top industry sectors in the region there were several noticeable increases and decreases in income:

- Business, government, health and social services, accommodation and food and beverage service industries realized increased incomes between 1990 and 2000; and
- Education services, other services, retail trade, manufacturing and construction industries had declining incomes during that same period.

**FIGURE 56 – AVERAGE INCOME PER SECTOR IN THE RDN (1990 – 2000)**



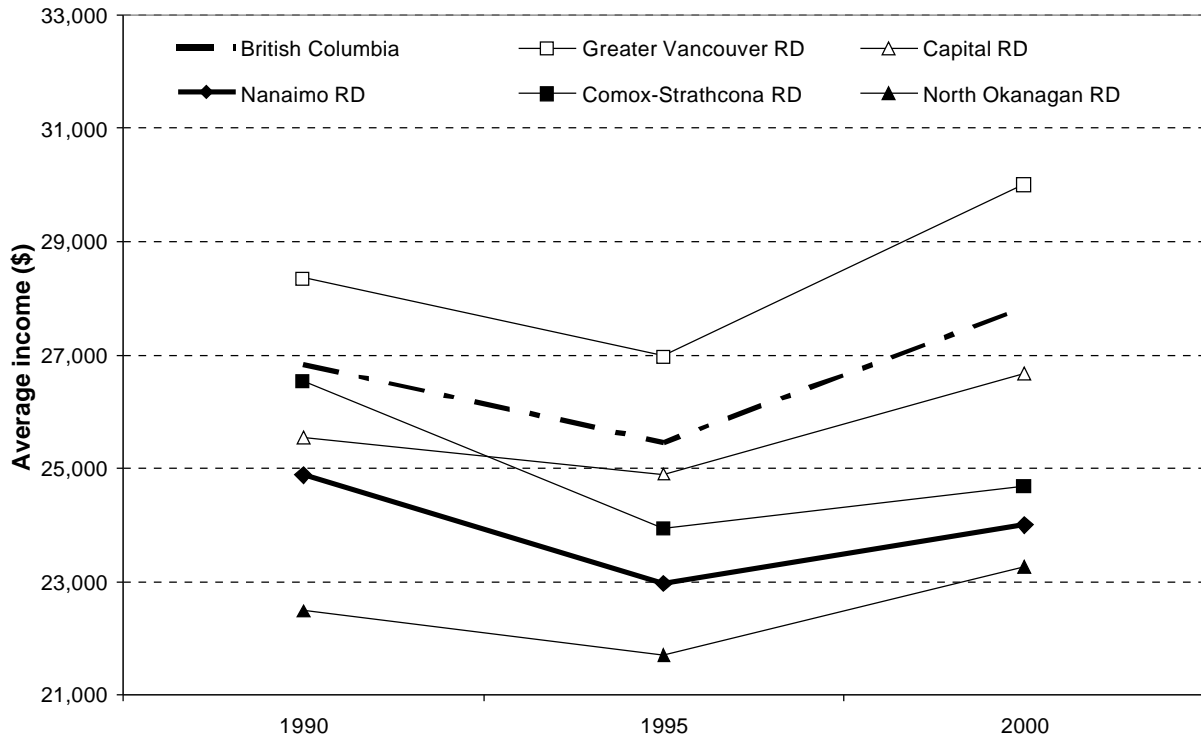
\*Note: income based on 1992 constant dollars.  
Source: Statistics Canada

The average income in the RDN is lower than the provincial average and other comparable jurisdictions<sup>40</sup> and has decreased overall since 1990 (see Figure 57). The comparable jurisdictions, such as Capital Regional District (CRD), Comox-Strathcona Regional District

<sup>40</sup> It is not known whether these data reflect the number of retired people on fixed incomes.

(CSRD) and North Okanagan Regional District (NORD) also have lower average incomes than the provincial average.

FIGURE 57 – COMPARISON OF INFLATION ADJUSTED AVERAGE PERSONAL INCOME PER CAPITA (1990 – 2000)



\*Note: data are in 1992 constant dollars  
Source: Statistics Canada

The decline in average personal incomes for the period recorded in 1995 may be attributed to a provincial slump in the economy. According to the Ministry of Finance and Corporate Relations (1997) “[1996] was a difficult one for the British Columbia economy. The slowdown that began during the second half of 1995 continued through most of 1996. Growth accelerated late in 1996, allowing the economy to post growth of around 0.5 per cent for the full year.”

15.2.5 Are there any limitations for this indicator?

There are several data limitations for this indicator.

- Data are outdated. The last set of complete data was for 2000, with some data available for 2003; in the past few years, there have been several significant increases to cost of living, including shelter and energy as well as upswings in the construction and service industries.

- As well, the average income may not be an accurate indicator because of the number of retirees who are drawing from pensions (particularly those that are indexed to the cost of living) and retirement savings. A better measure may have been median income. It is not clear if retirees' disposable income has been measured and/or factored into the calculations.

### 15.2.6 Assessment

Both the average income from all industries and the inflation-adjusted average income indicated a declining trend in income between 1990 and 2000. As well, the change in income between 1995 and 2000 did not meet the increase in cost of living for that same period, which would indicate an overall move away from sustainability. However, the data are over six years old and several significant changes have occurred in the region over that period, likely increasing the cost of living, but it is unclear to the extent of the increase. Although it is not possible to accurately assess the current situation, the historic trend indicates that the region is moving away from sustainability.

Grade: \*

Trend: Getting Worse

Indicator: Average Annual Income Compared to Cost of Living

Rationale: In 2000, the region was moving away from sustainability. However, until a more recent set of data is released, it is not possible to ascertain the region's current movement towards or away from sustainability.

## 15.3 HOUSEHOLDS BELOW LOW INCOME CUT-OFF

### 15.3.1 What does this indicator tell us?

The number of households below low income cut-off is a basic measure of the proportion of the population living below the poverty line<sup>41</sup>. It describes the number of households (families or unattached individuals) that have an income level where persons spend 20 percent more than the national average on food, shelter and clothing (Statistics Canada, 2001). This indicator enables an assessment of the progress in poverty alleviation, through national, provincial and regional programs and policies. According to Statistics Canada (2001),

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<sup>41</sup> These cut-offs do not take into account a number of important factors that could impact an individual's or family's standard of living such as wealth (e.g. home ownership and mortgage indebtedness), access to subsidized goods and services or future earning potential.

low income cut-offs were established based on national family expenditure data from 1969, 1978, 1986 and 1992. This data indicated that Canadian families spent, on average, 42 percent in 1969, 38.5 percent in 1978, 36.2 percent in 1986 and 34.7 percent in 1992 of their total income on basic necessities. By adding the original difference of 20 percentage points to the basic level of expenditure on necessities, new low income cut-offs were set at income levels differentiated by family size and degree of urbanization. Since 1992, these cut-offs have been updated yearly by changes in the consumer price index.

For 2000, the low income cut-offs for economic families<sup>42</sup> and unattached individuals in Canada is described in Table 23.

Family Size	Community Size		
	30,000 - 99,999	Small urban regions	Rural (farm and non-farm)
1	\$15,648	\$14,561	\$12,696
2	\$19,561	\$18,201	\$15,870
3	\$24,326	\$22,635	\$19,738
4	\$29,448	\$27,401	\$23,892
5	\$32,917	\$30,629	\$26,708
6	\$36,387	\$33,857	\$29,524
7+	\$39,857	\$37,085	\$32,340

Source: Statistics Canada

This indicator would then tell us if the number of households living below low income cut-off (LICO) is increasing or decreasing over time.

A reduction in the number of households below low income cut-off indicates an alleviation of the poverty situation, with fewer households falling below low income cut-off.

### 15.3.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability as it is evidence of low income, poverty, the effects of low income on households and on society, and the overall impact of programs to alleviate poverty. There are several factors that may contribute to an impoverished household. External factors may include decreased employment opportunities, low-wage employment settings, increased cost of living, or a combination of all three. This can affect health and stress on the medical system and unemployment and stress on social services.

<sup>42</sup> Economic family refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. A couple may be of opposite or same sex. Foster children are included.

<sup>43</sup> Note: the numerical values for low income cut-off change with each Census, depending on results of the associated expenditure study.

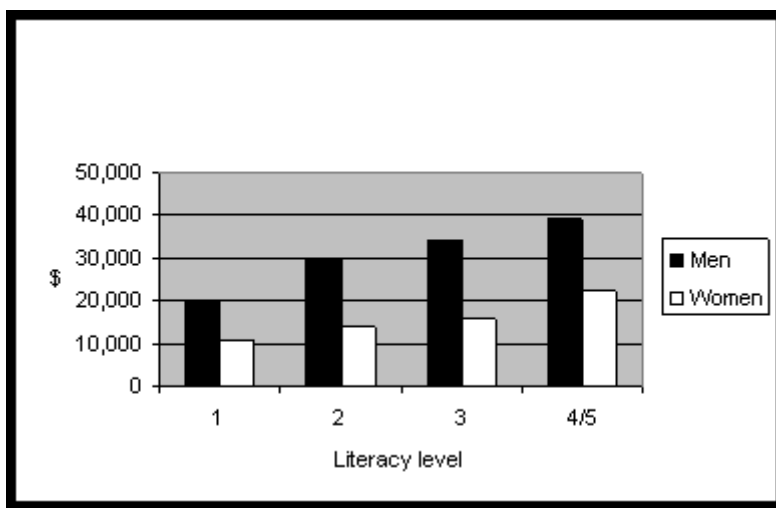
According to Statistics Canada (April 2001) personal factors, such as poor literacy skills and gender, are linked to low income households.

Working-age adults with weak literacy skills were far more likely to be living in low-income households than those with strong literacy skills. The risk of living in a household below the [low income cut-off] was six times greater for working-age adults at level 1 [low literacy] than for those at level 4/5 [high literacy] (47 percent vs. 8 percent). However, the likelihood of living in a low-income household was substantially reduced, from 47 percent to 22 percent, by having skills just one level above the lowest level of proficiency.

Sex [gender] plays a distinct role, which overrides literacy and its effect on household or personal income. For example, at all literacy levels, women were more likely than men to be living in low-income households and, at both levels 2 and 3, women's likelihood of falling below the LICO was roughly twice that of men.

The following figure illustrates the connection between literacy skills, gender and income.

FIGURE 58 - AVERAGE PERSONAL INCOME ACCORDING TO LITERACY LEVEL AND GENDER (1991 - 2001)



Source: Statistics Canada

By understanding what triggers low-income lifestyle, the region can work to prevent that by increasing literacy programs, introducing educational and training programs and mitigating the impacts of low income.

Households below low income cut-off are not conducive to the region's economic sustainability as they add burden to the social system without contributing significantly to the system through taxes or local spending.

A reduction in the percent of households below low income cut-off will indicate that households are better able to afford food, shelter and clothing due to increased income or income opportunities; this may also be indicative of regional circumstances, such as better employment and more employment.

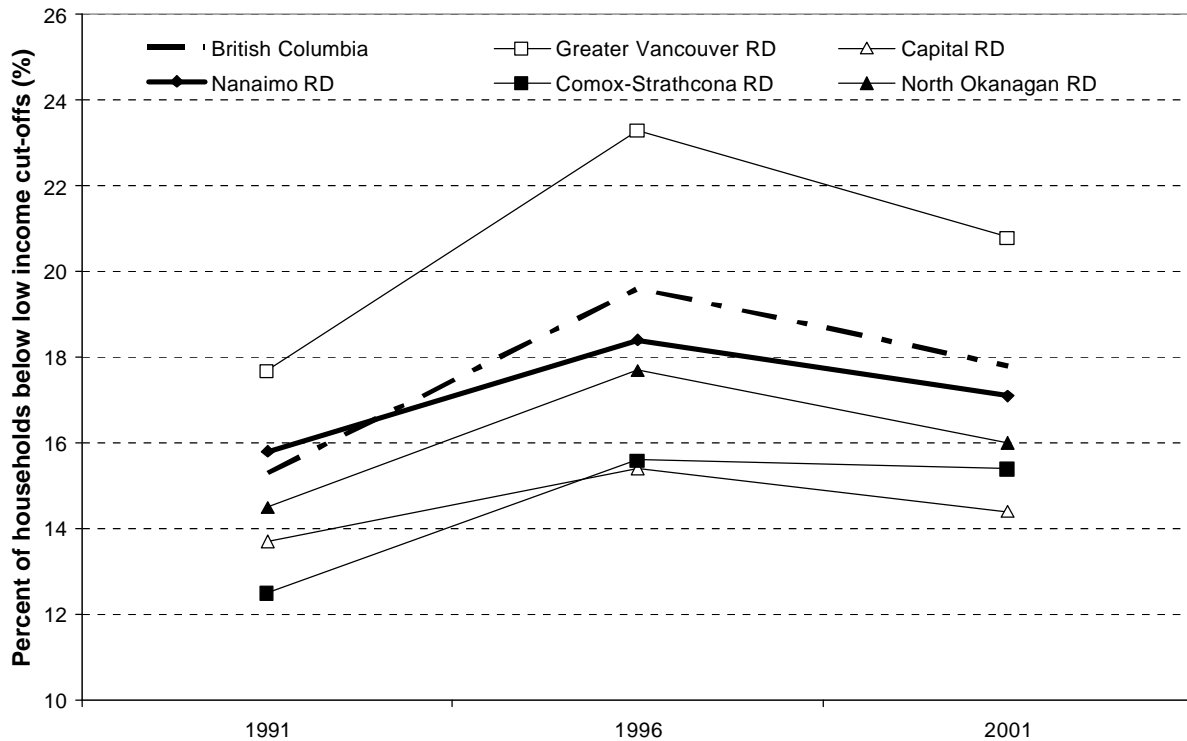
### 15.3.3 Where do we want to go?

The RDN's Regional Growth Strategy supports this indicator through Goal 6: Vibrant and Sustainable Economy. Goal 6 supports strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region. Therefore, a sustainability goal is to reduce the number of households below low income cut-offs, preferably to a level below the provincial average.

### 15.3.4 Where are we right now?

The RDN has had an increase in number of households below low income cut-offs from 1991 to 2001. Between 1991 and 1996, the number of households below low income cut-off increased by over two percent; then decreased by more than one percent in 2001. In 2001, more than 21,000 people in the RDN were considered to be below the low income cut-off. This trend was also found in all regional districts of the province. The overall pattern for the RDN indicates an increase in number of households below income cut-offs since 1991; however, it remains below the provincial average but above the Capital Regional District and the Comox-Strathcona Regional District. The RDN's pattern suggests an increasing trend overall, but additional data from future Census years are required to clarify the long-term direction.

FIGURE 59 - PERCENT OF HOUSEHOLDS BELOW LOW-INCOME CUT-OFF



Source: Statistic Canada

### 15.3.5 Are there any limitations for this indicator?

The indicator is limited because data are outdated. The most current data available are from the 2001 Federal Census. According to past historic trends, the percent of households below low income cut-off can shift drastically over a period of five years. Given that the general economy of the region has increased in the past 5 years, it is very likely that the percentage of people living below the poverty line has changed.

Another limitation is that is unclear from the data how the number of retired people on fixed income (pensions) affect this indicator.

### 15.3.6 Assessment

In 2001, the level of households below the low income cut off decreased; however, there was an overall increase since 1991. Since the latest data shown are from 2001, more recent data are required to accurately reflect the region’s sustainability and the overall trend in the data. Until new data are acquired, there are several questions that remain: is this standard a ‘new normal’, is the percent gradually rising over time, or are the data so outdated that we do not have an accurate assessment?

Other information that may better inform the data are the correlation to age of household members living below low income cut off, and the correlation, if any, to First Nations living off-reserve.

**Grade: \*\*\***                      **Trend: Uncertain**

**Indicator:** Households Below Low Income Cut-Off

**Rationale:** Until a more recent set of data are released, it is not possible to ascertain the region's movement towards or away from sustainability. In 2001, the region was progressing towards sustainability, but this was an overall increase since 1991; therefore, more data are needed to verify the results.

#### 15.4 SUMMARY

The last recorded data for both average annual income compared to cost of living and number of households below low income cut-off are from 2001. During the span of five years, much can change. Due to this factor, it makes it difficult to determine with accuracy the present state of sustainability for the region. Nevertheless, based on the data given, the region is moving away from sustainability in terms of affordability and poverty.

##### Average Annual Income Compared to Cost of Living

- Consumer Price Index, a measure of inflation, indicated an increase of 5.0 percent between 1995 and 2000.
- Average gross income in the region increased by 4.5 percent between 1995 and 2000.
- The average annual income in the region is not increasing at the same rate as the cost of living, which ultimately decreases the amount of disposable income available.
- More recent data are required to adequately assess this indicator.

##### Households Below Low Income Cut-Off

- The overall pattern for the RDN indicates an increase in number of households below income cut-offs since 1991; however, it remains below the provincial average. In 2001, more than 21,000 people in the RDN were considered to be living below the low income cut-off.



## 16.0 HOUSING IS AFFORDABLE, AND A VARIETY OF DIFFERENT TYPES AND SIZES OF HOUSING IS AVAILABLE

### 16.1 INTRODUCTION

Housing is a basic need for all people. However, if the type of housing required is not available, or not available at an affordable price, people suffer. This characteristic looks at the “match” between the demand for housing and the supply of housing in terms of housing variety (numbers of bedrooms, locations, own/rent and detached dwelling versus attached dwelling) and its affordability (for all income levels).

Subsidized housing is available to eligible people who meet specific criteria. The criteria for subsidized housing are subject to change based on the provincial government’s mandate. Criteria changes ultimately affect the number and type (i.e., age, ability, etc) of people eligible.

### 16.2 RESIDENTS IN CORE HOUSING NEED

#### 16.2.1 What does this indicator tell us?

The indicator, residents in core housing need, identifies the number of residents who are living in a house that is inadequate, unsuitable, or unaffordable. CMHC (2004) states, “a household is said to be in core housing need if its housing falls below at least one of the adequacy, suitability, or affordability standards, and it would have to spend 30 percent or more of its before tax income to pay the median rent of alternative local housing that is acceptable (meets all three standards).” The three housing standards are further described by the CMHC (2004) as:

- Adequate: dwellings not requiring any major repairs, as reported by their residents;
- Suitable: dwellings have enough bedrooms for the size and make-up of resident households, according to National Occupancy Standard requirements. The requirements state that one bedroom is required for each cohabitating adult couple, unattached household member 18 years of age and over, same-sex pair of children under age 18, and additional boy or girl in the family. Two opposite sex siblings under 5 years of age, may share a bedroom; and
- Affordable: dwellings cost less than 30 percent of before-tax household income.

In applying these criteria, the affordability factor usually outweighs the other two criteria. As well, the criteria for core need do not address accessibility issues for the physically challenged.

The indicator is also broken down by tenure, owners and renters. Tenure helps identify where potential gaps are. For example, renters have more difficulty securing affordable housing than owners do as very few purpose-built rental units are constructed, and those that are, are not in the affordable category (Housing Policy Branch).

For homeowners, core need indicates a financial inability to make repairs, the inability to afford suitable housing that meets their family's needs, and/or the high cost of owning a home. For renters, the indicator suggests that landlords are not maintaining their properties accordingly, that renters are unable to afford a suitable home, and/or the high cost of rent in the region. In essence, the indicator is a descriptor of both the quality of housing available and the affordability of housing.

Data for this indicator include private non-farm, non-Band, non-Reserve households with incomes greater than zero and shelter cost-to-income ratios of less than 100 percent<sup>44</sup>.

### 16.2.2 Why is this indicator important to our sustainability?

This indicator is important to the region because it reflects the socio-economic conditions of our region. According to the Alberta Urban Municipalities Association (2003) and the Treasury Board of Canada (2005), adequate and safe housing is important to personal well being, physically, socio-economically and socially.

- Housing that is not cold, damp, unsanitary, in poor repair, or is located in an unsafe neighbourhood can prevent disease and injury;
- Housing represents the largest monthly expenditure for households; if too much is spent on housing, households may need to sacrifice other essentials, work longer hours to compensate for that added expenditure, or may lead to overcrowding. This can further increase the risk of injury, mental health problems, family tensions, and violence.
- Housing can support or disrupt personal social networks; moving frequently impacts employment and training opportunities, access public and private services, participate in community activities, and ability to sustain social networks.

According to Engeland et al (2004) "there is a strong association between core housing need and labour force ties. Households with weak ties to the labour force have lower incomes, are more likely to rent, and are much more likely to be in core housing need than other households." Engeland goes on to state that key groups are at high risk of falling into core housing need, including Aboriginal households, recent immigrant households, unattached people, and lone-parent households. Those most affected by core housing need are children.

"Research also shows that there is a link between behaviour problems in Canadian children and the physical condition of their housing and neighbourhoods. Children living in housing that is both crowded and in need of major repair score lower on various development measures, such as academic performance and general health, than other children." (Engeland et al, 2004).

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<sup>44</sup> Because the definition of this variable will lead to some double counting of households, the total of households below the individual standards will not sum to the total below housing standards.

16.2.3 Where do we want to go?

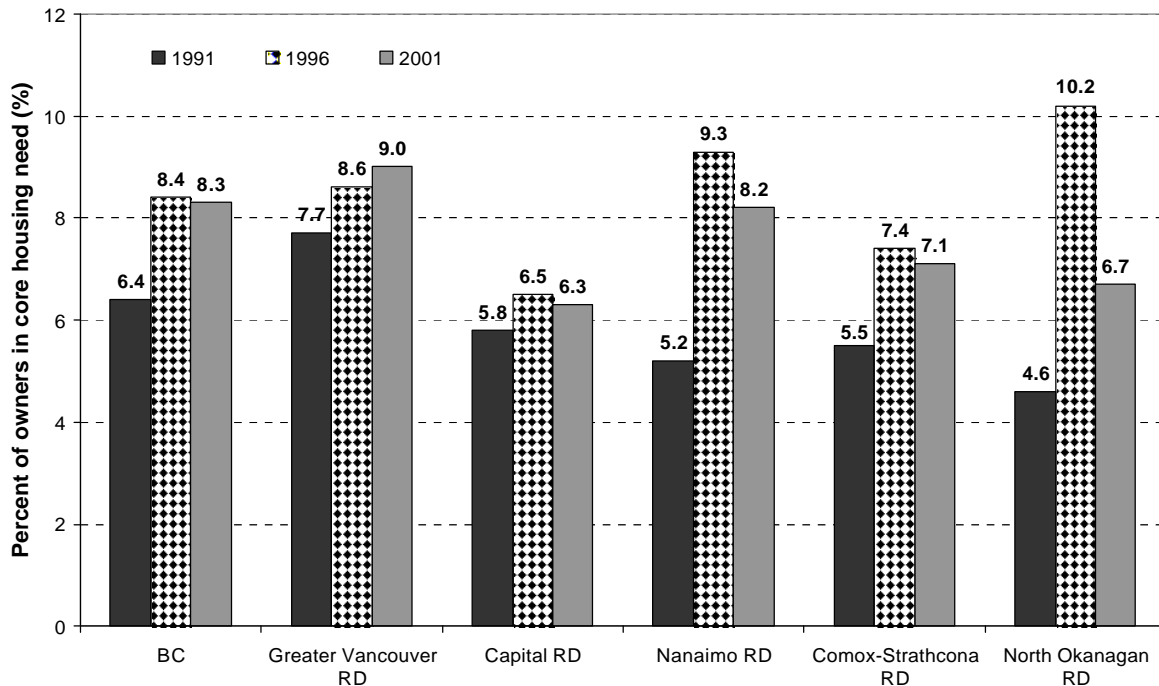
As a region, the goal is to reduce the percent of owners and renters in core housing need, at minimum, to the provincial average. This may be done by improving the housing's adequacy, suitability and affordability.

16.2.4 Where are we right now?

In the region, approximately 75 percent of households are owner occupied and 25 percent are rented. This proportion has remained relatively stable since 1991, with the number of owners increasing only two percent in ten years. Between 1991 and 2001, the percentage of homeowners in the RDN in core housing need (having inadequate, unsuitable and/or unaffordable housing) has increased three percent to 8.2 percent, as compared to the provincial average of 8.3 percent (see Figure 60). Although other regional districts experienced the same increasing trend, the RDN experienced the greatest increase compared to other regional districts and the province as a whole.

From 1991 to 1996, there was a drastic increase in core housing need throughout the province; this was followed by a decline in core housing need by 2001. Rationale for this experience is not presented here.

