



CITY OF CARNATION, WASHINGTON

STORMWATER COMPREHENSIVE PLAN



OCTOBER 2003

PREPARED BY

Roth Hill Engineering Partners, LLC



2600 – 116th Avenue NE, #100
Bellevue, Washington 98004
Telephone 800.835.0292
Fax Phone 425.869.1190

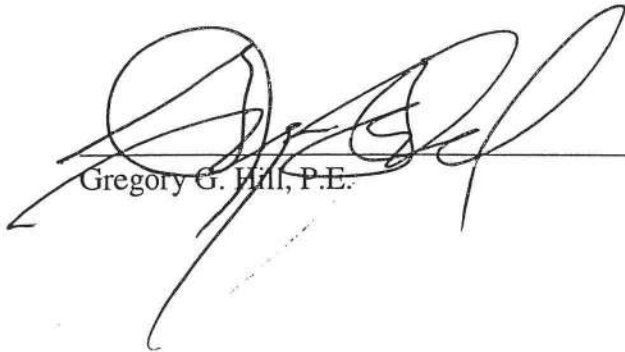
Financial Consulting Solutions Group, Inc

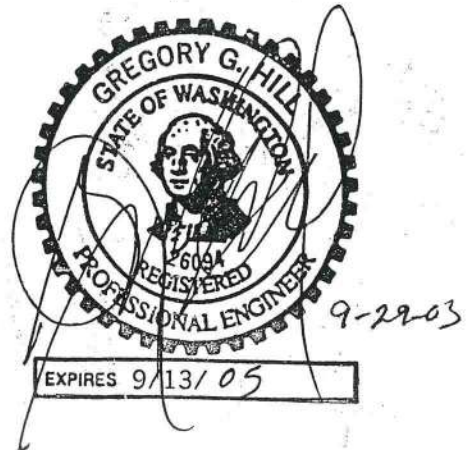


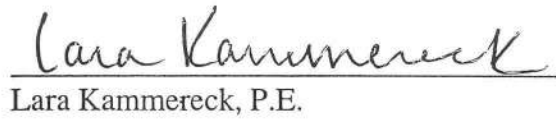
8201 – 164th Avenue NE, #300
Redmond, Washington 98052
Tel 425.867.1802
Fax 425.867.1937

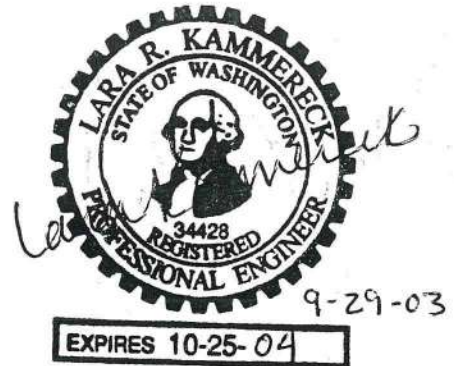
CERTIFICATION

This Stormwater Comprehensive Plan for the City of Carnation (October 2003) was prepared under the direction of the following Registered Professional Engineers:


Gregory G. Hill, P.E.




Lara Kammereck, P.E.



CITY OF CARNATION



STORMWATER COMPREHENSIVE PLAN

OCTOBER 2003

**Carnation City Hall
4621 Tolt Avenue / SR-203
Carnation, WA 98014-1238**

Mayor

Stuart Lisk

City Council

**Position 1 – Bob Patterson
Position 2 – Laurie Clinton
Position 3 – Yvonne Funderburg
Position 4 – Joan Sharp**

PREPARED BY

Roth Hill Engineering Partners, LLC



2600 – 116th Avenue NE, #100
Bellevue, Washington 98004
Telephone 800.835.0292
Fax Phone 425.869.1190

Financial Consulting Solutions Group, Inc



8201 – 164th Avenue NE, #300
Redmond, Washington 98052
Tel 425.867.1802
Fax 425.867.1937

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

TABLE OF CONTENTS

CHAPTER ONE – INTRODUCTION 1-1

PURPOSE OF STORMWATER COMPREHENSIVE PLAN 1-1

SCOPE OF SERVICES 1-2

PLAN AUTHORIZATION 1-2

PLAN ORGANIZATION..... 1-3

CHAPTER TWO – PLANNING CONSIDERATIONS 2-1

INTRODUCTION 2-1

URBAN GROWTH AREA 2-1

LAND USE..... 2-1

Major Land Use Considerations 2-2

Land Use Inventory..... 2-2

Residential Land Use 2-2

Commercial / Retail Land Use..... 2-2

Light Industrial Land Use 2-3

Park / Recreational Land Use 2-3

Natural Resources / Open Space Land Use 2-3

Agricultural Land Use..... 2-3

Public / Semi-Public Facilities and Services Land Use 2-4

FUTURE LAND USE 2-5

Future Residential Land Use..... 2-5

Future Commercial and Industrial Land Use..... 2-6

EXISTING POPULATION 2-6

FUTURE POPULATION PROJECTIONS..... 2-7

CHAPTER THREE – REGULATORY ISSUES..... 3-1

INTRODUCTION 3-1

FEDERAL PLANNING EFFORTS 3-1

Clean Water Act..... 3-1

National Pollutant Discharge Elimination System
(NPDES) Stormwater Permit Program 3-1

Total Maximum Daily Loads (TMDLs) 3-3

Wetland Fill Permits 3-3

Endangered Species Act 3-4

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

TABLE OF CONTENTS – CONTINUED

CHAPTER THREE – CONTINUED

STATE PLANNING EFFORTS.....	3-5
Puget Sound Water Quality Management Plan	3-5
State Department of Fisheries Hydraulic Project Approval	3-7
Growth Management Act.....	3-7
State Floodplain Regulations	3-7
COUNTY / REGIONAL PLANNING EFFORTS.....	3-8
Snoqualmie Watershed Forum.....	3-8
King Conservation District	3-9
City Comprehensive Plan	3-9
RECOMMENDATIONS	3-10

CHAPTER FOUR – EXISTING SYSTEM..... 4-1

INTRODUCTION	4-1
STUDY AREA CHARACTERISTICS.....	4-1
CLIMATE.....	4-1
SURFICIAL GEOLOGY.....	4-2
SOILS	4-2
TOPOGRAPHY.....	4-3
SURFACE WATER	4-3
DRAINAGE BASINS	4-4
DRAINAGE SYSTEM.....	4-5
ENVIRONMENTAL RESOURCES.....	4-6
Wetlands	4-6
Other Sensitive Areas	4-7
Vegetation and Wildlife.....	4-7
RECOMMENDATIONS.....	4-8

CHAPTER FIVE – SYSTEM EVALUATION AND RECOMMENDATIONS 5-1

INTRODUCTION	5-1
HYDROLOGIC ANALYSIS	5-1
WATER QUANTITY AND QUALITY RECOMMENDATIONS.....	5-4
Water Quantity.....	5-4
Water Quality.....	5-4
BEST MANAGEMENT PRACTICES (BMPs).....	5-7

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

TABLE OF CONTENTS – CONTINUED

CHAPTER FIVE – CONTINUED

SUMMARY OF RECOMMENDATIONS	5-7
Water Quantity.....	5-7
Water Quality.....	5-8

CHAPTER SIX – OPERATIONS AND MAINTENANCE..... 6-1

INTRODUCTION	6-1
CURRENT OPERATIONS AND MAINTENANCE STANDARDS	6-1
Operation and Maintenance of Existing Stormwater System	6-1
Monitoring, Enforcement and Inspection	6-1
STAFFING	6-1
EQUIPMENT	6-1
RECOMMENDED OPERATIONS AND MAINTENANCE PRACTICES.....	6-2
Operation and Maintenance Standards	6-2
Collection Systems, Pipes, Catch Basins, Manholes and Inlets ..	6-2
Pipelines, Ditches and Culverts	6-3
Detention Facilities, Oil Separators and Flow Control Devices ..	6-3
Detention Ponds	6-3
Construction Sites	6-3
Parking Areas.....	6-3
Sand on Streets from Snow Removal Operations.....	6-3
Monitoring, Enforcement and Inspection	6-4

CHAPTER SEVEN – PUBLIC EDUCATION AND INVOLVEMENT..... 7-1

INTRODUCTION	7-1
CURRENT PROGRAM	7-1
RECOMMENDATIONS	7-1
MONITORING PUBLIC EDUCATION AND INVOLVEMENT	7-2
PROGRAM	

CHAPTER EIGHT – CAPITAL IMPROVEMENT PROGRAM 8-1

INTRODUCTION	8-1
COST ESTIMATE METHODOLOGY	8-1
CAPITAL IMPROVEMENT PROJECTS	8-1
Regulatory/Programmatic Improvements.....	8-2
Development Standards	8-1
Updated Comprehensive Plan.....	8-2

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

TABLE OF CONTENTS – CONTINUED

CHAPTER EIGHT – CONTINUED

CAPITAL IMPROVEMENT PROJECTS – CONTINUED

Water Quantity Improvements.....	8-2
Survey of Existing System.....	8-2
Soils Mapping	8-2
Wetland Delineation	8-3
Hydraulics of 60-Inch Culvert	8-3
Hydrologic and Hydraulic Model	8-3
Water Quality Improvements.....	8-3
Water Quality Assessment.....	8-3
Testing of Soils for Contaminants	8-3
Miscellaneous Water Quality Improvements.....	8-4

