SOUTHGATE TOWN CENTRE CONCEPT PLAN:
Designing A "Functional" Community

by

ELAINE RUTH GARDAM

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ABSTRACT

It is estimated that the population of the City of Nanaimo will almost double in the next 25 years. In the past, Nanaimo’s urban growth has been absorbed using a typical pattern of development - strip-malls, supported by ever-expanding low-density suburban sprawl. This development seems to have occurred with little or no forethought to its environmental or social consequences. Urban sprawl is consuming our land and endangering the natural ecosystems in our region.

In response to the ecological and social problems of urban sprawl the City of Nanaimo, in coordination with the Regional District of Nanaimo, has developed a Growth Management Plan. The Plan focuses on creating compact communities within the city boundary, thereby alleviating sprawl and maintaining the ecological integrity of the hinterlands. We must now seek ways of designing neighbourhoods that not only accommodate our growing population but also enhance both the human and environmental “functioning” of the site.

This project examines a sustainable growth strategy for one of Nanaimo’s designated urban growth areas. The Southgate Town Centre Concept Plan is the product of an integrated planning process and is based on principles of sustainable and complete communities. The Plan addresses the basic functional elements of a community (habitat and watershed integrity, pedestrian and traffic circulation, and residential and commercial development) and explores how the application of sustainability principles can result in a functional community.

The result is a comprehensive design of an urban growth area that has accommodated density while also improving the ecological, social and experiential functioning of the site. The design addresses the relationship of the site to its watershed context and its surrounding community. As a comprehensive document it also serves as a model for similar urban development areas.
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1.0 INTRODUCTION

It is estimated that the population of Nanaimo will almost double in the next 25 years (City of Nanaimo Economic Development Office, 2000). In the past, Nanaimo’s urban growth has been absorbed using the typical pattern of development of strip-malls supported by ever-expanding low-density suburban sprawl. This development seems to have occurred with little or no forethought to its environmental or social consequences. Urban sprawl is consuming our land and endangering the natural ecosystems in our region - the ‘development at any cost’ mentality is no longer acceptable. By the end of the 1980’s concerns about the patterns of Change in Nanaimo began to emerge. People were concerned about the loss of natural areas and environmental degradation (City of Nanaimo, 1999). This heightened awareness of environmental issues is reflected in Plan Nanaimo’s goal to “Protect the Environment”. But what does “protecting the environment” mean within the context of urban development?

Issues that arise in the development of the Southgate Town Centre are typical of the ever more crowded environments of the twenty-first century, in that they involve the merging and interacting of human and natural processes. A great many of the most pressing, most challenging and probably even the most important landscape issues occur in these areas of compromise; “human ecosystems” where human beings and nature are brought together and function symbiotically (Lyle, 1985). In the past, the design of most urban ecosystems has been unintentional - they were designed without the basic understanding of how natural processes work, therefore they could not predict how they would function. In the case of Nanaimo, we might point to the Island Highway, strip-malls, parking lots and low-density suburban development as examples of unintentional ecosystem design. Since urban growth is inevitable, we should attempt to design our human ecosystems intentionally, using the best of all available ecological and social understanding (Ibid). Only then can we shape our ecosystems to be sustainable - to support both human and non-human communities.

In response to the ecological and social problems of urban sprawl the City of Nanaimo, in co-ordination with the Regional District of Nanaimo, has developed a Growth Management Plan. The Plan focuses on creating compact communities within the city boundary, thereby alleviating sprawl and maintaining the ecological integrity of the hinterlands (R.D.N. Development Services, 1997). We must now seek ways of designing neighbourhoods that not only accommodate our growing population but also enhance both the human and environmental “functioning” of the site.

This project examines a sustainable growth strategy for one of Nanaimo’s designated urban growth areas. The Southgate Town Centre Concept Plan is the product of an integrated planning process and is based on principles of sustainable and complete communities. The Plan addresses the basic functional elements of a community (habitat and watershed integrity, pedestrian and traffic circulation, and residential and commercial development) and explores how the application of sustainability principles can result in a functional community.

1.1 Vision

Driving home from work through South Nanaimo, I see the impacts modern development has had over the past century: ditches, fields and fences, shopping malls, highways, trailer parks, parking lots. Every modification of the original environment has occurred without regard for its natural inhabitants or for the landscape itself. Instead, this landscape has been used in a haphazard fashion and the result a setting that is mundane, ordinary, uninteresting, and environmentally suspect.
What an opportunity there could be, at this time of changing attitudes towards our environment, to alter the course of development of this potentially vital district! If we humans rethought ourselves as simply a part of nature, only one of a multitude of species existing in a landscape, perhaps we could turn around the dreary results of a hundred years of thoughtless monopoly. Perhaps we could design a vital, thriving ecosystem, a co-operative existence, not for humans, but including them.

There is a metaphor that illustrates the vision that has come to me as I drive through this place. A piece of cloth is woven from countless individual strands of thread. Though these threads live side-by-side, never do they erode, change or destroy one another; in fact, the strength and beauty of the whole fabric depends absolutely on the existence and functioning of each one of them. Habitat, watershed, pedestrian and traffic circulation, residential and commercial development - the cloth of a truly functional community.

1.2 Statement of Intent

I propose that it is possible to design a plan for the Southgate Town Centre that accommodates projected growth while enhancing both the human and environmental functioning of the site; to provide a high quality of life for residents while measurably improving environmental quality.

2.0 RATIONAL FOR PROJECT

Nanaimo, like many other communities, is concerned about the environmental and social consequences of growth. The more land there is available to use for development, the more we, as a society, tend to squander it. The bulk of new development in Nanaimo is being guided to designated growth areas, keeping sprawling subdivisions from marching across the landscape. The City of Nanaimo estimates that land suitable for single family housing will be exhausted in the next ten to twenty years (City of Nanaimo, 1999). Once land is checkerboarded into “wall-to-wall houselots”, it is nearly impossible to retrofit greenways, trails, parks, into the established pattern.

The site of the Southgate Town Centre is located at the edge of the surrounding city and is one of the next logical catchment areas for Nanaimo’s population expansion. The city is presently planning to increase Southgate’s allowable density to accommodate this next wave of population growth. Approximately 537 persons live in the area today however, according to Nanaimo’s Official Community Plan, this is expected to increase to 5000 persons in the next twenty-five to fifty years (Ibid). This presents an opportunity to develop a community which addresses these environmental, social and economic issues at the point of inception, rather than reacting to them in the future.

The site of the proposed Southgate Town Centre is, in many ways, an ideal location for development - it is situated around the historic town centre of Chase River, it is a flat site, and Highway 1 provides a direct linkage to downtown Nanaimo. Initially the site seems to have a substantial amount of land available for building a new neighbourhood, although closer examination shows approximately one third of the land is classified as environmentally sensitive (Ibid). These undevelopable lands are the wetlands and riparian areas of Wexford Creek and estuary, which are important to the ecology and aquatic productivity of the region. Subsequent review reveals that approximately half of the ‘buildable’ area of the site are located on soils with a high, perched water-table. This poses a challenge for construction and special attention must be given to maintaining the hydrological integrity and water quality of the watershed.

Residents enjoy the rural character of the site (Ibid). However, existing zoning hampers the ability for the site to retain this ‘rural character’; approximately 95% of the site is zoned medium-high density.
single family housing or a more intensive land use (commercial, multiple family) (Ibid). While changing this zoning to a less intensive land use is not feasible, it is possible to produce a plan which can preserve the natural qualities of the site they most enjoy.

The Southgate Town Centre Plan will provide a vision which will have a number of long term benefits. Residents will have a framework for making decisions about change and growth in their community. Developers will have a better understanding of what area residents and the City want to see built. City staff will gain a better understanding of how to accommodate growth and what elements of their community residents would like to see protected and/or enhanced. Council would be better able to make decisions that will benefit the neighbourhood, when it understands the residents’ expectations (Ibid.).

3.0 PROJECT GOAL

To demonstrate through design what the Southgate Town Centre could look like if it were developed with the intention of enhancing both the human and environmental functioning of the site based on the following sustainable development principles (Condon, et al, 2000):

Ecological Infrastructure:

![Functional Elements]

**Principle #1**
Protect and connect environmentally sensitive areas (streams, wetlands, waterfront, etc.) from encroaching development by providing sufficient setbacks; further ensure their viability by maintaining connection between corridors and larger habitat patches.

**Principle #2**
Protect and augment natural drainage systems, in which storm water is held on the surface and permitted to seep naturally into the ground.

Land Use and Development:

![Functional Elements]

**Principle #3**
Provide different dwelling types (a mix of housing types, including a broad range of densities from single family homes to apartment buildings) in the same neighbourhood and even on the same street.

**Principle #4**
Conserve land and energy by designing compact walkable neighbourhoods that provide services such as transit, shops, parks etc. within a five-minute walking distance.
Traffic and Pedestrian Circulation:

Principle #5
*Provide an interconnected street and path network to allow for ease of movement.*

Principle #6
*Provide narrow, people friendly streets (with sidewalks and paths), shaded by rows of trees in order to save costs and provide a greener, friendlier neighbourhood.*

4.0 PROJECT OBJECTIVES

- To illustrate through design how sustainable development principles can inform the Southgate Town Centre development to produce a more complete, compact community within a healthier urban ecosystem.
- To illuminate the connection between more sustainable sites and an enhanced quality of life for all citizens.
- To quantify the design and determine if it is possible to increase the density and maintain (or enhance) the environmental quality as well as the quality of life of residents through an analysis of the community’s functional elements.
- To produce a concept plan for the proposed Southgate Town Centre that may provide patterns, processes and prototypes for other urban growth areas within the city of Nanaimo.

5.0 METHODOLOGY

- The research methodology primarily consisted of a literature review of ecological and new urbanist design theory; these theories in turn provided the foundation for the sustainable development principles and guidelines.

  A literature review was conducted of the following:
  * sustainable development principles and BMPs
  * environmental site planning
  * urban development principles (town centre, residential and open space planning)
  * urban watershed management and storm water BMPs
  * past precedent
- From the literature available, the basic functional elements of an urban community were distinguished and correlated with sustainable development principles.
- A site analysis was performed and key issues and concerns were identified.
- A series of design strategies were developed, informed directly by the sustainable development principles and site analysis. These design strategies were then used to guide the design of a ‘functional’ Southgate Town Centre.
An analysis of the functional elements was undertaken in order to determine if the "functional" design objectives were met and if the goal of enhancing the human and ecological functioning of the Southgate Town Centre was achieved.