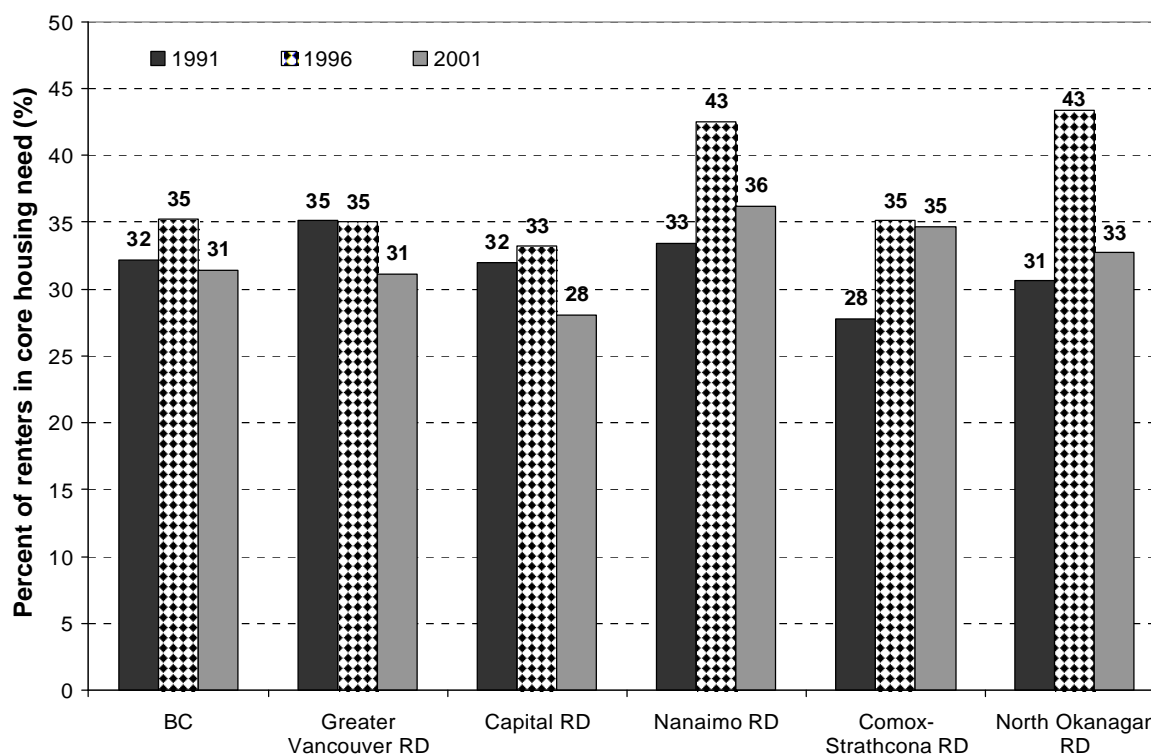
FIGURE 60 - PERCENT OF HOME OWNERS IN CORE HOUSING NEED (1991 – 2001)



Source: CMHC

In 1996 and 2001, the RDN had the highest percentage of renters in core housing need, above the provincial average. In striking contrast to homeowners, between 28 to 36 percent of renters are considered in core housing need<sup>45</sup> in 2001 (see Figure 61). Percentages have decreased since 1996, but remain higher than 1991 levels (with the exception of the GVRD).

FIGURE 61 - PERCENT OF RENTERS IN CORE HOUSING NEED (1991 – 2001)



Source: CMHC

It is expected that with the increasing cost of housing in the region, that the core housing need for homeowners and renters will increase.

### 16.2.5 Are there any limitations for this indicator?

There are several data limitations for this indicator:

- Subjective responses to the adequacy standard, and what people consider a major repair.
- Sampling issues – some people may not want to report their housing situation.
- No data on the impacts of core housing needs.

<sup>45</sup> Information based on the five comparable regional districts and the provincial average.

- No data to interpret the spike that occurred for homeowners in core housing need in 2001.
- Data do not reflect the demographics of the homeowners and renters, which would aid in interpretation.
- Data do not reflect the impacts of secondary suites on core housing; for instance, do secondary suites increase the number of quality affordable units?
- Data do not take into account the large number of residents paying more than 30 percent of their household income on shelter. Some of whom choose to, or can afford to (e.g., if they earn more than \$200,000/yr).

### 16.2.6 Assessment

Although there was a decline in residents in core housing, for both homeowners and renters, from 1996 to 2001, the overall trend from 1991 indicates an increase in residents in core housing need. Until more recent data are released, to indicate otherwise, it is suggested that the region is not progressing towards sustainability.

Grade: \*

Trend: Getting Worse

Indicator: Residents in Core Housing Need

Rationale: Renters in core housing need in the region exceed the provincial average, and there is an increasing trend in the number of residents (homeowners and renters) in core housing need in the region.

## 16.3 APPLICANTS ON WAIT LIST FOR SUBSIDIZED HOUSING

### 16.3.1 What does this indicator tell us?

The “applicants on wait list for subsidized housing” indicator illustrates the level of need for people requiring assistance to afford shelter.

This indicator is measured by the number of people on the wait list for subsidized housing. The duration of wait time is not measured, as subsidized housing is not distributed on a first come, first serve basis, but rather as a reflection of the level of need.

### 16.3.2 Why is this indicator important to our sustainability?

This indicator is important to the region’s sustainability as it reflects both the level of need, as well as the ability of the region to meet those needs. It is expected that the number of applicants and duration of their wait for subsidized housing would naturally reduce with

increased employment and improvement to the economy. Alternatively, the number of applicants and wait duration will decline if adequate social programs, such as constructing additional subsidized housing projects, are implemented.

It is also important to determine the root cause of the need for subsidized housing in order to mitigate it. This may be linked to unemployment, educational attainment, cost of living and other indicators. By understanding the demographics, such as age and sex, of the people on the waiting list, it may indicate other societal trends.

Shelter is a basic societal need. A region that can meet that need for all is progressing towards sustainability.

### 16.3.3 Where do we want to go?

As a region, we need to reduce the number of applicants waiting for subsidized housing as well as the average duration of the wait time.

### 16.3.4 Where are we right now?

British Columbia Housing Management Commission (BCHMC) and Canada Mortgage and Housing Corporation (CMHC) provide subsidized housing in the region. BCHMC maintains a housing registry with applicant information. Unlike BCHMC, CMHC does not track the total number of applicants. Rather, each housing complex maintains its own applicant list. The same is also true for individual housing providers. As such, the data shown below are only representative of the BCHMC housing and applicants.

The RDN has a much smaller number of applicants for subsidized family and senior housing, compared to several regions. Of note, is that single parent families comprise 63 percent of the total family applicants. This is above the provincial average. Table 24 describes the number of applicants per type of subsidized housing and region.

TABLE 24 - NUMBER OF APPLICANTS, BY REGION (2005)			
Region	Total Family Applicants	Percent of Family Applicants with Single Parent	Total Senior Applicants
Capital RD	1,017	73 %	316
Comox-Strathcona RD	82	12 %	52
Greater Vancouver RD	5,591	59 %	3,276
Nanaimo RD	219	63 %	34
North Okanagan RD	7	86 %	9
British Columbia	7,647	42 %	2,484

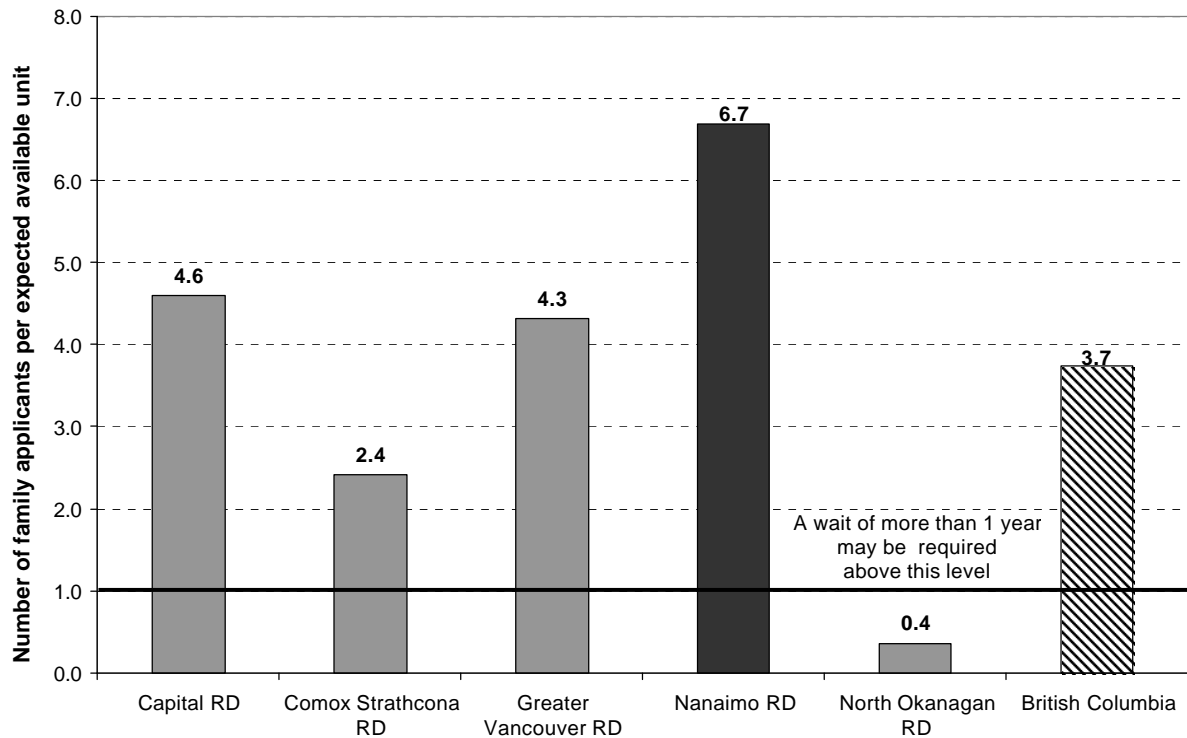
Source: BC Housing Management Commission

The RDN has the highest number of family applicants per subsidized housing unit in the province (see Figure 62). In the RDN, as of March 2005, there were almost seven applications per BCHMC subsidized family housing unit expected to become available

during the year. On average, between 12 to 15 percent of available housing units become vacant each year. In comparison, the provincial average is 3.7 applicants per unit.

Applicants are awarded housing based on a needs assessment; therefore, the wait time for housing is directly dependent upon the level of need. The result is that the neediest of applicants will have a relatively short wait, while others, with less need, will have a longer wait. The wait time is also dependent upon the number of available units. In general, a wait of more than one applicant per unit will likely be a wait of more than one year. In the case of the RDN, since there are almost seven applicants per unit expected to become available, this may indicate a wait time of almost seven years.

**FIGURE 62 - NUMBER OF APPLICANTS PER BCHMC SUBSIDIZED FAMILY HOUSING UNIT EXPECTED TO BECOME AVAILABLE\* (2005)**

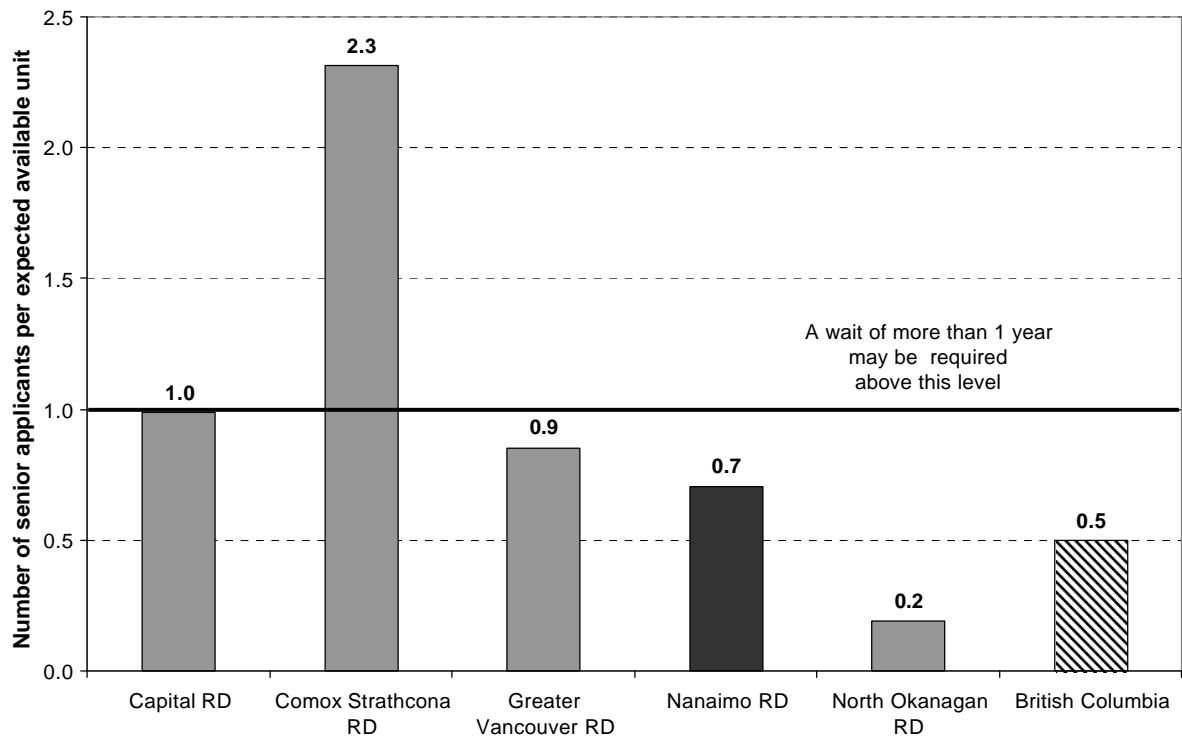


\* assumed to be 15 percent of current housing stock  
Source: BC Housing Management Commission

The ratio of applicants to units for subsidized seniors housing in the RDN is slightly above that of the province (see Figure 63), with less than one applicant per unit, indicating that applicants are likely to wait less than one year for subsidized seniors housing. This may be indicative of fewer seniors requiring subsidized housing due to alternative social programs that provide financial assistance for them to stay in their current housing situation. Some

seniors are eligible for rent assistance through the provincial government’s Shelter Aid for Elderly Renters (SAFER) program. It may also be indicative of the economic status of seniors moving to the area that do not require social assistance. There are more applicants per unit in the Capital Regional District, Comox-Strathcona Regional District and Greater Vancouver Regional District than in the RDN. The figure below illustrates the number of applicants per subsidized seniors housing unit expected to become available.

**FIGURE 63 - NUMBER OF APPLICANTS PER BCHMC SUBSIDIZED SENIORS HOUSING UNIT EXPECTED TO BECOME AVAILABLE\* (2005)**



\* assumed to be 15 percent of current housing stock  
Source: BC Housing Management Commission

For both family and senior subsidized housing, North Okanagan Regional District had far fewer applicants than the provincial average. Further research into the demographic structure of the region’s residents and the social programs present would be required to identify the reason why. In part, this may be due to the number of retired seniors that have migrated to the area.

Housing affordability continues to deteriorate in the region as supply costs of land and labour increase and the demand for new and used homes remains high. The rising house prices combined with increasing mortgage rates makes housing less and less affordable. According to the Royal Bank of Canada’s Assistant Chief Economist, Derek Holt, “while



property taxes and utilities increased this past quarter, most of the deterioration in affordability was driven by a surge in home prices and rising mortgage rates” (Smart Growth BC, 2006).

### 16.3.5 Are there any limitations for this indicator?

Data are limited by several factors:

- Data do not include CMHC or individual housing provider information (if additional data are collected by CMHC and other providers, it may lead to over-reporting due to applicants having their name on more than one agency’s wait list).
- Lack of historical data that would indicate a trend in number of applicants over time.
- No data are available on the duration of the wait time.
- No data are available that would explain the type of people on the wait list (age, sex, etc).
- No data are included on the accessibility of social programs that prevent applicants from requiring subsidized housing.
- Difficult to compare data with other indicators that may cause people to apply for subsidized housing.
- No data are available on the number of housing units and the cost benefit analysis required before constructing additional units.

### 16.3.6 Assessment

The region is unable to fulfill the needs of family applicants in providing subsidized housing in a timely manner. One of the primary issues is ensuring that there are a variety of types and sizes of houses to meet the needs of families, seniors and physically challenged people. At present, there is a lack of units for families.

Using the BCHMC information as an indicator of the region’s applicants and housing capacity, the number of applicants per expected available family unit is almost double that of the provincial average, with a wait time in excess of one year (and likely much more). Seniors housing applicants are able to access housing in less than one year, yet the number of seniors requiring housing is above the provincial average. From 2005 data alone, it is not possible to observe if the region’s number of applicants have increased or decreased per subsidized unit. However, due to the high number of applicants for family housing, it is possible to assess that the region is not sustainable in this area. There are no historical data to determine if the indicator is getting better or worse.

In 2006, the BC Housing Policy Branch is expected to release a comprehensive provincial housing strategy. The province is focusing subsidized housing to help meet the housing needs of BC’s most vulnerable citizens first, including low income households with special

housing needs such as seniors, mentally and physically disabled, women and children fleeing domestic violence, the homeless and individuals at risk of becoming homeless (Black, 2006). Other types of government housing assistance, such as housing allowances in the private rental market, are proposed to assist other low income households that do not require housing with support services.

Grade: \*

Trend: Uncertain

Indicator: Applicants on Wait List for Subsidized Housing

Rationale: The number of applicants for subsidized family and senior housing is above the provincial average, indicating that the region is not able to adequately prevent the need or meet the demand for subsidized housing.

#### 16.4 SUMMARY

The proportion of residents on wait lists for subsidized housing and/or in core housing need (i.e., having inadequate, unsuitable and/or unaffordable housing) has increased since 1991. This indicates a trend away from housing affordability and regional sustainability.

##### Residents in Core Housing Need

- Between 1991 and 2001, the percentage of homeowners in the RDN in core housing need (having inadequate, unsuitable and/or unaffordable housing) has increased three percent to 8.2 percent, as compared to the provincial average of 8.3 percent.
- In 2001, the RDN had the highest percentages of renters (36 percent) in core housing need, above the provincial average (31 percent). Percentages have decreased since 1996, but remain higher than 1991 levels.
- From 1991 to 1996, there was a drastic increase in core housing need throughout the province; this was followed by a decline in core housing need by 2001.

##### Applicants on Wait List for Subsidized Housing

- The RDN has the highest number of applicants per subsidized housing unit in the province
- The RDN has 6.7 applicants per expected available family unit, compared to provincial average of 3.7; this may indicate a wait time of almost seven years.
- The RDN has 0.7 applicants per expected available seniors unit, compared to provincial average of 0.5; this may indicate a wait time of less than one year.

## 17.0 THE NEED FOR TRAVEL IS MINIMIZED, AND NECESSARY TRIPS DO NOT RELY SOLELY ON PRIVATE AUTOMOBILE TRAVEL

### 17.1 INTRODUCTION

In a sustainable Regional District of Nanaimo, the need for private motor vehicle travel is minimized and necessary trips do not rely solely on private motor vehicles. To help assess the need for travel by private motor vehicle, this section of the report provides information about the following indicators:

- Mode of transportation to work and location of work;
- Bus rides per capita;
- Residences within walking distance of amenities;
- Residents inside urban containment boundaries living within walking distance of a bus stop; and
- Vehicles per household.

### 17.2 MODE OF TRANSPORTATION TO WORK, AND LOCATION OF WORK

#### 17.2.1 What does this indicator tell us?

The mode of transportation to work and the location of work are important indicators of the level that residents rely on their vehicles for travel to work, instead of walking, cycling, using public transit, or other alternatives. The location of work places may also be a factor in determining the type of transportation that people use. This information then provides an indication of individual travel mode preferences, and the impact of location of work on automobile use.

#### 17.2.2 Why is this indicator important to our sustainability?

The region's sustainability is partially determined by both the mode of transportation and the location of work because of the social, environmental and economic impacts of the automobile to our region. Vehicles support sprawling, low density communities and require large amounts of parking. A reduction in automobile dependence is a result of more compact, walkable communities within the region. This especially benefits people with mobility issues or without access to a car, such as seniors who are no longer able to drive vehicles, but have access to an electric scooter. As well, walking and cycling contribute to the physical health of the population and the environmental health of the region. According to Skelton (2006), "people who live in high-density core cities are significantly healthier than residents of sprawling suburbs." He suggests that this is due to the extra time that suburbanites spend in their cars makes them gain weight and increases their risk of chronic disease. As well, the Sightline Institute has released a report stating that people who walk are more fit and less likely to die in a motor vehicle accident.

Vehicles typically rely on gasoline or diesel consumption and results in emissions of greenhouse gases and other polluting substances into the environment. Pollutants released into the atmosphere from vehicles can have a negative impact on the health of residents, other living beings and the environment. Another impact of automobile use is the number of motor vehicle accidents. The development and maintenance of infrastructure to support an increasing number of vehicles represents a significant economic investment that will compete with other societal priorities, including better public transit.

### 17.2.3 Where do we want to go?

The RDN's Regional Growth Strategy outlines several goals that relate to this indicator:

Goal 1: Strong Urban Containment - to limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure - to encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection - to protect the environment and minimize ecological damage related to growth and development.

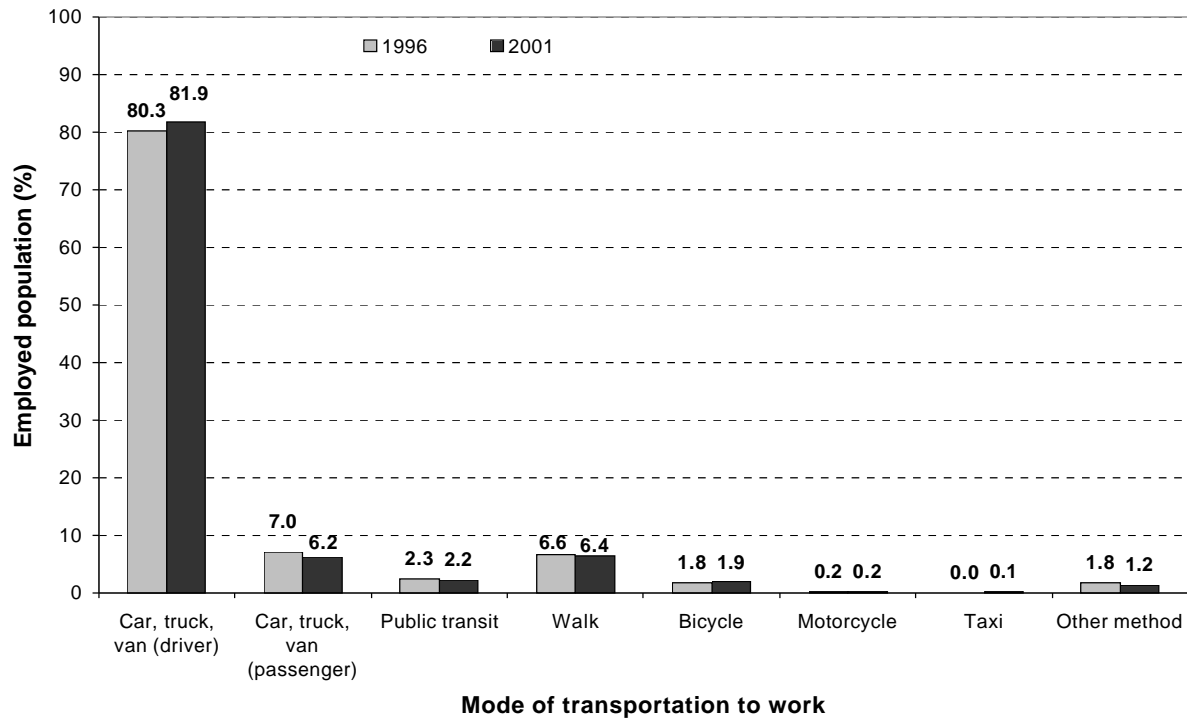
Goal 5: Improved Mobility - to improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Therefore, a sustainability goal is to decrease the amount of travel to work by automobile by increasing the amount of travel to work by other modes such as walking, cycling and public transit through reducing the distance between places of employment and residences.

### 17.2.4 Where are we right now?

Residents of the RDN rely primarily on vehicles to commute to work. In 2001, approximately 88 percent of RDN residents commuted to work in private vehicles, as either driver or passenger. In fact, there has been an increase in the number of people commuting to work as drivers and a reduction in the number of people commuting to work as passengers. Second to private vehicles, approximately eight percent of RDN residents choose to commute to work by walking and cycling; this has reduced slightly since 1996. Finally, two percent of residents commute to work using public transit. This proclivity to driving to work persists despite high proportions of RDN residents who live and work in the same census subdivision (municipality, town, electoral area).