CHAPTER NINE – FINANCIAL ANALYSIS 9-1

INTRODUCTION	9-1
STORMWATER PROGRAM FUNDING OPTIONS.....	9-1
RECOMMENDED FUNDING STRATEGY	9-4
THE UTILITY CHARGE CONCEPT	9-4
Rate Philosophy Options.....	9-4
Potential Rate Exemptions and Credits.....	9-6
Rate Analysis	9-7
CONCLUSION.....	9-9

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

LIST OF TABLES

TABLE 2-1	SUMMARY OF LAND USE AND URBAN GROWTH AREA	2-5
TABLE 2-2	POPULATION TRENDS – CARNATION AND KING..... COUNTY (1970 – 2000)	2-6
TABLE 2-3	MAXIMUM POPULATION POTENTIAL.....	2-7
TABLE 4-1	RECURRENCE INTERVAL PRECIPITATION TOTALS	4-2
TABLE 4-2	DRAINAGE BASINS	4-4
TABLE 5-1	EQUIVALENCE BETWEEN SCS AND KCRTS SOIL TYPES	5-2
TABLE 5-2	RUNOFF VOLUME MODELING PARAMETERS.....	5-3
TABLE 5-3	BASIN RUNOFF VOLUMES	5-3
TABLE 8-1	RECOMMENDED IMPROVEMENTS AND ESTIMATED IMPLEMENTATION COSTS BY YEAR.....	8-4
TABLE 9-1	REVENUE ESTIMATES.....	9-9

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

LIST OF FIGURES

- FIGURE 2-1** VICINITY MAP
- FIGURE 2-2** CITY OVERVIEW
- FIGURE 2-3** CITY OF CARNATION 1996 EXISTING LAND USE
- FIGURE 2-4** CITY OF CARNATION 1996 FUTURE LAND USE PLAN W/O SEWER SYSTEM
- FIGURE 4-1** 2003 COMPREHENSIVE STORM DRAINAGE PLAN STUDY AREA

**CITY OF CARNATION
STORMWATER COMPREHENSIVE PLAN**

LIST OF APPENDICES

APPENDIX “A” – SEPA CHECKLIST

APPENDIX “B” – GRANT AGREEMENT

APPENDIX “C” – FEMA LETTER OF MAP REVISION (LOMR)

APPENDIX “D” – ADOPTING RESOLUTION

Chapter One
INTRODUCTION

Chapter One

INTRODUCTION

The City of Carnation is located in the Snoqualmie Valley, adjacent to the confluence of the Tolt and Snoqualmie Rivers in eastern King County. The City limits encompass approximately 1.2 square miles of land, a portion of which is within the recently revised limits of the 100-year floodplain for the two adjacent rivers. The City, with approximately 1900 residents, is a suburban community with some supporting retail and commercial development. Carnation was officially incorporated at the end of 1912, when it was known as Tolt. However, the extensive history of the community stretches back to the mid-1800s. It is currently a non-charter code city under Washington State's municipal designations.

PURPOSE OF STORMWATER COMPREHENSIVE PLAN

In May of 1999, the City entered into an agreement with King Conservation District No. 9 and accepted a grant to revise the City's Stormwater Management Plan and develop permanent funding for an effective stormwater program and stormwater improvements. This grant agreement is provided in Appendix B. The grant from King Conservation District was approved by the Snoqualmie Watershed Forum. This document, the revised Stormwater Comprehensive Plan (referred to herein as "Plan"), results from the agreement with the King Conservation District. The primary purposes of the Plan are as follows:

- Document the City's planning data
- Analyze the current regulatory requirements and impacts on the City
- Recommend revisions to existing policies and City ordinances to meet regulatory requirements
- Document the City's major drainage basins and existing storm drainage facilities within each basin
- Document existing storm drainage problems within the City
- Determine runoff volumes for the major drainage basins
- Document operation and maintenance practices
- Document public education and involvement programs
- Summarize recommended improvements in a Capital Improvement Plan

Carnation has experienced flooding in recent years, but has avoided extensive flood damage within the City limits. The majority of the flooding and stormwater drainage problems the City is experiencing are directly related to its proximity to the two rivers.

As discussed in more detail in Chapter Three, the City is not required to prepare this Plan. It is intended as a planning tool to assist the City with the development of its stormwater program, as the regulatory environment has changed significantly in recent years and is continuing to evolve in response to a number of environmental issues. The National Pollution Discharge Elimination System (NPDES) phase II rules vastly increase the number of jurisdictions required to apply for a permit. The Puget Sound Water Quality Management Plan (PSWQMP) regulates stormwater runoff ultimately discharging to Puget Sound. The PSWQMP specifies that stormwater systems discharging to Puget Sound develop a stormwater program addressing stormwater quality. The Tri-County proposal is being negotiated with the National Marine Fisheries Service in response to the Endangered Species Act listing of salmon and the 4(d) rule. Stormwater regulations have grown to a complex state. Since one of the primary goals is to regulate the quantity and quality of stormwater runoff, there is considerable overlap between the various regulatory agencies and their respective mandates. These issues are further discussed in Chapter Three.

SCOPE OF SERVICES

The scope of work has been developed to comply with the King Conservation District grant agreement for preparation of a Stormwater Comprehensive Plan. The scope of services was developed between Roth Hill Engineering Partners, LLC and the City of Carnation. The intent of the scope was to create a Stormwater Comprehensive Plan that the City can use as a framework to develop and implement a stormwater management program over a multi-year time frame that will meet specific City needs as well as applicable local, state and federal regulations.

PLAN AUTHORIZATION

The preparation of the Stormwater Comprehensive Plan was authorized by the City of Carnation through a consulting agreement with Roth Hill Engineering Partners. The City of Carnation concurrently worked with a financial consultant, FCS (Financial Consulting Solutions) Group, Inc., hired independently to provide funding mechanism options. The Plan was managed by Jim Dorsey, Director of Public Works, City of Carnation. The consultant team and their respective areas of work on the Plan included:

Roth Hill Engineering Partners, LLC – Prime consultant, planning considerations, regulatory analysis, system analysis, system evaluation and recommendations, operations and maintenance, public education and involvement, capital improvement program, environmental SEPA checklist.

FCS (Financial Consulting Solutions) Group, Inc. – Financial analysis and recommendations for stormwater program.

A project activity mentioned in the funding agreement is the submittal of the Plan to the Washington State Department of Ecology for review. A SEPA checklist has also been prepared and submitted with this Plan (see Appendix A). The Plan will be reviewed by the City of Carnation Utilities and Public Facilities Committee, which will then recommend it to the Carnation City Council for adoption. As required by the grant, the

City must also prepare an ordinance creating a stormwater utility and consider a stormwater utility fee to fund the operation of an effective stormwater program.

The King County Regional Water Quality Committee (KCRWQC) assured the compliance of the grant from the King Conservation District with the KCRWQC's regional funding principles.

PLAN ORGANIZATION

The Stormwater Comprehensive Plan is organized into the following nine chapters:

- Introduction – Provides a brief description of the planning area and identifies the purpose, scope of services, plan authorization, approval process, agency coordination and plan organization.
- Planning Considerations – Documents the City's general planning information, including zoning and land use, city limits, urban growth boundary, potential annexation areas and population data.
- Regulatory Issues – Describes the evolving regulatory environment and current requirements, in particular as they relate to the City. Regulations include federal, state, regional and local levels. Recommendations for program updates are proposed.
- Existing System – Describes the general climate, soils and topography. Describes the City's existing stormwater system, major drainage basins and outfalls. Mapping identifies facility locations and outfalls relative to major drainage basins. Drainage problems are identified and recommendations are proposed.
- System Evaluation and Recommendations – Provides an estimate of runoff volumes for major drainage basins and establishes evaluation criteria for future hydrologic/hydraulic modeling. Describes existing water quantity and quality issues and provides recommendations.
- Operations and Maintenance – Documents current operations and maintenance personnel, equipment, and practices. Recommendations are proposed for policies and procedures for monitoring and enforcement.
- Public Education and Involvement – Documents current public education and involvement programs at the City. Recommendations are proposed for the development of a campaign to minimize impacts to stormwater quantity and quality.
- Capital Improvement Program – Summarizes capital improvement projects with planning level opinions of probable cost, based on recommendations from previous chapters.

- Financial Analysis – Financing recommendations are included resulting from an analysis performed by FCS Group.

Chapter Two
PLANNING CONSIDERATIONS

Chapter Two

PLANNING CONSIDERATIONS

INTRODUCTION

The City of Carnation is located within the Snoqualmie Valley, a pastoral area that is dominated by the scenic floodplain of the Snoqualmie River. Once predominated by farming, Carnation is a bedroom community with some supporting retail and commercial development to serve the residents as well as those traveling along State Route 203. There is some land used for agricultural purposes within the city limits. However, much of this land is located within the 100-year floodplains of the Tolt and Snoqualmie Rivers and is not suitable for intensive development. See Figure 2-1 for a vicinity map.

The City is responsible for all municipal services within the City limits. Municipal services are provided directly or through agreements with other public agencies and private parties. Land within the city limits is subject to all City ordinances, policies, and resolutions.

This chapter documents general planning information from the City's 1996 Comprehensive Plan, which represents the most current approved planning document. It includes land use, city limits, urban growth boundaries, potential annexation areas, and population data. The City of Carnation 2004 Comprehensive Plan was under development when this document was prepared, and the City is actively working on new population household and employment forecasts. Upon its completion, the new planning information will supercede information in this Chapter. However, more recent land use information was used for hydrologic modeling in Chapter Five in order to provide more accurate and conservative runoff volumes for each drainage basin.