These analyses include the following:
- Land Use Statistical Analysis
- Riparian Cover Analysis and Storm Water Drainage Calculations
- Automobile and Pedestrian Circulation Analysis

Figure 4: Design Approach

6.0 DESIGN BRIEF

The approach to this design proposal is based on a number of underlying assumptions. The proposed plan is based on the supposition that it will unfold within a twenty-five to fifty year time period, and that during this time land ownership would naturally turn over to the proposed land uses. The existing site infrastructure is likely to require upgrading or re-construction during this time period and could be realigned or reconfigured to correspond with the proposal. Furthermore, it is assumed that development within the Southgate Town Centre is not occurring in isolation but that adjacent neighbourhoods are also developing in a similar way with similar objectives. The Southgate Town Centre must be examined within its larger context, as an element in the larger urban landscape. The proposal will take into consideration its links to the larger region.
The Chase River Neighbourhood Plan calls for 2,000 residential units and over 40,000m² of commercial GFA, as well as two gas stations and a 100 room hotel in the Southgate Town Centre. To accommodate the projected increase in population, the plan calls for moderately high densities with small-lot detached and townhouse development, with a focus on apartments and townhouses over ground floor commercial along the main street. Decisions regarding the type and relative proportion of dwelling units need to take into account the strong public preference for free hold dwellings and dwellings with private yards.

The intensification of the commercial area in the Southgate town centre suggests that most of the residents in the proposed communities will make their major purchases in the community and that the community will continue to attract the majority of its customers from the surrounding areas. Service industrial, commercial and office space requirements support a general goal to provide one job for every worker (18-65 years old) within Nanaimo.

The site is located within the bottom portion of the Wexford Creek watershed; there are therefore many areas of sensitive aquatic habitat, including an estuary. Protecting this environment is of utmost importance. Based on the information provided, the challenge will be to decide how best to protect and perhaps enhance the ecological functioning of the site.

According to the Chase River Neighbourhood Plan, the community would like to maintain the area’s ‘rural character’. However, this may not be feasible due to the existing residential zoning (approximately 95% of the land within the urban containment boundary is zoned for either single-family housing or a more intensive land use such as commercial, multiple family or industrial) (City of Nanaimo, 1999). It may be more appropriate to strive for a ‘green’ rather than a ‘rural’ neighbourhood.

The plan will address how prototypical development could occur in the suburban single-family residential, industrial and town centre areas. (See Appendix 1 for more detail)

7.0 BACKGROUND

7.1 Site Context

The project site is the proposed town centre of the Chase River Neighbourhood which is located just minutes south of downtown Nanaimo on Vancouver Island. The site is situated almost entirely within the lower reaches of the 669ha Wexford Creek watershed, a small creek system which empties out into the Straight of Georgia.

7.1.1 Setting

Nanaimo is a continually changing and evolving city. The economy was developed on mining, fisheries, forestry and transport industries which established Nanaimo as the ‘hub’ of Vancouver Island. However, the original resource-based economy has shifted towards a more diversified information and service based economy (City of Nanaimo Economic Development Office, 2000).

Rapid population growth in the late 1980s early 1990s brought Nanaimo’s population to an estimated 80,772 in 2001, making it the second largest city on Vancouver Island (Ibid.). The recent population explosion peaked in 1994, but the city continues to grow at a moderate pace of 2.4% per year (Ibid.). The City of Nanaimo covers an 88.2 square kilometre area within the Nanaimo Regional District (Ibid.). Although the City only accounts for 4.3% of the total land area of the region, it is home to 56.4% of the population and operates as the economic and employment centre (Ibid.). This role is
expected to continue as the City has been identified as a growth concentration area that will accommodate the largest share of the region’s projected growth over the next twenty-five years.

7.1.2  Physiography
Nanaimo, due to development pressure, has expanded away from the waterfront westward towards low hills and mountains. The city is has been developed on a mosaic of small watersheds - numerous creeks and rivers which originate in the hills and empty out into the Straight of Georgia. The study area is located within the flat, lower reaches of the Wexford Creek watershed. The watershed includes both the north and south tributaries of Wexford Creek which join together and empty out into the estuary.

7.1.3  Growth Management
The City of Nanaimo does not support rezoning of existing agricultural lands for development nor does it support increasing density by up-zoning existing residential neighbourhoods to medium and high density development (City of Nanaimo, 1999). Nanaimo’s long term strategy for growth management is to encourage significant additional development to occur inside an urban containment boundary, within a series of identified “Growth Centres” (City of Nanaimo, 1999). According to the Official Community Plan (1999), the total growth potential of these proposed Town Centres and Neighbourhood Villages is between 15,000 and 30,000 people, accommodating growth for the next 17 to 38 years (assuming rates of growth between 2% and 4%). Together with existing development, this should bring Nanaimo’s population up to 120,000 people.

The purpose of the Regional District’s Growth Management Plan (1997) is to:
- avoid urban sprawl;
- develop settlement patterns that minimise the use of automobiles and encourage walking, bicycling and the efficient use of transit;
- protect environmentally sensitive areas;
- encourage development that supports the unique character of communities;
- reduce and prevent air, land and water pollution;
- provide adequate, affordable and appropriate housing;
- protect the quality and quantity of ground water and surface water;
- create patterns that minimise the risks of natural hazards;
- preserve, create and link urban and rural open space, including parks and recreation areas;
- protect and enhance the stewardship of land, sites and structures with cultural heritage.

7.1.4  Town Centres
One of the proposed Town Centres in the Nanaimo Official Plan is the Southgate Town Centre. This area is presently quite rural, with a population of only five hundred and thirty seven (City of Nanaimo, 1999). However, between the years of 2001 and 2040 the Southgate Town Centre is expected to absorb a large portion of Nanaimo’s growth resulting in a total population of five thousand (Ried, Crowther & Partners, 1999). The average population density for this area will increase from six people to sixty-two people per hectare. To accommodate this increase, an additional two-thousand residential units will be developed in a variety of different densities and building forms. Medium density residential is meant to accommodate the majority of residential density for the Town Centre future (City of Nanaimo, 1999). With a target density of 37-62 units per hectare the typical building forms would be single family homes, row houses and duplexes. High-medium density residential development has a target density of 62-86 units per hectare and would have more fee-simple row houses and townhouse developments. High density residential would be located within the urban centre with a target density of 86-110 units per hectare and would consist of apartment buildings with a maximum building height of three to four stories (Ibid.).
7.1.5 Community Vision
How can these future land use decisions contribute to the achievement of broad social, economic and environmental goals? A community visioning process, “Imagine Nanaimo”, was undertaken in 1992 which asked the community their goals they would like Nanaimo to work towards for the future (City of Nanaimo, 1999). The vision that emerged included the following goals:

**Social** - to create a community that respects people
- neighbourhoods are the vital building blocks of the city
- a safe and supportive place for people of all ages and incomes
- an attractive place to live
- pedestrian friendly

**Economic** - to provide a place of social and economic opportunity
- a diverse economy
- a range of social, recreational, cultural and artistic amenities

**Environmental** - To build a city that respects the environment
- protect critical environmental areas
- reduced dependency on the automobile

The Chase River Neighbourhood is the southern “Gateway” to the City of Nanaimo. The character of this neighbourhood is unique within Nanaimo, in that the area has retained its rural atmosphere while being situated only a short distance away from Nanaimo’s downtown. This rural character is, in part, created by the large residential lots and farms that exist in the area. The two tributaries of Wexford Creek run through the site to the estuary, providing habitat for wildlife and enjoyment for residents. Residents would like to encourage new people and businesses to their neighbourhood, without jeopardising this rural character (Ibid.). However, given the amount of development planned for this area, it may be more appropriate to strive for a ‘green’ rather than a ‘rural’ neighbourhood (Ibid.). This can be achieved through planting and maintaining existing trees in existing and new subdivisions; developing greenways and walking trails along waterways and further protecting environmentally sensitive areas by acquiring more parkland where possible.

7.1.6 Cultural History
The city of Nanaimo began with a “boom” in the last half of the 19th century when the British were attracted to the area by the discovery of coal in 1852 (Ibid.). Prior to the arrival of the British, the Nanaimo area was home to the Snuneymuxw, a Coast Salish people from which Nanaimo gets its name. However, the Snuneymuxw were gradually pushed to the south end of Nanaimo to make way for development.

Other minority groups were also forced to create their own communities. Finnish immigrants bought 5-acre farms on a rent-to-own basis from the mining company and created their own community on the outskirts of Nanaimo in the Chase River area (Ibid.). Here they made their living working in the coal mines, logging and farming. They worked together to build the “Finn Hall” community centre which was located at the site of the present Moose Hall. Many of the original buildings can still be found in the area. The first school (1891), on Haliburton Street presently exists as a private residence (Ibid.). The church, which opened its doors in 1912, and the volunteer fire department, organised in 1949, still serve the community today (Ibid.). The existing commercial development of Southgate is located in approximately the same location as the original village core (Ibid.). Other immigrants left an impression on the landscape of the Chase River area as well. Lois Stark, a black settler, farmed a five hundred tree orchard on the present school site and his original barn still stands near the Stark’s railway crossing (Ibid.).

As Nanaimo grew, its boundaries began to be pushed outwards. By the mid-1970’s many of the original outlying communities including Chase River were amalgamated with Nanaimo (Ibid.).
7.2 Site Analysis

7.2.1 Site Location
Southgate is the most southerly of the Town Centres proposed in the City’s Official Community Plan. The site is approximately 82 hectares and is located at the north end of the Chase River Neighbourhood in south Nanaimo. The area is bounded by the E&N Railway to the north and west, the Inland Island Highway to the south and Beck Creek to the east. Currently the study area is relatively undeveloped, except for a commercial node at Highway 1 and 10th Street/Maki Road.

7.2.2 Existing Land Use
The entire watershed is approximately 669ha. The upper and lower reaches of the watershed are located within the forest reserve lands of the Nanaimo Regional District. Suburban development makes up about 13% of the watershed where industrial development is 2% and the more intensive development of the Town Centre will encompass 16%.

Within the site of the Town Centre the largest land use (30%) is suburban development in the form of trailer parks and a few single-family lots. As you might expect from a rural area, a significant portion of land use is open fields (20%) whereas commercial and industrial development is minimal (12% and 6% respectively).

7.2.3 Proposed Town Centre Land Use (City of Nanaimo, 1999)
Plan Nanaimo has outlined a land use plan for the future Southgate Town Centre based on a target population of 5000.

Downtown Development:
The highest densities of commercial and residential development will be concentrated in a core ‘downtown’ district located to the west of the Highway 1/10th Street intersection. The Plan is centred on this downtown commercial core which is to be based on a ‘Mainstreet’ Concept. In order for this type of development to be successful, its design and implementation must be based on the following planning principles:

- creating a ‘sense of place’ based on the site’s unique location and/or historical background;
- designing the scale of buildings to respect the pedestrian experience (only 2-4 stories in height so as not to dominate over the pedestrian; set close to sidewalk and have continuous windows, displays and interesting architectural features along the ground floor);
- providing pedestrian connections to the surrounding neighbourhood, safe street crossings and access to rear parking lots;
- encouraging mixed use development which includes shops and offices, public places, apartments and townhouses.