**FIGURE 64 - MODE OF TRANSPORTATION TO WORK BY EMPLOYED RESIDENTS IN THE RDN (1996 - 2001)**



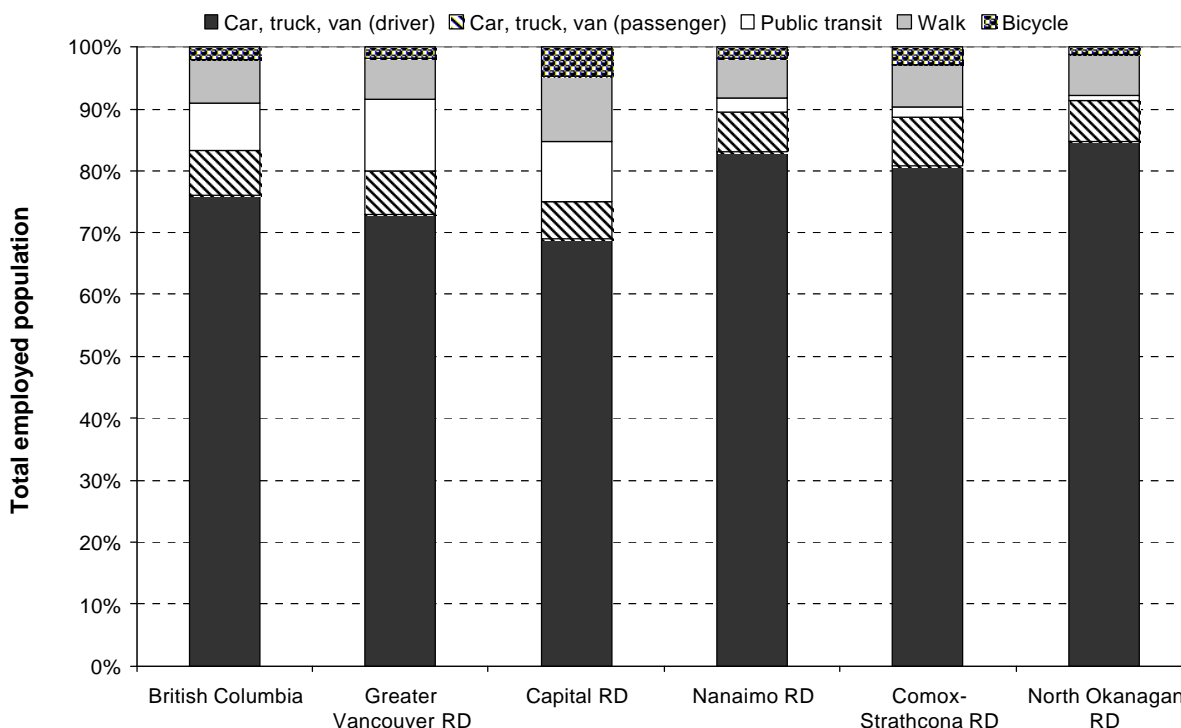
Source: Statistics Canada

The RDN exceeds the provincial average of 82 percent in use of cars and trucks (including both drivers and passengers). However, it is generally consistent with several other regional districts. Of exception are the Greater Vancouver and Capital Regional Districts, which have lower percentages of working residents commuting by car or truck (79 and 73 percent respectively).

The percent of RDN employed residents who use public transit is less than the provincial average. Comparatively, the percent of employed residents using public transit in Greater Vancouver Regional District and Capital Regional District is greater than the RDN; however, the Comox-Strathcona Regional District and North Okanagan's employed residents use public transit less than RDN residents. This is primarily due to increased population density, location of work in close proximity to residences, increased accessibility to public transit and increased cost of parking that acts as a deterrent.

Overall, the automobile continues to be the most common form of transportation to work for residents in the RDN and British Columbia.

**FIGURE 65 – COMPARISON OF MODES OF TRANSPORTATION TO WORK (2001)**

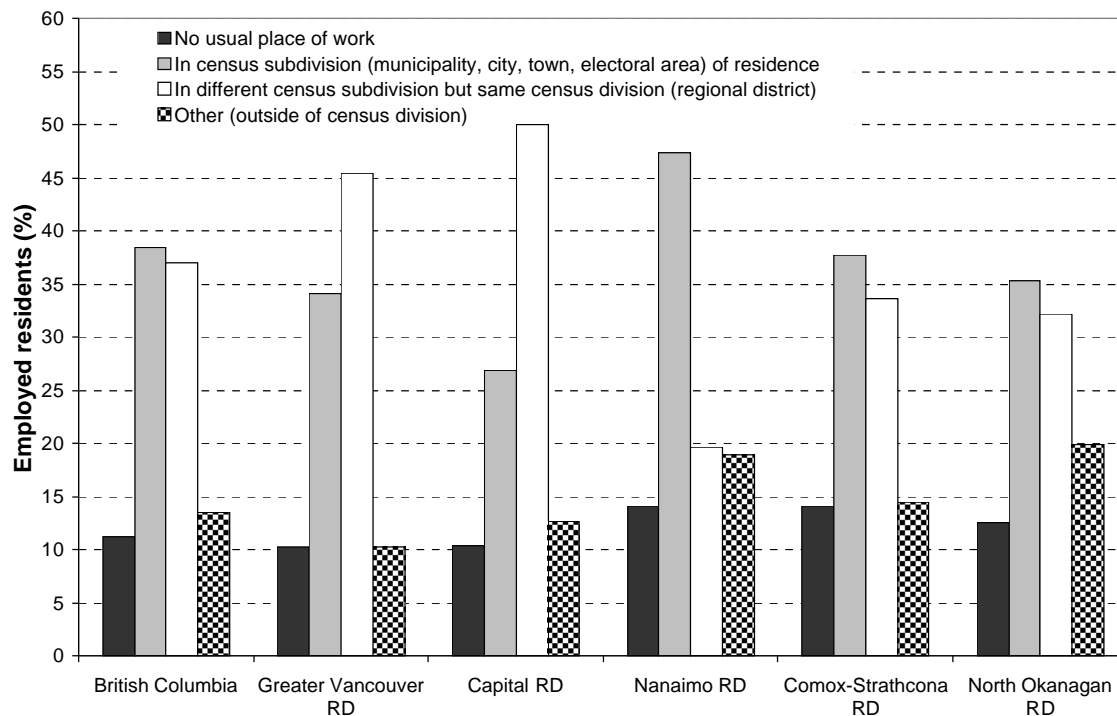


Source: Statistics Canada

Since 1991, the percentage of employed residents in the RDN who live and work in the same census subdivision (municipality, town, city, electoral area) has decreased from 55 to 47 percent. There has also been a very slight decline in the percentage of employed residents who work in a different census subdivision within the same census division (regional district), from 22 percent in 1991 to 20 percent in 2001. The percentage of employed residents who travel outside of the census division (regional district) is approximately the same as those who travel to other census subdivisions. The percentage of employed residents with no usual place of work has increased significantly, from three percent in 1991 to 14 percent in 2001.

Despite this, the RDN has more employed residents who live and work in the same census subdivision than in any of the other regional districts compared, and the provincial average. This result suggests that more residents are living closer to work, with shorter commute times and more opportunity for alternative modes of transportation.

FIGURE 66 - COMPARISON OF WORK LOCATIONS (2001)



Source: Statistics Canada

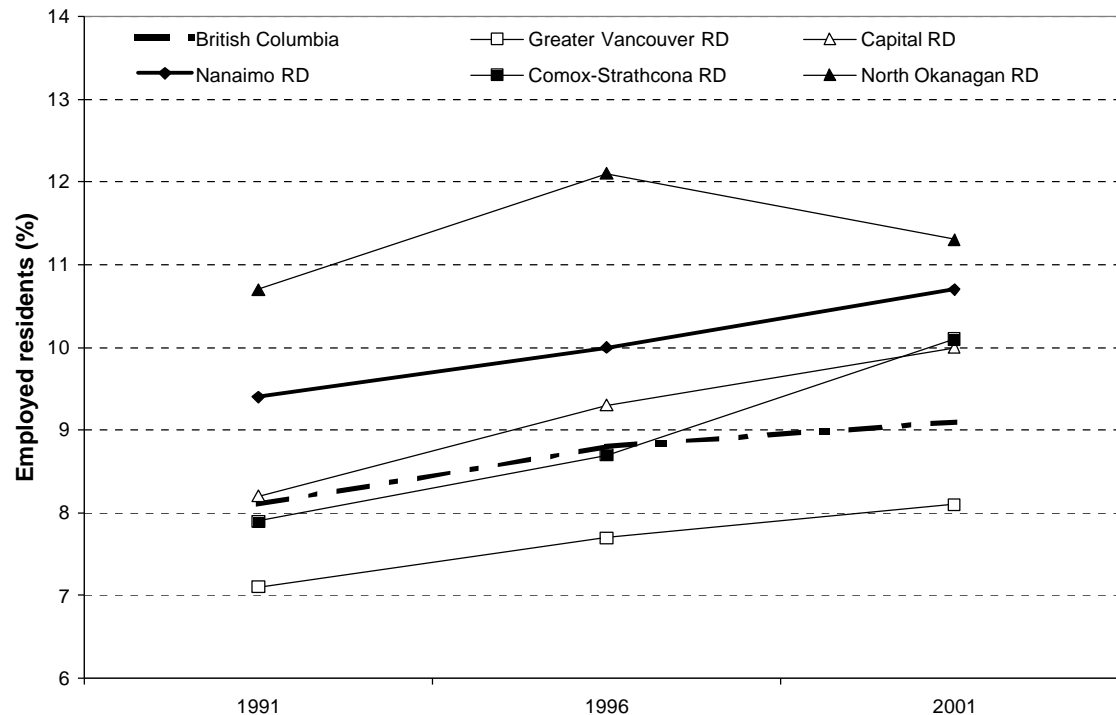
There is a clear trend among the regional districts. In more populated regional districts, such as the CRD and GVRD, many more residents live and work in different census subdivisions than compared to the RDN and Regional District of Comox-Strathcona (RDCS). The results may be influenced by the large number of municipalities in the CRD (13) and GVRD (30), compared to the RDN (3). Despite this, the CRD and GVRD rely on vehicles to a lesser extent as a mode of transportation to work.

The number of employed residents who leave the RDN to work is relatively high in comparison to the other regional districts. This may suggest two things:

- Travel time and distances to neighbouring regional districts, such as CVRD and RDCS, are relatively short compared to other locations in the province (depending on the size of the regional district); and
- The RDN's relatively small geographic size compared to other regional districts, such as RDCS and Cowichan Valley Regional District (CVRD), provides RDN residents access to employment in neighbouring regional districts.

The percentage of residents working at home in the RDN is higher than the provincial average and other compared regional districts with the exception of NORD.

FIGURE 67 - PERCENTAGE OF EMPLOYED RESIDENTS WORKING AT HOME (1991-2001)



Source: Statistics Canada

### 17.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Data do not differentiate vehicles that are more environmentally friendly, such as hybrids or SMART cars.
- Data do not factor in the availability or accessibility of infrastructure for other modes of transportation, such as public transit, walkways and cycling pathways.
- Location of work does not factor in the distance of travel within the census subdivision.
- Mode of transportation does not reflect the physical ability of people to travel to work by walking or cycling; for instance, if they are elderly or physically disabled.
- Other factors that influence choice of transportation may relate to housing affordability. For example, some residents may wish to live near their work, but cannot afford to own or rent in the area.



- Data cannot reflect the personal choices and preferences of people, for either mode of transportation or location of their home or work.
- Data do not reflect the number of employed residents who work at home.
- Data do not reflect the geographic size, shape (long and narrow), or topography of the region and its impact on mode of travel.

### 17.2.6 Assessment

Residents of the RDN increasingly use vehicles as their primary mode of transportation to access work, more than many other jurisdictions, even though a greater percentage of RDN residents work closer to home, or at home. There is significant opportunity to decrease reliance on vehicles. Overall, the region's reliance on vehicles is greater than the provincial average and continues to increase over time, although updated data are required to provide an accurate assessment of the region's movement toward or away from sustainability.

Grade: \*

Trend: Getting Worse

Indicator: Mode of Transportation to Work, and Location of Work

Rationale: Employed residents are increasingly reliant on vehicles as their primary mode of transportation to and from work, despite living closer to work than those in other regions.

## 17.3 BUS RIDES PER CAPITA

### 17.3.1 What does this indicator tell us?

The number of bus rides per capita indicates the efficiency of the public transit system, in terms of regional use and preferred mode of travel. Specifically, the indicator describes the number of transit trips per resident per year. Ridership may indicate trends in urban development, such as increased density and nodal development, and affordability of transit compared to operating a car.

### 17.3.2 Why is this indicator important to our sustainability?

The number of bus rides per capita is important to the region's sustainability in that buses provide a more efficient, environmentally friendly mode of transportation than automobiles. Public transit is efficient in that it provides an alternative to personal vehicles and one bus carries several passengers, thereby reducing the amount of fuel consumed per person. By decreasing the amount of emissions, public transit effectively improves overall environmental health and air quality, and therefore, human health. Financially, public

transit is more accessible to residents of all abilities, ages, and income levels than personal automobile travel, while not always being accessible for certain physical handicaps. Public transit provides a less costly method of transportation, without significant personal investment in a vehicle and its maintenance. As well, improved ridership improves transit efficiency and the ability to expand services. Public choices to use transit often reflect the growing awareness of the benefits of transit versus personal vehicles as a primary mode of transportation. It is expected that the rate of ridership should parallel population growth in urban areas.

### 17.3.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

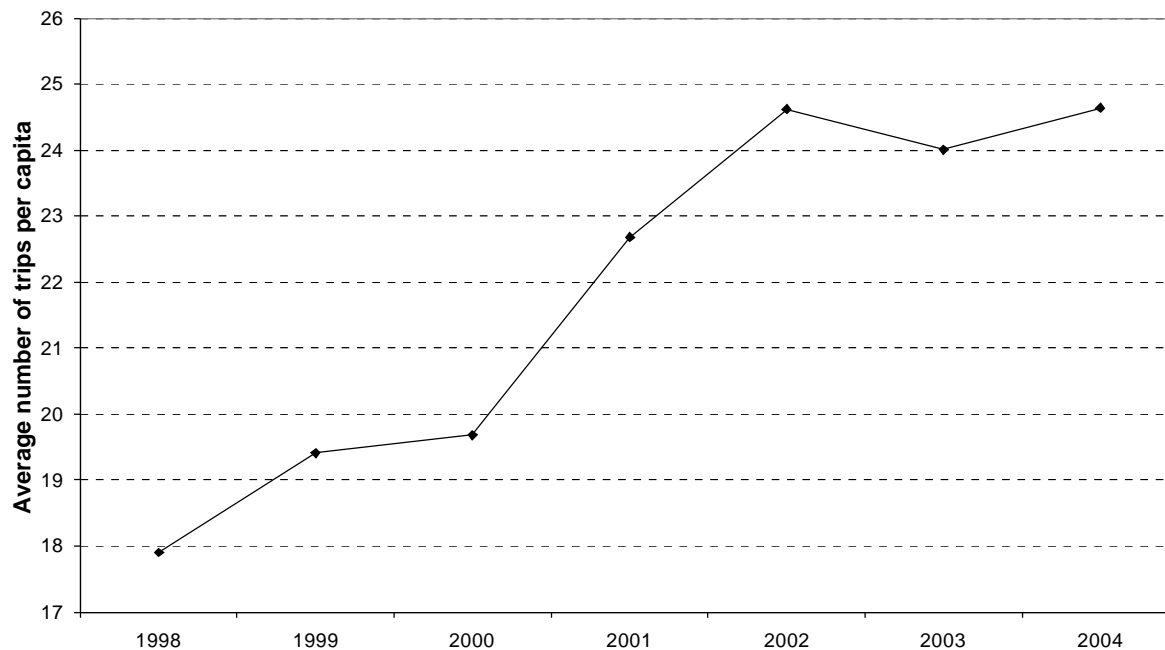
Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

The sustainability goal is to increase the number of bus rides per capita. This will not only reduce the number of personal vehicles, but it will increase the economic efficiency of operating transit services.

### 17.3.4 Where are we right now?

Since 1998, the number of bus rides has increased in the region. In 1998, just over 1.5 million bus rides were taken in the RDN; this increased nearly 45 percent by 2004 to over 2.2 million bus rides. Per capita, the number of bus rides has also steadily increased by 39 percent. Figure 68 illustrates the increase in bus rides per capita since 1998.

FIGURE 68 - BUS RIDES PER CAPITA IN THE RDN (1998 - 2004)



Source: BC Transit

While the increased bus ridership indicates a positive trend, there is still need for improvement. Improvement may occur through increased ridership in existing transit service areas through education and advertising programs and by improving transit service in specific high opportunity areas such as Nanaimo, Parksville and Qualicum Beach. However, the social benefits must be compared with the economic impacts that increased services would have. Increasing transit service implies increased demand for provincial grants for acquisition of vehicles and equipment as well as operating deficits.

### 17.3.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The data do not reveal if public transit is used as an alternative to personal vehicles, or if it is used because there are no other options, financially or physically, for the rider.
- The data do not reveal the demographics (age, economic status, etc) of people who use public transit.
- The data do not reveal factors that influence a change in bus ridership, such as addition of new transit routes, change to the frequency of service on transit routes, or other

changes to the transit/transportation system, that might increase or decrease its desirability as a transportation choice (e.g. fare price, free newspapers, employer transit incentives, hours of operation, increased cost of gas, etc.).

- The 2001 ridership indicator was based on 1996 census population data. Actual population growth during 1996-2001 (based on the 2001 census) was significantly less than the projections from 1996 data. As a result, the 2001 and 2005 ridership indicators are not comparable. Based on the 2001 census the population served has been recalculated back to 1998 by BC Transit and included in the analysis for the 2005 indicator.

### 17.3.6 Assessment

Bus rides per capita in the RDN has increased significantly since 1998. However, there are no data to compare the ridership in the RDN to other regional districts or the province. As such it is not possible to assess the region's comparative sustainability; however, the data indicate progress towards increased transit ridership.

Grade: ?

Trend: Getting Better

Indicator: Bus Rides Per Capita

Rationale: The number of bus rides per capita is increasing in the region.

## 17.4 RESIDENCES WITHIN WALKING DISTANCE OF AMENITIES

### 17.4.1 What does this indicator tell us?

This indicator tells us how many residences are within walking distance (i.e., 400 metres) of one or more of the following: a school, retail space, green space, recreation facility, or a service, such as government office, post office, or medical office. The general walking distance guideline of 400 metres, or a five minute walk, was used for this indicator. This guideline is commonly used to determine walking distance to public transit (O'Sullivan and Morrall, 1996).

### 17.4.2 Why is this indicator important to our sustainability?

The proportion of residences within walking distance of amenities is important to the region's sustainability in that it measures the opportunity for people to walk or cycle to their destination, and not rely on personal vehicles. This not only improves the health of residents, but it reduces the need for road and highway infrastructure and maintenance.

Studies indicate that people who live in settlement forms that lend themselves to walking and cycling transportation methods are healthier and less likely to suffer from obesity; obesity has been linked with people who live in settlement forms characterized as sprawl.

According to Skelton (2006), “people who live in high-density core cities are significantly healthier than residents of sprawling suburbs.” Finally, by reducing the use of personal vehicles, it also reduces the amount of exhaust emissions that enter the environment.

#### 17.4.3 Where do we want to go?

The RDN’s Regional Growth Strategies has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

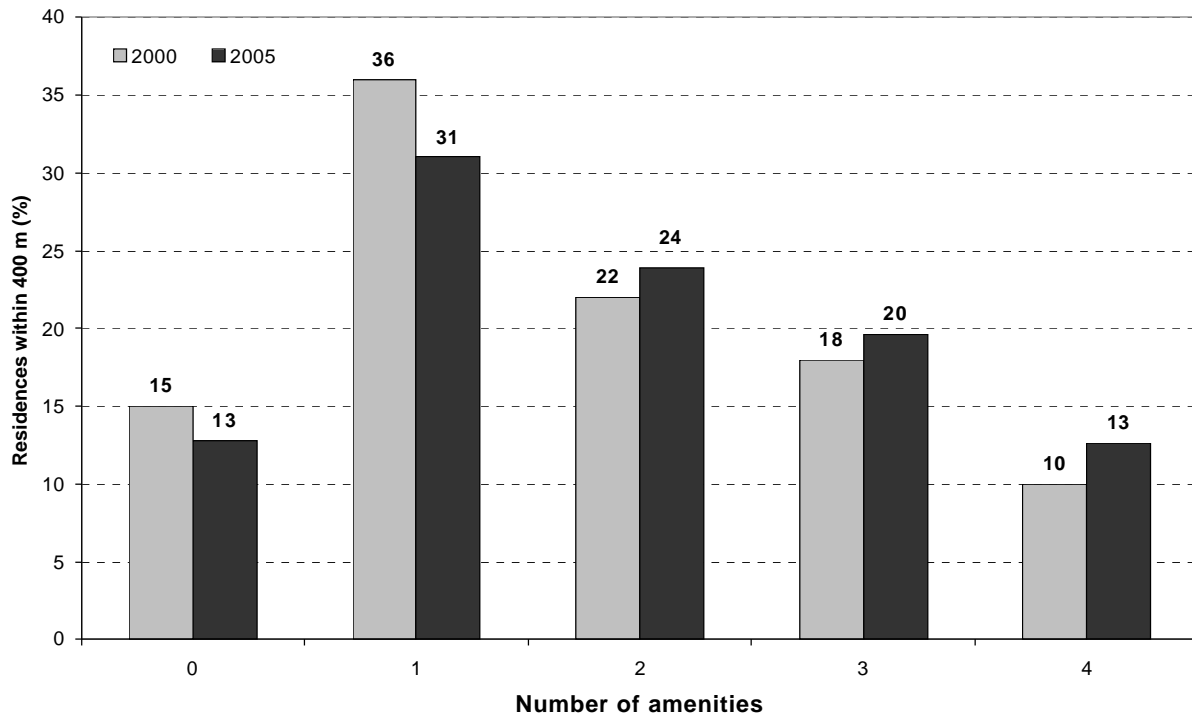
Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issues and the provision of the service will not result in additional development.

The region’s goal is to increase the percentage of residences within walking distance of amenities through the development of nodes, or complete communities. This is indicated in the Regional Growth Strategy.

#### 17.4.4 Where are we right now?

Within the RDN, the percentage of residences within walking distance of amenities has increased. There are two likely reasons for this success. The first is the creation of amenities closer to residences; the second is the construction of residences closer to amenities. A combination of both factors has led to an overall increase in percent of residences within 400 m of multiple amenities between 2000 and 2005. This confirms that nodal development is occurring, which is in accordance with the Regional Growth Strategy and which favours complete communities with residences and amenities in proximity to each other.

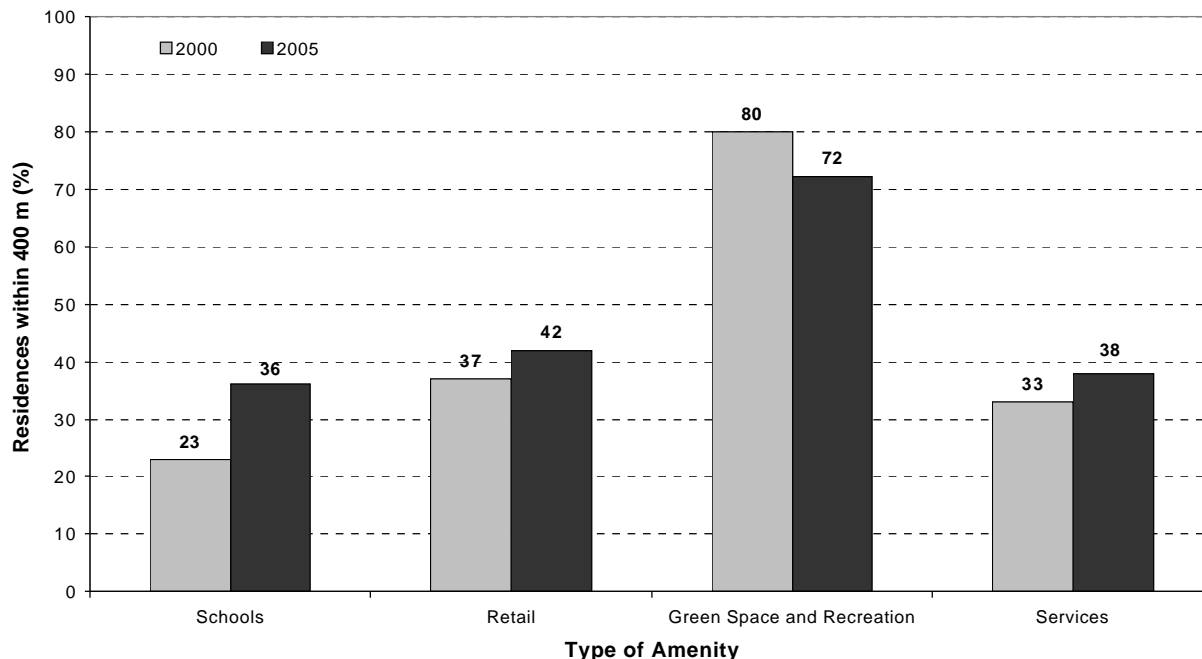
**FIGURE 69 - PERCENT OF RDN RESIDENCES WITHIN 400 METRES OF AMENITIES (2000 - 2005)**



Source: British Columbia Assessment Authority; RDN GIS Department

There has been an increase in percentage of residences within 400 m of schools, retail, and services. Since 2000, there has been a decrease in percentage of residences within walking distance to green space and recreation. This may be partially due to the conversion of green space to residences or amenities. The figure below describes the proximity of residences to specific amenities.