URBAN GROWTH AREA

The Urban Growth Area (UGA) of the City of Carnation consists of land currently within the City limits and within the Potential Annexation Areas (PAA). The City and King County coordinated in identifying and providing services with the UGA, which complies with the Washington Growth Management Act (GMA).

The UGA is based on factors such as 20-year population forecasts, concentrations of existing development, environmental constraints, existing infrastructure and services, and existing and planned transportation corridors. It is expected the City will have annexed all of the UGA within the 20-year timeframe, and will have provided or have plans for providing all necessary utilities, roads, and other urban services.

LAND USE

The Washington Growth Management Act requires cities to prepare a land use element designating the proposed general distribution, general location and extent of the uses of land. This includes population densities, building intensities, and estimates of future population growth. The element must provide for protection of the quality and quantity of groundwater used for public water supplies. Where applicable, the land use element

should review drainage, flooding and storm water run off in the area and provide guidance for preventing degradation of waters.

Major Land Use Considerations

There are areas of land in and surrounding the City that are suitable for development. However, a considerable amount of undeveloped land in the City is located in the floodplain, and is not suitable for extensive development. The land within the urban growth area is a mix of residential and non-residential land. Figure 2-2 (City Overview) shows the current city limits, urban growth boundary and potential annexation areas. Annexations have occurred since the 1996 Comprehensive Plan was adopted and are included on Figure 2-2. There are currently 659.2 acres within the city limits and 171.6 acres within the urban growth areas.

Land Use Inventory

The inventory presented herein provides information useful to the planning process. However, it does not include all of the data or information that may be desired but contains relevant information that was available from prior plans and other sources. The inventory summarizes the general development and describes the following types of land use in the City, based on the 1996 Comprehensive Plan:

- Residential Land Use
- Commercial/Retail Land Use
- Light Industrial Land Use
- Park / Recreational Land Use
- Natural Resources / Open Space Land Use
- Agricultural Land Use
- Public / Semi-Public Facilities and Services Land Use

Residential Land Use

Approximately 30% of the land within the City and its UGA is devoted to residential use. The housing type is primarily single family with a small number of duplex and multi family units. The average density of residential development in the City is approximately 3 dwelling units per acre.

Commercial/Retail Land Use

There are 5.7 acres of commercial land within the city limits, accounting for less than 1% of the total area. Approximately 1.9 acres are available for future development, and there are 4.6 acres of commercial land per 1000 population. Most of the City's commercial development is located along State Route 203 and consists of office and retail,

restaurants, and a supermarket. These uses serve the surrounding population and the traveling public.

The expansion of Carnation's commercial base will depend on the provision of a wastewater treatment system that has the capacity to accommodate new development and that will protect important sources of ground and surface water. The City is currently proceeding with the development of a sewer system, and has entered into an agreement with King County to provide treatment of the City's sewage.

Light Industrial Land Use

There is some light industrial land use within the city limits, primarily in the southwest portion of the City. The major industrial activities consist of manufacturing concrete products and asphalt. The largest increase in industrial land can be attributed to the concrete manufacturing plant. The remaining industrial areas consist mainly of older warehouse buildings. There are 20.4 industrial acres per 1000 population.

Park / Recreational Land Use

The Snoqualmie Valley provides an excellent setting for several recreational opportunities, including bicycling, berry picking, hiking, camping, fishing, horseback riding, picnicking and swimming. There are 62.3 acres of recreation lands within Carnation, which consist of Memorial Park, Loutsis Park, Fred Hockert Park, portions of McDonald Park within the city limits, and the playing fields associated with the elementary and middle school. The recreational areas compare favorably to National Park and Recreation Standards. In addition, the Tolt-MacDonald Park is fully accessible to city residents, although not within the city limits. There are 50 acres of recreational land per 1000 population.

Natural Resources / Open Space Land Use

The Growth Management Act requires cities to identify open space corridors within and between the UGA. These corridors include lands that are useful for recreation, wildlife habitat, trails, and connection of critical areas. Open space corridors provide important linkages for wildlife habitat and can unify the community through a system of trails.

The old Chicago Milwaukee Railroad right of way which runs north south through the City is being developed as part of a regional trail system that links Snoqualmie Valley to other portions of King County. In addition, some public pedestrian trails and open space corridors featuring abundant wetlands and wildlife habitat exist along the Snoqualmie and Tolt Rivers.

Agricultural Land Use

Agricultural lands account for approximately 35% of the City's total land area. These agricultural lands are located within the 100 year floodplains of the Snoqualmie and Tolt Rivers, and thus are not well suited for intensive development. Agricultural lands in the city and surrounding UGA consist of the Remlinger Farms, in addition to the smaller family farms and strawberry and raspberry fields along the northern city limits.

Public / Semi-Public Facilities and Services Land Use

There are a number of public and semi-public facilities and services in the city, which comprise about 3.2% of the total land.

The City of Carnation principal municipal services include general government administration, planning and building, police protection, solid waste collection (contracted) and recycling, water supply and distribution, stormwater management, street maintenance, cemetery and parks. The City does not operate recreation programs.

Several agencies operate facilities in Carnation or its UGA. These are entities such as King County, Seattle-King County Health Department, King County Library District, King County Fire District #10, Puget Sound Air Pollution Control Agency, the State of Washington, Riverview School District, and various private utilities and human service agencies.

Table 2-1 (Summary of Land Use and Urban Growth Area) shows a summary of land uses in Carnation and its UGA in 1995 by acreage and type of use. Figure 2-3 (City of Carnation 1996 Existing Land Use) shows the land use based on the 1996 Comprehensive Plan.

TABLE 2-1 SUMMARY OF LAND USE AND URBAN GROWTH AREA

LAND USE	ACREAGE			
	WITHIN CITY LIMITS	WITHIN URBAN GROWTH AREA	TOTAL	% OF TOTAL AREA
S.F. Residential	147.4	77.5	224.9	29.8%
Duplex	1.0	-	1.0	-
M.F. Residential	5.4	-	5.4	0.7%
Commercial	5.7	-	5.7	0.8%
Industrial	25.3	-	25.3	3.4%
Agriculture	142.8	156.5	299.3	36.4%
Recreation	62.3	-	62.3	8.3%
Public Facilities	24.4	-	24.4	3.2%
Church	9.4	-	9.4	1.3%
Vacant	30.2	3.6	33.8	4.5%
Snoqualmie Valley Trail	18.5	2.5	21	28%
Roads	63.6	2.9	66.5	8.8%
TOTAL	536	243	779	100.0%

FUTURE LAND USE

This section provides the amount of land or increased density that will be needed to accommodate Carnation's growth, based on population projections, buildable land analysis for the study area, and the types of allowable development. This analysis is based on the City of Carnation 1996 Comprehensive Plan, which provided a basis for the City's future land use map shown in Figure 2-4 (City of Carnation 1996 Future Land Use). This future land use map does not assume the development of a sewer system.

Future Residential Land Use

Based on the City's 1996 Comprehensive Plan, approximately 554 additional dwelling units are needed in the area in order to meet housing needs by the year 2015. The amount of land required to accommodate these projected housing needs depends on many factors, including soil conditions for septic systems, whether the City installs a sewer system,

housing market demands (e.g. single family residences on moderate size or large lots or multi family residences at higher densities), and rezoning of properties to minimum density requirements of 4 units per acre. Currently, more than 90 percent of the housing in Carnation is either single family or mobile home dwelling units. The average residential density is three units per acre. Since the City does not have an abundance of undeveloped land within its limits and since much of the undeveloped land is within the floodplain, higher density residential development is appropriate in order to accommodate projected populations. Also, developable agricultural land within the UGA could be converted to residential use.

Future Commercial and Industrial Land Use

The amount of commercial and industrial land within the City (31 acres) is likely to accommodate future growth. It is anticipated that much of the future commercial development will occur within Carnation's existing downtown area. The proposed future development of a sewer system should be able to accommodate this growth.

EXISTING POPULATION

The analysis of population and demographic trends, provided in the 1996 Comprehensive Plan, is important for a broad understanding of the community and to anticipate future needs. While the population of Carnation currently represents only about one tenth of one percent of the total King County population, the population of Carnation as a percentage of King County population has increased over time. Table 2-2 shows historical population trends for Carnation and King County.

**TABLE 2-2 POPULATION TRENDS – CARNATION AND KING COUNTY
(1970 – 2000)**

YEAR	1970	1980	1990	1995	2000
Carnation	530	951	1,243	1,490	1,893
King County	1,159,587	1,269,898	1,507,319	1,613,601	1,737,034
Carnation as a % of King County	0.05%	0.07%	0.08%	0.09%	0.10%

Source: U.S. Bureau of the Census, 1970, 1980, 1990, 2000.

Carnation's population increased 79% from 1970 to 1980, 31% from 1980 to 1990 and it has grown 65.6% from 1990 to 2000. Carnation's population growth is tied to the regional economy, the desire for a more rural lifestyle, relative affordability of Carnation

housing and the effects of the Growth Management Act, which has intentionally steered development from unincorporated rural portions of the county to the cities and the urbanized unincorporated area.