Highway Commercial Development:
Commercial development adjacent to the Old Island Highway should develop their highway frontage in a manner that focuses buildings towards the highway. No on-street parking will be permitted and all parking should be located behind the building or screened from the street.

Residential Development:
The Southgate Town Centre will have a variety of different housing types based on two kinds of residential development.
Medium-High Density Residential:
This type of development is meant to accommodate the majority of residential density for the Town Centre. The target density is 100-150 units per hectare (40-60 per acre). The permitted building forms include three story residential structures up to eight story towers.

Low-Medium Density Residential:
This type of development provides transitional housing between the higher densities of the town core and the lower densities in the surrounding area. The target density is 50 units per hectare (20 units per acre). The permitted building forms being townhouse and 3&4 story apartments/condos. However it must be kept in mind that individual development sites should also include land a mix of commercial, residential and public open space.

Public and Natural Areas:
Twenty percent of the land area within the Town Centre is to be in the form of open space and should be considered to be the ‘heart’ or focal point of the community. These parks and dedicated open spaces should be linked to form interconnected natural corridors; thereby providing connections from neighbourhoods to parks and recreation facilities to allow all residents to be within walking distance of a park or public open space. This goal may be achieved by requiring a 5% dedication of land for parks upon subdivision or density bonusing may be considered in exchange of a significant portion of a parcel for park or the provision of a community-wide recreational facility.

7.2.4 Historic Settlement Pattern
The pattern of modern settlement in the Chase River Neighbourhood was in a large part determined by the existing landscape structure, organic development, and the agricultural grid. The landscape structure is distinguished by the Cinnibar Valley which runs north, gradually opening up into lowlands where the mouths of the Chase River, Nanaimo River, Wexford and Beck Creeks converge into a large productive estuary. This low-lying valley is contained to the west by the uphill terrain of the Harewood Plains and to the east by a low ridge which separates it from the Nanaimo River flood plain. The landscape influenced the placement of the Island Highway and the E&N railway, which was built through the flattest areas, thereby connecting Chase River northwards to Nanaimo and southwards to Duncan and Victoria. Extension Road follows the western ridge of Cinnibar Valley, connecting Chase River to the small town of Extension to the south. Both the Island Highway and Extension Road stimulated organic development along their routes. The site of the proposed Southgate Town centre, the flat lands near the Chase River/Wexford Creek estuary, was developed into a patchwork of farms creating a loose gridiron framework based on 2 hectare (5 acre) parcels. In later years the remaining land to the south of the study site was subdivided into a typical cul-de-sac pattern of low density suburban development with 0.2 hectare (1/2 acre) parcels.

7.2.5 Local Rainfall and Runoff Characteristics
The yearly rainfall characteristics in Nanaimo are typical of those in the Pacific Northwest. The yearly recurring, five-month wet weather period from October 31 to March 30 accounts for over sixty-five percent of the total average rainfall (Condon, et al. 2000). During that period, evaporation rates are very low and the proportion of rainfall accounted for by infiltration losses are reduced due to saturation.

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* Willis Cunliffe, Tait and DeLCan, 1981.
7.3.6 Soils
The study site has a number of soil types, each distinguished by its topography. The western and eastern slopes of the site have moderate to rapidly drained soils (Jungen, J.R. et al., 1985). However, over half of the developable area has soils which are imperfectly drained where the watertable is only seventy centimetres below the surface. When the soils become completely saturated, the effective infiltration rate is zero. While this adds to baseflows in Wexford Creek, it also complicates building and with development may increase the possibility of groundwater pollution. In Southgate, the planned building density, paved roadway areas, paved driveways and patios, as well the application of traditional lot grading and landscaping practices will result in an increase in impervious surfaces and surface runoff. This will reduce the natural soil water storage capacity and consequently alter Wexford Creek's flow regime. Groundwater storage can be increased by adopting various infiltration measures throughout the watershed and adopting different construction practices during fill material selection for lots.

7.3.7 Streams and Hydrology
The study site is within the natural topographic boundary of the Wexford Creek watershed. This one and a half kilometre creek contains two tributaries which flow east through the centre of the proposed Southgate Town Centre to the Chase River estuary where it joins Beck Creek. The lowest five hundred metres of the creek flows through a tidal marsh. Stormwater from the site is collected via a surface drainage system of roadside ditches which are then directed into Wexford Creek. There are plans to accommodate the stormwater from the development higher in the watershed in an off-line retention pond system located at the south end of the site near the Cranberry Road / Inland Island Highway overpass (Delcan Engineer Planners, 1995).

Urban development around a stream alters the stream hydrograph and decreases water quality resulting in stream morphology and habitat issues. Urban development changes the natural stream hydrograph by altering drainage patterns through re-grading; making the channel course more 'efficient' by implementing manmade storm water conveyance systems and channel straightening; as well as by increasing impervious surfaces and reducing vegetation cover (Loizeaux-Bennett, 1999). These actions result in changes in infiltration, interception and evapotranspiration rates. These changes can lead to a significant increase in storm runoff volume and an increase in overland flow during storm events, resulting in higher in-stream velocities and peak-flows. These changes also limit subsurface recharge, resulting in reduced stream base-flow due to loss of interception, infiltration and depression storage (Ibid.). Altering the predevelopment hydrologic regime results in significant changes to the stream morphology (pools and riffles, streambed substrate, bank stability, and in-stream and riparian vegetation) which is often destroyed or severely disrupted. The urban watershed effectively loses its capacity to control flooding, erosion, sedimentation, rate of discharge, water temperature or the base-flow, thereby degrading our valuable aquatic ecosystems (Ibid.).

Although much of the site has not yet been developed, years of agricultural influence has extensively modified the hydrology of Wexford Creek. The creek's path has been altered and channelized resulting in straight ditches, with little or no vegetative cover, that follow road and property lines. These straight, efficient drainage channels do not provide adequate habitat for fish which need the natural diversity of a complex channel (Thirkill-Hobson, 1995).

Wexford Creek supports sculpin, stickleback, pumpkinseed and lamprey, however cutthroat and coho fry were only found downstream of the Highway 1 culvert (Thirkill-Hobson and McNaughton, 1995). It is assumed that this culvert acts as a barrier to fish migration due to excessive water velocities (Ibid.). Even if this Highway culvert were made passable, the north tributary contains an additional three culverts, and the first one, just upstream of the Highway culvert at the intersection of Wexford Road and 11th Street, is also a barrier to fish passage (Ibid.). The course of the south tributary on the
other hand has not been significantly altered. There is existing riparian vegetation and it runs through a marsh which has been identified as potential winter rearing habitat for juvenile coho (Ibid).

Water quality has often been directly affected by traditional urban development. As the imperviousness of the watershed increases, water quality tends to decrease. Urban runoff can carry pollutants including sediments, nitrogen and phosphorus, metal and trace elements, oil and grease, organic contaminants, oxygen demanding substances, toxic chemicals and floatable materials to the receiving stream (GVS&DD, 1999).

The removal of vegetation around a stream in conjunction with an increase volume of runoff causes channel instability and subsequent sedimentation. This results in increased turbidity, gills and filter clogging of aquatic invertebrates, and changes in the stream substrate-degrading available spawning beds (Zanbergen, 1998). Less riparian vegetation also leads to an increase in water temperature causing stress to salmon and trout.

The water quality of Wexford Creek shows increased nitrate and phosphate levels (Thirkill-Hobson and McNaughton, 1995). This is likely due to local septic fields and the agricultural influence in the watershed. While levels are not considered detrimental to fish or humans, higher nutrient levels support the excessive growth of weeds (i.e. duckweed) which choke the stream (Ibid.). Although water quality is presently not an issue for Wexford Creek, unchecked development has the potential to further degrade the stream.

7.3.8 Vegetation

The site of the Southgate Town Centre is bounded by large coniferous forest habitat patches - to the east by rural development and to the west by a Regional District of Nanaimo forest reserve. Connectivity between these patches however, is jeopardised by the Inland Island Highway and development within the study site. The vegetation of the site is primarily a mixture of fields and relatively young stands of mixed forest. Historically, this area conformed to the Coastal Western Hemlock biogeoclimatic zone which consists of Western hemlock, Douglas fir and western red cedar. However, logging and clearing in the late 1800s for agriculture together with more recent suburban development has resulted in a landscape of open fields and forest blocks of red alder, big-leaf maple and Douglas fir.

The site includes a number of sensitive ecosystems related to Wexford Creek. The south tributary of the creek contains a marsh at the south end of the site and there is a tidal estuary located at the mouth of the creek (Thirkill, 1999). The riparian vegetation of the creek and estuary is however, minimal reducing its natural ability to control erosion, filter and absorb pollutants.

Riparian vegetation plays a vital role in determining the health and functioning of the watershed. Vegetation has the ability to filter sediment, pollutants and nutrients, regulate stream flow, modify temperature, provide diverse fish and wildlife habitat, stabilise stream banks and reduce erosion. The riparian strip acts as a storage area as well as a filter for water pollution, thus controlling stream flow and water quality.

The lack of riparian vegetation on the site has resulted in fragmented corridors and loss of ecosystem integrity thereby reducing ecosystem stability and biological diversity. Increased development will require more roads which may further deteriorate the function of the riparian buffer as they break the continuity of forest cover and can result in an increase in erosion and sedimentation problems (Zanbergen, 1998). Furthermore, underground stormwater drainage systems often bypass the riparian buffer zone reducing the capacity of buffers to filter out pollutants from runoff (Ibid).
7.3.9 Road and Trail Network

The study area is bisected north-south by Highway 1 (Old Island Highway). The Inland Island Highway (Nanaimo Bypass) intersects with Highway 1 (and Cedar Road) at the southern edge of the study area and continues along the site’s western border. Both Cedar Rd and 10th Street are classified as urban arterials with medium volumes of traffic; all other roads on the site are local roads with a low volume of traffic (Ried Crowther & Partners, 1999). There are three traffic signals in the study area, all located on Highway 1, at 10th/Maki Road, Cranberry Road and the Nanaimo Parkway/Cedar Road. All other intersections are stop controlled.

Both Highway 1 and the Nanaimo Parkway currently have four general purpose lanes. All other roads in the study area have only two general purpose lanes, except for 10th Street between Highway 1 and the Mall Access which has four lanes.

Presently, there is a considerable amount of traffic congestion occurring at the Cranberry Road/Highway 1 intersection. This is due to the fact that there is no direct access from Cranberry Road to the 10th Street commercial node; traffic is forced to use Highway 1, creating additional turning movement and increasing delays on the Highway (Ibid.). The City has plans to improve the functioning of this intersection. However, the City has also found that this issue may be partially resolved by building a connector road from Cranberry Road to 10th Street (Ibid.). The preferred connection is to tie directly into Wexford Road/ Lawlor Road (Ibid.).