FIGURE 70 - PERCENT OF RDN RESIDENCES WITHIN 400 METRES PER TYPE OF AMENITY (2000 - 2005)



Source: British Columbia Assessment Authority; RDN

This figure illustrates the region’s increased potential for less reliance on personal vehicles and progress towards sustainability. However, the proximity of residences to green space and recreation is evidently being eroded over time. This may suggest that green space needs to be protected in areas of designated growth and nodal development.

17.4.5 Are there any limitations for this indicator?

The limitations to this indicator are that there are not data on whether residents actually walk or cycle to the nearby amenities, or if the amenities appeal to, or are of regular use to, the residents who live in close proximity to them.

17.4.6 Assessment

There has been an increase in residences within walking distance of amenities, and therefore, an increase in potential for people to reduce their reliance on vehicles. This may be due to increased construction of amenities, or construction of residences closer to amenities. Overall, this result suggests that nodal development is occurring, which is in accordance with the Regional Growth Strategy. However, the number of vehicles is increasing in the region, and there are no data to support whether residents actually walk or cycle to amenities. Although there are no comparative data available to accurately assess the indicator’s sustainability, the data suggest movement towards the sustainability goal.

Grade: \*                      Trend: Getting Better

Indicator: Residences Within Walking Distance of Amenities

Rationale: There has been an increase in the proportion of residences within walking distance to two or more amenities.

## 17.5 RESIDENTS INSIDE URBAN CONTAINMENT BOUNDARIES LIVING WITHIN WALKING DISTANCE OF A BUS STOP

### 17.5.1 What does this indicator tell us?

This indicator tells us the number of people residing inside the urban containment boundary that live within walking distance (i.e., 400 metres) of a bus stop. The proximity of residents' homes to bus stops could impact their use of transit service; that is, residents who live in close proximity to bus stops could be expected to take the bus more often. However, this expectation is often not realized due to increased transit travel time or lack of transit services to a destination.

The general walking distance guideline of 400 metres, or a five minute walk, was used for this indicator. This guideline is commonly used to determine walking distance to public transit (O'Sullivan and Morrall, 1996).

### 17.5.2 Why is this indicator important to our sustainability?

This indicator is important to our sustainability in that it measures the potential for people to use public transit, and rely less on personal vehicles. Socially, buses provide people with access to transportation that may otherwise be limited by age, abilities and income levels. Environmentally, a reduction in personal vehicle use will reduce the amount of emissions and improve environmental health and air quality; this in turn may lead to improvements in human health. By reducing the number of personal vehicles, it may also reduce the number of motor vehicle accidents. Economically, public transit provides a less costly method of transportation, without significant personal investment in a vehicle and its maintenance or public investment in road and highway infrastructure and maintenance. An increase in transit use will improve the cost efficiency of existing transit services or additional transit routes to other parts of the region.



### 17.5.3 Where do we want to go?

The RDN's Regional Growth Strategies has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

The region's target is to increase the number of people residing inside the urban containment boundary that live within 400 metres of a bus stop.

### 17.5.4 Where are we right now?

In 2001, 89 percent of the RDN's 90,345 residents within the urban containment boundary lived within 400 metres of a bus stop. This suggests that a high percentage of people have access to public transportation. According to Murray (2006), approximately 94,900 residents lived within 400 metres of a bus route in 2005<sup>46</sup>.

The proportion of regional residents living within walking distance of a bus stop is a result of settlement location both within a community, and in the region. There are 12 transit routes in the City of Nanaimo and three transit routes servicing Parksville-Qualicum Beach. Therefore, if growth occurs within Nanaimo, there is greater opportunity to live within walking distance of a bus stop; there is less opportunity within Parksville or Qualicum Beach. Finally, there are limited transit services within electoral areas.

### 17.5.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- The data do not reflect the reasons why people who live close to a bus stop do not choose to take public transportation. Reasons may include the frequency of transit service, length of time to travel to destination via transit, location of destination in relation to transit route, number of bus transfers required, comfort, and perceptions regarding safety.

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<sup>46</sup> Murray's data do not indicate the location of residents, whether inside or outside of the urban containment boundaries.

- There is only one year's data, so it is impossible to determine a trend.
- Data may be limited by the lack of information on the number of bus stops within the urban containment boundaries, and if that changes over time. If the number of bus stops is reduced, it may reduce the number of residents living in close proximity to a bus stop.
- Data do not include evidence of the difference in people's willingness to walk to bus stops if the distance is less than 400 m, 400 m or greater than 400 m.

### 17.5.6 Assessment

The majority of residents within the urban containment boundary live within 400 metres of a bus stop. Since there are no multi-year data, it is impossible to determine if there is an increasing or decreasing trend. Although with the recent increase in residential construction within the RDN, it is presumed that this indicator will progress towards its target unless the number of bus stops is reduced. Until another set of data are present, it is not possible to accurately assess the region's movement towards or away from sustainability.

Grade: \*\*

Trend: Uncertain

Indicator: Residents Inside Urban Containment Boundaries Within Walking Distance of a Bus Stop

Rationale: There are an increasing number of residents within walking distance of bus stops; however, there are no data regarding change in proportion of residents within the urban containment boundaries.

## 17.6 VEHICLES PER HOUSEHOLD

### 17.6.1 What does this indicator tell us?

This indicator describes the average number of vehicles owned per RDN household.

### 17.6.2 Why is this indicator important to our sustainability?

The average number of vehicles per household is directly related to the number of vehicles on the road, thus contributing information regarding energy use, air pollution, and motor vehicle accidents. Vehicles utilize several imported non-renewable energy sources, such as gasoline, diesel and oil, for their operation. Using this type of energy is unsustainable, as these products are non-renewable.

Personal automobile use contributes to air pollution and non-point source soil and water pollution, which affects human health as well as the environment. According to the BC Lung Association (2002), "while air quality has improved in some areas – due to less

industry and better pollution controls on cars – the growing rate of vehicle purchases and kilometres driven are leading to declining air quality in large cities in Canada and across the world.” The Government of Canada also states, “transportation is the single largest source of GHG [Greenhouse Gas] emissions in Canada, accounting for about 25 percent of Canada’s total emissions in 1997. The sector also accounted for the largest share of the growth of emission between 1990 and 1997.” Emissions also contribute to ground level ozone and fine particulate matter (PM<sub>2.5</sub>).

Reduced air quality has significant health impacts. The Chief Medical Officer for Vancouver and Richmond states “15-150 people die every year in the Lower Mainland from air pollution” (CBC British Columbia News Online, 2001). In addition, the number of vehicles is related to the number of motor vehicle accidents. The Sightline Institute has released a report stating that people who walk are more fit and less likely to die in a motor vehicle accident. According to Skelton (2006), “people who live in high-density core cities are significantly healthier than residents of sprawling suburbs.” He suggests that this is due to the extra time that suburbanites spend in their cars makes them more obese and increases their risk of chronic disease.

The number of vehicles also contributes to increased road congestion, increased travel times and increased infrastructure costs to build and maintain road networks, generally leading to a decreased quality of life. The development and maintenance of infrastructure, including roads and parking structures, to support an increasing number of vehicles represents a significant economic investment that will compete with other societal priorities. Therefore, the reduction of vehicles may allow a shift in funding priorities.

### 17.6.3 Where do we want to go?

The RDN’s Regional Growth Strategy has two goals that support this indicator:

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

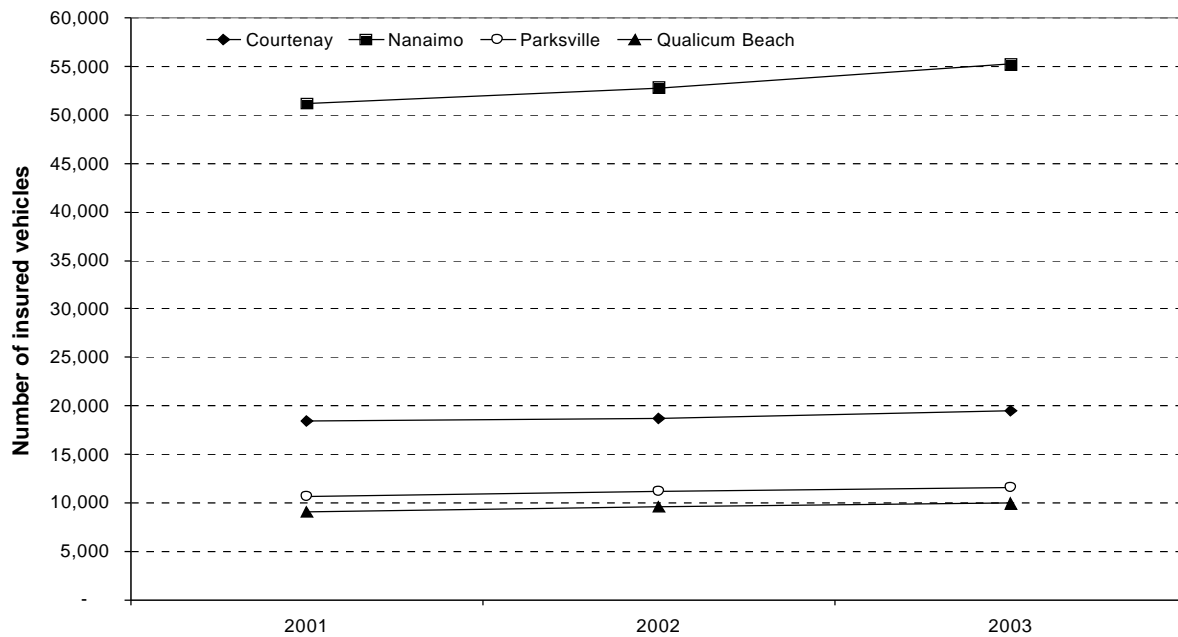
Goal 5: Improved Mobility: To improve and diversify mobility options within the region – increasing transportation efficiency and reducing dependency on the automobile.

The sustainability target is to reduce the average number of vehicles per household.

### 17.6.4 Where are we right now?

The region and its communities have experienced an increase in population size, number of households and number of vehicles. The following figure describes the increase of vehicles in each community as an overall trend in the RDN. The number of insured vehicles increased in Nanaimo, Parksville and Qualicum Beach from a combined total of 70,886 vehicles in 2001 to 76,747 vehicles in 2003.

**FIGURE 71 - TOTAL NUMBER OF INSURED VEHICLES PER COMMUNITY (2001-2003)**

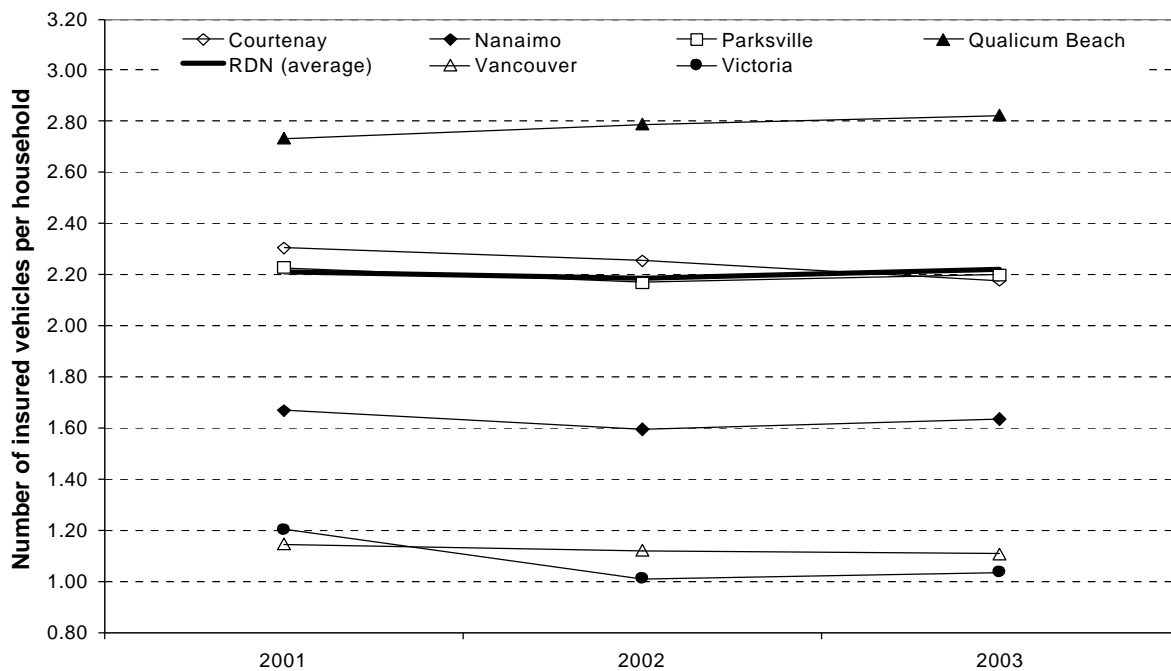


\*Includes commercial vehicles, passenger vehicles, motorcycles, and motor homes

Source: Insurance Corporation of British Columbia

The number of insured vehicles per household increased slightly in the RDN between 2001 and 2003, from 2.21 to 2.22 vehicles per household. The greatest number of insured vehicles per household was in Qualicum Beach with an increase from 2.73 in 2001 to 2.82 in 2003. Besides Qualicum Beach, each of the urban centres has shown a decline in the number of insured vehicles per household during this period. Vancouver and Victoria have significantly fewer vehicles per household than the RDN.

**FIGURE 72 - NUMBER OF INSURED VEHICLES PER HOUSEHOLD (2001 – 2003)**



\*includes commercial vehicles, passenger vehicles, motorcycles, and motor homes

Source: Insurance Corporation of British Columbia, Statistics Canada

As a part of a current RDN project to develop a greenhouse gas emissions reduction plan, a calculation was performed using the number of insured vehicles in the region and estimated number of vehicle kilometres traveled in the region. These data indicate that there are 82,287 vehicles registered in the Regional District of Nanaimo in 2002. According to the Hyla (2006) community vehicle travel was responsible for 63 percent of the greenhouse gas emissions in the region in 2002.

### 17.6.5 Are there any limitations for this indicator?

There are several limitations for this indicator:

- Data do not reflect the amount that a vehicle is driven in comparison to other vehicles in the same household.
- Data do not differentiate between domestic, commercial and recreational vehicles.
- Data do not differentiate between the amount of energy consumed or pollution emitted that may differ between types of vehicle. For instance a motor home will consume more non-renewable resources per kilometre than a motorcycle.
- Data were only available for the three primary communities of Nanaimo, Qualicum Beach and Parksville, and not the RDN as a whole.
- Data for insured vehicles represent vehicles that were insured in municipalities, although the vehicle owners may reside outside of that municipality. For the purpose of this indicator, it is assumed that individuals living in these urban centres operate vehicles insured in these locations. This may impact some data shown here. For example, Qualicum Beach's data may include vehicles outside of the municipality.
- Data do not reflect the reasons for driving. One such reason may be safety. It may not be perceived as safe to walk or cycle to a certain destination, based on the location or the time of travel. For instance, many school children are driven to school even though their homes are within walking distance to schools; they are driven based on fear of abduction.
- Data do not reflect the impact of institutional decisions on the RDN. For instance, the school district's decision to increase the cost of providing buses for school children may provide incentive for parents to drive their children to school instead of take the bus, if the costs are similar.
- The number of vehicles per household data may be skewed if secondary suites or boarders are not separated from the primary household.

### 17.6.6 Assessment

Although there are no direct regional or provincial comparisons of the number of vehicles per household, the data suggest that the municipalities within the region have a higher number of insured vehicles per household. As well, there has been an increase in the number of vehicles in the region, and a slight increase in the number of vehicles per household. The increasing number of vehicles impacts the region's environment, economy and society. This indicates a movement away from sustainability.

Grade: \*                      Trend: Getting Worse

Indicator: Vehicles per Household

Rationale: The number of vehicles per household is increasing in the region.

## 17.7 SUMMARY

### Mode of Transportation to Work and Location of Work:

- In 2001, 88 percent of RDN residents commute to work in private vehicles (as driver or passenger), which exceeds the provincial average of 82 percent.
- Eight percent of RDN residents walk or cycle to work.
- Two percent of RDN residents use public transit; this is less than the provincial average.
- There is an increasing reliance on vehicles for commuting to work.
- The RDN has more employed residents who live and work in the same census subdivision and at home than the provincial average.

### Bus Rides Per Capita

- In 1998, there were 1.5 million bus rides in the RDN; this increased by 45 percent to 2.2 million in 2004.
- Ridership increased by 39 percent per capita between 1998 and 2004.

### Residences within Walking Distance of Amenities

- Between 2000 and 2005, the percent of residences within walking distance of schools, retail and services increased; there was a decrease in number of residences within walking distance to green space and recreation.
- Overall increase in percent of residences within 400 m of multiple amenities between 2000 and 2005.

### Residents Inside Urban Containment Boundary Living Within Walking Distance of a Bus Stop

- In 2001, 89 percent or 80,407 RDN residents within the UCB lived within walking distance of a bus stop.
- In 2005, 94,900 residents lived within walking distance (i.e., 400 m) of a bus stop (although it was not clear what portion of those residents lived within the UCB).
- There are 12 transit routes in the City of Nanaimo and three transit routes servicing Parksville-Qualicum Beach. There are limited transit services within electoral areas.

### Vehicles per Household

- Between 2001 and 2003, there was an increase in the number of vehicles in each municipality in the RDN.
- There was a slight increase in the average number of vehicles per household, from 2.21 in 2001 to 2.22 in 2003; compared to Vancouver and Victoria of less than 1.11 vehicles per household.
- It is estimated that vehicle travel accounts for 63 percent of the greenhouse gas emissions in the region.

## 18.0 THE REGION IS A SAFE PLACE TO LIVE, AND RESIDENTS CARE FOR AND RESPECT EACH OTHER

### 18.1 INTRODUCTION

The region's sustainability is also reliant on its safety and social character, where residents care for and respect each other. Crime rates provide an indication of the level of safety, care and respect for residents in the region.

A recent socio-economic index produced by BC Stats (Vancouver Island Health Authority, 2006) measures several factors including economic hardship, crime, health, education, children-at-risk and youth-at-risk. A standardized score was calculated for each local health area in the province. For comparison purposes, Table 25 reveals the results for those local health areas located on Vancouver Island only. BC Stats identified the Local Health Areas in the RDN as mediocre performing areas in the province in terms of crime.



TABLE 25 – LOCAL HEALTH AREA CRIME RANKING (2004)	
Local Health Area	Crime
Saanich	1
Sooke	1
Gulf Islands	1
Ladysmith	1
Qualicum Beach	2
Greater Victoria	2
Courtenay	2
Cowichan	2
Vancouver Island North	3
Nanaimo	3
Campbell River / VI West	4
Lake Cowichan	3
Alberni	3

1 = Best Quartile, 4 = Worst Quartile

Source: Vancouver Island Health Authority (2006)

## 18.2 CRIME RATE

### 18.2.1 What does this indicator tell us?

The crime rate measures within the indicator describe the frequency of serious violent crimes, break and enters, and drug offences in the region and the perceived and real safety of RDN residents. On a broader level, crime rate is a reflection of the social and economic stability of our community.

Serious violent crimes include homicide, attempted homicide, abduction, assaults level 2 & 3, sexual assaults levels 2 & 3 and robbery involving a weapon. Serious property crime is synonymous with break and enters. Non-cannabis drug offences include all illicit drug crimes except those involving cannabis.

The crime measures for this indicator were selected based on geographic coverage of the region and are comparative with other regions as these crimes would be reported and pursued by the police on a consistent basis across the province (Calderbank, 2006).

Data for juveniles is based on juveniles charged, while the total rates are based on the number of offences reported to the police whether or not charges have been laid. Juveniles are defined as aged 12 to 17 years old. The police jurisdictions were summed to the regional district jurisdictions.

### 18.2.2 Why is this indicator important to our sustainability?

This indicator is important to our sustainability in that it is a major component of resident well-being and reflects a variety of social and economic issues that contribute to the existence and proliferation of crime. The factors often include unemployment, poverty, and drug and alcohol addiction. The socio-economic conditions associated with high crime rates are also conditions that make it difficult to address environmental issues.

According to the United Nations (2001), "the phenomenon of crime, through its impact on society, can hamper the overall development of nations. It can undermine people's spiritual and material well-being, compromise human dignity and create a climate of fear and violence that endangers personal security and erodes the quality of life." Crime impacts residents' safety, sense of security and quality of life. Fear of crime results in costs to society for such things as installation and monitoring of security systems. While crime itself has economic impacts for additional police, repair or remediation of damaged property, medical and psychological treatment for victims, and rising insurance costs. Crime rates provide an indication of community security and well-being and also reflect the ability of all residents to meet their basic needs within our economy (Fraser Basin Council 2000, 28).

Safety from crime is a key component of a healthy, stable community. It is important that people be safe, and feel safe, in their homes, neighbourhoods, parks and public places throughout the region. Freedom from crime and from fear of crime also promotes neighbourhood connections, housing stability, and the community's attractiveness as a place to work and do business.

### 18.2.3 Where do we want to go?

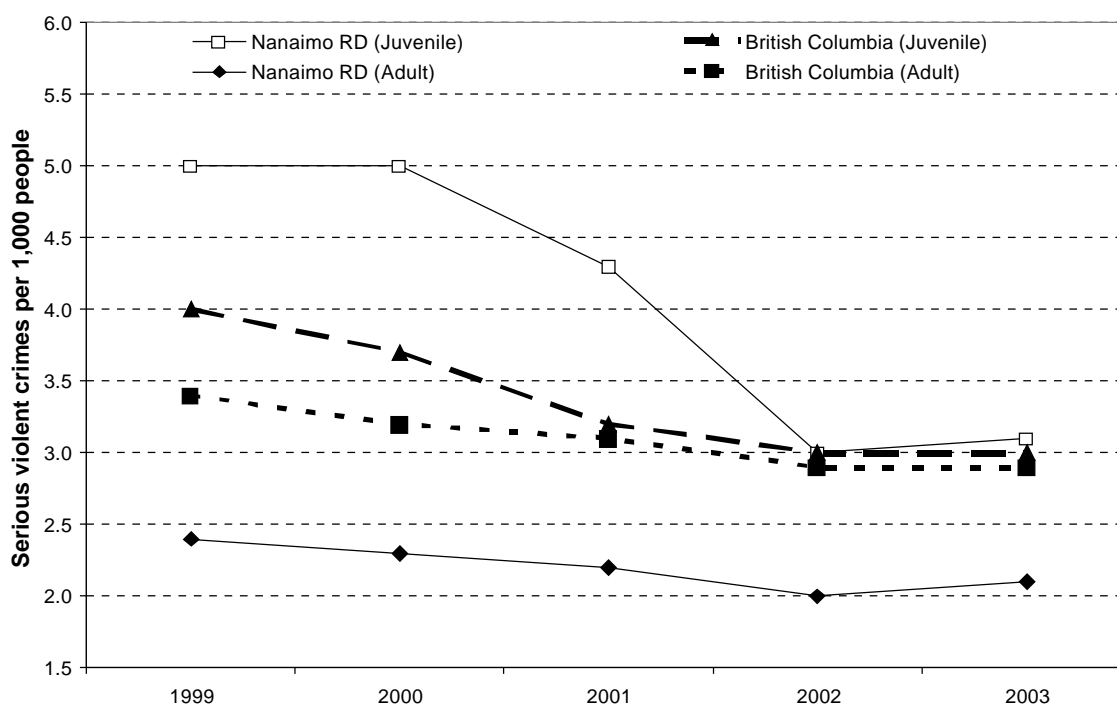
The region's target is to reduce the crime rate by addressing the root causes of crime, such as poverty and unemployment.