FUTURE POPULATION PROJECTIONS

In order to establish a basis for land use policy decisions, it is necessary to perform a population build-out analysis that establishes Carnation's carrying capacity. Actual lot sizes and number of potential homes depend on a number of variables, such as geologic conditions and the presence of a sewer system. According to the 1996 Comprehensive Plan, the estimated maximum build-out population potential of Carnation and its UGA is 4,289 in the Year 2015. A revised figure may be included with the 2004 Comprehensive Plan currently in development for the City. The maximum build-out potential assumes a municipal sewer system and building at minimum lot sizes. Details are shown in Table 2-3, Maximum Population Potential. Much of the growth potential comes from the undeveloped UGA, with the exception of the garden tracts. However, population projections for Carnation exceed this figure when based on historical growth rates as shown in Table 2-3, Maximum Population Potential.

TABLE 2-3 MAXIMUM POPULATION POTENTIAL

AREA	ZONING	POTENTIAL POPULATION
Existing City Limits (1995)	Varies	1,490
Vacant R 7.2 land within City limits	R-7.2	178
Vacant R-12.5 land within City limits, including Claude Stephens area	R-12.5	483
Vacant Other land within City limits	All other	574
North Agriculture Area (Strawberry fields)	R9.6	512
Northern Residential Area (Garden Tracts)	R-7.2-R9.6	929
Northeastern Agriculture Area (Clinton Property)	R-12.5	123
TOTAL MAXIMUM POPULATION		4,289

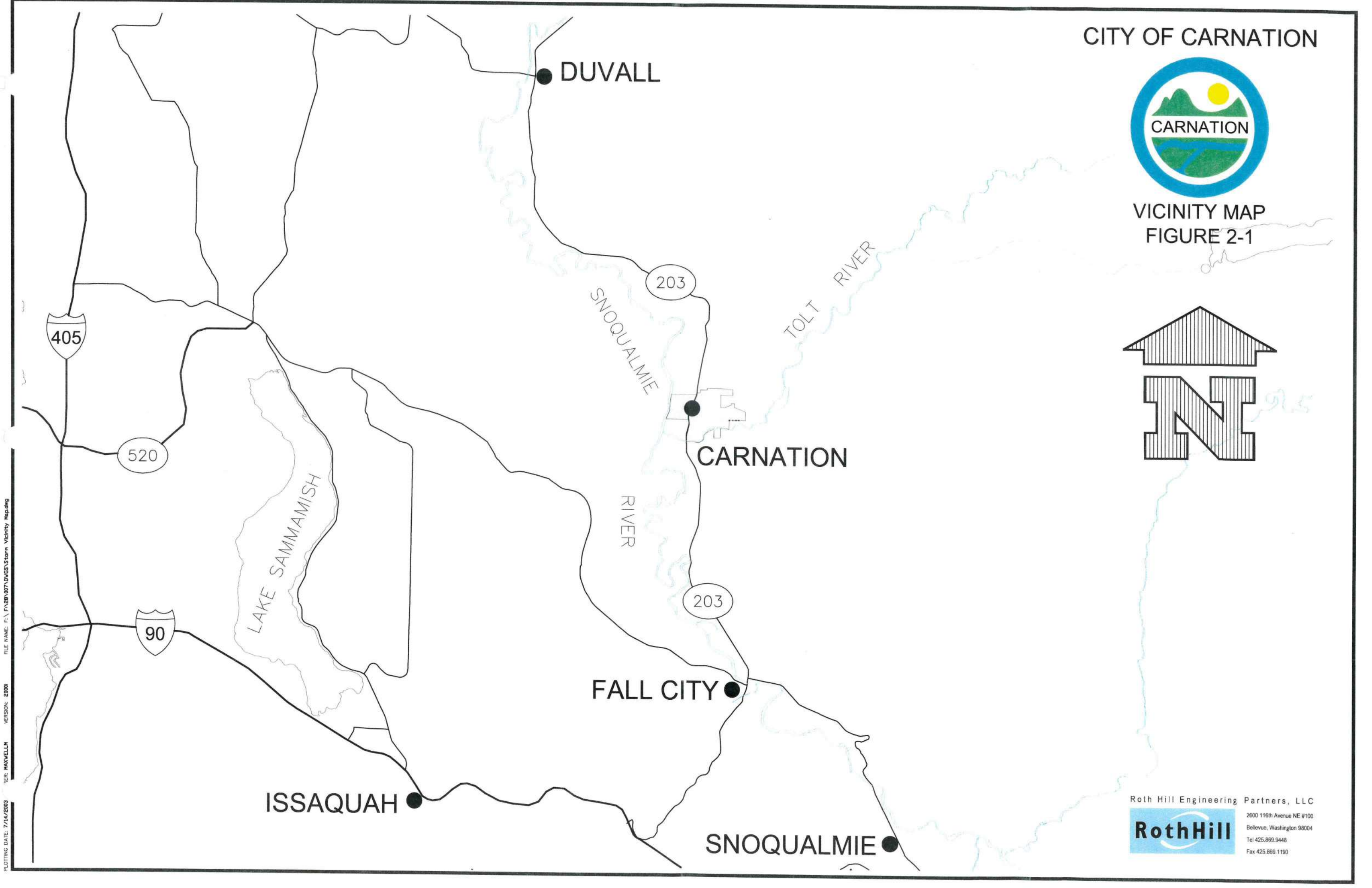
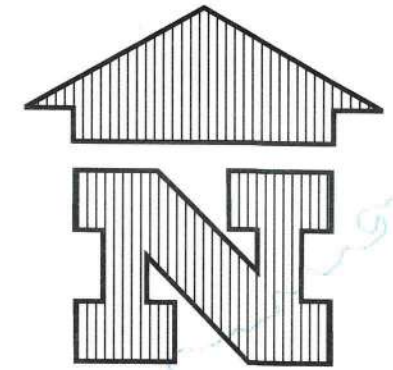
Source: 1996 Carnation Comprehensive Plan.

The actual maximum population will realistically be considerably less than the theoretical maximum of 4,289. The theoretical maximum assumes the City will be completely “sewered” and that all agricultural lands outside of the floodway and inside the UGA have been annexed and converted to residential use.

CITY OF CARNATION

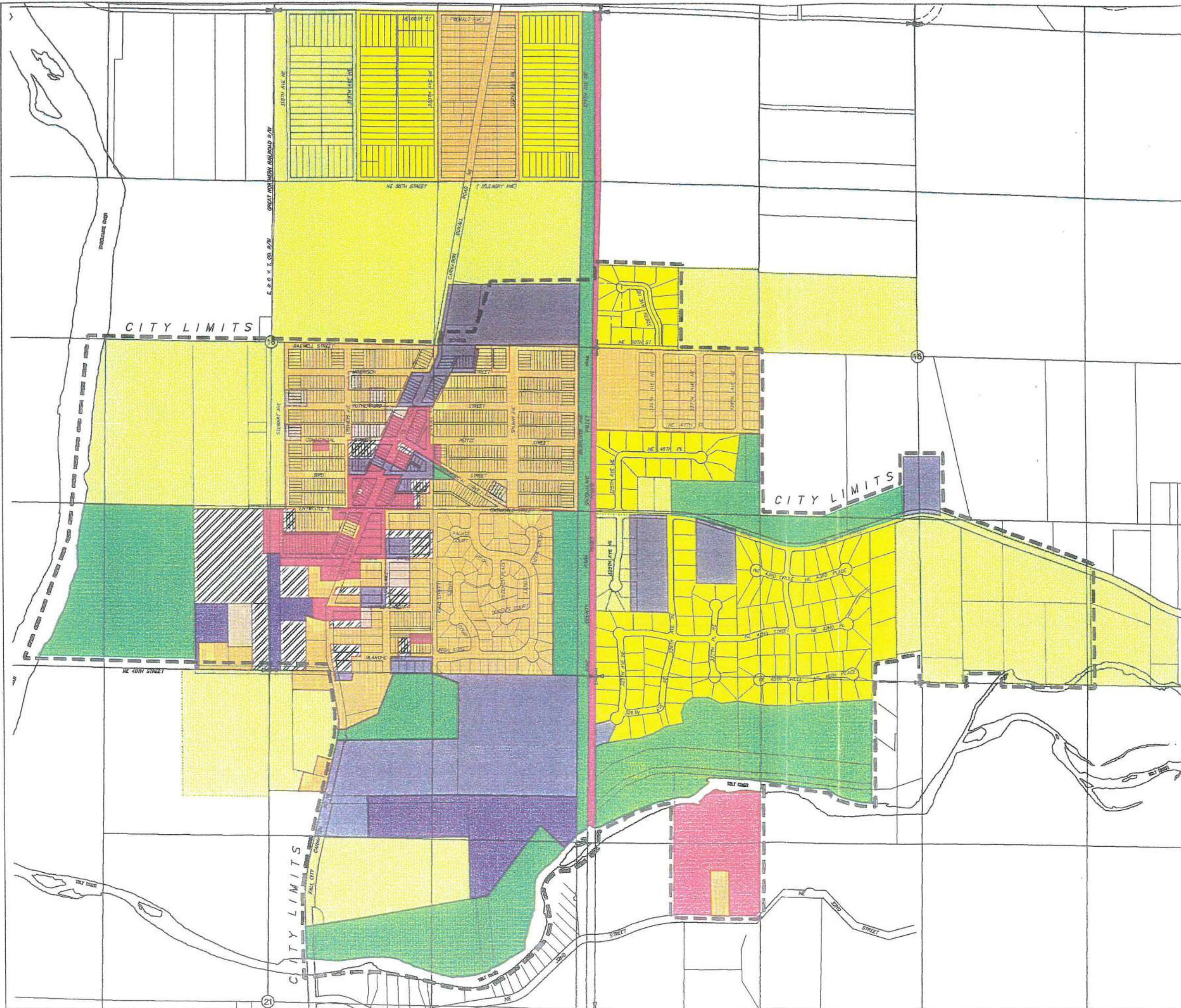


VICINITY MAP
FIGURE 2-1



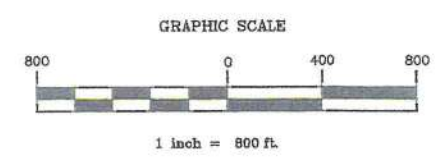
FILE NAME: F:\FN28\007\DWGS\Storm Vicinity Map.dwg
VERSION: 2000
USER: MAXVELLM
PLOTTING DATE: 7/14/2003