It has also been recommended that the existing frontage road east of Highway 1 be eliminated in favour of a new back access system; this new access road would be extended southwards to connect to Highway 1 at the Cranberry Road signal, eliminating the current problems with truck or queues of vehicles blocking the frontage road intersection of Maki Road (Ibid.).

There are currently no trails within the study site however, the Official Community Plan has identified a future trail network along the north/south track of the E&N railway. This will provide a major trail corridor which connects other trail networks to the Southgate Town Centre.

8.0 SUSTAINABLE DEVELOPMENT PRINCIPLES

8.1 Ecological Infrastructure

8.1.1 Principle #1

Protect and connect environmentally sensitive areas (streams, wetlands, waterfront, etc.) from encroaching development by providing sufficient setbacks; further ensure their viability by maintaining connection between corridors and larger habitat patches.

Little-by-little, urbanisation is spreading out over our landscapes, enveloping natural areas, leaving them as mere fragments of the former ecosystem. Urbanisation impacts whole watersheds and fragments important wildlife corridors. These isolated patches of habitat lead to a decrease in native species diversity, and with decreased areas for dispersal, and genetic inbreeding, localised extinction of certain species occurs (Smith and Hellmund, 1993). Protecting or restoring environmentally sensitive areas such as streams, rivers, wetlands, meadows, and remnant forests can help mitigate the detrimental impacts of urbanisation and contribute to urban environmental health.

Ecologically healthy landscapes are typically an interconnected series of ‘patches’ and ‘corridors’ that together form a ‘landscape matrix’ (Dramstad, Olson, Forman, 1996). In cities this matrix is urban.
development, within which occur patches of natural areas. By linking these patches with corridors (or greenways), an ecologically functioning green infrastructure can be developed (Smith and Hellmund, 1993). By linking important habitat areas to form a network, they become a more robust system that is more effective at protecting water quality, retaining diverse habitat, providing recreational corridors, and generally preserving the local ecology (Dramstad, Olsen, Forman, 1996).

Riparian corridors are one of the most diverse and valuable habitat areas. They are home to a variety of aquatic, amphibian and terrestrial species. They also provide important movement corridors which link dispersed upland and lowland habitat patches, helping to prevent genetic isolation (Smith and Hellmund, 1993). These corridors perform a vital role in the health of the watershed by helping to clean both surface and groundwater, slow overland flow and maintain base flows. In a hypothetical drainage basin of one square mile, an average buffer width of about 30 metres along a 1.4 mile stream can reduce watershed imperviousness by about 5% (CWP, 1997).

Riparian corridors also provide a great opportunity for linear recreation such as walking, jogging and biking. These ‘blueways’ are an important amenity in urban areas since immediate contact with nature provides enjoyment, relaxation and reduced stress levels in most people (Kaplan and Kaplan, 1989).

Preserving natural habitat also has a positive effect on land value. Homes near to parks and natural areas have been found to have a 20% higher market value (American Forests/National Association of Homebuilders, 1995). Likewise, lots with mature trees typically sell for 20%-30% more than similar lots without trees, adding more value than post construction landscaping (McMahan, 1996).

Creating an ecological infrastructure requires (Girling, et al., 2000)
- preserving and protecting environmentally sensitive areas;
- stream and wetland buffering;
  * To be effective wildlife corridors, riparian buffers must be 30-90 metres wide per side. Many ‘conservation’ incentives exist to encourage increases in open space and conservation of natural areas. Examples of such programs include: buffer averaging, reductions in storm water fees in exchange for protection, property tax credits for conservation, and density transfers to more developable lands (CWP, 1998).
- planning a surface storm water system and a parks and open space network that incorporates and connects natural resources;
  * Opportunities for these connections exist in transport and utility corridors, streams, linear parks, storm water conveyances and storage or filtration facilities.
- laying out new development and redevelopment on lands within this green infrastructure.
  * Individual homes can be connected with this regional green infrastructure through a finer-scaled network of drainage ways, parks and open space.

8.1.2 Principle #2
Protect and augment natural drainage systems, in which storm water is held on the surface and permitted to seep naturally into the ground.

Urbanisation disrupts the natural hydrologic system. Under natural conditions, rainfall is intercepted by vegetation, slowly allowing it to infiltrate and saturate the soil. The majority of rainfall is absorbed into the ground and slowly flows into creeks and rivers. Urbanisation however, typically results in the removal of vegetation as well as building and paving vast areas of the watershed. The runoff is then directed into pipes that quickly carry all of the collected rainfall to the streams and rivers. This results in the alteration of the natural stream’s hydrograph - increasing the volume and velocity of runoff, coupled with a number of negative impacts on water quality (i.e. eroded stream banks, increased
eutrophication, increased stream temperatures, decreased in available oxygen for fish and other aquatic life, and increased sedimentation) (Smith and Hellmund, 1993).

The objective of conventional storm water drainage systems is to capture and convey runoff to nearby streams as quickly as possible using pipes. “Natural” storm water systems on the other hand, try to mimic natural hydrologic conditions as quickly as possible - infiltrate, infiltrate, infiltrate. The foundation of this system relies on the protection of riparian corridors, wetlands, floodplains, and forested areas which infiltrate storm water and act as a reservoir. It further involves replacing lost storage and infiltration capacity of a developed site through practices such as small-scale biofiltration and water harvesting, porous pavements, reducing impervious surfaces, and maximising tree cover.

“Natural” drainage systems have many functions. They reduce runoff volumes and recharge groundwater by capturing rain in vegetation, depressions, ponds, and wetlands which allow water to infiltrate rather than to run off; maintain water quality by filtering or absorbing sediments and other pollutants; minimise capital costs of storm water drainage systems (Golden, 1999) and spread maintenance costs over several jurisdictions (parks, highways). The “Somerset” development, in Prince George County, Maryland, saved 75% on storm water detention and filtration by using a natural storm water system which used “rain gardens” (on-site infiltration areas) and extensive surface drainage throughout the development (Girling, et al, 2000). Natural systems also provide many social benefits such as scenic values of natural areas, passive recreation, environmental education, and alternate transportation.

Protecting and augmenting natural drainage requires (Girling, et al, 2000)

- planning at the watershed scale;
- Create a drainage plan that incorporates the watershed, the basin, and the individual lot;
- Assess the site’s natural features (topography, slope, natural vegetation, soils, groundwater and rainfall regime), to determine the natural drainage opportunities and identify areas for preservation and areas for development;
- Create a schematic surface drainage system and co-ordinate this system with streets, infrastructure, development, parks and open space.
- Try to keep rainfall at its source by creating an integrative storm water system that includes biofilter strips, bioretention ponds, swales, and streams located on every urban site to supplement the natural drainage.
- Filter storm water at locations where it enters the natural system.

- reducing the amount and effect of impervious surfaces.
- reduce street lengths by using longer blocks with mid-block paths or using narrow, deep lots in residential areas which increases the total dwelling units per street;
- minimise the width of streets
- incorporate water filtration into streetscape design by using planting strips and medians as retention areas
- use efficient parking lot design
- disconnect impervious surfaces from the storm water system, infiltrate the runoff at the source using swales, vegetated areas etc.
- use pervious pavements which allow water to infiltrate through the pavement where appropriate.

Southgate Town Centre Plan

The Plan’s ecological infrastructure is supported by its linked system of streets and open spaces, which includes local streets, parks, riparian protection areas/buffers, and tree preservation areas. This system will satisfy social and recreational demands as well as meeting ecological goals (such as stream protection, storm water management, and habitat preservation/restoration. As a result of the
increased permeability of roads, yards, parks and open space, it is anticipated that the storm water from a ten-year storm will be able to be absorbed by the soil.

8.2 Land Use and Development

8.2.1 Principle #3
Provide different dwelling types (a mix of housing types, including a broad range of densities from single family homes to apartment buildings) in the same neighbourhood and even on the same street.

Since World War II, most urban areas have turned to zoning and subdivision codes as a method of preventing “incompatible” development (R.D.N Development Services, 1997). It was originally intended to keep land uses such as residential and industrial development from conflicting. The uncritical adoption of conventional suburban zoning and subdivision regulations has created development after development of standardised, bland, homogeneous, insular neighbourhoods - based on one housing type and consequently only one income group. Diversity in housing type is a positive attribute of a working community and is related to the layout, design, structure, use mix, and densities now outlawed under most modern land-use regulations.

A healthy community should be full of choices and differences. There is a diverse number of human needs and family types in our modern world and no one should be forced to move from their neighbourhood when family circumstances change. A rich mix of socio-economic and age groups should be encouraged by the provision of a variety of housing types, costs and sizes.

Southgate Town Centre Plan
The plan is designed to accommodate a diverse and socially cohesive community of 5000 people. A wide variety of household types and tenures are provided which promotes integration between different family types and ages as a way of strengthening the larger community. Each block incorporates a variety of housing options and configurations such as multiple-unit residential in the form of ground-oriented townhouses and multiplexes; single-family semi-detached homes in the form of duplexes and fee-simple rowhouses; and single-family detached homes on medium- to small-sized lots. Each housing type is scaled and designed to create the ambience, character and vitality of a single family neighbourhood. In the downtown core can be found multiple-unit residential in the form of apartments, live/work, and mixed-use commercial/residential housing. The diversity of housing tenures and types that the plan proposes ensures that a proportion of units are affordable rental suites.

8.2.2 Principle #4
Conserve land and energy by designing compact, walkable neighbourhoods that provide services such as transit, shops, parks etc. within a five-minute walking distance.

Our suburbs are expanding faster than our population growth (Girling, et al., 2000). The legacy of exclusionary zoning, has been our reliance on the automobile and the design of our urban centres around them. In Nanaimo, this type of zoning has lead to the development of a series of strip malls with large parking lots. The lack of vitality of Nanaimo’s downtown core can also, in part, be attributed to its focus on commercial development without providing the residential population to support it. New growth centres need to break this pattern; they need to provide services, shops and parks close to residents which support the pedestrian (City of Nanaimo, 1999).

Town planners have recognised this pattern and the detrimental effect it is having on our urban centres - Duany and Plater-Zyberk developed the Traditional Neighbourhood Design concept and Peter Calthorpe based proposals on his theory of Transit Oriented Development. These concepts are based
on traditional American towns and an environmental ethic. They promote “a small scale, mixed use, environmental sensitivity, internally consistent hierarchy of architectural building and street types, finite geometry with legible edges and a centre, walkability, alleys with accessory units and the reliance on succinct graphic guidelines in lieu of traditional zoning codes” (Kelbaugh, 1997).

Achieving pedestrian-oriented neighbourhoods therefore, requires
- homes to be within a walkable distance of shops and services;
- an interconnected street network that provides a variety of routes to nearby destinations;
- residential neighbourhoods to be structured around a fine-grained grid of streets and lanes; and
- streets that can accommodate automobile, pedestrian, and bicycle traffic.