### 18.2.4 Where are we right now?

The RDN has had a declining crime rate since 1999. The region's overall crime rate is lower than the provincial average and other comparable regional districts. However, the RDN's juvenile crime rate has been above the provincial average.

Since 1999, serious violent crime rates (i.e., all crimes involving a weapon, sexual assaults resulting in bodily harm, non-sexual assaults resulting in serious injury, and abductions) have been generally decreasing province-wide for both juveniles and adults. According to Anderson (2006), this trend is nationwide. Adult serious crime rates in the RDN are substantially lower than those for the province as a whole. Serious crimes perpetrated by juveniles (age 12-17) were well above provincial average, but declined significantly until 2002 where they equalled the provincial average. Since that time, the juvenile serious crime rate has increased and remains slightly above the provincial average. This recent rise in juvenile serious crime rate should be monitored carefully in the future.

FIGURE 73 - SERIOUS VIOLENT CRIMES (JUVENILE AND ADULT) PER 1,000 PEOPLE (1999 – 2003)\*



\*Data is averaged over three years, i.e. 1999 = 1996-1998; 2000 = 1997-1999; 2001 = 1998-2000; 2002 = 1999-2001; 2003 = 2000-2002.

Source: BC Stats Socio-Economic Profiles (2004)(Police Services, Ministry of Public Security, Solicitor General)

In comparison to the table above, the number of serious violent crimes in the City of Nanaimo has increased between 1999 and 2004 to 1,227 and 1,266 respectively (Anderson, 2006):

- The number of non-sexual assaults increased from 917 in 1999 to 1,101 in 2004, an increase of 20 percent;
- The number of sexual offences increased from 71 in 1999 to 90 in 2004, an increase of 27 percent.

When considering the increase in population of four percent during this same period, this suggests an increasing violent crime for some types of assaults, within the City of Nanaimo.

Overall, juvenile and adult break and enter crimes have been declining since 1999. Juvenile break and enter crime rates, have followed the provincial trend in declining, but remain significantly higher than those of the GVRD and the province. Adult break and enter crime rates are lower than the provincial average. This is also true for the RDCS, and CRD compared to the GVRD and NORD. The RDN experienced a slight rise in adult break and enters from 2002 to 2003.

FIGURE 74 - BREAK AND ENTER CRIMES (JUVENILE AND ADULT) PER 1,000 PEOPLE (1999 - 2003)

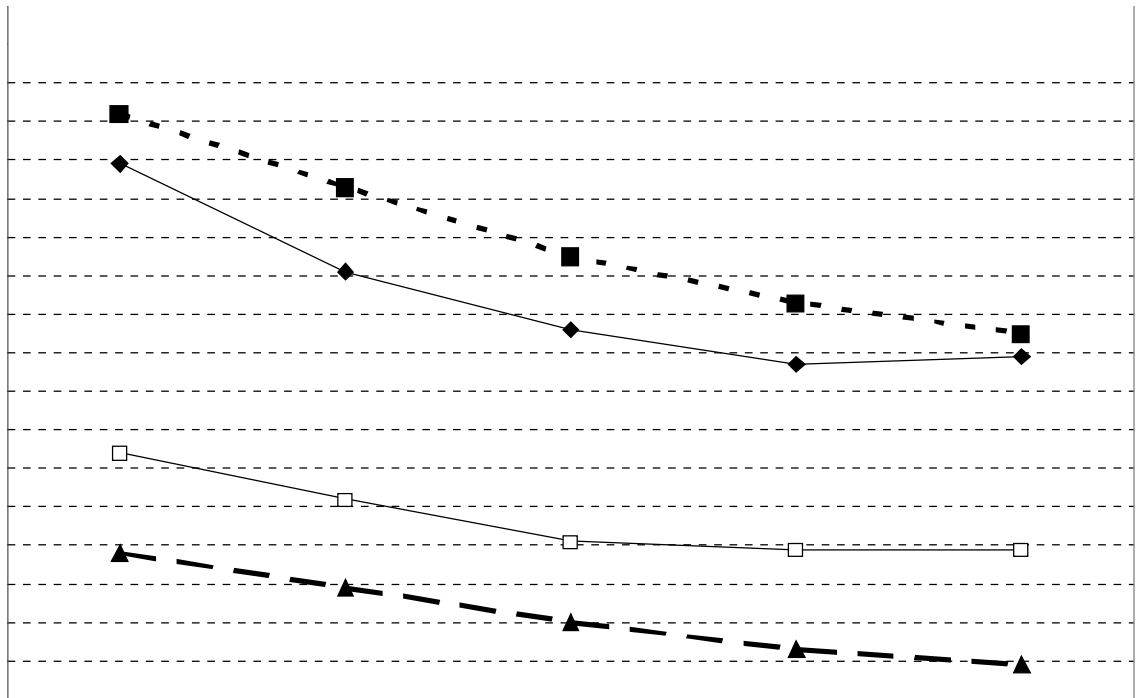


FIGURE 75 - NON-CANNABIS DRUG OFFENCES PER 10,000 PEOPLE (1999 – 2003)

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### 18.2.6 Assessment

Since 1999, the region has experienced a decline in serious violent crime, break and enter, and non-cannabis drug offences for both juvenile and adults. However, from 2002 to 2003, there was a slight increase in juvenile and adult serious violent crime, adult break and enter, and adult non-cannabis drug offences. The reason for a decline of crime in the region may be due to several factors, such as increasing employment or a shift in population demographics (age, etc). In order to ensure a continued decrease, the RDN should ensure provision of adequate social programs to prevent causal factors, and adequate policing to enforce the laws, specifically geared to juvenile and youth programs. The RDN should monitor juvenile crime rates and commit to undertaking measures and programs for youth that would reduce the crime rate to below the provincial level. Although the recent crime rate is increased slightly, until more recent data are provided to signify a trend, the region has experienced a drop in crime overall. This signals progress towards sustainability.

Grade: \*\*

Trend: Getting Better

Indicator: Crime Rate

Rationale: The crime rate for serious violent crime, break and enter and non-cannabis drug offence has declined since 1999 in the region.

### 18.3 SUMMARY

A decline in the crime rate indicates an increasingly safe region, where residents care for and respect each other. One significant limitation for this indicator is that the data provided may reflect either changes in crime, or law enforcement.

#### Crime Rate

- Since 1999, serious violent crime rates (i.e., all crimes involving a weapon, sexual assaults resulting in bodily harm, non-sexual assaults resulting in serious injury, and abductions) have been generally decreasing province-wide for both juveniles and adults.
  - Juvenile serious violent crimes decreased from 5.0 to 3.1 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 4.0 to 3.0 crimes per 1,000 people in the same period.
  - Adult serious violent crimes decreased from 2.4 to 2.1 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 3.4 to 2.9 crimes per 1,000 people in the same period.
- Overall, juvenile and adult break and enter crimes have been declining since 1999.

- Juvenile break and enter crimes decreased from 9.4 to 6.9 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 6.8 to 3.9 crimes per 1,000 people in the same period.
- Adult break and enter crimes decreased from 16.9 to 11.9 crimes per 1,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 18.2 to 12.5 crimes per 1,000 people in the same period.
- Significant decreases in rates of non-cannabis drug offences have occurred in the RDN since 1999. Meanwhile, adult non-cannabis drug offence rates are rising slightly in the CRD, GVRD, and the province as a whole.
  - Juvenile non-cannabis drug offences decreased from 6.5 to 4.6 crimes per 10,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 5.3 to 5.1 crimes per 10,000 people in the same period.
  - Adult non-cannabis drug offences decreased from 15.2 to 8.7 crimes per 10,000 people between 1999 and 2003, respectively. In comparison to the provincial average of 11.8 to 13.7 crimes per 10,000 people in the same period.

## 19.0 THERE ARE A VARIETY OF OPPORTUNITIES FOR RESIDENTS TO INTERACT WITH EACH OTHER AND NATURE

### 19.1 INTRODUCTION

Social sustainability is partially dependent upon the variety of opportunities for residents to interact with each other and nature. The variety of opportunity is measured in the participation in recreational and cultural programs, participation in elections and amount of active and nature park land.

### 19.2 PARTICIPATION IN RECREATIONAL & CULTURAL PROGRAMS

#### 19.2.1 What does this indicator tell us?

The amount of participation in recreational and cultural programs is an indicator of social and economic capital. It measures the amount of participation in programs offered by the RDN, the City of Nanaimo and Malaspina University-College's Continuing Studies. Programs are measured from use of arena, aquatic and sport field facilities as well as course enrolment; the indicator does not measure casual recreational events. From this measurement, the programs may be assessed to ensure that programs are tailored to meet the needs of residents. This is indicated by high participation rates.

### 19.2.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability as it reflects the region's social character and economic capital. Socially, participation in recreational and cultural programs reflects residents' vitality and their willingness and ability to actively participate in such programs. As well, it reflects the RDN, City of Nanaimo and Malaspina University-College's ability to provide adequate number and types of programs to meet the needs of residents. In particular, recreational and cultural programs increase the ability of residents, creatively, artistically, emotionally or physically. Sports programs for youth also provide alternative outlets for energy and social interaction that may decrease the factors that contribute to youth-at-risk or juvenile crime. Programs such as these, improve residents' well being.

Participation also reflects the economic capital, as residents are often only able to participate if they have adequate leisure time and can afford the expense.

### 19.2.3 Where do we want to go?

The regional target is to increase the number of users, admissions and enrolments at the arenas, aquatic centres, programs and courses.



#### 19.2.4 Where are we right now?

Recreational and cultural programs are offered by the RDN, City of Nanaimo and Malaspina University-College. Regional and City of Nanaimo arenas are used by people of all ages for hockey, figure skating, and general physical activity. Since 1995, the City of Nanaimo's arenas have had fluctuating usage, but overall, the trend has increased. In July 2006, the City of Nanaimo's new arena will open, which may affect the usage rates. The RDN's arena has also increased its usage since 2002.

FIGURE 76 – ARENA USERS, RDN AND CITY OF NANAIMO (1995 – 2004)

There has been an increase in number of admissions at both the RDN and City of Nanaimo aquatic centres. The City of Nanaimo experienced a dramatic increase in admissions, almost double, from 2000 to 2002. Reasons for the increase may include the opening of the new aquatic centre in 2001 or increased population. In recent years, the City's number of admissions has fallen by more than six percent. In comparison, the RDN's admissions have steadily increased.

FIGURE 77 – AQUATIC CENTRE ADMISSIONS, RDN AND CITY OF NANAIMO (1995 – 2004)

FIGURE 78 – ENROLMENTS IN PROGRAMS AND COURSES, OFFERED BY RDN, CITY OF NANAIMO AND MALASPINA  
(2000 – 2004)

Thousands of organized groups utilize the School Districts 68 and 69's fields. Table 26 indicates the usage within each field location. More than half of the organized groups use fields located in the City of Nanaimo.

TABLE 26 – FIELD USE BY ORGANIZED GROUPS			
Field Location	Number of Organized Groups Using Fields		Total Number of Organized Groups Using Fields
	School District 68	School District 69	
City of Nanaimo	3,610	52	3,662
City of Parksville	12	516	528
Town of Qualicum Beach	14	308	322
District of Lantzville	250	6	256
Electoral Area A	143	3	146
Electoral Area B	12	0	12
Electoral Area C	49	0	49
Electoral Area D	98	0	98
Electoral Area E	17	185	202
Electoral Area F	9	207	216
Electoral Area G	14	351	365
Electoral Area H	3	75	78
Other	125	19	144
TOTAL	4,356	1,722	6,078

Source: RDN

### 19.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator. Limitations include:

- There are many potential confounders that affect the type of programs the government, post secondary institutions and private organizations offer and the number of people that will sign up for the programs (i.e. funding for programs, cost of programs, marketing, etc.).
- The Continuing Studies program at Malaspina offers many programs; data do not clearly specify which are cultural, recreational or educational (and not within the scope of this indicator).
- Data do not include the number of programs and people that each facility can accommodate.
- The number of enrolments in minor sports programs is not measured.

- Data compiled for this study does not take into consideration the vast number of other opportunities provided to residents by other private and non-profit agencies that have impact on the sustainability of the region.
- Data do not reflect the impact of increases to population in the area on number of admissions or enrolments. Therefore, this indicator may be better assessed by participation per capita.

### 19.2.6 Assessment

The number of admissions or enrolments to arenas, aquatic centres and programs and courses has increased in the region. Although this may indicate that residents are increasingly able to participate in recreational and cultural programs it may, due to the data limitations, also indicate that the region's increasing population may account for increasing admissions and enrolment.

Grade: **	Trend: Getting Better
Indicator: Participation in Recreational and Cultural Programs	
Rationale: The number of users, admissions and enrolments in recreational and cultural programs has increased in the region and additional facilities have been added to accommodate the regional need.	

## 19.3 PARTICIPATION IN ELECTIONS

### 19.3.1 What does this indicator tell us?

Voter turnout reflects citizen participation in regional, provincial, and national decision-making and their concerns and involvement in the government that will make decisions for them.

### 19.3.2 Why is this indicator important to our sustainability?

Participation in elections is a direct measure of participation in decision-making and an expression of civil responsibility and democracy. Voter turnout reflects the ability and the desire of community members to be directly involved in making key decisions that support sustainability. Poor voter turnout can indicate unfamiliarity with the democratic process, apathy, a sense of disempowerment or the state of community well being (Fraser Basin Council, 2000).

### 19.3.3 Where do we want to go?

The regional target is to have an increasing percentage of eligible voters participating in elections.

### 19.3.4 Where are we right now?

Voter turnout is varied for federal, provincial and municipal elections. Voter turnout in the past three federal elections in the RDN has fluctuated slightly, between 65 and 68 percent, but has shown an overall increase. In federal elections, the electoral areas that contain the RDN include Nanaimo-Alberni and Nanaimo-Cowichan. The RDN's participation rate in elections is greater than the provincial average.

FIGURE 79 – PARTICIPATION IN FEDERAL ELECTIONS (1997 – 2004)

FIGURE 80 - PARTICIPATION IN PROVINCIAL ELECTIONS (1991 – 2001)

FIGURE 81 – PARTICIPATION IN MUNICIPAL ELECTIONS (1999 – 2002)



**Grade: \*\*****Trend: Stable**

Indicator: Participation in Elections

Rationale: The region has comparable turnout with other regions and the province. There is no discernible trend in participation in federal, provincial and municipal elections.

## 19.4 AMOUNT OF ACTIVE AND NATURE PARK LAND

### 19.4.1 What does this indicator tell us?

This indicator describes the area of dedicated active parks, nature parks and provincial parks in the region per 1000 residents. Activity parks primarily consist of play areas, playing fields, or other built-up facilities. Nature parks are primarily undeveloped park land and parks not within the activity park definition. Provincial park designations are determined by BC Parks.

Data for this indicator include regional and municipal parks within the RDN, City of Nanaimo, City of Parksville, Town of Qualicum Beach and District of Lantzville as well as provincial parks located in the region. However, data for this indicator do not include active, nature or provincial park land located in Electoral Area B as it is not within the geographic focus of this report. In addition, the data do not include school district playfields or playgrounds.

Municipal and regional parks are acquired by way of dedication at subdivision (as a result of development). Others have been acquired by purchase, partnerships with land owners or agencies, or bequests.

Changes to this indicator either reflect a change in amount of park land or a change in the regional population affecting the amount of park land per resident.

### 19.4.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability active and nature park land support longer, healthier and more productive lifestyles of residents. Sustainable communities offer opportunities for residents to interact with each other and with nature. In addition, the amount of nature park land also reflects the ability of the region to maintain its ecosystems. Nature parks provide filtration systems for our water, air and noise pollution.

### 19.4.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 8: Cooperation Among Jurisdictions: To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

To ensure regional sustainability, the region needs to maintain or increase the amount of active and nature park land.

#### 19.4.4 Where are we right now?

The region has 3,525.5 hectares of activity parks, nature parks and provincial parks within its boundaries, or 27.75 hectares of park land per 1,000 residents. The table below describes the breakdown of park area and park area per 1,000 residents, by type of park.

TABLE 27 – AREA OF ACTIVE AND NATURE PARK LAND PER 1,000 RESIDENTS* (2005)		
Park Type	Area (ha)	Area per 1,000 Residents (ha)
Activity Parks (ha)	664.3	5.23
Nature Parks (ha)	1,019.2	8.02
Provincial Parks (ha)	1,736.0	13.67
ALL PARK LAND	3,419.5	26.92

\* RDN population based on 2001 Census data of 127,016 residents. Electoral Area B's activity, nature and provincial parks are not included in the area calculations. Data do not include school district playfields and playgrounds.

Source: BC Parks, RDN, City of Nanaimo, City of Parksville, Town of Qualicum Beach, District of Lantzville, BC Stats.

Provincial parks in the RDN (not including Electoral Area B) are: Petroglyph (2 ha), Arbutus Grove (23 ha), Englishman River Falls (97 ha), Hemer (93 ha), Horne Lake Caves (158 ha), Little Qualicum Falls (440 ha), MacMillan (157 ha), Morden Colliery (4 ha), Rath Trevor (347 ha), Roberts Memorial (14 ha), Spider Lake (65 ha) and Newcastle Island (336 ha).

A broad comparison may be made to the amount of park land in cities. The average amount of parkland in a city is 8.1 hectares per 1000 people. Edmonton had the highest parkland to person ratio<sup>47</sup> of 17.7 hectares per 1000 people. Survey cities included Atlanta, Portland, Denver, Ottawa-Hull, Surrey, Calgary, Vancouver, Winnipeg, Edmonton and St. Albert.

<sup>47</sup> It should be noted that the City of Edmonton's topography impact the amount of park land. For example, there is a large amount of park land within its river valley.

#### 19.4.5 Are there any limitations for this indicator?

This indicator measures the quantity of park land for use by residents, but does not measure the level of use by residents or the quality of park land. Quality of park may reflect the location, accessibility, and attractiveness to residents as well as its value to nature. As such, this indicator should be used in conjunction with park accessibility or level of use data. Finally, data from other regional districts, instead of cities, should be chosen to compare the RDN's data.

#### 19.4.6 Assessment

In comparison to city averages, the amount of regional active and nature park land per 1,000 residents is high. Future data should better identify trends in the amount of park land available.

Grade: \*\*\*

Trend: Uncertain

Indicator: Amount of Active and Nature Park Land

Rationale: The amount of park land in the RDN per 1,000 residents is high in comparison with other cities; there are no historic trends identified.

### 19.5 SUMMARY

There are a variety of opportunities for residents to interact with each other and nature through participation in recreational and cultural programs and the amount of active and nature park land. It is not clear if residents are increasing or decreasing their participation in decision-making through the election process. Future data will assist in discerning a trend in participation in elections as well as the amount of active and nature park land.

#### Participation in Recreational and Cultural Programs

- Since 1995, the City of Nanaimo's arenas have had fluctuating usage, but overall, the trend has increased. The RDN's arena has also increased its usage since 2002.
- There has been an increase in number of admissions at both the RDN and City of Nanaimo aquatic centers.
- The number of registrants has increased slightly since 2000 for recreational, cultural and continuing studies programs and courses offered by the RDN, City of Nanaimo and Malaspina University-College.
- 6,078 organized groups utilize the School Districts 68 and 69's fields.

### Participation in Elections

- Voter turnout in the past three federal elections in the RDN has fluctuated slightly, between 65 and 68 percent, but has shown an overall increase. The electoral areas in the RDN (Nanaimo-Alberni and Nanaimo-Cowichan) have greater participation than the provincial average.
- The number of voters participating in provincial elections has been declining in the RDN and the province in general. The RDN's electoral areas consist of Nanaimo and Parksville-Qualicum; both of which have experienced a decline of between four and five percent between 1991 and 2001.
- For municipal elections, voter turnout has had no discernible trend. In 1999, voter turnout ranged from 28 to 65 percent of registered voters within the Parksville, Nanaimo and Qualicum Beach.

### Amount of Active and Nature Park Land

- The region has 3,525.5 hectares of activity parks, nature parks and provincial parks within its boundaries, or 27.75 hectares of park land per 1,000 residents.

## 20.0 SOCIAL CAPITAL CONCLUSION

There are a wide range of grades and trends for the 19 indicators that determine the region's social capital. Fifteen of 19 indicators are below or slightly below the comparable averages (\* or \*\*); however, seven of the 15 below average indicators contain improving trends. Below average indicators occur in every sustainability characteristic; all but two of these characteristics indicate at least one trend of improvement over time. The two characteristics that do not indicate improvement over time are:

- poverty is minimized, and residents can meet their basic needs; and
- housing is affordable, and a variety of different types and sizes of housing is available.

The following table provides an overview of the assessments for all indicators.

## SOCIAL CAPITAL PROGRESS REPORT

Characteristic	Indicator	Grade	Trend
Residents are Healthy, and Healthcare Services and Facilities are Available When Needed	Birth Weight	***	Getting Better
	Life Expectancy at Birth	*	Getting Better
	Live Births to Teenage Mothers	**	Getting Better
	Motor Vehicle Accidents	**	Stable
Residents are Educated or Trained to Qualify for Employment	Educational Attainment	*	Getting Better
A Wide Variety of Employment Opportunities Exist, and Residents are Employed	Unemployment Rate	*	Getting Better
Poverty is Minimized, and Residents can Meet Their Basic Needs	Average Annual Income Compared to Cost of Living (Real Income per Capita)	*	Getting Worse
	Households Below Low Income Cut-Off	***	Uncertain
Housing is Affordable, and a Variety of Different Types and Sizes of Housing is Available	Residents in Core Housing Need	*	Getting Worse
	Applicants on Wait List for Subsidized Housing	*	Uncertain
The Need for Travel is Minimized, and Necessary Trips do not Rely Solely on Private Automobile Travel	Mode of Transportation to Work, Location of Work	*	Getting Worse
	Bus Rides Per Capita	?	Getting Better
	Residences Within Walking Distance of Amenities	*	Getting Better
	Residents Inside Urban Containment Boundaries Within Walking Distance of a Bus Stop	**	Uncertain
	Vehicles per Household	*	Getting Worse
The Region is a Safe Place to Live, and Residents Care for and Respect Each Other	Crime Rate	**	Getting Better
There are a Variety of Opportunities for Residents to Interact with Each Other and Nature	Participation in Recreational and Cultural Programs	**	Getting Better
	Participation in Elections	**	Stable
	Amount of Active and Nature Park Land	***	Uncertain

? – the data cannot be assessed.

\* - the region is well below average.

\*\* - the region is slightly below average.

\*\*\* - the region is meeting the average.

\*\*\*\* - the region is exceeding the average

Getting Worse - the trend indicates movements away from the goals of 'Where do we want to go?'

Stable – the trend indicates no discernible movement towards or away from the stated goal.

Getting Better – the trend indicates movement towards or exceeding the stated goal.

Uncertain – there are not enough data or historical depth to accurately identify the indicator's trend.

Many of the indicator assessments are limited by outdated data. Updated data will assist in identifying more accurate trends in each of the indicators and characteristics.

# ECONOMIC CAPITAL

## 21.0 ECONOMIC CAPITAL INTRODUCTION

Economic capital is a primary component of sustainability. Economic capital, when sustainable, can contribute to social and environmental capital. On the same note, healthy and progressive environmental and social capital also contributes to economic capital. However, when economic capital is unsustainable it can also cause environmental degradation if combined with inappropriate consumption, which will inevitably affect human health (United Nations, 2005).

While sustainability calls for reduced consumption of environmental resources, it also requires economic stability and social cohesion (Federal Office for Sustainable Development, 2005).

Economic development is sought by societies not only to satisfy basic material needs, but also to provide the resources to improve the quality of life in other directions, meeting the demand for health care, education and a good environment. Many forms of economic development make demands upon the environment; they use natural resources which are sometimes in limited supply, and generate by-products of pollution and waste.

But there are also many ways in which the right kind of economic activity can protect or enhance the environment. These include energy efficiency measures, improved technology and techniques of management, better product design and marketing, waste minimization, environmentally friendly farming practices, making better use of land and buildings, and improved transport efficiency. The challenge of sustainable development is to promote ways of encouraging this kind of environmentally friendly economic activity, and of discouraging environmentally damaging activities (University of Reading).

## 22.0 THERE IS POSITIVE ECONOMIC GROWTH IN THE REGION

### 22.1 INTRODUCTION

The region's economic capital is partially defined by the characteristic of economic growth. Two indicators are used to assess this characteristic: average annual income compared to cost of living and the number of business formations and bankruptcies. These indicators are important because the first determines the amount of disposable income, which in turn affects the second indicator's success or failure of businesses located in the region. The more disposable income that people have, the more potential for spending money at regional businesses. An increase in the average annual income would likely increase the number of business formations and/or decrease the number of business bankruptcies, which would indicate positive economic growth in the region.