Roth Hill Engineering Partners, LLC
2600 116th Avenue NE #100
Bellevue, Washington 98004
Tel 425.869.9448
Fax 425.869.1190

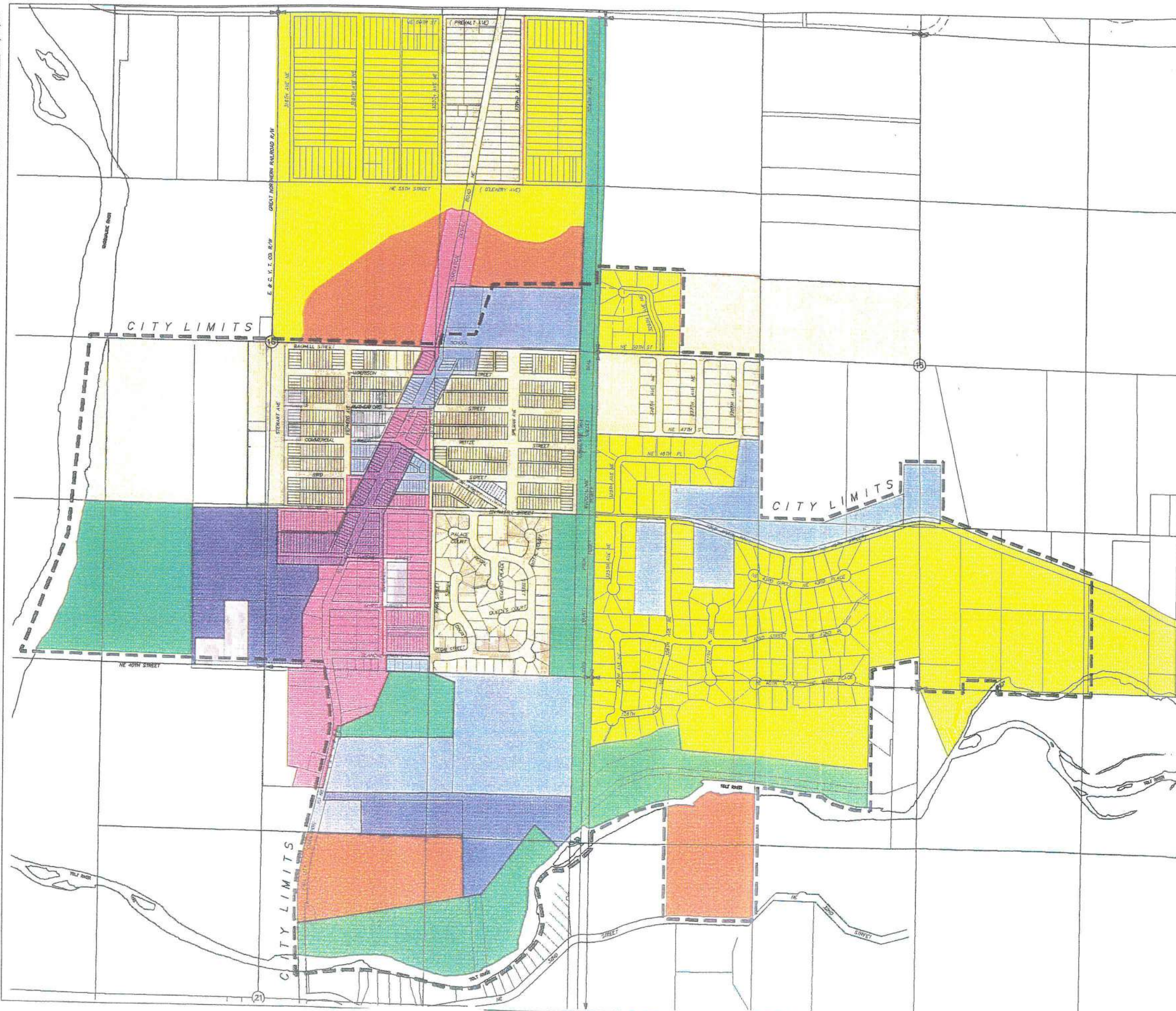


LEGEND

-  MEDIUM DENSITY RESIDENTIAL
-  LOW DENSITY RESIDENTIAL
-  MULTI - FAMILY RESIDENTIAL
-  RESIDENTIAL - AGRICULTURAL
-  COMMERCIAL / RETAIL
-  LIGHT INDUSTRIAL / MANUFACTURING
-  PARKS / OPEN SPACE
-  PUBLIC / COMMUNITY FACILITY
-  TRANSPORTATION, UTILITIES, COMMUNICATIONS
-  VACANT

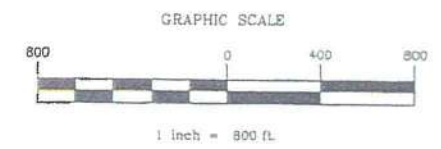


CITY OF CARNATION
EXISTING LAND USE
FIGURE 2-3



LEGEND

- MDR** MEDIUM DENSITY RESIDENTIAL
- LDR** LOW DENSITY RESIDENTIAL
- MFR** MULTI - FAMILY RESIDENTIAL
- R-A** RESIDENTIAL - AGRICULTURAL
- M-U** MIXED USED
- L-I** LIGHT INDUSTRIAL / MANUFACTURING
- R/O** RECREATION / OPEN SPACE
- P/SP** PUBLIC / SEMI-PUBLIC
- O/E** OFFICE / EMPLOYMENT
- CBD** CENTRAL BUSINESS DISTRICT



CITY OF CARNATION
FUTURE LAND USE PLAN
W/O SEWER SYSTEM
FIGURE 2-4

Chapter Three
REGULATORY ISSUES

Chapter Three

REGULATORY ISSUES

INTRODUCTION

There have been significant recent changes to regulations affecting surface water management on federal, state, and local levels. This evolution of stormwater regulations is in response to a number of environmental concerns, together with advances in engineering techniques that facilitate more complicated and thorough analyses of stormwater systems. This Chapter identifies and summarizes the numerous relevant regulations that affect surface water management in the City of Carnation. City ordinances and programs are compared to regulations on the state and federal levels and recommendations are provided where applicable.

FEDERAL PLANNING EFFORTS

Clean Water Act

In 1972, Congress passed the Clean Water Act (CWA), which established a regulatory framework for protecting water quality in the United States. The CWA is the primary federal mechanism available for protection of the waters of the United States. The Environmental Protection Agency (EPA) delegated authority of CWA requirements to the State Department of Ecology (DOE) in Washington State. The following provisions of the CWA impact stormwater regulations.

National Pollutant Discharge Elimination System (NPDES) Stormwater Permit Program

The NPDES program is implemented under Section 402 of the CWA to control urban stormwater runoff, recognizing that water pollution degrades surface waters by making them unsafe for drinking, recreation, and other uses. The program originated with Phase I in 1987, as an amendment to the CWA. Its purpose is to control water pollution by regulating point source discharges (i.e. from pipes, constructed ditches, etc.) of pollutants into receiving waters. Phase I requires municipalities operating stormwater systems serving populations over 100,000 to obtain a permit to discharge stormwater. This Phase did not affect the City as its population is under 100,000. Industrial sites and construction activities disturbing over 5 acres of land are also required to obtain Phase I discharge permits.

Phase II of the NPDES program was enacted in 1999 to expand permitting requirements to municipalities operating publicly owned stormwater utility systems in "Census Defined Urbanized Areas." Small systems within these areas or larger systems outside of these areas are being evaluated to determine if they must apply for a permit. The City of Carnation is not on DOE's list of Cities required to obtain an NPDES II permit. The ultimate goal of the CWA and NPDES permitting requirements however is to protect receiving waters and the environment in general from pollution resulting from stormwater runoff. The State of Washington has the authority to impose NPDES requirements on additional cities, if it is deemed necessary, to meet this ultimate goal.

NPDES Phase II rules require that the following six minimum elements be addressed in the permit application:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site runoff control
- Pollution prevention/good housekeeping for municipal operations

The EPA believes that successful implementation of these 6 elements will result in successful protection of water quality.

The deadline for submitting permit applications was March 10, 2003 and Phase II municipalities are required to fully implement a phase II program within 5 years of obtaining a permit. In addition to expanding NPDES regulations to include additional municipalities, Phase II reduces the threshold for construction sites required to address stormwater from 5 acres of disturbed land to one acre. A key element for construction activities is development of a Stormwater Pollution Prevention Plan (SWPPP).