Southgate Town Centre Plan
The Plan incorporates these principles and promotes a diversity of land use, activities and building types as well as pedestrian oriented streets that accommodate easy, direct access to parks, shopping and work.

A community centre and two major parks are to be centrally located within the community. These connections are strengthened by a network of paths and sight lines.

The “Main Street” Commercial Area centred around the intersection of Highway 1 and 10th Street is the most important commercial destination for residents of Southgate. This district will also serve 1,780 new residents. Most residents in the community will be within a five minute walking distance of this node.

8.3 Transportation Infrastructure

8.3.1 Principle #5
Provide an interconnected street and path network to allow for ease of movement.

It is well known that automobiles are a major source of air pollution and greenhouse gases. Despite this fact however, every day many of us continue to make several trips in our cars - going to work, shopping, picking up the kids. Apparently this dependence on the automobile in increasing; one car is no longer enough, it seems we have now become a two car per household society (Girling, et al., 2000). Between 1969 and 1995, the number of cars on the road and distances travelled per year have more than doubled (Ibid.).

Where and how we use vehicles is influenced by how we design communities. The extent and connectivity of the street network and the attractiveness of routes to pedestrian, bicycle and transit modes of travel along with many other planning and design factors, influence the number, length and types of trips we choose to take by automobile. “Development patterns that reduce vehicle use also reduce vehicle miles travelled, vehicle starts, and congestion and may encourage alternative modes of travel” (Girling, et al., 2000). If fact areas similar to Southgate show up to 40% reduction in trip generation per capita (Condon, et al., 2000).

An accessible, interconnected street and path system requires (Girling, et al., 2000)
- a fine-grained grid or modified grid street pattern to ensure a variety of itineraries and to disperse traffic congestion (generally the greater the number of access points and intersections, the higher the accessibility and connectivity of the network);
- a number of continuous, well-connected, safe and a physically accessible (2%-5% grades and appropriate surfaces) network of sidewalks and bicycle paths;
attractive routes with interest points that provide visual and physical enjoyment.

Southgate Town Centre Plan

The organisation of the Plan’s road, block, park and greenway patterns responds to the site’s natural features and topography. The Plan proposes that traffic is dispersed through an interconnected modified grid pattern of streets which minimises congestion and ultimately reduces reliance on the automobile. This street network is based on a hierarchy of streets, which includes arterials, collectors, local streets and lanes and is based on existing roads and land parcel layout. Major and local through traffic is accommodated on a system of major and minor arterials. Through traffic occurs on Highway 1 as well as Cranberry Road and the mixed-use, commercial “Mainstreet” of 10th Street. The Wexford Road Connector and Maki Road act as collectors. This street system, when accompanied by a compact, mixed-use development pattern, can reduce our dependence on the automobile.

8.3.2 Principle #6

Provide narrow, people friendly streets (with sidewalks and paths), shaded by rows of trees in order to save costs and provide a greener, friendlier neighbourhood.

People often assess a place by the character of its streets; roadways help create a community’s identity and personal sense of orientation. “Roadways can be great linear hallways with permeable walls shaped by the natural and built features along a road” (Morrish, 1996) - unfortunately new developments often pay little attention to these important corridors. Streets are an often-neglected resource that can be reclaimed to increase the permeability, enhance wildlife habitat and enrich the social interactions of the neighbourhood.

The street network is a major source of imperviousness in a watershed. Therefore, narrowing the streets and incorporating a roadside swale system which infiltrates storm water near its source can help maintain the health of the watershed. An environmentally healthy street also includes trees which can improve local energy consumption, air quality, water conservation, noise pollution, recreation opportunities, wildlife habitat and soil quality.

A healthy, liveable street is one that is safe and quiet, provides opportunities for play and learning and brings people together. A healthy liveable street implies comfort. Social relationships between families living on the same block can in part be determined by the spatial design of a street. “The right combination of site design and building orientation can mean the difference between a ‘development’ where people exist and a ‘neighbourhood’ where families thrive” (Arendt, et al.,1994).

Greener, friendlier streets require (Arendt, et al.,1994)

- narrow roadways that slow cars down and increase permeability;
- sidewalks which allow people to walk safely around their neighbourhood;
- front yards no more than six metres in depth and front porches to encourage conversations with passersby and to enable backyards to be larger;
- low fences or plantings at the edge of the sidewalk to mark the boundary between the public space of the street and semi-public space of the front yard;
- a row of deciduous shade trees between the street and the sidewalk to enclose the street, separate pedestrians from parked cars, and form the ‘wall’ of a leafy corridor;
- rear parking spaces accessed by rear lanes to prevent building fronts from being consumed by garages;
- on-street parking since lot sizes are too small to accommodate all parking needs comfortably;
Southgate Town Centre Plan
Paved street widths for local and connector streets range from 13.6m to 6.0m with 2.5m gravel parking lanes. Rights-of-way for these streets range from 21.7 to 16.5 and are determined by street trees, natural drainage infrastructure, and sidewalks which also create a buffer from traffic and a pleasant pedestrian environment.

Narrow lots demand lanes so as to prevent building fronts from being taken over by garages and concrete thereby allowing residents to interact more freely with their neighbours. Since existing site conditions (i.e. topography, streams, vegetation, road network, parcel configuration) determined the proposed community structure and lots sizes, there are some areas of the Plan where lanes are not feasible. In these areas parking is still accommodated in the rear through the use of shared driveways.

9.0 DESIGN STRATEGIES

Based on the issues identified in the site analysis and the sustainable design principles, the following eight design strategies were developed to help inform the final design of the Southgate Town Centre:

9.1 “Centring”

Objective: to establish a compact, high density urban neighbourhood

Principle #3
Provide different dwelling types (a mix of housing types, including a broad range of densities from single family homes to apartment buildings) in the same neighbourhood and even on the same street.

Principle #4
Conserve land and energy by designing compact walkable neighbourhoods that provide services such as transit, shops, parks etc. within a five minute walking distance.

Figure 5

Issues
Exclusionary zoning in Nanaimo has led to the proliferation of strip-malls and insulated neighbourhoods. This has created a community dependant on the automobile and a downtown core lacking in vitality. New growth nodes, such as Southgate, should be compact, high density urban neighbourhoods which are pedestrian friendly and support a large cross-section of people (age groups, incomes and ethnicity).

Generative Solutions
Create a compact, high-density town centre that provides a central focus to the community. This “Mainstreet” commercial mixed-use core is located at the historical town centre of Chase River and is strategically located to be within a five-eight minute walking distance of most residents within the community. This area will develop incrementally over time, as an increasing population demands more shops and services to support it. The proposed design illustrates how this incremental growth can be directed to incorporate existing buildings (i.e. existing malls) to create a compact, high-density residential commercial core. Buildings will be two-threes stories high except at the main intersection
of Hwy 1 and 10th Street where they will be four stories, enhancing its visual importance. This downtown core will be home to 1,780 residents in mixed use, high-density apartments and condos.

9.2 "Bridging The Gap"

"BRIDGING THE GAP"

Objective: to bind both sides of the community together

Principle #4
Conserve land and energy by designing compact walkable neighbourhoods that provide services such as transit, shops, parks etc. within a five-minute walking distance.

Principle #5
Provide an interconnected street and path network to allow for ease of movement.

Figure 6

Issues
The west and eastern sides of the Southgate community are presently disconnected from each other due to the Wexford Creek estuary and Highway 1. The Highway is a wide, fast-paced artery into downtown Nanaimo which cleaves this community in two.

Generative Solutions
An opportunity exists to knit these two disparate neighbourhoods together; to improve the cohesiveness of the community. This can be achieved by proving more pedestrian trails/boardwalks through the estuary and by redefining the function of the Highway.

The Inland Island Highway has re-directed the majority of through-traffic from Highway 1, thereby downgrading its role and allowing it to become a community resource rather than an obstacle. Due to its change in function and the resulting decrease in traffic demand, the intimidating nature of the Highway can be minimised by narrowing it (decreasing crossing distances) and increasing the number of pedestrian crossings from three to five (four cross-walks, an overpass and an underpass).

9.3 "High Street"

"HIGH STREET"

Objective: to make the highway 'Mainstreet'

Principle #4
Conserve land and energy by designing compact walkable neighbourhoods that provide services such as transit, shops, parks etc. within a five minute walking distance.

Principle #6
Provide narrow, people friendly streets (with sidewalks and paths), shaded by rows of trees in order to save costs and provide a greener, friendlier neighbourhood.

Figure 7
Issues
The Southgate Town Centre is the southern gateway to Nanaimo, and this should be expressed with more than just a landscaped/decorative sign. Passers-by often assess a place by the character of its roadway; an opportunity exists to use the Highway corridor to reflect the unique character of Southgate and to give Nanaimo the ‘introduction’ it really deserves. However, the land use plan does not address this important consideration. Highway 1 is zoned for highway commercial development which often takes on the form of strip-malls (with large set-backs and parking in front)- perhaps not the introductory image Nanaimo, or Southgate would like to provide.

Generative Solutions
The ‘presence’ of this important corridor is developed by redefining the spatial orientation of the buildings and natural features along it. Mixed-use commercial development with a maximum setback of two metres and heights of two to three stories define the street. This ‘streetwall’, coupled with the presence of street trees, create a consistent street edge and provides unity and character to the corridor.

9.4 “Grounding”

"GROUNDING"

Objective: to maintain the rural character of the site

Figure 8

Issues
The site of the proposed Southgate Town Centre has historically been a rural community. Residents highly value the rural character created by large residential lots, agricultural fields and natural features such as the Wexford Creek estuary. Residents would like to encourage new people and businesses to their neighbourhood, without jeopardising this rural character.

Generative Solution
Given that the population of this area is expected to increase tenfold, it may be more appropriate to strive for a ‘green’ rather than a ‘rural’ neighbourhood. This can be achieved through planting and maintaining existing trees in existing and new subdivisions; developing greenways and walking trails along waterways and further protecting environmentally sensitive areas by acquiring more parkland where possible.

Residents’ exposure to green space has been maximised with view corridors and by placing open space at strategic locations. For example, streets (i.e. 10th Street) have terminal views of forested areas, uninterrupted by buildings; the connector road is flanked by open space for the majority of its route into town; the view of the estuary has been preserved and enhanced (especially driving north); and, perhaps most importantly, at the heart of the community is a large natural park.
9.5 "Green To The Core"

Objective: to weave green into the community

Principle #1
Protect and connect environmentally sensitive areas (streams, wetlands, waterfront, etc.) from encroaching development by providing sufficient setbacks; further ensure their viability by maintaining connection between corridors and larger habitat patches.

Issues
A healthy community is an ecologically functioning community. Protecting the ecologically sensitive areas of this site presents a problem since most of these areas are already severely degraded due to the past agricultural and residential development history. If development continues unchecked, the ecological integrity of this site will be even more seriously jeopardised. Presently there is little or no riparian vegetation along much of Wexford Creek and Highway 1 presents a significant barrier for wildlife movement.