## 22.2 AVERAGE ANNUAL INCOME COMPARED TO COST OF LIVING (REAL INCOME PER CAPITA)

### 22.2.1 What does this indicator tell us?

Average annual income compared to cost of living is used as a proxy for real income growth and real income output. It describes the employment income of people who worked full time (30 hours or more per week for 49 weeks or more per year) and compares it with the average cost of living in the region. This indicator provides information on the residents' disposable income. Adjustments to the average annual income should keep pace with changes to the cost of living as measured by the Consumer Price Index (CPI), an index of movement in prices (Government of Canada, 2006).

### 22.2.2 Why is this indicator important to our sustainability?

This indicator identifies how residents are affected by the external forces that often change the cost of living. The indicator is important to our sustainability in that if the residents' average income is not keeping up with the cost of living, it may precipitate an out-migration of residents and may indicate an erosion of spending power – which would add to a declining economy.

In addition, the Canadian Council on Social Development states that “there are strong relationships between income levels and levels of health within communities. People living with lower incomes face many challenges that their wealthier neighbours may not. They may be less healthy than people with higher incomes and are more likely to experience shorter... lives.”

### 22.2.3 Where do we want to go?

The RDN's Regional Growth Strategy supports this indicator through Goal 6: Vibrant and Sustainable Economy. The RDN supports strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

While there is no quantifiable goal for this indicator, it is clear that it is best if the change in average income meets or exceeds the change in cost of living. This would indicate that the region's residents are able to maintain their purchasing power.

The rate of change of both income and cost of living should not be too high, in order to be sustainable. When income grows too high, it signals a bubble and when the cost of living grows, it shows an erosion of wealth and savings. Negative income growth signals a declining economy, which is not sustainable.

### 22.2.4 Where are we right now?

The increase in cost of goods and services, or the cost of living, in the region has generally been greater than the increase in average income. Even during 1995 to 2000, when the cost of shelter declined due to falling interest rates, the cost of goods and services still rose due

to increased cost of food, tuition and energy. The cost of goods and services, as measured by the CPI, rose by five percent; whereas, the average income rose by four and a half percent. Between 1995 and 2000, the RDN income growth lagged behind all CPI-monitored items except shelter. Table 28 describes the CPI change of select items and all items, as compared to the RDN's income change. Although the 2003 average gross income in the RDN is not known, it is evident that CPI has risen in the region by 6.3 percent since 2000.

TABLE 28 - RATES OF CHANGE IN INCOME AND COST OF SELECTED GOODS AND SERVICES (1995 – 2003)						
Category	Item	1995*	2000	% Change (1995 – 2000)	2003	% Change (2000 – 2003)
CPI (Select Items)	Food	107.3	113.0	5.3	122.8	8.7
	Shelter	103.9	99.6	-4.1	103.7	4.1
	Tuition	122.3	138.9	13.6	183.6	32.2
	Energy	107.4	130.8	21.8	144.9	10.8
CPI	All Items	107.9	113.3	5.0	120.4	6.3
RDN	Average Gross Income	\$22,968.26	\$23,998.23	4.5	NA	NA

\*Base year = 1992

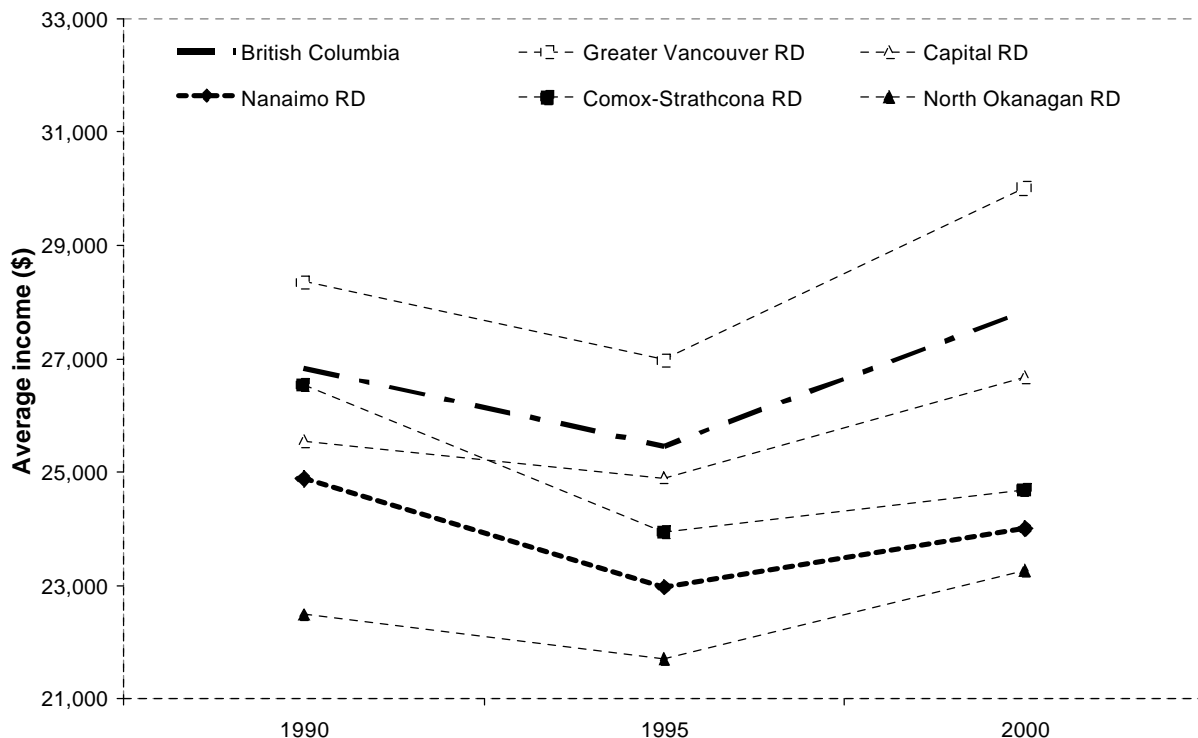
Source: BC Stats

Figure 82 illustrates the change in income over time, per sector, as well as an average of all sectors. Between 1990 and 1995, the average income dropped by almost \$2,000 per year. By 2000, the average income had increased, but remained less than 1990 levels. Of the top industry sectors in the region there were several noticeable increases and decreases in income:

- Business, government, health and social services, accommodation and food and beverage service industries realized increased incomes between 1990 and 2000; and
- Education services, other services, retail trade, manufacturing and construction industries had declining incomes during that same period.

FIGURE 82 – AVERAGE INCOME PER SECTOR IN THE RDN (1990 – 2000)

FIGURE 83 – COMPARISON OF INFLATION ADJUSTED AVERAGE PERSONAL INCOME PER CAPITA (1990 – 2000)



\*Note: data are in 1992 constant dollars

Source: Statistics Canada

The decline in average personal incomes for the period recorded in 1995 may be attributed to a provincial slump in the economy. According to the Ministry of Finance and Corporate Relations (1997) “[1996] was a difficult one for the British Columbia economy. The slowdown that began during the second half of 1995 continued through most of 1996. Growth accelerated late in 1996, allowing the economy to post growth of around 0.5 per cent for the full year.”

### 22.2.5 Are there any limitations for this indicator?

There are several data limitations for this indicator.

- Data are outdated. The last set of complete data was for 2000, with some data available for 2003; in the past few years, there have been several significant increases to cost of living, including shelter and energy as well as upswings in the construction and service industries.
- As well, the average income may not be an accurate indicator because of the number of retirees who are drawing from pensions (particularly those that are indexed to the cost

of living) and retirement savings. A better measure may have been median income. It is not clear if retirees' disposable income has been measured and/or factored into the calculations.

### 22.2.6 Assessment

Both the average income from all industries and the inflation-adjusted average income indicated a declining trend in income between 1990 and 2000. As well, the change in income between 1995 and 2000 did not meet the increase in cost of living for that same period, which would indicate an overall move away from sustainability. However, the data are over six years old and several significant changes have occurred in the region over that period, likely increasing the cost of living, but it is unclear to the extent of the increase. Although it is not possible to accurately assess the current situation, the historic trend indicates that the region is moving away from sustainability.

Grade: *	Trend: Getting Worse
Indicator:	Average Annual Income Compared to Cost of Living (Real Income per Capita)
Rationale:	In 2000, the region was moving away from sustainability. However, until a more recent set of data is released, it is not possible to ascertain the region's current movement towards or away from sustainability.

## 22.3 BUSINESS FORMATIONS AND BANKRUPTCIES

### 22.3.1 What does this indicator tell us?

This indicator describes the number of businesses formed and the number of businesses that have gone bankrupt in the region over a one-year period. Business formations, or incorporations, are defined as "new limited companies registered under the Company Act...not included are sole proprietorships or partnerships" (BC Stats)." A bankruptcy is "a legal process performed under the Bankruptcy and Insolvency Act. ... A Business Bankruptcy is a bankruptcy (under federal legislation) which is chiefly attributable to the liabilities incurred as a result of the carrying on of a commercial venture or business and includes proprietorships, partnerships and Limited Companies" (BC Stats)."

### 22.3.2 Why is this indicator important to our sustainability?

The indicator provides information on the general economic trend in the region, if the economy is growing or shrinking. An economy is growing if the number of businesses formed increases and/or the number of bankruptcies is shrinking. The magnitude of net gain of businesses indicates the vibrancy of the economy. It is important to have increasing

number of businesses to employ people and to assist with the tax burden. In addition, diversification through multiple businesses and industries minimizes the effect of failure of one large business or industry. If there are a declining number of businesses, the bulk of the tax burden is transferred to residents or there is a decrease in the level of public services.

### 22.3.3 Where do we want to go?

The RDN's Regional Growth Strategy has three goals that support this indicator:

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

In order to have economic growth, the region needs to maintain or increase the number of businesses formed and decrease the number of business bankruptcies.

### 22.3.4 Where are we right now?

The business formation, or incorporation, rate and bankruptcy rates cannot be directly compared, as incorporation data are reported by the Corporate Registry of the Provincial Government and are available only by regional district, while bankruptcy data are reported by the Office of the Superintendent of Bankruptcy and is available either by area (first three letters of postal code) or by urban centre.

Since 1990, there has been a fluctuating, but increasing trend in business formations. In 1994, the number of business formations peaked at 652 incorporations, then declined and remained relatively stable at 460 incorporations until recently, when in 2004 the number of incorporations increased to 606. Figure 84 illustrates the fluctuating number of incorporations since 1990.

FIGURE 84 – NUMBER OF BUSINESS INCORPORATIONS IN THE RDN (1990 – 2004)

During the period of 1996 to 2004, there has been a decreasing trend in the number of bankruptcies in the City of Nanaimo. Due to the limitations associated with data collection, the only data available are for the City of Nanaimo. In 2000, the number of bankruptcies peaked at 48, but has been declining since then, reaching a low in 2003 and 2004 of 18 and 19 commercial bankruptcies. Figure 85 indicates the latest trends in business bankruptcy rates.

FIGURE 85 – BUSINESS BANKRUPTCIES IN THE CITY OF NANAIMO (1996 – 2004)



- It is not known if data include companies not registered under the Company Act; in future, it may be better to compare the number of business licenses.
- Data do not address the growth or decline of existing businesses, which also affect the number of people employed and the level of taxes paid.

### 22.3.6 Assessment

Although the business formation and bankruptcy data are not directly comparable, data do indicate an increasing number of business formations, and decreasing number of business bankruptcies. This would indicate economic vibrancy in the region.

There are no comparable data for other regions or the province<sup>49</sup>. In such case, the data would suggest that the region should be graded, at minimum, as fair and moving towards sustainability.

<b>Grade:</b> **	<b>Trend:</b> Getting Better
<b>Indicator:</b> Business Formations and Bankruptcies	
<b>Rationale:</b> There are an increasing number of business formations and decreasing number of business bankruptcies; however, there are no comparable data.	

## 22.4 SUMMARY

The indicators for this characteristic provide mixed evidence of movement towards and away from sustainability.

### Average Annual Income Compared to Cost of Living (Real Income Per Capita)

- Consumer Price Index, a measure of inflation, indicated an increase of 5.0 percent between 1995 and 2000.
- Average gross income in the region increased by 4.5 percent between 1995 and 2000.
- The average annual income in the region is not increasing at the same rate as the cost of living, which ultimately decreases the amount of disposable income available.
- More recent data are required to adequately assess this indicator.

<sup>49</sup> Note: Data in this indicator are not comparable to the declining trend in income found in indicator 'Average Annual Income Compared to Cost of Living (Real Income Per Capita)' because of the different dates of the data sets.

### Business Formations and Bankruptcies

- The number of business formations in the RDN increased to 606 in 2004.
- The number of business bankruptcies in Nanaimo decreased to 19 bankruptcies in 2004.
- There has been an overall indication of economic vibrancy in the region.

## 23.0 THE TAX SYSTEM FAVOURS SUSTAINABLE, ENVIRONMENTALLY RESPONSIBLE ECONOMIC ACTIVITIES

### 23.1 INTRODUCTION

In establishing a sustainable economy, it is important that the tax system favours sustainable, environmentally responsible economic activities. One indicator of this characteristic is the taxes paid by residents and businesses. At this time, there are no indicators to adequately address environmentally responsible economic activities.

### 23.2 TAXES PAID PER CAPITA

#### 23.2.1 What does this indicator tell us?

This indicator describes the taxes paid by residents within the RDN. Property taxes encompass taxes for house and property value and are used to support schools, municipal, regional district and hospital functions, amongst others.

There are no data provided on the amount of business taxes collected, or what those taxes encompass.

#### 23.2.2 Why is this indicator important to our sustainability?

This indicator is important to the region's sustainability, as taxes are a source of government revenue for the provision of public services and infrastructure. The cost of providing public services is borne by residents and businesses through property tax, income tax or taxes collected at the time of purchases, such as Goods and Services Tax or Provincial Sales Tax. Socially, the public benefits through provision of services. However, the reduction of disposable income also negatively impacts the public, depending on their level of disposable income. Therefore, there must be a balance in the amount of taxes paid and services provided, or a balance of costs and benefits.

Too high a tax burden discourages personal savings and spending, which ultimately impacts businesses. When taxes are perceived as too high, it also provides incentive for people and businesses to move to other regions with lower taxes, which diminishes the region's economic vibrancy and increases the tax burden on the remaining residents and businesses.

A change in tax base also affects the burden borne by residents. For instance, a reduced industrial tax base causes an increased burden on residents and commercial businesses.

### 23.2.3 Where do we want to go?

The RDN's Regional Growth Strategy goal 6: Vibrant and Sustainable Economy supports this indicator. Goal 6 supports strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

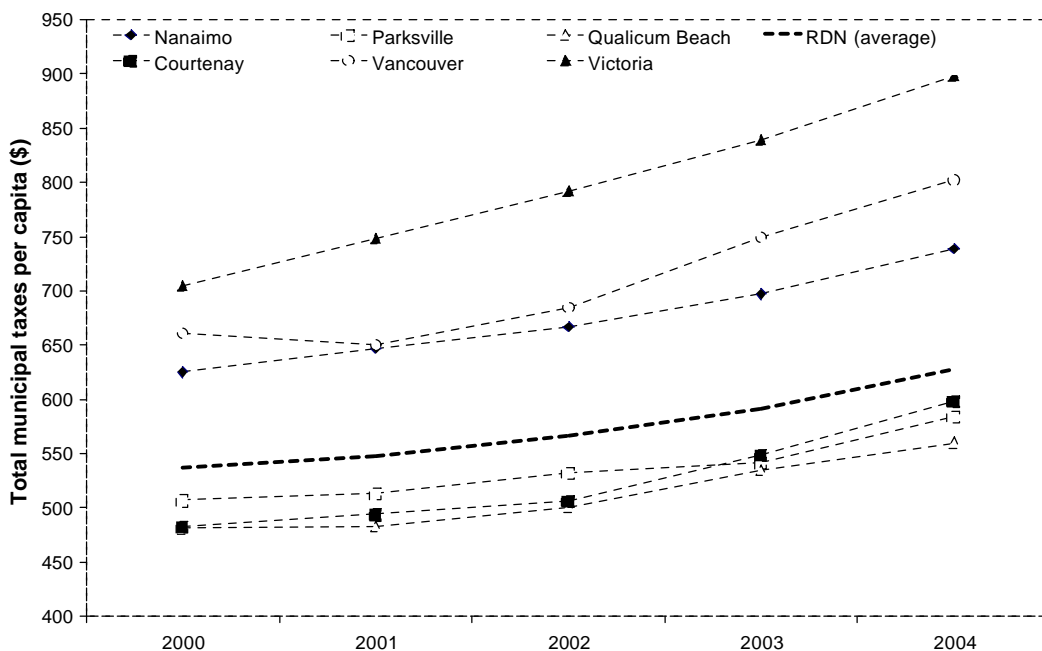
Therefore, a sustainability goal is to ensure that the region remains competitive and provides adequate and robust services.

### 23.2.4 Where are we right now?

From 2000 to 2004, the municipal property taxes in the region have increased. An average of all the municipalities within the region indicates an increase of \$90 per capita, from \$538 to \$628. The average municipal property taxes paid in the region are less than Victoria and Vancouver.

The differences between the taxes paid are due to a combination of factors. The taxes are determined by the levels of service offered in each region. Property taxes are also affected by inflation and increasing property values. The land use mix in a community often dictates the amount of taxes due. A community such as Qualicum Beach that has predominantly residential land uses and a small population may have higher taxes than a community with a robust commercial and industrial tax base and a large population (such as Vancouver).

**FIGURE 86 – TOTAL MUNICIPAL PROPERTY TAXES PER CAPITA (2000 – 2004)**



Source: Ministry of Community, Aboriginal, and Women's Services

In 2004, the residential property taxes for municipalities in the RDN ranged from \$420 to \$496 per person. The highest municipal residential taxes per capita are in Qualicum Beach (\$496), while the lowest taxes paid are in Courtenay (\$322) and Vancouver (\$340).

FIGURE 87 - MUNICIPAL RESIDENTIAL PROPERTY TAXES PER CAPITA (2000 – 2004)

Municipal non-residential property taxes per capita have also been increasing in the region, except in Qualicum Beach, where the taxes have slightly decreased. However, the average regional non-residential tax per capita is \$174, less than half of the non-residential taxes found in Victoria (\$478) and Vancouver (\$451).

FIGURE 88 - MUNICIPAL NON-RESIDENTIAL PROPERTY TAXES PER CAPITA\* (2000 – 2004)

- Assessments are based on per capita; however, not all residents pay property tax (e.g., children or people who rent).

### 23.2.6 Assessment

The data indicate that total, residential and non-residential municipal property taxes are increasing over time but are generally less than taxes paid in Victoria and Vancouver. As well, the data indicate that the municipal taxes in the region are increasing less rapidly than in Victoria and Vancouver. As there are no data to assess if adequate services are present in the region, compared to the level of taxation, it is not possible to determine if the region is moving towards or away from sustainability. However, the level of taxation indicates that there is continued incentive for residents to stay in the region.

Although taxes can favour economic sustainability and environmental sustainability (through provision of parks, or as an incentive), there are no data to assess at this time.

Grade: ***	Trend: Uncertain
Indicator: Taxes Paid Per Capita	
Rationale: Municipal property taxes are increasing in the region, but less rapidly than comparative cities. As well, municipal taxes in the region are less than comparative cities. However, there are no data on levels of service in the region.	

### 23.3 SUMMARY

A characteristic of a sustainable region is that the tax system favours sustainable, environmentally responsible economic activities. The indicator for this characteristic cannot be graded, nor a trend discerned, to identify the region's movement towards or away from sustainability.

#### Taxes Paid Per Capita

- From 2000 to 2004, the municipal property taxes in the region have increased by \$90 per capita, from \$538 to \$628. The average municipal property taxes paid in the region are less than Victoria and Vancouver.
- From 2000 to 2004, the municipal residential property taxes in the region have increased. In 2004, the residential property taxes for municipalities in the RDN ranged from \$420 to \$496 per person.

- Municipal non-residential property taxes per capita have also been increasing in the region, except in Qualicum Beach, where the taxes have slightly decreased; the average non-residential tax per capita is \$174.

## 24.0 THE ECONOMY IS CHARACTERIZED BY A DIVERSITY OF DIFFERENT TYPES AND SIZES OF BUSINESSES

### 24.1 INTRODUCTION

Another characteristic of economic capital is a diversity of different types and sizes of businesses. This characteristic is measured by the type of industries that dominate the region's industry sectors. These industries indicate changes in regional economy and affect income and incentive for educational attainment.

### 24.2 PERSONAL INCOME FROM TOP THREE INDUSTRIES AS A PROPORTION OF PERSONAL INCOME IN REGION AND PERSONAL INCOME FROM INDUSTRY

#### 24.2.1 What does this indicator tell us?

This indicator provides information on industries in the RDN that provide the most income to the region's residents and contribute to the RDN's revenue, the change in primary industries in the region over time, and the amount of diversification in the regional economy. The percent of employment within each primary sector and the amount of income generated indicates the region's dependence on those industries.

#### 24.2.2 Why is this indicator important to our sustainability?

This indicator is important to our sustainability as more diversified economies are characterized by lower percentages of economic concentration. However, too low a percentage shows a fragmented economy, which may not be sustainable. The type of primary industries also impact sustainability. A sustainable economy is reflected in industries that are goods and services producing, that are not entirely resource-based, and that provide average or above average salaries to their employees. As well, a diversified economy protects a region from "boom and bust" economic cycles and the fluctuations in a specific industry. Heavy dependency on a single or limited number of sectors, especially resource (forestry, mining and fishing), increases the vulnerability of the region to changes in the economic cycle that could result in economic hardship (BC Stats, 2005). Therefore, the larger the range and variety of employment opportunities, the less impact from those economic fluctuations.

The types of dominant industries also affect the region's sustainability. All developed countries now show an economic structure dominated by the service sector with the resource sector (agriculture, forestry and mining) being a minor contributor. The type of service sector is important as services provided by the government, such as health and education, do not contribute to wealth generation in the region (i.e., accumulating money from outside of region, other than incomes). Service sectors such as retail and business are

more efficient at wealth generation, but this is often offset by the low levels of personal incomes for their employees. Retail and tourism generally offer the lowest salaries.

Another aspect to sustainability is the environmental and social impacts of the industry. For instance, retail and tourism industries may offer lower salaries but may have less impact on the environment. As well, although health and education sectors are not efficient at wealth generation, they provide important services that contribute to the region's overall sustainability.

### 24.2.3 Where do we want to go?

The RDN's Regional Growth Strategy has several goals that support this indicator:

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 4: Environmental Protection: To protect the environment and minimize ecological damage related to growth and development.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

All developed countries now show an economic structure dominated by the service sector with the resource sector (agriculture, forestry and mining) being a minor contributor. Therefore, a sustainability goal is to reflect such a structure, while ensuring that the region is sufficiently diverse.

### 24.2.4 Where are we right now?

The RDN has a diverse range of industries, and the top three industries in the region have changed very little from 1990 to 2000. During that period, the top income-generating industry in the RDN has changed from manufacturing, to retail, to health and social services. These statistics show an economy in transition. The lack of dependency on a single industry is a good sign, showing increasing diversification, which may be more sustainable than a dominant service sector.

In the RDN, manufacturing and retail have been in the top three industries since 1990. Health and social services replaced construction in 1995 and 2000. Province-wide, manufacturing and health and social services have been in the top three income generating industries since 1990. Retail services were also in the top three in 1990 and 1995, but were replaced by business services in 2000. However, no recent data are available; since 2000, there have been significant changes in the region since that time, with a dramatic increase in population and the construction industry.

More diversified economies are characterized by lower percentages of economic concentration, such as those seen for the province and the RDN. In 2000, the RDN's top three industries generated 33.8 percent of total personal income for all workers aged 19 to 64. This proportion is comparable to the provincial level of 33.6 percent. The total percent



of top three income generating industries in the RDN has decreased from 36.0 to 33.8 percent between 1990 and 2000. Conversely, the provincial average indicates an increase in percent of top three income generating industries from 31.7 to 33.5 percent. This indicates an increasing diversification in the region, and a decreasing diversification in the province.