Regulations are contained in Carnation's Municipal Code (CMC) Chapter 15. The CMC includes a range of regulations related to land development. However, Chapter 15.64 (Floodway, Floodplains, Drainage, and Erosion) is most directly related to drainage and storm water management. The CMC section 1.64.169P, Part II provides specific regulations for Drainage, Erosion Control, and Storm Water Management. Additionally, Chapter 15.88 (Environmentally Sensitive Areas) contains procedural rules and specific regulations to minimize the impact of development on streams, wetlands, and steep slopes. Other provisions of the CMC that affect storm water management include requirements for landscaping, tree retention, roadways, parking, and open space.

Based on the current CMC, the latest version of the DOE Manual should be adhered to. The DOE Stormwater Management Manual for Western Washington has undergone significant revisions. One of the intents of the latest (2001) version is to incorporate the latest techniques and understanding of stormwater management. It is intended to be utilized as a tool for implementation of DOE regulations. It can be used to address at least three of the six minimum elements identified in NPDES requirements.

Monitoring is the process of collecting and evaluating the information about the surface water management program to determine if the program is meeting the statutory requirements. The City should evaluate the regulatory program every 5 years to confirm that is meeting the federal, state and local regulations in effect at the time. The City should also determine if other regulations are needed to strengthen and enhance the restrictions of contamination of the stormwater system. This will provide a more environmentally sound practice.

The adoption of the DOE manual is a significant step towards compliance on all regulatory levels, even though there are no known regulatory requirements for implementation of stormwater plans.

Total Maximum Daily Loads (TMDLs)

The CWA requires that states develop standards to protect water quality. All significant water bodies in the state have therefore been classified by DOE according to their beneficial use. Water quality standards have been developed for each classification of current or potential beneficial use. Based on these standards, DOE is required every four years to identify water bodies that are not meeting their respective criteria and are not anticipated to improve within the next four years. The list is then submitted to the EPA. This information is identified as the DOE 303(d) list of impaired or threatened water bodies. The list identifies impaired water bodies within the state, which water quality standards are exceeded and by how much. Each body of water that fails to meet the required standards must then have TMDLs calculated for the excessive pollutant.

The TMDL is the maximum daily loading of an identified pollutant that a water body can receive, without exceeding the DOE standard for that pollutant, thereby remaining healthy for its intended uses. The TMDL identifies a water cleanup plan, including recommendations for controlling the pollutant(s) and a monitoring plan to test cleanup plan effectiveness. The basic goal of the cleanup plan is to reduce the amount of effluent discharging from the pollutant source to the affected receiving water until the TMDL is no longer exceeded. Currently, primary water quality issues in Washington State's waters are temperature and fecal coliform bacteria. Both are typically associated with non-point source pollution, making improvements more challenging. Temperature is significant because of its impact on the health of aquatic life, including salmon. Fecal coliform bacteria are an indicator of the presence of disease carrying organisms.

There are no water bodies within Carnation City limits included on the DOE 303(d) list, last updated in 1998. The Snoqualmie River, starting roughly adjacent to NE 60th Street and for approximately 1¼ miles downstream is identified on the 303(d) list for exceeding temperature limits.

Wetland Fill Permits

Section 404 of the CWA is administered by the US Army Corps of Engineers (Corps) and regulates the placement of dredged or fill material into the "waters of the United States," including rivers, lakes, wetlands, intermittent and perennial streams, bays, estuaries, and portions of the oceans. Although this encompasses a wide range of surface waters, Section 404 is typically associated with activities that involve the filling of wetlands. To be considered a wetland according to the definition set forth by federal regulations, an area must exhibit the hydrology, wetland-dependent vegetation and types of soil associated with water saturated conditions. Areas exhibiting these conditions do not lose their wetland status if they periodically dry out.

Nationwide general permits can be obtained for projects that involve filling small areas of wetlands. An individual permit must be obtained to fill more than 5 acres of wetlands.

Wetland fill permits usually require compensatory mitigation since a fundamental goal of the 404 program is to avoid any net loss of wetlands. Another goal is to avoid projects having an adverse effect on wetlands. This generally involves a thorough analysis of the impacts of a project on wetlands, including the impacts of avoiding the project.

The Seattle District of the Corps is responsible for administering 404 permits locally. Wetlands within Carnation City limits are identified in the 1996 City Comprehensive Plan.

Endangered Species Act

The fundamental purpose of the Endangered Species Act (ESA) is to protect species identified as threatened or endangered. Acting under authority granted by the ESA, the National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS) have promulgated lists of threatened and endangered species. They have also designated habitat critical to those species.

Section 9 of the ESA prohibits activities resulting in the “taking” of endangered species. “Take” is defined as harming, capturing, killing, pursuing or other activities including the attempt to engage in these activities. This wide-ranging prohibition impacts activities within habitats of endangered species since a primary goal of ESA is to preserve ecosystems that the species depend on. Ecosystem preservation affects activities related to habitat modification, which result in death or injury to endangered species due to significant impairment of essential behavioral patterns such as breeding, feeding, or sheltering. This has significant implications for the habitats of endangered Chinook salmon and bull trout, which are impacted by stormwater runoff from urbanized areas.

To apply the Section 9 “take” prohibition of ESA beyond endangered species, to include threatened species, NMFS adopted the 4(d) rule, which is a regulation “necessary and advisable for the conservation of the species.” This makes it illegal to harm species identified as endangered, or their habitats. Section 4(d) exceptions, or “take” limits may be negotiated with NMFS but “take” must be associated with an approved program. Section 4(d) identifies criteria for evaluation of local proposals for limited exemptions to the “take” prohibition.

King, Pierce, and Snohomish Counties, together with local cities, Native American tribes, environmental groups, and business and other interests, have formed a voluntary partnership to develop the Tri-County Model 4(d) Rule Response proposal for Chinook salmon. The goals of the Tri-County proposal are to:

- Conserve Chinook salmon habitat to support sustainable and harvestable population levels
- Maintain the economic health of the region

- Respond to the feral listings and seek available legal protections under the 4(d) rule
- Create a plan that can be tailored to local needs

The Tri-County proposal has 6 main elements:

Early action elements established either by regulations or through programs:

- Land Management
- Stormwater Management
- Regional Road Maintenance Program

Long Term Actions:

- Watershed Planning
- Adaptive Management
- Habitat Funding Program

Note that a similar “take” prohibition is in effect for bull trout.

The Tri-County model has two potential uses, which provide local government agencies with options for limiting potential legal liability under ESA. The Tri-County Model can be used as a resource by local government agencies to develop or modify programs and regulations that protect Chinook salmon and their habitat, thereby reducing potential legal liability under ESA. Another option is to go beyond using the Tri-County Model as a resource and adopt it, or a variation then negotiate a “take” limit with NMFS, per the 4(d) rule, which would provide further legal liability protection. In addition, by adopting the recently updated DOE Stormwater Management Manual for Western Washington, the City can demonstrate that they are making a good faith effort towards ESA compliance.

STATE PLANNING EFFORTS

Puget Sound Water Quality Management Plan

The Puget Sound Water Quality Management Plan (Plan) is a comprehensive, long-term plan enacted to protect Puget Sound. The Plan results from the 1996 Puget Sound Water Quality Protection Act. The Plan is administered by the Puget Sound Water Quality Action Team and Puget Sound Council and calls for cities of all sizes and counties within the Puget Sound basin, to adopt Plan elements ultimately to protect the Sound’s water quality and biological resources. Plan coverage extends beyond cities and counties to the EPA, State DOT, federal facilities, tribal lands and commercial properties to develop continuous coverage throughout the Puget Sound basin. The Plan calls for implementation of a comprehensive program based on the most up to date understanding

of stormwater management. The benefits of program implementation are not only protection of Puget Sound, but also assistance of local jurisdictional agencies in eliminating existing stormwater problems, preventing future problems, and reducing associated costs.

The Plan includes the following program elements:

- Stormwater controls for new development and redevelopment
- Stormwater site plan review
- Construction site inspection
- Permanent stormwater facility maintenance
- Source control program
- Detection and elimination of illicit discharges; water quality response to spills and violations
- Identification and ranking of existing problems
- Public education and involvement programs
- Program integration into watershed / basin planning
- Development of stable funding (i.e. stormwater utility)
- Monitoring of program implementation and environmental conditions
- Implementation schedule
- Provisions for innovative low-impact development technologies, as demonstration projects or directly in development regulations

The program was updated in 2000 to account for the latest understanding of stormwater management technology and also to accommodate lessons learned from past experiences. Since each jurisdiction has unique conditions associated with stormwater management, the program can be tailored / prioritized to meet these individual conditions.

By adopting and implementing the Puget Sound Water Quality Management Plan, the City will be able to increase its confidence that all important aspects of stormwater management are being addressed within the City, and that Puget Sound's water quality and biological resources are protected.

State Department of Fisheries Hydraulic Project Approval

The Washington State Department of Fisheries (WSDFW) requires a Hydraulic Project Approval (HPA) for construction activities that use, divert, obstruct, or change the natural flow or bed of any waters of the state (Revised Code of Washington (RCW) 77.55). The purpose of the requirements, which are administered through the HPA permit process, is to protect fisheries habitat in stream channels and prevent erosion, and to protect freshwater and near-shore marine aquatic life. Any construction activity such as channel widening or culvert improvements within the ordinary high water of any stream would fall under the HPA permit requirements. In some instances, WSDFW is also extending their permitting authority to include developments creating new impervious surfaces in excess of 5,000 square feet even if the project does not include work within the ordinary high water mark. The rationale for extending their permit authority is that such a project will affect the hydrologic regime of downstream stream habitats. The City should obtain an HPA permit if any of the above-mentioned activities are performed.