Generative Solutions
Not only must the existing green space/habitat be preserved it must also be recreated. Development must be designed around an ecological infrastructure - an integrated network of green space which functions at many levels. At the heart of the proposed community is a large park which is part of a larger park/open space corridor which links the uplands to the estuary. This viability of this greenway is strengthened by proving an underpass under Highway 1. This spine is supported by a network of smaller greenways and 'green' streets and by a co-ordinated backyard 'naturescape' planting program.

9.6 "Restore It They Will Come"

Objective: to recreate the morphology and ecology of Wexford Creek

Principle #1
Protect and connect environmentally sensitive areas (streams, wetlands, waterfront, etc.) from encroaching development by providing sufficient setbacks; further ensure their viability by maintaining connection between corridors and larger habitat patches.

Principle #2
Protect and augment natural drainage systems, in which storm water is held on the surface and permitted to seep naturally into the ground.
Issues
Wexford Creek historically supported populations of coho and trout. However, past agricultural practices and roadway development have drastically altered the course and morphology of the creek, reducing fish access and habitat. The creek has been relegated to a roadside ditch for most of the site and the north tributary goes through a series of three culverts before disappearing under Highway 1. Both the Highway culvert and the downstream culvert of the north tributary are barriers to upstream fish passage.

Generative Solutions
The course of the creek needs to be altered to minimise the number of road crossings and culverts that are required. The importance of the creek needs to be reasserted; it needs to follow its own path, not that of the road system. The confluence of the north and south tributaries is a meaningful location which is re-discovered and reinforced by removing the culvert at the intersection of Wexford Road and 11th Street. A section of 11th Street is also removed to allow for a wider buffer of riparian vegetation in this area. Buffers are provided and riparian vegetation is restored along the entire length of Wexford Creek in order to increase storm water infiltration, stream cover and the supply of nutrients. Since water infiltration techniques and vegetation are incorporated throughout the community, these buffers vary from fifteen to thirty metres depending on the adjacent land uses.

9.7 “High-Low”

"HIGH-LOW"

Objective: to respect the watertable

Principle #2
Protect and augment natural drainage systems, in which storm water is held on the surface and permitted to seep naturally into the ground.

Figure 11

Issues
Over half of the developable area of the site is on Fairbridge Soils. These soils are typically found on nearly level, undulating landscapes. The biggest issue with these soils is their imperfect drainage and high watertable (40-70cm below grade) which becomes completely saturated in winter rains; the soil is not able to absorb storm water, creating a large amount of surface runoff. These soils present a problem for development since building foundations can not be built below grade.

Generative Solutions
Retention basins and roadside swales will capture overland flow, holding storm water long enough for it to be absorbed by the soil. Where possible, roads have been oriented and designed to capture and direct runoff to public parks which also function as large retention/infiltration areas. Building sites will be developed on about two to four metres of well-drained, sandy loam soil. This will allow for basements and underground parking and will increase the soil’s infiltration rate and capacity.
9.8 “Blueway Connections”

"BLUEWAYS"

Objective: to connect the community to the waterfront

**Principle #1**
Protect and connect environmentally sensitive areas (streams, wetlands, waterfront, etc.) from encroaching development by providing sufficient setbacks; further ensure their viability by maintaining connection between corridors and larger habitat patches.

**Principle #2**
Protect and augment natural drainage systems, in which storm water is held on the surface and permitted to seep naturally into the ground.

**Principle #5**
Provide an interconnected street and path network to allow for ease of movement.

Issues
Upstream of Highway 1, Wexford Creek is functionally “disconnected” from its lower reaches and estuary - there is no continuous riparian corridor and the culvert acts as a barrier to fish and people movement.

Generative Solutions
Restoring the riparian corridor recreates habitat for fish and other wildlife. Replacing the culvert with a highway overpass provides opportunities for a continuous wildlife and recreational corridor that connects the community to the estuary and waterfront.

10.0 PERFORMANCE STANDARDS AND GUIDELINES
(adapted from the East Clayton Neighbourhood Concept Plan)

10.1 Ecological Infrastructure

“Functional” Design Objectives:

- To design a natural storm water drainage system that is capable of retaining and infiltrating the runoff generated by a five-year storm.
- To improve the quality and quantity of wildlife habitat in the Southgate Town Centre by restoring the riparian vegetation cover of Wexford Creek.

The performance standards and guidelines outline how the ecological infrastructure can be designed to maintain or enhance the natural storm water drainage systems and wildlife habitat in the Southgate Town Centre and are based on the sustainability development principles with a special focus on the following:
Principle #1
Protect and connect environmentally sensitive areas (streams, wetlands, waterfront, etc.) from encroaching development by providing sufficient setbacks; further ensure their viability by maintaining connection between corridors and larger habitat patches.

Principle #2
Protect and augment natural drainage systems, in which storm water is held on the surface and permitted to seep naturally into the ground.

The principles of infiltration best management practices (BMPs) and urban forestry are applied to building sites, streets and public green spaces, the basic building blocks of an urban centre.

Objectives
- to protect and enhance wildlife habitat (especially fish habitat);
- to maintain stream hydrology and stream water quality;
- to capture and infiltrate a ten-year storm;
- to provide access to a variety of recreational opportunities;
- to enhance community value, quality and appeal.

10.1.1 Natural Drainage System
The overall serving scheme is comprised of three key components:
- On-lot measures - for infiltration
- On-street measures - for conveyance and infiltration
- Community Recreation facilities - for retention, infiltration and controlled discharge into Wexford Creek

Building Sites
On-lot drainage areas will cover approximately sixty percent of the site. Impervious areas including buildings, patio areas, driveways and parking lots do not allow natural infiltration of rainwater and therefore produce significantly high levels of surface runoff. Traditional landscaping (lawns and raised planting beds) is designed to shed rainwater rather than infiltrate it.

Innovative designs to manage on-lot drainage through groundwater infiltration is key for the functioning of Southgates’s natural storm water drainage system. Net storm water runoff can be significantly reduced by implementing storm water Best Management Practices in each lot, that will handle the area’s frequent rainfall events.

Performance Objectives
- Sites must be able to detain and infiltrate storm water from a five-year storm. Performance thresholds for sites are therefore 24mm per day, on average, times the total area of the parcel;
- Impervious surfaces should be minimised;
- Medium density areas should have a maximum total lot coverage of 45%, medium-high and high density areas, 55%. Mixed use areas can have a total area coverage of up to 80%, but they must meet storm water infiltration requirements;
- All parking lots should be designed to capture and infiltrate the storm water runoff they and adjacent buildings produce by incorporating landscaped medians which double as storm water retention/infiltration basins;

Infiltration Best Management Practices for Building Sites
- The drainage from all impervious areas should be directed into on-site infiltration facilities and not directly connected to the street swales system;
• Building sites that require fill must use porous/permeable soils;
• Infiltration pits should be located at front, rear and side property lines;
• Create rainwater gardens by grading garden areas to act as retention basins;
• Capture and re-use rainwater from roofs using cisterns;
• Promote evapotranspiration losses by growing trees and bushes in each lot.

Streets
The street/lane network typically covers about thirty percent of the gross development area. In urban areas these roads are typically paved and as a result contribute high storm water runoff volumes and flow rates. The road network also functions as the overland conveyance system for storm water. By directing this flow into grassed swales instead of pipes provides an opportunity to clean and infiltrate runoff close to its source thereby improving runoff volume and water quality.

A combination of on-site infiltration measures and roadway swales form the backbone of a good natural drainage-servicing scheme. They are designed to convey all runoff, including those from heavy and infrequent 100-year events, to the community detention ponds and eventually to Wexford Creek.

Performance Objectives
• Street right-of-ways are to be no more than fifty percent impermeable surfaces.
• Permeable areas should be designed to accept and infiltrate runoff from paved areas.
• Infiltration performance thresholds for streets are 24mm per day, on average, times the total area of the street right-of-way.

Infiltration Best Management Practices for Streets
• Where possible (i.e. residential areas) provide gravel parking lanes to minimise the amount of pervious surfaces;
• Grade streets and sidewalks to direct runoff into grassed swales located on one or both sides of the street.
• Water must be able to free flow from paved surfaces to roadside grassed swales/boulevards therefore curbs are not allowed.
• Modified rolled curbs with water inlets located at no more than 1.5 metre intervals may be used as an option.

Public Green Spaces
The intent of natural storm water systems is to provide a safe, well-drained community while maintaining pre-development flows in Wexford Creek. Therefore, all runoff is directed to Neighbourhood Parks which double as community retention facilities. Due to “upstream” on-site and street interception and infiltration measures, the need for large retention ponds is drastically reduced.

Performance Objectives
• Park and open space areas are to be no more than ten percent impermeable surfaces.
• Neighbourhood parks are to accept and to manage drainage from the surrounding street swale system.
• Sites must be able to detain and infiltrate storm water from a ten-year storm.

Best Management Practices for Neighbourhood Parks
• Parks should double as community retention facilities and should have a storage capacity that can accommodate runoff from a ten-year flood (one hundred-year floods flow directly into the creek system).
10.1.2 Urban Forestry
Urban forestry creates wildlife habitat as well as helping to infiltrate and purify storm water runoff. In a matrix of urban development (building sites, streets and neighbourhood parks), wildlife habitat can be provided in an integrated network of patches, corridors and stepping-stones.

**Building Sites**
- Residential yards are an important part of the urban forestry and wildlife habitat strategy in Southgate.
- Places should be found for medium-sized shade trees whose canopy, when mature, will cover at least forty percent of the lot.
- Trees should be layered with native and non-native shrubs and plants that provide wildlife value - food (i.e. berries, nectar, insects) or habitat.
- When found in every yard, these plantings form small habitat patches, or stepping stones, that link with larger patches and corridors.

**Streets**
- Street trees create an important network of habitat which connects to larger habitat patches and corridors.
- Medium-sized shade trees should be placed in the permeable areas of the street right-of-way, when mature, the canopy of these trees will cover at least sixty percent of the street.
- These trees turn street corridors into corridors of green space.

**Neighbourhood Parks and Open Space**
- At least forty percent of park sites are to be covered by canopy at tree maturity.
- These areas are to be designed to function as large habitat patches and along Wexford Creek are to form a linear riparian corridor.
- Riparian vegetation is to be planted along this corridor to form a complex layering of plantings - tree canopy, understory, groundcover.
- Riparian corridors are to be between thirty and sixty metres in width.
- Pathways are to be designed as narrow, low impact walkways (max 1.5 m) with natural substrate or crushed gravel surfaces to encourage infiltration.