TABLE 29 - TOP THREE INCOME GENERATING INDUSTRIES IN THE RDN AND BC (1990 – 2000)						
Location	1990		1995		2000	
	Industry	Percent	Industry	Percent	Industry	Percent
RDN	Total Percent of Top 3 Industries	36.0	Total Percent of Top 3 Industries	33.0	Total Percent of Top 3 Industries	33.8
	Manufacturing	13.1	Retail	11.3	Health and Social Service	12.3
	Retail	11.8	Health and Social Services	11.1	Manufacturing	10.8
	Construction	11.1	Manufacturing	10.6	Retail	10.7
BC	Total Percent of Top 3 Industries	31.7	Total Percent of Top 3 Industries	31.5	Total Percent of Top 3 Industries	33.5
	Manufacturing	13.7	Manufacturing	12.8	Manufacturing	11.7
	Retail	9.2	Health and Social Services	10.0	Health and Social Services	11.0
	Health and Social Service	8.8	Retail	8.7	Business Services	10.8

Source: Statistics Canada

Since 1990, the percentage of total personal income generated by the top three industries has remained relatively stable in the RDN, the CRD, the NORD, and the province. Percentages have increased in the GVRD (becoming less diversified) and decreased in the CSRD (becoming more diversified).

FIGURE 89 - TOTAL PERSONAL INCOME GENERATED BY TOP THREE INDUSTRIES (1990 - 2000)

FIGURE 90 - INCOME GENERATED PER SECTOR IN THE RDN AND BC (1990 - 2000)

FIGURE 91 – AVERAGE INCOME IN THE RDN, PER SECTOR (1990 – 2000)

**Grade: \*\*****Trend: Stable**

**Indicator:** Personal Income from Top Three Industries as a Proportion of Personal Income in Region and Personal Income from Industry

**Rationale:** The region has an increasingly diversified range of industries, with low economic concentrations, comparable to the provincial average. However, the incomes associated with two of the top three industries are declining over time.

### 24.3 SUMMARY

Personal Income from Top Three Industries as a Proportion of Personal Income in Region and from Industry.

- Since 1990, the top income-generating industry in the RDN has changed from manufacturing, to retail, to health and services.
- In 2000, the top three income generating industries were health and social services (12.3 percent), manufacturing (10.8 percent) and retail (10.7 percent).
- In 2000, the RDN's top three industries generated 33.8 percent of total personal income for all workers aged 19 to 64; this is comparable to the provincial average of 33.6 percent.
- The total percent of top three income generating industries in the RDN has decreased from 36.0 to 33.8 percent between 1990 and 2000; compared to the provincial average that indicates an increase from 31.7 to 33.5 percent.
- Of the top three industries, the actual employee incomes for health and social services increased slightly and the incomes for manufacturing and retail declined.

## 25.0 A WIDE VARIETY OF EMPLOYMENT OPPORTUNITIES EXIST AND RESIDENTS ARE EMPLOYED

### 25.1 INTRODUCTION

The region's economic and social sustainability rely on employment and the variety of employment in the region. Employment by industry sector indicates the number of people employed in each class of occupation. The unemployment rate reflects the percent of residents who are seeking employment. Changes in the employment by industry sector may reflect on the number of unemployed people. For example, increased employment in the construction sector may lead to decreased unemployment in the region.

## 25.2 EMPLOYMENT BY INDUSTRY SECTOR

### 25.2.1 What does this indicator tell us?

Employment by sector indicates the region's diversity, the primary sectors that the region is dependent upon for employment, and shifts in occupations over time. The variety of employment opportunities is an indicator of the diverse range of employment that protects a region from "boom and bust" economic cycles and the fluctuations in a specific industry. Heavy dependency on a single or limited number of sectors, especially resource (forestry, mining and fishing), increases the vulnerability of the region to changes in the economic cycle that could result in economic hardship (BC Stats, 2005). This is evidenced by recent local history in both the mining and fishing industries. Therefore, the larger the range and variety of employment opportunities, the less impact from those economic fluctuations.

### 25.2.2 Why is this indicator important to our sustainability?

Sustainability is measured by the ability of the economy and the community to survive changes. Diversity in employment sectors demonstrates the ability to survive an economic downturn in one sector by support in other sectors, and to take advantage of new opportunities.

As well, employment provides household income. The industry in which people are employed often dictates the amount of income earned. Therefore, rising employment in the retail sector may indicate a shift to lower paid positions, which may affect people's ability to afford housing in the region. This indicator is supported by several other indicators including educational attainment, and average annual income compared to cost of living.

### 25.2.3 Where do we want to go?

The RDN's Regional Growth Strategy supports this indicator through Goal 6: Vibrant and Sustainable Economy - to support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

In general, a region is more sustainable when it has a diverse range of employment opportunities and employment is not concentrated in few industry types. Therefore, the region should strive for a diverse economic base representing a variety of skill and education levels. Another sustainability goal associated with this indicator is to increase the levels of employment associated with higher paying positions and education requirements.

### 25.2.4 Where are we right now?

The RDN has a diverse range of employment types and employment is not concentrated in one industry. The largest single percentage of workers is employed in retail trade industries, approximately 15 percent, followed by the health and social service industries at almost 12 percent. The lowest percent of RDN residents are employed in the mining, quarrying and oil and gas industries. Sectors showing steady increases include wholesale trade, business

services, educational services, and health and social services. The employment trends are similar to that of the province, with only slight differences.

The service sectors, when combined, represent over 79 percent of the economy indicating that the region has a mature economy. The region's service sector proportion is equivalent to the provincial average. The service sectors include: transportation and storage, communication and other utilities, wholesale trade, retail trade, finance and insurance, real estate and insurance agent, business, government, educational, health and social, accommodation and food and beverage, and other service industries.

Extraction of primary resources provides employment for a declining number of workers in the RDN. While agricultural employment is increasing very slightly, employment in fishing, trapping, logging and forestry is declining.

FIGURE 92 –WORKING POPULATION EMPLOYED BY INDUSTRY SECTOR, FOR RDN AND BC (1990 – 2000)

and beverage industries are among the industrial groups with the lowest income per employee in the region.

FIGURE 93 – AVERAGE INCOME IN THE RDN, PER SECTOR (1990 – 2000)



### 25.2.6 Assessment

The overall assessment is that the region is neither progressing nor declining in the area of diversifying employment by occupation. While there has been a rise in employment in certain occupations, there has been a steady decline in resource-based industries with no measurable increase in the value added component of manufacturing. There have not been significant changes in the overall level of employment within one occupation, nor has there been a reduction in the types of occupations. This would indicate that the region is remaining stable overall. However, the data are outdated and may not adequately reflect the region's current sustainability.

The average salaries associated with the top three employment sectors indicate that employment is growing in sectors with low incomes. In addition, if the data are compared to educational attainment levels, it will indicate that the retail and accommodation, food and beverage sectors do not generally require high levels of education. This will negatively impact the region economically and socially.

Grade: \*\*

Trend: Getting Worse

Indicator: Employment by Industry Sector

Rationale: The employment by occupation is remaining stable within the region; however, top employment sectors in the region provide lower than average incomes.

## 25.3 UNEMPLOYMENT RATE

### 25.3.1 What does this indicator tell us?

The unemployment rate is measured by Statistics Canada as "the percentage of the labour force that actively seeks work but is unable to find work at a given time." People who are not seeking work are not counted as unemployed, or as part of the labour force.

This indicator describes the "unutilized labour supply" (United Nations, 2001) of a region. According to the United Nations (2001) "unemployment rates by specific groups – such as by age, sex, occupation or industry – are also useful statistics in identifying groups of workers and sectors most vulnerable to joblessness."

It should be noted that the number of people unemployed is not the same as the number of people receiving employment insurance. Therefore, although the number of people receiving employment insurance is a reflection of the number of unemployed people, it does not accurately depict the number of unemployed people.

### 25.3.2 Why is this indicator important to our sustainability?

The unemployment rate is a traditional measure of the economic health of the region. Unemployment can be a primary contributor to poverty in our region, that can affect people individually (socially, financially and mentally) and the region as a whole.

Historically, the Province has received Federal transfer payments, which includes Employment Income (income or insurance) payments. Therefore, a reduction in unemployment, and by proxy, employment insurance, reduces the region's dependence on social systems.

This indicator also reflects the transition of youth from school to work. Youth unemployment measures success in the transition from school to work (Statistics Canada, 2000), when the youth unemployment rate decreases, it indicates a successful transition, reflecting appropriate training and education.

### 25.3.3 Where do we want to go?

The RDN's Regional Growth Strategy Goal 6: Vibrant and Sustainable Economy supports this indicator - to support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

The regional, provincial and national goal is to reduce the unemployment rate, or eliminate unemployment altogether. A practical goal is to be less than or equal to the provincial unemployment rate.

The structural unemployment rate in Canada is around five percent. Figures above five percent signal that an economy is not able to sustain its current level of human resources and that there are likely to be hardships for the persons concerned. Four percent unemployment is considered by economists to reflect full employment (reflecting the fact that there are always a certain percentage of the population seeking work at any given time).

### 25.3.4 Where are we right now?

The City of Nanaimo's unemployment rate has declined. Although the City of Nanaimo is not an indicator of the region, it has the only available data for the region. Since 1987, Nanaimo's unemployment rate steadily declined until its low in 1999 of 6.3 percent unemployment. After that, the unemployment rates increased dramatically to a high of 12.5 percent in 2001. Most recently, the unemployment rates have declined to 7.8 percent in 2004. The City of Nanaimo's unemployment rates remain higher than the provincial average. In comparison, Victoria and Vancouver have lower unemployment rates than the provincial average.

FIGURE 94 – COMPARISON OF UNEMPLOYMENT RATES (1987 – 2004)

FIGURE 95 - PERCENT OF POPULATION AGED 19 TO 64 RECEIVING EMPLOYMENT INSURANCE (1999 – 2003)

Comparatively, the RDN's percent of population receiving Employment Insurance has also fluctuated, but to a smaller extent, and is considered relatively stable from 1999 to 2003. At present, the City of Nanaimo's unemployment rate is declining, as is the number of recipients of Employment Insurance in the region. This indicates a slight progression towards the goal of a declining unemployment rate; however, the unemployment rate remains above the provincial average.

Grade: \*

Trend: Getting Better

Indicator: Unemployment Rate

Rationale: The unemployment rate in the City of Nanaimo is declining, which indicates improvement; yet, the unemployment rate remains above the provincial average.

#### 25.4 SUMMARY

Improvement in the regional economy has provided more employment opportunities. The growth in the service and retail sector in the region over the past five years may be a factor for the decrease in unemployment.

##### Employment by Industry Sector

- The largest single percentage of workers is employed in retail trade industries, approximately 15 percent, followed by the health and social service industries at almost 12 percent.
- The service sectors, when combined, represent over 79 percent of the economy indicating that the region has a mature economy. The region's service sector proportion is equivalent to the provincial average.
- The top three employers are retail trade, health and social services, and accommodation, food and beverage service industries. Incomes in retail trade have decreased; incomes in health and social services have increased slightly and incomes in the accommodation, food and beverage industry has remained relatively stable between 1990 and 2000. However, retail and accommodation, food and beverage industries are among the industrial groups with the lowest income per employee in the region.

##### Unemployment Rate

- The City of Nanaimo's unemployment rate has declined. Most recently, the unemployment rates have declined to 7.8 percent in 2004; however, the City of Nanaimo's unemployment rates remain higher than the provincial average.

- At present, the number of Employment Insurance recipients in the City of Nanaimo is declining. Employment Insurance rates in the RDN remain above the provincial average at 3.7 percent compared to the provincial average of 3.6 percent.

## 26.0 RESIDENTS HAVE TRAINING THAT QUALIFIES THEM FOR EMPLOYMENT

### 26.1 INTRODUCTION

Another characteristic of economic capital is that residents have training that qualifies them for employment. An indicator for this characteristic is educational attainment. The level of education reflects residents' level of training and qualifications for employment.

### 26.2 EDUCATIONAL ATTAINMENT

#### 26.2.1 What does this indicator tell us?

The level of educational attainment describes the highest level of school that was completed by the region's residents. It is an indicator of the human capital stock within the adult population (United Nations, 2001). According to the United Nations (2001) "those who have completed secondary education can be expected either to have an adequate set of skills relevant to the labour market or to have demonstrated the ability to acquire such skills"; thus, it may also reflect the socio-economic status of the region.

Education levels may include elementary, secondary, college or university. In general, the following categories are used to assess the indicator (Council of Ministers and Education and Statistics Canada, 2003):

- Less than high school: persons who did not graduate from high school;
- High school: high school graduates with no further education or with some post-secondary education but with no degree, certificate or diploma;
- Trade vocational: persons with a trade certificate or diploma from vocational or apprenticeship training;
- College: persons with a non-university certificate or diploma from a community college, or school of nursing<sup>50</sup>; and
- University: persons with a bachelor's degree, university degree, certificate above a bachelor's degree, or a certificate below a bachelor's degree.

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<sup>50</sup> There have been recent changes to nursing schools. Licensed Practical Nurses achieve their qualifications through college; whereas, Registered Nurses are required to complete a Bachelor of Science in Nursing degree from a recognized university or university-college.

The order of the categories indicates increasing time commitments to schooling. Each person is classified according to the highest level completed. This category usually measures the education of people aged 15 and over.

### 26.2.2 Why is this indicator important to our sustainability?

Educational attainment is important to the region's sustainability, in that education improves "the capacity of people to address environment and development issues. It facilitates the achievement of environmental and ethical awareness, values, and skills consistent with sustainable development and effective public participation in decision-making" (United Nations, 2001). Therefore, it is not just the ability to work, but also the ability to think and understand issues.

Educational attainment has direct impacts on the socio-economic status and health of the region's residents. Natural Resources Canada (2004) suggests that people with higher levels of education are more likely to have employment, jobs with higher social status, and stable incomes. These characteristics are also related to health. Higher levels of education "increases financial security, increases job security and satisfaction, equips people with the skills they need to identify and solve individual and group problems, increases the choices and opportunities available to people, and can unlock the innate creativity and innovation in people, and add to our collective ability to generate wealth" (Natural Resources Canada, 2004). The 1996 to 1997 National Population Health Survey illustrates the inter-relationships between education and health; people who have completed university self-rated their health status as better than people who have not completed university and a higher proportion of people in lower educational attainment categories indicated that they suffered from chronic health problems (e.g., chronic bronchitis, emphysema, heart disease, arthritis, diabetes) than people in the higher educational attainment categories (Natural Resources Canada, 2004). Higher education generally reflects that the individual can make better choices regarding nutrition, exercise, smoking and other factors that influence health.

### 26.2.3 Where do we want to go?

The RDN's Regional Growth Strategy has two goals that support this indicator:

**Goal 6: Vibrant and Sustainable Economy:** To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

**Goal 8: Cooperation Among Jurisdictions:** To facilitate an understanding of and commitment to the goals of growth management among all levels of government, the public, and key private and voluntary sector partners.

Within the region and across Canada, the goal is to increase the percentage of residents with a trade certificate, college diploma or university degree, while reducing the percentage of residents with a high school diploma or less. This increases the capacity of residents and their potential to contribute to society and the economy.

Some suggest that the educational attainment profile should 'mirror' the industry and employment structures of the economy. For example, if more jobs are generated in skilled service sectors such as plumbers and electricians, then the supply of people with trade certification and diplomas should increase to meet the demand. However, the surge in unskilled positions may also hurt the region. In the case of Alberta, many students quit high school early to work in the lucrative oil and gas industry; to many students in the RDN, the construction industry is currently an attractive alternative.

#### 26.2.4 Where are we right now?

In the past few years, the region's residents have increased their educational attainment levels. The number of residents with a high school degree or less has decreased, while the number of residents with a trade certificate, diploma and university degree has increased. Since 1991, the percentage of residents with university level education has increased from 17 percent to 22 percent. This trend may reflect Malaspina's transition from a college to a university-college and the higher education level of new residents, including retirees. Malaspina issued its first degrees in 1998. The percentage of residents with trades certificates and diplomas has increased more dramatically from 1996 to 2001, from 5 percent to 16 percent. The decrease in people having, as their highest level of achievement, a high school diploma, some college, or a college degree may actually indicate a shift in students attaining a trades certificate or a university education instead; however, there is no accurate method of measuring this.



FIGURE 96 - EDUCATIONAL ATTAINMENT LEVELS IN THE REGION DISTRICT OF NANAIMO (1991 – 2001)

FIGURE 97 - COMPARISON OF EDUCATIONAL ATTAINMENT LEVELS, RDN AND BC (2001)

FIGURE 98 - PERCENT OF 18 YEAR-OLDS NOT GRADUATING FROM HIGH SCHOOL (1999 – 2003)

education; this in turn may not accurately reflect the educational attainment of the working population and its ability to meet the needs of the employers.

- Finally, it is not known if people are becoming educated in the RDN and then leaving the region for employment; or if people are educated elsewhere and then moving to the region for employment.

### 26.2.6 Assessment

The region has decreased the percent of 18 year olds not graduated from high school, yet the percentage remains significantly higher than the provincial average. However, the percentage of residents with a college, trades or university level of education has increased. This may reflect Malaspina University-College's transition to a degree granting university and the higher education levels of new residents, including seniors. Although the region does not meet the provincial educational attainment average, it has made progress towards achieving higher educational attainment levels.

Grade: \*

Trend: Getting Better

Indicator: Educational Attainment

Rationale: The Regional District is below the provincial average but progressing towards the goal of increasing the educational attainment level. With a fully accredited degree granting university within the RDN, it is anticipated that the education levels may increase.

## 26.3 SUMMARY

Residents are increasing their educational attainment level and therefore, their level of training and qualifications for employment.

### Educational Attainment

- The percent of students in the RDN not graduating from high school decreased from 35 to 32 percent between 1998 and 2003, but this is still significantly (six percentage points) higher than the provincial average.
- Since 1991, the percentage of residents with university level education has increased from 17 percent to 22 percent; however, the region's levels of university or other non-university education is below the provincial average.
- The percentage of residents with trades certificates and diplomas has increased from 1996 to 2001, from 5 percent to 16 percent.

- The number of residents with a high school degree or less has decreased. The region's residents exceed the provincial average for residents with high school degrees or less, trades certificates, and diplomas.

## 27.0 THE URBAN CORE AREAS OF THE REGION ARE CHARACTERIZED BY THEIR VITALITY

### 27.1 INTRODUCTION

In a sustainable Regional District of Nanaimo, the urban core areas are characterized by their vitality. Vitality may be realized through local retail services and higher population densities. The following indicators will be used to measure the urban core area's vitality, such as the potential for people accessing the area and general liveliness of the downtown core:

- Population density and amount of land in urban containment boundaries; and
- Retail space inside and outside of urban core areas.

### 27.2 POPULATION DENSITY AND AMOUNT OF LAND IN URBAN CONTAINMENT BOUNDARIES

#### 27.2.1 What does this indicator tell us?

Population density is the concentration of human population in reference to space, or in this case, designated growth and non-growth areas. According to the RDN's Regional Growth Strategy, designated growth areas are located within the urban containment boundary and areas not designated for growth are areas outside the urban containment boundary. Therefore, the population density within designated growth areas identifies the degree of urbanization.

According to the RDN (2003: 23), an urban containment boundary is defined as "a line that defines urban versus rural areas. The urban containment boundary is intended to control urban sprawl and to encourage the development of compact, complete communities. The intention is not necessarily to develop all land inside the urban containment boundary; it is also important to retain areas of green space inside the urban containment boundary."

The urban containment boundary includes:

- Bowser Village Centre;
- Qualicum Bay Village Centre;
- Dunsmuir Village Centre;
- Hilliers Village Centre;
- Qualicum River Estates Village Centre;
- Errington Village Centre;
- Bellevue/ Church Road Rural Separation Area;

- Coombs Village Centre;
- Qualicum Beach Area;
- Parksville Area;
- Red Gap Village Centre;
- Fairwinds;
- Nanaimo Area;
- Lantzville Village Centre;
- Extension Village Centre;
- Cedar Village Centre; and
- Cassidy Village Centre.

### 27.2.2 Why is this indicator important to our sustainability?

Over time, this indicator will identify where population density is increasing, whether inside or outside of the urban containment boundary. Targeting population growth in designated growth areas limits sprawl, contributes to mixed-use communities and cost effectiveness of services and infrastructure, and protects rural lifestyles, agriculture, forests and ecosystems. Compact, mixed use communities also encourage walking and cycling and, therefore, contribute to the physical health of the population and the environmental health of the region. According to Skelton (2006), “people who live in high-density core cities are significantly healthier than residents of sprawling suburbs.” As well, the United Nations (1996) states that “high concentration of population means more local demand for employment, housing, amenities, social security and services, and environmental infrastructure for sanitation and waste management, which may tax governments’ management ability”, although it may also increase efficiency in providing these services. Higher population densities generally mean increased reliance on resource imports and the export of goods, as well as environmental impacts such as solid waste disposal and emissions to air and water (United Nations, 1996). However, “urbanization is recognized as an intrinsic dimension of economic and social development... urban areas have distinctive characteristics reflecting the social fabric and density of their population, and the nature and scale of economic activities. Urbanization has profound social and economic implications that extend beyond the urban boundaries” (United Nations, 1996).

### 27.2.3 Where do we want to go?

There are four RDN Regional Growth Strategy goals that pertain to this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 7: Efficient Services: To provide cost efficient services and infrastructure where urban development is intended, and to provide services in other areas where the service is needed to address environmental or public health issued and the provision of the service will not result in additional development.

To achieve these goals, the Regional Growth Strategy establishes a goal of focusing the majority of new growth and development within the urban containment boundary. Therefore, a sustainable goal is to increase the population density within designated growth areas.

#### 27.2.4 Where are we right now?

Population density is greater on land inside the urban containment boundary. Within the urban containment boundary<sup>52</sup>, the population density is 8.62 persons per hectare in 2001, as compared to 0.19 persons per hectare outside the urban containment boundary. In actuality, the population within the urban containment boundary decreased by approximately 900 people between 1996 and 2001, whereas, the population outside the urban containment boundary increased by approximately 3,900 people or 12 percent.

Table 30 reveals that population density inside and outside of the urban containment boundary is increasing. Between 1991 and 2001, the population density for land inside the urban containment boundary (which was designated in 1997) increased by 1.32 persons per hectare, compared to the population outside the urban containment boundary which increased by 0.06 persons per hectare.

Year	Inside UCB (Persons Per Hectare)	Outside UCB (Persons Per Hectare)
1991	7.30	0.13
1996	8.71	0.16
2001 <sup>53</sup>	8.62	0.19

Source: RDN, Statistics Canada, Regional Growth Strategy for Regional District of Nanaimo, 2000 Annual Report on Growth Management Plan

<sup>52</sup> The urban containment boundary did not exist until 1997. The figures provided for 1991 and 1996 are based on the designation of an urban containment boundary as per the 1997 Regional Growth Strategy. The figures provided for 2001 are based on the applicable urban containment boundary designation at that time.

<sup>53</sup> Population data are for 2001, areas inside and outside of urban containment boundary taken from 2003 data.

This may be partially due to the fact that the amount of land designated for growth, within the urban containment boundary, has fluctuated<sup>54</sup> and increased since 1991. Table 31 indicates the change in area and designation.

TABLE 31 – AREA AND POPULATION IN RELATION TO URBAN CONTAINMENT BOUNDARY				
Year	Inside Urban Containment Boundary		Outside Urban Containment Boundary	
	Area (Land & Water) (ha)	Population	Area (Land & Water) (ha)	Population
1996		NA		NA
1997	10,394		200,239	
1999	10,450		190,641	
2001	10,457	90,135	190,659	35,940
2003	10,430		190,661	

Source: RDN, Statistics Canada, Regional Growth Strategy for Regional District of Nanaimo

### 27.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator, including:

- The population density data are calculated using a variety of sources, which allows for some error.
- No data are provided as to the population inside and outside of the urban containment boundary for 1997, 1999 and 2003.

### 27.2.6 Assessment

Population density inside the urban containment boundary is greater than the population density outside the urban containment boundary and is increasing over time. Although the density outside of the urban containment boundary continues to grow, it will eventually plateau as the Regional Growth Strategy policies permits only a specified amount of new development on land outside the urban containment boundary. It is expected that as the development capacity of land outside the urban containment boundary diminishes, leaving only the most difficult to develop properties behind, and as the development community and residents really 'buy-in' to the positive aspects of the Regional Growth Strategy, the amount of development and redevelopment taking place on land inside the urban containment boundary will increase substantially. This projected future development is

<sup>54</sup> In 1997, the Regional Growth Strategy designated urban containment boundaries in Nanaimo, Parksville, Qualicum Beach, and Fairwinds Area. In 1999, additional urban containment boundaries were designated for each Village Centre. In 2003, small changes were made to some urban containment boundaries. In 2004 and 2005, additional properties were added to the Nanaimo urban containment boundary.



anticipated to result in more dramatic population density increases for land inside the urban containment boundary than for land outside the urban containment boundary.