Growth Management Act

A general discussion of the Growth Management Act (GMA) is provided herein as it contains land use planning requirements for designating and protecting critical environmental areas such as wetlands and fish habitat areas. Enacted in 1990 the GMA's goals are to manage growth in Washington State's fastest growing counties through the adoption of local comprehensive plans and development regulations.

Jurisdictions required to adopt comprehensive land use plans are:

- Counties with population of 50,000 or greater and increase in population of more than 17 percent in the last 10 years and any cities in such county.
- Counties that have a population increase of more than 20 percent in the last 10 years and any cities in such county.
- Counties that elect to conform to the Act.

Eleven counties in Washington, including King County, must adopt comprehensive plans under the GMA. Carnation, as a city in King County complied with the GMA through adoption of the 1996 City of Carnation Comprehensive Plan discussed later in this Chapter.

State Floodplain Regulations

The RCW 86.16 establishes statewide authority through regulations by DOE for coordinating the flood plain management regulation elements of the National Flood Insurance Program (NFIP). Under the Washington Administrative Code (WAC) 173-158, DOE requires local governments to adopt and administer regulatory programs compliant with the minimum standards of the NFIP. DOE provides technical assistance to local government both for identifying the location of the 100-year (base) floodplain, and in administering their floodplain management ordinances.

In addition, DOE establishes land management criteria in the base floodplain area by adopting the federal standards and definitions contained in 44 CFR, Parts 59 and 60 as minimum state standards. The state regulations provide additional regulation of residential development in the floodplain in addition to adopting the federal standard. The Federal Emergency Management Agency (FEMA) made a revision to the effective Flood Insurance Rate Map (FIRM) for King County, Washington and Incorporated Areas, in accordance with National Flood Insurance Program (NFIP) regulations. These changes are discussed in a Letter of Map Revision (LOMR) dated May 1, 2002. (City of Carnation; Community No: 530076; Panels affected: 53033C0418 G, 0419 G, 0420 G; Refer to Case No: 02-10-336P). The LOMR is shown in Appendix C.

The Carnation Municipal Code Chapter 15.64 adopts the Washington Model Flood Damage Prevention Ordinance and is in compliance with portions of the WAC 173.

COUNTY/REGIONAL PLANNING EFFORTS

Snoqualmie Watershed Forum

The Snoqualmie Watershed Forum is comprised of local elected officials and citizens throughout the watershed to address local and regional habitat, flood concerns and water quality. In 2001, the City of Carnation signed an Interlocal Agreement (ILA) with the cities of Duvall, Snoqualmie, and North Bend as well as King County to cooperate in the watershed planning and conservation in the Snoqualmie and South Fork Skykomish Watersheds.

This ILA has the goal of clarifying the roles and responsibilities of local jurisdictions in the development of WRIA-based salmon conservation plans and make a commitment to watershed planning. The ILA also provides a mechanism for the implementation of habitat, water quality and flood projects with other funds as they become available. The five-year agreement provides a great level of certainty that local governments in the Snoqualmie Watershed will actively participate in developing a salmon conservation plan for the Snohomish Basin. The Snoqualmie Watershed ILA recognizes the potential for a Snohomish basin-wide agreement to be executed in the future, and is intended to be compatible with it.

The primary roles of the Snoqualmie Watershed Forum are to:

- Administer the King Conservation District grant process
- Create and advocate a watershed plan which would guide efforts for both fish and the community
- Provide a leadership role in the larger Snohomish Basin (WRIA7) conservation planning process, and provide direction and planning for WRIA7 conservation plan development and implementation
- Perform proactive research and influence on actions, alternatives, funding and incentive options for the plan

- Respond to outputs of WRIA7 process and planning
- Support and direct continued joint regulatory work in the watershed, in order to build consistency between jurisdictions
- Support and direct community outreach and education on watershed issues, helping raise awareness and foster meaningful public involvement in watershed protection

Currently, six members of the Snoqualmie Watershed Forum (including one from Carnation) are voting members of the Snohomish Basin Salmon Recovery Forum, which is a group of elected officials and stakeholders drawn from the Snohomish River Basin to address watershed issues and salmon recovery.

King Conservation District

The King Conservation District (KCD), created under RCW 89.08, administers a program to conserve the natural resources of King County. KCD's goals are to teach principles of conservation to landowners and the general public; encourage the development of comprehensive actions plans and procedures that promote environmental quality; coordinate productive relationships between citizens and environmental regulatory agencies; and assist citizens and governments with the implementation of sound conservation practices. KCD places emphasis on projects and work that directly impacts salmon. KCD partners with federal and state agencies to use grants and cost-share money as incentive for local landowners to implement best management practices for salmon and the environment.

City Comprehensive Plan

The City's 1996 Comprehensive Plan contains a number of policies in its Land Use Element that are intended to enhance and maintain the City's natural resources, critical areas, and open spaces. The policies provide a basic source of reference for elected officials as they consider enactment of ordinances and regulations. The policies also provide guidance to City staff as they administer ordinances and regulations. This process ensures that the community's overall goals are met.

RECOMMENDATIONS

As a summary has been provided earlier in the Chapter, it is important to identify actions the City will need to take in the near future based on the difference between what is required by federal and state regulations and those local regulations currently in effect in Carnation. There is however, some overlap between the various levels of regulations. It is recommended the City proceed with the following:

- Adhere to the latest version of the Department of Ecology Stormwater Manual
- Monitor the Tri-County 4-d ESA negotiations for revisions to the City's stormwater program based on the outcome of these negotiations
- Continue participation in the Snoqualmie Watershed Forum. This will provide continuity with other Cities in the Snoqualmie Valley
- Adopt the Puget Sound Water Quality Management Plan
- Review the City's regulatory program every 5 years to confirm that is meeting the federal, state and local regulations

Chapter Four
EXISTING SYSTEM

Chapter Four EXISTING SYSTEM

INTRODUCTION

The City of Carnation is located adjacent and to the northeast of the confluence of the Tolt and Snoqualmie rivers. The characterization of the study area within the two major drainage basins documents the climate, soils, topography, existing storm drainage system, and environmental resources. The analysis includes the hydrologic response to precipitation, which is the basis for the system evaluation presented in the following chapter. This chapter also summarizes this information, identifies problems and provides recommendations, relative to the two basins within the City.

STUDY AREA CHARACTERISTICS

The extent of the study area for this Plan is comprised of the contiguous Carnation city limits (659.2 acres) and three separate areas between the contiguous city limits and urban growth boundary, identified as urban growth areas (171.6 acres). Note that this more recent data differs from the information in Chapter Two, which is based on the 1996 Comprehensive Plan. Current land use information was used in order to provide a more accurate hydrologic analysis, as further described in Chapter Five. The study area is identified in Figure 4-1.

CLIMATE

The local climate is dominated by the influence of marine air from the Pacific Ocean, resulting in temperate conditions throughout the year. Carnation's proximity to the Cascade mountain range to the east results in higher average annual precipitation than Seattle (57 inches compared to 38 inches). Moist air coming from the Pacific Ocean encounters the mountains and releases precipitation, particularly in the late fall and winter months. In the spring, subsequent snowmelt from winter snowfall causes elevated runoff conditions in the Tolt and Snoqualmie rivers, which can cause flooding.

Annual precipitation in Carnation can vary from less than 45 inches to over 90 inches. However, rainfall totals for a significant rainstorm are only marginally higher than in Seattle. Table 4-1 summarizes 24-hour recurrence interval precipitation totals for Carnation, Seattle (at SeaTac airport), Duvall and Snoqualmie.

TABLE 4-1 RECURRENCE INTERVAL PRECIPITATION TOTALS

CITY	RECURRENCE INTERVAL			
	2-YEAR	10-YEAR	25-YEAR	100-YEAR
Carnation	2.2	3.0	3.7	4.3
Seattle	2.0	2.9	3.4	4.0
Duvall	2.1	3.0	3.5	4.0
Snoqualmie	3.2	4.5	5.0	6.2

Source: King County Surface Water Design Manual Isopluvials

Precipitation varies seasonally, with approximately three-fourths of the total annual rainfall occurring between October and March. The greatest amount of precipitation falls during the months of December and January. Moderate temperatures typically range from the 70's during the summer to the 30's and 40's in the winter.

SURFICIAL GEOLOGY

The surficial (near-ground) geology is almost entirely younger (Holocene) alluvium with a minor amount of Vashon recessional outwash deposits in the northeast portion of the city. The younger alluvium is characterized by unconsolidated very fine to medium grained silts, sands and gravels, rich in organics. It is usually located at or near the groundwater table and may be exposed to periodic flooding. Recessional outwash contains well-stratified fine to coarse-grained sands and gravels. It is unconsolidated, moderately erodable and highly permeable.

The surficial geology is due to the natural migration of the river systems over time. As the river systems alter their course, the abandoned riverbeds are gradually filled in with progressively finer materials as they are inundated less frequently.