10.2 Land Use And Development

*Functional* Design Objective:
- *To provide housing and employment opportunities for a population of five thousand.*

The general premise and land use structure of the proposed Southgate Town Centre is derived from Nanaimo’s OCP, Chase River Neighbourhood Plan. A mixed-use commercial core is centred around the intersection of Highway 1 and 10th Street. Incorporating the Highway into the downtown core allows the passer-by to be pulled into and experience the unique community of Southgate. This commercial area is supported by the surrounding residential development. These performance standards and guidelines are intended to help create a mixed use, and pedestrian oriented, “functional” community which is based on principles of sustainable development, with special emphasis on the following two:

**Principle #3**
*Provide different dwelling types (a mix of housing types, including a broad range of densities from single family homes to apartment buildings) in the same neighbourhood and even on the same street.*
Principle #4

Conserve land and energy by designing compact walkable neighbourhoods that provide services such as transit, shops, parks etc. within a five-minute walking distance.

These guidelines are organised by the following three land uses proposed by the plan:

1. Residential Areas
2. Commercial Areas

10.2.1 Residential Areas

The residential design guidelines are intended to create visually unified, socially diverse neighbourhoods by providing a wide variety of housing types, densities and forms.

Objectives:

- To provide diversity of housing including apartments, rowhouses, townhouses, multiplexes, semi-detached and detached.
- To provide housing for a wide variety of people and family at different income levels.
- To reduce dependence on cars.
- To create friendly, green streets by proving sidewalks, street trees, swales, on-street parking, and by establishing front yard setbacks.

1. Medium-High Density

The majority of residential development in the Southgate Town Centre is medium-high density residential which has an average target density of 65 units per hectare (26 units per acre). A typical block is comprised of single family detached homes on medium-small lots; single-family semi-detached homes in the form of duplexes and fee-simple row-houses and at the higher density range, multiplexes and ground-oriented townhomes.

2. High Density

High-density residential development is located within the downtown commercial district and has an average target density of 88 units per hectare (35 units per acre). In order to fit in with the community's small-town neighbourhood character, emphasis will be placed on providing as many ground/street-oriented units as possible.

3. Mixed-Use Main Street Residential

High-density residential units with an average target density of 88 units per hectare (35 units per acre), are encouraged in the "Main Street", mixed-use district. The visual and functional harmonisation of these Main Street residential units is required and special attention is paid to creating a friendly pedestrian realm.

Housing Density and Diversity

Net Density

Based on the assumption that all target densities are attained, the total net density for the Southgate Town Centre is 26 units per hectare (area includes all roads, parks and open space).

Built Form Diversity

- The residential density target is achieved by providing a mix of dwelling types within the same neighbourhood and on the same block.
- Typically, single-family detached and semi-detached homes are located mid-block and higher density multiplexes mark street corners and front busier streets.
• Attention must be paid to house variety, identical house design is permitted however, exterior treatments and materials must differ.

Relation of Buildings to Streets - Building Footprint Standards

Building Coverage
Meeting storm water drainage and green infrastructure requirements involves minimising impervious cover, which allows infiltration of lot-generated storm water and increases wildlife habitat.

- The maximum total lot coverage of medium density lots is 45%
- In medium-high density areas, total lot coverage should be no more than 45% for single family lots with coach houses and 55% for semi-detached duplex and row houses.
- High-density areas should not have more than 55% total lot coverage.
- Mixed-use areas can have a total area coverage of up to 80%, but they must meet storm water infiltration requirements.

Building Height

- In medium-high density areas building height should not exceed two and a half stories plus basement.
- High density and mixed-use apartments should not exceed three stories (except at the intersection of Highway 1 and 10th Street where buildings should be four stories in height).

Parking and Garages

In high density and mixed-use areas, below ground or at grade parking will be provided for residents. For medium-high density areas, each unit must be provided with a minimum of two parking spaces. The second parking space can either be provided on-site or on-street. Twenty percent of the total parking spaces on the block however, must be for visitors and cueing space.

- The lane right-of-way should be kept clear of parking
- Rear lot resident parking will be provided off rear lanes and where lanes are not feasible, rear lot parking will be provided via shared drives.
- Coach houses and garages will have a maximum setback of one metre.
- All driveways, parking pads, paths etc. will be constructed of permeable materials.
- Garages and coach houses should be designed to fit in with the architectural style of the main house.
- In high-density areas the entrance to the parking facility should be off a secondary road or lane and must be integrated with the rest of the building.

Front Setbacks

Front setbacks help define the scale of the street. The most satisfying ration between the "width" of the street corridor and the height of the "walls" is 2:1 (Arendt, et al, 1994).

- The front setback in medium-high density areas should be between four and five metres.
- Commercial/Mixed-use residential buildings should have a maximum setback of one to two metres.

Entries, Porches, Front Yards

- The transition between the public space of the street and the semi-public space of the front yard should be delineated. This can be achieved though the use of a low retaining wall (max 1m), fence or vegetation that is visually permeable (i.e. picket fence).
- Front porches promote social interaction with neighbours and are therefore encouraged.
• In high density urban areas, as many units as possible should be ground-oriented and provide street access.

10.2.2 Commercial Areas
The commercial area guidelines are meant to create street-oriented commercial and mixed-use commercial development.

Objectives:
• To promote appropriate commercial development within walking distance of adjacent residential areas.
• To promote the development of street-oriented commercial that are compatible with upper story residential units providing housing options and increasing the viability of the Main Street commercial district.
• To create pedestrian friendly, green streets by proving, street trees, swales, sidewalks, on-street parking and human-scale building frontages with minimal setbacks.
• To promote local economic development.

1. Main Street Mixed-Use Commercial / Residential
The development guidelines for this area promotes the creation of upper story apartments which both visually and functionally relate to the street-oriented commercial below. Mixed-use commercial areas are designed to be vibrant nodes with high levels of pedestrian activity and this character is accentuated by providing an aesthetic, pedestrian-oriented streetscape. The proposed Mixed-use commercial area is centred around the intersection of Highway 1 and 10th Street and extends south along the Highway and serves as the primary commercial and service centre for the Chase River Neighbourhood.

2. Neighbourhood Commercial
The everyday needs of residents are met by small-scale commercial and service development (i.e. corner store). Locating this area in the eastern neighbourhood ensures that every resident is within a five minute walking distance of stores and services.

3. Service Industrial Mixed Use
This unique area, located to the east of the downtown core, combines some residential development with compatible light industrial/ office uses at densities between 37 and 62 units per hectare (15 and 25 units per acre). The area is similar in layout to the Main street mixed use area, based on a grid pattern of streets and lanes, rear unit access and storage, on-street parking and maximum continuous street frontage for buildings.

4. Live/Work Commercial
The intent of the live/work area is to provide a transition from the downtown Main Street commercial core into the residential areas. This designation permits and encourages the development of a medium density neighbourhood alongside compatible businesses.

Relation of Buildings to Streets - Building Footprint Standards
Building Coverage
Meeting storm water drainage and green infrastructure requirements involves minimising impervious cover due to building and pavement lot coverage.
• The total maximum building coverage permitted for Main Street mixed-use commercial lots is eighty percent.
• The total maximum building coverage permitted for Neighbourhood Commercial lots is fifty percent.
• The total maximum building coverage permitted for Service Industrial mixed-use lots is fifty percent.

**Building Height**
• Buildings in Main Street mixed-use commercial areas shall not exceed a height of three stories except buildings fronting the intersection of Highway 1 and 10th Street whose height shall be four stories.
• Buildings in Neighbourhood Commercial areas will have a maximum height of two and a half stories.
• Buildings in Service Industrial mixed-use areas will have a maximum height of two and a half stories.

**Parking and Garages**
• All commercial parking will be provided by on-street parking and parking lots.
• Providing on-street parking increases parking convenience for visitors and shoppers and improves the pedestrian realm by creating a buffer between moving traffic and the sidewalk. The proposed plan maximises on-street parallel and angle parking.
• Parking lots that front onto streets disrupt the continuity of the street-wall, diminishing street character and pedestrian experience. Therefore, all parking lots must be located behind buildings and accessed by rear lanes or side streets.
• In order to minimise the amount of parking, parking should be shared among adjacent uses where it is found that parking demand does not overlap.
• Parking lots should be designed to capture and infiltrate the storm water runoff they and adjacent buildings produce by incorporating landscaped medians which double as storm water retention/infiltration basins.
• Shade trees should be planted at an approximate ratio of one tree per five spaces.

**Front Setbacks and Building Orientation**
• Creating pedestrian-friendly streets requires minimising front setbacks and maximising street frontage of buildings.
• All mixed-use buildings shall have front setbacks between one and two metres.
• In order to maintain an interesting pedestrian environment buildings shall address public streets with their primary facades (shop windows, awnings, canopies, signage).

**Primary Entries**
• The entrances of all commercial buildings are to be visible and immediately accessible from the public street.
• Shopping malls are discouraged

**Built Form and Materials**

**Massing**
• Where mixed-use commercial buildings are adjacent to surrounding residential areas they should be compatible in both form and scale.
• Building form and configuration should maximise solar exposure

**Canopies**
• Commercial buildings should provide continuous pedestrian weather protection at the street level.
10.3 Traffic And Pedestrian Circulation

"Functional" Design Objective:

- To conserve land and energy by designing compact walkable neighbourhoods that provides services such as transit, shops, parks etc. within a five-minute walking distance.

The performance standards and guidelines are based on the sustainability development principles with a special focus on the following:

Principle #5
Provide an interconnected street and path network to allow for ease of movement.

Principle #6
Provide narrow, people friendly streets (with sidewalks and paths), shaded by rows of trees in order to save costs and provide a greener, friendlier neighbourhood.

10.3.1 Road Network Plan

Objectives:

- To maintain the existing arterial and collector road network.
- To use a modified “grid” system of local and minor streets with rear lanes to minimise congestion and to provide a fine-grained cyclist/pedestrian network.
- To provide a variety of street types which respond to different land uses and functions.
- To design a road network that respects local topography and existing property boundaries as well as the continuity of proposed green space and drainage systems.
- To incorporate street drainage systems which emphasise infiltration methods (i.e. swales) which reduce the environmental impacts of urban development;

Recommended Street Hierarchy

Table 2: Street Hierarchy

<table>
<thead>
<tr>
<th>Street Type</th>
<th>RoW Width</th>
<th>Paved Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>Hwy 1</td>
<td>4 lanes</td>
</tr>
<tr>
<td></td>
<td>Hwy with Boulevard</td>
<td>4 lanes</td>
</tr>
<tr>
<td>Minor</td>
<td>Cranberry Rd</td>
<td>17.0m</td>
</tr>
<tr>
<td></td>
<td>Main Street (10th St)</td>
<td>on-street pking</td>
</tr>
<tr>
<td>Collectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>Wexford Rd Collector</td>
<td>on-street pking (one side only)</td>
</tr>
<tr>
<td>Minor</td>
<td>Maki Rd.</td>
<td>17.0</td>
</tr>
<tr>
<td>Locals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>Two-Way</td>
<td>gravel on-street pking</td>
</tr>
<tr>
<td></td>
<td>Queuing</td>
<td>gravel on-street pking</td>
</tr>
<tr>
<td>Commercial</td>
<td>Downtown</td>
<td>on-street pking (angle)</td>
</tr>
<tr>
<td>Lanes</td>
<td>Residential</td>
<td>6.0m</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td>8.0m</td>
</tr>
</tbody>
</table>
**Street Cross Sections**

Pedestrian and environmentally friendly streets are a critical component of the Southgate TCP.