At present, however, there are a few factors that affect new development on land outside the urban containment boundary. The first is that land is typically less expensive and less complicated to develop in unincorporated areas outside the urban containment boundary. Other factors include the minimum permitted parcel size allowed by the current zoning regulations, official community plan policy in place when the Regional Growth Strategy was adopted, and whether the property was in a community water service area in 2003. As a result, land outside the urban containment boundary may be developed first, or at a faster rate, than land inside the urban containment boundary leading to more rapid population growth and density increases on land outside the urban containment boundary than on land inside the urban containment boundary.

The amount of land within the designated growth areas has increased since 1991. Although increasing the areas reflects the demands for development, it also removes the area from rural resource areas, and allows for greater sprawl.

Grade: \*\*

Trend: Getting Better

Indicator: Population Density and Amount of Land in Urban Containment Boundaries

Rationale: Population density within the urban containment boundary is greater than outside the urban containment boundary.

## 27.3 AMOUNT OF RETAIL SPACE INSIDE AND OUTSIDE OF THE URBAN CORE AREAS

### 27.3.1 What does this indicator tell us?

This indicator describes the amount of retail space in the RDN, both inside and outside of the urban core areas. This measures the success of containing retail activities within downtown areas and contributing to their vitality. However, the indicator does not measure the quality of commercial businesses or occupancy ratios that may contribute to urban core areas vitality.

Urban core areas are located within the City of Nanaimo, City of Parksville and Town of Qualicum Beach. The following figures illustrate the study areas.

FIGURE 99 – CITY OF NANAIMO URBAN CORE AREA (2006)

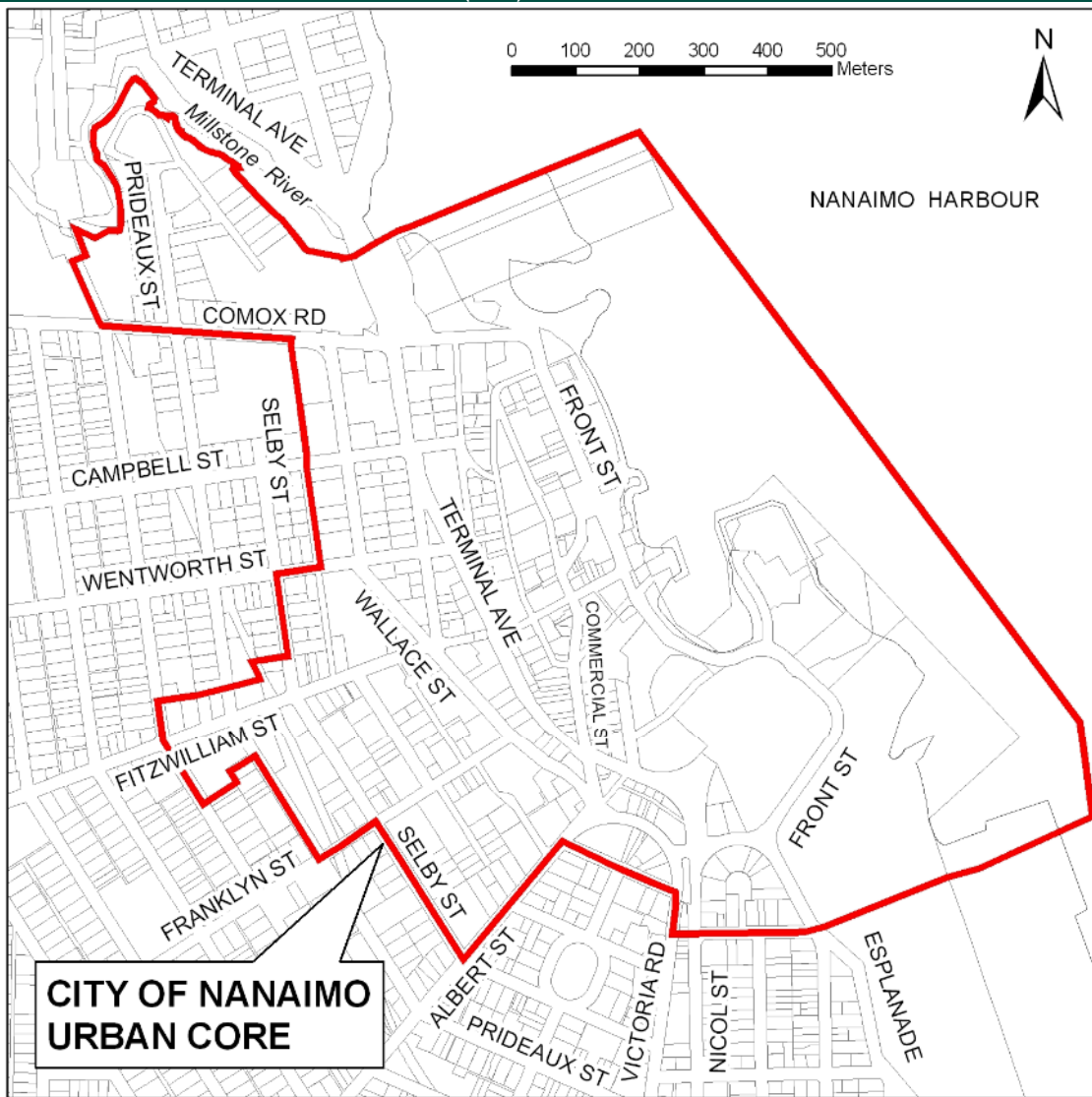


FIGURE 100 – CITY OF PARKSVILLE URBAN CORE AREA (2006)

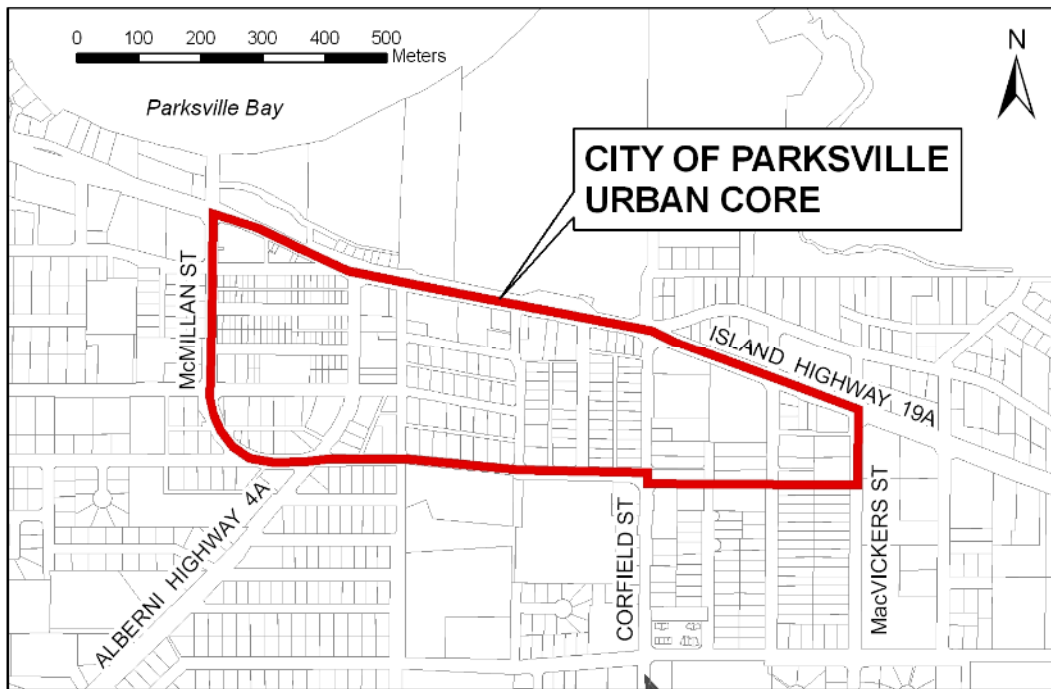
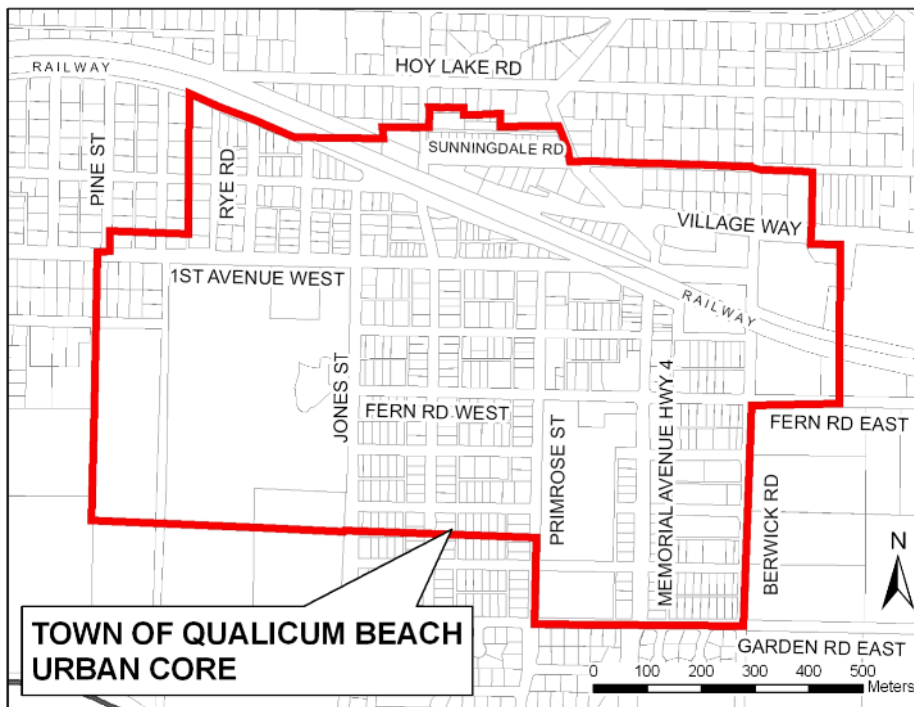


FIGURE 101 – TOWN OF QUALICUM BEACH URBAN CORE AREA (2006)



### 27.3.2 Why is this indicator important to our sustainability?

The location of retail space within the urban core areas is important to the region's sustainability, as it promotes downtown economic vitality which will draw consumers, and therefore, vitality to the area. In addition, if a retail space is located within the urban core areas, it is more likely to be accessible by a variety of modes of transportation, including walking, cycling and bus transportation.

### 27.3.3 Where do we want to go?

The RDN's Regional Growth Strategy (2003) has several goals that support this indicator, including:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

In order to progress towards sustainability, the amount of retail space should increase within the urban core areas, and maintain or decrease outside of the urban core areas.

### 27.3.4 Where are we right now?

The majority of retail space is located outside of the urban core areas. Of the 677,644 sq. metres of retail space in the RDN, 37 percent of retail space is found within the urban core areas, and 63 percent is outside of urban core areas. This indicates that in spite of malls and other sprawling commercial areas, the downtown core areas in Nanaimo, Parksville and Qualicum Beach have potential for vitality. The amount of retail space per location is indicated below in Table 32.

TABLE 32 – AMOUNT OF RETAIL SPACE PER LOCATION (2005)		
Location	Retail Space (m <sup>2</sup> )	Percent
Nanaimo Urban Core	146,996	22%
Parksville Urban Core	55,376	8%
Qualicum Beach Urban Core	45,715	7%
Total Retail Inside Urban Cores	248,087	37%
Outside Urban Cores	429,558	63%
Total Retail Space	677,644	100%

Source: British Columbia Assessment Authority; RDN GIS

### 27.3.5 Are there any limitations for this indicator?

There are several limitations to the data presented in this indicator, including:

- There are no historical data to represent changes in amount of retail space inside or outside of urban core areas.
- Data do not capture cultural, commercial or recreational attractions to the urban core areas that support vitality.
- Data do not include the quality of retail businesses located in the urban core areas, or the ability to draw consumers to the area.

### 27.3.6 Assessment

Approximately 37 percent of retail space is located within the urban core areas of Nanaimo, Parksville and Qualicum Beach. Although there are no comparable data to assess the indicator; the relatively large percentage represents the potential for vitality within the downtown core areas of these communities. However, additional data sets are required to identify if retail space continues to concentrate inside or outside of the urban core areas.

Grade: \*\*

Trend: Uncertain

Indicator: Retail Space Inside and Outside of Urban Cores

Rationale: A large proportion of retail space is located within the urban core areas; however, there are no historical data to identify if the concentration is increasing or decreasing.

## 27.4 SUMMARY

Urban core areas have higher population densities than rural resource areas. However, it is unclear whether the amount of retail space in urban cores is at a level that supports vitality.

### Population Density and Amount of Land in Urban Containment Boundaries

- Density has increased within the Urban Containment Boundary, from 7.30 people per hectare in 1991 to 8.62 people per hectare in 2001, an increase of 18 percent.
- Density has increased outside the Urban Containment Boundary, from 0.13 people per hectare in 1993 to 0.19 people per hectare in 2001, an increase of 46 percent.

## Retail Space Inside and Outside of the Urban Core Areas

- 37 percent of retail space is found within the urban core areas of Nanaimo, Parksville and Qualicum Beach.

## 28.0 REGIONAL CONSUMPTION OF PRODUCTS AND SERVICES PRODUCED IN THE REGION IN ECONOMICALLY VIABLE WAYS IS MAXIMIZED

### 28.1 INTRODUCTION

The region's sustainability is also reliant on maximizing the regional consumption of products and services produced in the region in economically viable ways. An indicator of this characteristic is the economic health of agriculture. However, this indicator is limited because it does not provide information on the consumption of all products and services produced in the region.

### 28.2 ECONOMIC HEALTH OF AGRICULTURE

#### 28.2.1 What does this indicator tell us?

This indicator describes the growth or decline of agriculture through evaluation of the gross farm receipts per farm and for the regional district. The gross farm receipts are the receipts of sale from farm products. The data were collected based on census farms<sup>55</sup>. According to Statistics Canada (2002), census farms were defined in 2001 as an agricultural operation that produces at least one of the following products intended for sale: crops (hay, field crops, tree fruits or nuts, berries or grapes, vegetables, seed); livestock (cattle, pigs, sheep, horses, game animals, other livestock); poultry (hens, chickens, turkeys, chicks, game birds, other poultry); animal products (milk or cream, eggs, wool, furs, meat); or other agricultural products (Christmas trees, greenhouse or nursery products, mushrooms, sod, honey, maple syrup products). The 1996 definition of a census farm was expanded from the definition used in 1991 to include commercial poultry hatcheries and operations that produced only Christmas trees. The 1996 definition was the same as the 1991 definition.

#### 28.2.2 Why is this indicator important to our sustainability?

Agriculture, and its economic health, is important to the region's overall sustainability as a means to protect and maintain the region's food source. A local food source not only relieves the pressure on importing goods, but it reduces the amount of fuel required to transport goods to the market. However, to be sustainable, agriculture must also be economically viable. This may include producing items that are marketable locally. It is expected that there will be variations in the gross farm receipts for the products, which

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<sup>55</sup> It is important to note that data for this indicator was derived from Statistics Canada's Agricultural Census and therefore, uses their definition of census farms. This contrasts the BC Ministry of Agriculture and Lands' definition of agriculture which includes aquaculture and commercial fishing.

reflect the change in consumer demands (International Institute of Sustainable Development).

### 28.2.3 Where do we want to go?

There are four RDN Regional Growth Strategy goals that pertain to this indicator:

Goal 1: Strong Urban Containment: To limit sprawl and focus development within well defined urban containment boundaries.

Goal 2: Nodal Structure: To encourage mixed-use communities that includes places to live, work, learn, play, shop and access services.

Goal 3: Rural Integrity: To protect and strengthen the region's rural economy and lifestyle.

Goal 6: Vibrant and Sustainable Economy: To support strategic economic development and to link commercial and industrial strategies to the land use and rural and environmental protection priorities of the region.

Generally, increasing gross farm receipts should indicate better economic health, which should suggest a more sustainable region. However, an increase in farm income might not always be directly related to increased farming, rather, it may reflect increased produce prices. The gross receipts do not provide any indication of costs and hence do not provide an accurate picture of profitability.

Increased farm capital generally indicates better economic health of the agricultural industry, suggesting a more sustainable region. However, the increasing property values may skew the overall farm capital that also includes the value of buildings, farm machinery and equipment, and livestock.

### 28.2.4 Where are we right now?

The total gross farm receipts in the RDN increased from 1991 to 2001. In 1991, the total gross farm receipts were \$15.3 million; they then rose to a high of \$17.5 million in 1996, and declined in 2001 to \$16.6 million.

Although the total gross farm receipts in the RDN have increased, the gross farm receipts per farm are declining. The average farm receipts in 1991 were \$38,724, and declined to \$33,903 in 2001. Other jurisdictions have greater gross farm receipts per farm, and the receipts are increasing over time.

FIGURE 102 – COMPARISON OF AVERAGE GROSS RECEIPTS PER FARM (1991 – 2001)



The RDN's farms have a higher proportion of marginal operations, reporting less than \$25,000 gross farm receipts, and a diminished proportion of high return operations, reporting greater than \$100,000 gross farm receipts as compared to the provincial average. In 2001, the majority of farms (84 percent) in the RDN reported gross farm receipts less than \$25,000; this is much higher than the provincial average. The RDN has approximately seven percent of 'high return' farms, approximately half of the provincial average, and North Okanagan Regional District.

FIGURE 103 – COMPARISON OF GROSS FARM RECEIPTS PER REGION (2001)

The total farm capital in the RDN nearly doubled from \$125 million in 1991 to \$249 million in 2001. In fact, the majority of this increase occurred by 1996, when the total farm capital reached \$242 million. After 1996, the total farm capital increased at a slower rate. The total farm capital is less in the RDN than in other comparable regional districts. It is unclear as to the reason for the sudden growth in capital from 1991 to 1996. More recent data may indicate another jump in total farm capital that would represent the increased property values that have affected Vancouver Island in recent years.

FIGURE 104 – COMPARISON OF TOTAL FARM CAPITAL (1991 – 2001)

### 28.2.5 Are there any limitations for this indicator?

There are several limitations for this indicator, including:

- Gross farm receipts do not accurately reflect economic health of agriculture as they do not account for produce prices or costs associated with production.
- There are no data for the amount of government subsidies provided, if any, to farmers.
- There are no data reflecting the average size of farm per regional district, nor the type of produce. The size of farm and type of produce will directly impact the amount of gross farm receipts and total farm capital.
- There are no data to reflect the type of farm, whether it is a hobby farm or one from which the household is dependent on as a primary source of income.
- Recent data are required to accurately assess agriculture's economic health.
- Statistics Canada's Agricultural Census does not provide accurate data for the region.

### 28.2.6 Assessment

Although the gross farm receipts have increased for the region, they have decreased per farm. In fact, the percent of farms in the RDN reporting gross farm receipts of less than \$25,000 greatly exceeds that of the provincial average. The value of land and buildings has risen significantly since 1991; however, this reflects an increasing property value and not necessarily the region's consumption of local agricultural products. The indicator is limited by its lack of current data, as well as the lack of data that would correlate the size of farm and type of produce with the amount of gross farm receipts. For instance, gross farm receipts per hectare of agricultural land may better serve the indicator. Until more recent data are available, it is not possible to accurately assess this indicator.

One reason for the increased gross farm receipts across the region may be the BC Ministry of Agriculture and Lands' change in program and policy in the past decade that provided funding for farmers' markets, creation of farmers' institutions, and promoted Grow BC.

Grade: \*                      Trend: Stable

Indicator: Economic Health of Agriculture

Rationale: Although the total gross receipts and farm capital has increased since 1991, the gross receipts per farm have decreased.

### 28.3 SUMMARY

From the data provided, it is not possible to assess if the regional consumption of products and services produced in the region has been maximized. The gross farm receipts do not indicate if the costs of produce have risen, or if there has been greater consumption of products.

#### Economic Health of Agriculture

- The total gross farm receipts in the RDN increased from 1991 to 2001. In 1991, the total gross farm receipts were \$15.3 million; they then rose to a high of \$17.5 million in 1996, and declined in 2001 to \$16.6 million.
- Although the total gross farm receipts in the RDN have increased, the gross farm receipts per farm are declining. The average farm receipts in 1991 were \$38,724, and declined to \$33,903 in 2001.
- In 2001, the majority of farms (84 percent) in the RDN reported gross farm receipts less than \$25,000; this is higher than the provincial average. The RDN has approximately seven percent of 'high return' farms reporting greater than \$100,000 in gross farm receipts.
- The total farm capital in the RDN nearly doubled from \$125 million in 1991 to \$249 million in 2001. The majority (87 percent) of farm value is in the land and buildings.

### 29.0 ECONOMIC CAPITAL CONCLUSION

Of the 10 indicators that determine the region's economic capital, nine are below to slightly below comparable averages and only four indicate improving trends. All characteristics contain indicators with below average grades (\* or \*\*) except the characteristic: the tax system favours sustainable, environmentally responsible economic activities. However, all characteristics indicate some improvement over time, except the following two characteristics which indicate that they are remaining stable:

- The economy is characterized by a diversity of different types and sizes of businesses; and
- Regional consumption of products and services produced in the region in economically viable ways is maximized.

The following table provides an overview of the assessments for each indicator.

ECONOMIC CAPITAL PROGRESS REPORT			
Characteristic	Indicator	Grade	Trend
There is Positive Economic Growth in the Region	Average Annual Income Compared to Cost of Living (Real Income per Capita)	*	Getting Worse
	Business Formations and Bankruptcies	**	Getting Better
The Tax System Favours Sustainable, Environmentally Responsible Economic Activities	Taxes Paid Per Capita	***	Uncertain
The Economy is Characterized by a Diversity of Different Types and Sizes of Businesses	Personal Income from Top Three Industries as a Proportion of Personal Income in Region and Personal Income by Industry	**	Stable
A Wide Variety of Employment Opportunities Exist, and Residents are Employed	Employment by Industry Sector	**	Getting Worse
	Unemployment Rate	*	Getting Better
Residents have Training that Qualifies Them for Employment	Educational Attainment	*	Getting Better
The Urban Core Areas of the Region are Characterized by their Vitality	Population Density and Amount of Land in Urban Containment Boundaries	**	Getting Better
	Amount of Retail Inside and Outside Urban Core Areas	**	Uncertain
Regional Consumption of Products and Services Produced in the Region in Economically Viable Ways is Maximized	Economic Health of Agriculture	*	Stable

? – the data cannot be assessed.

\* - the region is well below average.

\*\* - the region is slightly below average.

\*\*\* - the region is meeting the average.

\*\*\*\* - the region is exceeding the average

Getting Worse - the trend indicates movements away from the goals of 'Where do we want to go?'

Stable – the trend indicates no discernible movement towards or away from the stated goal.

Getting Better – the trend indicates movement towards or exceeding the stated goal.

Uncertain – there are not enough data or historical depth to accurately identify the indicator's trend.

Within the economic capital section, several of the indicators are limited by their outdated data, making it difficult to assess the region's sustainability status and its movement towards or away from economic sustainability.

### 30.0 CONCLUSION

Overall, the region is below to slightly below provincial or comparable averages on an individual indicator-by-indicator basis; however, several indicators showed improving trends. It is not possible to fully compare the RDN with other regional districts as there is no standard report developed by other regional districts to assess their overall sustainability. Nevertheless, the assessment of the region's state of sustainability has revealed that there is much opportunity for improvement.

The indicators have revealed that it is possible to advance the level of sustainability in the region through a variety of actions. Some actions are small, such as walking instead of driving, voting in elections and purchasing local products. Other actions require more investment in time, energy or money, such as attaining higher levels of education and providing affordable housing. Every action that residents, corporations and governments make has a corresponding impact, positively or negatively, on the region's sustainability. Therefore, it is imperative that a collective and conscious effort is made to promote sustainability within the region.

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# APPENDIX

## APPENDIX A TIER 1 INDICATORS

# APPENDIX

## APPENDIX B TIER 2 INDICATORS



# APPENDIX

## APPENDIX C TIER 3 INDICATORS

# APPENDIX

## APPENDIX D TIER 4 INDICATORS

# APPENDIX

## APPENDIX E POTENTIAL ADDITIONAL INDICATORS

# APPENDIX

## APPENDIX F GROUNDWATER ELEVATION DATA

# APPENDIX

## APPENDIX G GROUNDWATER QUALITY DATA

# APPENDIX

## APPENDIX H IMPERMEABLE SURFACE AREA DATA

# APPENDIX

## APPENDIX I GROUNDWATER EXTRACTION DATA

# APPENDIX

## APPENDIX J STREAM TEMPERATURE DATA