*Design Guidelines:*

- Street drainage systems must be able to deal with the five-year storm without flooding the travel portion of the street.
- "Open" drainage systems (i.e. swales) should be used in as many street designs as possible.
- In the downtown areas "enclosed" drainage systems should be used that utilise gravel infiltration trenches, combined with a perforated pipe for water conveyance once the pit is saturated.
- The surface flow system must be as continuous as possible therefore driveway breaks are minimised by providing rear lanes.
- Reduced water quality associated with the use of curb and gutter must be addressed through design.
- On higher traffic speed and volume roads such as arterials and collectors curbs should be used to ensure pedestrian safety. However, the curbs should be modified to include water inlets to direct runoff into the drainage system.
- Arterial and collector roads should integrate cyclists into the roadway with the use of bike lanes or wider curb lanes. Other streets are designed so that separate bike lanes are not necessary due to their reduced traffic volume and speed.
- The encouragement of on-street parking effectively narrows the street width and contributes to traffic-calming.
- Rear lanes permit narrow lots which are not dominated by garage frontages, garbage collection in the rear, additional on-street parking supply and a “finer” pedestrian/cyclist network.

10.3.2 Bicycle and Pedestrian Network Plan

*Guidelines*

**Cyclists:**

- Both on-street and off-street routes must be provided. Cyclists should be integrated into all roadways and separate recreational routes should be provided on shared, multi-use pathways.
- All streets must be “bicycle friendly” even if they are not a designated cycle route.
- All arterial and collector roads must have a designated bicycle lane at least one metre wide.
- Major greenways should have multi-use pathways incorporated into them, which are constructed of porous pavement.

**Pedestrians:**

- The pedestrian network includes 1.2-2.0 metre sidewalks along streets, an off-street multi-use pathway system and greenways, as well as other off-street pedestrian links.
- Sidewalks, buffered by on-street parking and street trees, will be provided on both sides of most streets.
- Rear lanes are also incorporated into the pedestrian network.
- Frequent pedestrian crossings should be provided to increase connectivity.
11.0 SUMMARY OF “FUNCTIONAL” DESIGN OBJECTIVES

The intent of this project was to illustrate that the design of a “functional community” can be achieved using sustainable development principles. This section looks at the six functional elements and determines whether the “functional” design objectives have been met by the Southgate Town Centre Concept Plan.

11.1 Ecological Infrastructure
(Habitat and Watershed Integrity)

11.1.1 Storm Water Drainage

“Functional” Design Objective:
• To design a natural storm water drainage system that is capable of retaining and infiltrating the runoff generated by a five-year storm.

An analysis shows that, given the natural storm water drainage system outlined in the Plan, there is enough storage and infiltration capacity to effectively deal with the storm water generated in a five-year storm.

Table 3: Runoff Storage Capacity Required

<table>
<thead>
<tr>
<th>Return Period</th>
<th>Runoff Storage Capacity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Storm:</td>
<td>2688 m³</td>
</tr>
<tr>
<td>5-Year Storm</td>
<td>4144 m³</td>
</tr>
<tr>
<td>100-Year Storm</td>
<td>10,273 m³</td>
</tr>
</tbody>
</table>

Table 4: Runoff Storage Capacity Provided

<table>
<thead>
<tr>
<th>Natural Drainage Measures</th>
<th>Runoff Storage Capacity Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swales</td>
<td>3500 m³</td>
</tr>
<tr>
<td>Retention Areas*</td>
<td>1775 m³</td>
</tr>
<tr>
<td>Total</td>
<td>5275 m³</td>
</tr>
</tbody>
</table>

* includes on-site infiltration techniques (rainwater gardens, infiltration pits, cisterns etc) and public park and open space retention ponds.

11.1.2 Urban Habitat

“Functional” Design Objective:
• To improve the quality and quantity of wildlife habitat in the Southgate Town Centre by restoring the riparian vegetation cover of Wexford Creek.

Riparian habitat has been shown to be an important indicator or stream health as well as habitat connectivity. A comparison between the existing and proposed riparian habitat shows that the riparian habitat in the proposed plan (created through restoration) is double that of what is already there.

11.2 Land Use And Development
(Residential and Commercial Development)

“Functional” Design Objective:
• To provide housing and employment opportunities for a population of five thousand.

An analysis of the residential and commercial development provided in the Southgate Town Centre Concept Plan illustrates that the Plan will be able to accommodate the projected population of five thousand as well as providing one job per household.
Table 5: Proposed Land-Use Statistics

<table>
<thead>
<tr>
<th>LAND-USE</th>
<th>Area in hectares/ acres</th>
<th>Total No. Units</th>
<th>% of Total Net Area</th>
<th>Estimated Population (ave. 2.3 pple/unit high density &amp; 2.5 pple/unit Med-High density)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med-High density (62uph / 25 upa)</td>
<td>22.0 ha / 55 acres</td>
<td>1,364</td>
<td>27</td>
<td>3,410</td>
</tr>
<tr>
<td>High Density Mixed Use (86 uph / 35upa)</td>
<td>9 ha / 22 acres</td>
<td>774</td>
<td>11</td>
<td>1,780</td>
</tr>
<tr>
<td>Live/Work</td>
<td>1 ha 2.5/ acres</td>
<td>50</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Total Residential</td>
<td>31 ha/ 77.5 acres</td>
<td>2,148</td>
<td>38</td>
<td>5,240 people</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live/Work</td>
<td>1 ha 2.5/ acres</td>
<td>1,000</td>
<td>0.01</td>
<td>43</td>
</tr>
<tr>
<td>Mixed Use</td>
<td>10 ha / 22 acres</td>
<td>31,230</td>
<td>10</td>
<td>1,343</td>
</tr>
<tr>
<td>Neighbourhood Commercial</td>
<td>0.4 ha / 1 acre</td>
<td>800</td>
<td>0.006</td>
<td>34.5</td>
</tr>
<tr>
<td>Service Industrial</td>
<td>2 ha / 5 acres</td>
<td>8,500</td>
<td>0.02</td>
<td>365.5</td>
</tr>
<tr>
<td>Total Commercial</td>
<td>13.4 ha / 33.5 acres</td>
<td>41,540</td>
<td>10.04</td>
<td>1,786 jobs</td>
</tr>
</tbody>
</table>

11.3 Traffic And Pedestrian Circulation

“Functional” Design Objective:
- **To conserve land and energy by designing compact walkable neighbourhoods that provides services such as transit, shops, parks etc. within a five-minute walking distance.**

Research indicates that if a destination is within a five minute walk, people are more likely to walk than drive (Girling, et al.,2000). The Southgate Town Centre is a pedestrian oriented community where the majority of the residents live within a five-minute distance of shops and services as well as recreational open space and parks.
Figure 13: Five-minute Walking Radius
BIBLIOGRAPHY


Koers-InterCAD Joint Venture. 2000. *Cranberry Avenue to Tenth Street Alignment Study*. Prepared for City of Nanaimo.


*SOUTHGATE TOWN CENTRE CONCEPT PLAN*

## APPENDIX I: DESIGN BRIEF STATISTICS

### RESIDENTS (Southgate Town Centre)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Community Population</td>
<td>534</td>
</tr>
<tr>
<td>Proposed Community Population</td>
<td>5,000</td>
</tr>
<tr>
<td>Proposed Total Dwelling Units</td>
<td>2,000¹</td>
</tr>
<tr>
<td>Target Gross Unit Density</td>
<td>100-150 units/ha - town core</td>
</tr>
<tr>
<td></td>
<td>50 units/ha - transitional housing between the higher densities of the town core and the lower densities in the surrounding area.</td>
</tr>
<tr>
<td>Residential Parking Standard special</td>
<td>1.25 spaces per dwelling unit - .25 spaces per elderly or needs unit.² Parking can be on street or surface lots.</td>
</tr>
<tr>
<td>Total Number of Jobs</td>
<td>2000³</td>
</tr>
</tbody>
</table>

### OPEN SPACE ⁴

Twenty percent of the land use within the Town Centre should be in the form of open space. Consideration of all environmentally sensitive lands for inclusion in open space system.

### COMMERCIAL

<table>
<thead>
<tr>
<th>Category</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Space</td>
<td>14,000m² (low estimate) 19,500 m² (high estimate)</td>
</tr>
<tr>
<td>Commercial Parking Standard</td>
<td>750ft² or 70m² (3 spaces) per 90m² retail. On street, off street, and enclosed parking.⁵</td>
</tr>
</tbody>
</table>

### LIGHT INDUSTRIAL/OFFICE

<table>
<thead>
<tr>
<th>Category</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Industrial/Corporate Office Space</td>
<td>1,662m² per 1,000 population.⁷</td>
</tr>
<tr>
<td>Service Office Space</td>
<td>1,093 m² per 1,000 population.⁸</td>
</tr>
<tr>
<td>Light Industrial/Corporate Office/Service Office Parking Standard</td>
<td>37m² (1.5 spaces) per 90m² office/light industrial.⁹</td>
</tr>
</tbody>
</table>
PUBLIC BUILDINGS

Child Care Facilities and Pre-sCHOOLS 240m² interior space, 445m² exterior play space
Community Centre and Library One at 3,340m² with on-street parking for 32 cars
Fire Hall One- existing
Churches/Multi-Faith Centre One - existing (one per 4000 pop), parking for 60 cars.

1 Figure taken from the Chase River Neighbourhood Plan; assumes 2.5 people per household.
2 This number is one half the standard suburban residential parking requirement. One half standard is assumed to be appropriate for our purposes, given the “walking distance to services and transit” assumption.
3 Based on one job per household.
4 This goal is expressed in the Nanaimo OCP.
5 The minimum figure represents an average 2,800m² commercial floor space ratio. The maximum figure of 3,900m² suggests that all consumer needs can and should be met in the district.
6 This number is one half the suburban commercial requirement cited in Time Saver Standards for Site Planning.
7 This number is generated as follows: assume one job per household and 2.5 persons per household. The number of jobs for the entire area should be 400 per 1,000 population. Assume 35% of jobs are in corporate office/light industrial. 0.35x400=140 jobs. 140 jobs x 19m² per worker = 2,660m² per 1,000 population.
8 23% of 400 workers per 1,000 population = 92 persons at 19m² = 1,748m² per 1,000 population.
9 This number is one half the standard suburban light industrial/corporate office parking space requirement cited in Time Saver Standards for Site Planning.
APPENDIX II: DRAWINGS