SOILS

Soils within the study area also reflect the influence of the Snoqualmie and Tolt Rivers. The predominant soil is Oridia silt loam, formed in alluvium in river valleys. It is characterized by lower than average permeability. Pilchuck loamy fine sand and Riverwash soils are located along both the Snoqualmie and Tolt river banks. Alteration of the soils along the riverbanks is common, related to river overflow, erosion and deposition. Other types of soils are minimally present within the study area, and include: Everett gravelly sandy loam, Puyallup fine sandy loam, Sultan silt loam, Alderwood gravelly sandy loam, Kitsap silt loam, and Renton silt loam. All soils are classified as till by King County, except for Everett gravelly sandy loam, which is classified as outwash.

Carnation and its UGA contain a few areas identified as having erosion or landslide potential due to steep slopes. The areas consist mostly of the hillside in the far eastern portion of the city, along Tolt River Road. These areas may be challenging for development due to poor stability and soil suitability.

TOPOGRAPHY

Carnation lies at approximately 67 ft above sea level, in the eastern portion of the broad, flat Snoqualmie river valley. Topography of the city gently slopes from east to west. Elevations range from approximately 120 feet in the eastern end of the city, to 60 feet on the west side, at the Snoqualmie River. The topography tends to rise more sharply beyond the eastern end of the city. Figure 4-1 shows the study area and 2-ft and 10-ft elevation contours.

SURFACE WATER

The principal surface waters in Carnation and its UGA are the Tolt and Snoqualmie rivers. Based on the City's 1996 Comprehensive Plan, there are no creeks or lakes within the city limits.

The Snoqualmie River basin begins at Snoqualmie Falls and discharges north, toward Snohomish County. It has a total drainage area of 603 square miles. The river loses most of its elevation after the base of Snoqualmie Falls. It meanders through the broad, flat Snoqualmie valley floodplain, passing through Fall City and towards Carnation. From Fall City to the Snohomish County line, it drops only 50 ft over 30 miles of winding channel. The Tolt and Raging rivers join the Snoqualmie in its lower length, along with many creeks (Patterson, Tokul, Harris, Griffin and Cherry). The Snoqualmie River merges with the Snohomish River, and discharges into Puget Sound at Port Gardner in Everett.

The Tolt River is the major tributary to the Snoqualmie, and is partially regulated by the City of Seattle, through the operation of a water supply dam on the South Fork of the Tolt River. It has a drainage basin area of 97 square miles at the mouth. It exhibits rapid and extensive lateral channel migration, which poses a threat to both developed and undeveloped properties along its banks.

FEMA floodplain maps are based on the assumption of a fixed river channel, which has led to recent inconsistencies and multiple floodplain delineations. This has created numerous difficulties for regulatory agencies, landowners, and developers in determining suitable areas for future developments. The current floodplain boundaries are shown on Figure 4-1, and include the floodway, Type "AE" flood zone (inundated by 100 year flood), Type "X (shaded)" flood zone (average depths under 1 ft), and Type 'X' flood zone (outside of 500-year floodplain).

DRAINAGE BASINS

Two major drainage basins were identified for this study: Basin "A", which drains to the Snoqualmie River, and Basin "B" which drains to the Tolt River. Figure 4-1 shows the boundary between basins "A" and "B". A significant portion of the western and southern areas of the city are located in the 100-year floodplain of the Snoqualmie and Tolt rivers.

The 100-year floodplain consists of two components: the floodway and the flood fringe. The floodway is typically the area of fast moving, deep water with a high potential for damage. The floodway consists of water dependent structures such as dams, streambank stabilization facilities, diversions, storm water facilities and bridges. The flood fringe is the portion of the floodplain covered by floodwaters during a base flood, and generally consists of standing water.

Basin "A" covers a majority of area within the city limits (626.1 acres), as well as all three urban growth areas (171.6 acres). A combination of high annual precipitation and snowmelt in the Snoqualmie Basin increase the potential for significant winter flooding. Flooding of the lowland from river overflows combined with local drainage systems could be hazardous to the city. Based on King County flood data, considerable flood events occurred in November 1990, November 1995, February 1996, and November 2001. The largest known flood flow of 65,200 cfs occurred in November 1990. Based on discussions with City staff, no significant flooding damage has been recorded within the city limits during these or other known flood events.

Basin "B" is primarily limited to a narrow strip of land south of the levee and covers only 33.1 acres within the city limits. There are no urban growth areas within Basin "B". The same rainfall events which caused flooding of the Snoqualmie River (November 1990, November 1995, February 1996 and November 2001) also caused flooding along the Tolt River. The largest known flood flow of 11,400 cfs occurred in November 1995. During this flood, considerable streambank erosion occurred due to the sudden rise of the Tolt. Water entered the strawberry fields south of the city, in the vicinity of the middle school. The mentioned floods in late 1995 and early 1996 were significant, resulting in the closure of several roads, and evacuation of some residents. However, based on discussions with City staff, no significant flooding damage has been recorded within the city limits.

The respective drainage basin areas are shown in Table 4-2.

TABLE 4-2 DRAINAGE BASINS

DRAINAGE BASIN	WITHIN CITY LIMITS (ACRES)	WITHIN UGA (ACRES)
"A"	626.1	171.6
"B"	33.1	0

Continuous levees confine the lower Tolt River along both banks from its confluence with the Snoqualmie River upstream approximately 2 miles. The levees were constructed

with the intent of containing flood flows and constraining lateral migration of the Tolt River along its floodplain. The levees are maintained by King County, and provide protection against bank erosion and some flood protection from flooding at moderate discharges.

Flooding along the lower Tolt River is commonly due to rises in Snoqualmie River flows rather than Tolt River flows. Levees along the lower Tolt River (below the trail bridge) constrain the river channel, and prevent flooding only for small, frequent events (less than 8,000 cfs). However, levees upstream of the Trail Bridge provide effective flood control. Landward of the right bank levee and upstream of the Trail Bridge is a secondary containment berm, which provides additional flood protection for the nearby residential area. The 100-year event is contained along the right bank from the upstream end of the levee almost to the Trail Bridge, but the 100-year event overtops the right bank just upstream of the Snoqualmie Valley Trail Bridge. Downstream of the SR 203 Bridge, backwater and overbank flow from the Snoqualmie River inundates the Tolt River, resulting in frequent flooding. The South Fork Tolt Reservoir, primarily operated for water supply, has significantly reduced the size and frequency of floods.

A 60-inch culvert exists through the levee by the Tolt River, east of the bridge along Fall City-Carnation Road. During high flows in the Tolt River, this culvert discharges into a pond just north of the river bank. The culvert was constructed by King County in 1998, for the purpose of providing fish passage between the Tolt river and the pond. A containment berm was constructed at the northwest end of the pond, in order to preserve the overall containment elevation of the levee system. This culvert conveys minimum, if any, flow during normal stages of the Tolt River. Based on discussions with City staff, it is likely that this pond is hydraulically connected to another, larger, manmade pond northwest of it. This larger pond, north east of the bridge along Fall City-Carnation Road, discharges through a culvert under Fall City-Carnation Road.

It should be noted that the areas surrounding the Tolt River, adjacent to the eastern portion of the city, are classified as moderate and severe channel migration hazard areas.

DRAINAGE SYSTEM

In addition to the rivers, the study area includes other local drainage systems that collect and convey surface water runoff to Basin "A. These consist of open channels and roadside ditches, storm sewer pipelines, wetlands, infiltration systems and a detention pond. A fully developed citywide stormwater conveyance system does not exist, but a number of measures such as catch basins, underground recharge chambers and infiltration ponds have been installed in various parts of the city to manage stormwater runoff. There are a small number of private structures connecting to the City's drainage system. No drainage structures have been identified in Basin "B".

The Snoqualmie and Tolt rivers ultimately serve as receiving waters, but there are no direct outfalls to the rivers. The existing infrastructure is generally in poor to fair condition. However, based on discussions with City staff, there have never been any substantial water quantity problems within the City's drainage system.

As part of this study, the City's existing drainage system was mapped, and is shown in Figure 4-1. Private systems were not included in the study, as their locations were unknown at the time of preparing this report. Because the data was compiled from a variety of sources and is not, in many areas, "as-built" information, the drainage system inventory should only be used for general planning guidance. In addition, no surveyed data in a citywide database was available which would have provided a more detailed analysis.

According to City staff, the majority of the stormwater is collected and infiltrates through disjointed drainage structures located throughout the city. However, parts of the city (all within Basin "A") contain smaller conveyance systems, some of which are described below. No drainage structures are present within the urban growth areas.

Stormwater runoff from the southeastern portion of the city (NE 42nd ST, 325th and 326th Avenue NE) is collected through a series of catch basins and pipes, which ultimately discharge to a detention pond just south of the cul-de-sac by 325th and 326th Avenue NE. The pond contains an outlet and overflow spillway. However, all of the detained water eventually infiltrates before discharging. Based on discussions with City staff, this pond has never had more than 1-2 inches of water in it, even during the most severe storms.

Stormwater runoff from the eastern portion of the city (NE 40th PL, NE 42nd PL and 43rd PL) is also collected through a series of catch basins and pipes. However, the runoff from this area is not detained, but rather discharged through a pipe to a wooded area south of the NE 40th Circle cul-de-sac. Based on discussions with City staff, the discharged water flows a short distance overland and eventually completely infiltrates.

The City should consider constructing a regional stormwater facility, which would collect and infiltrate stormwater at a centralized location, as opposed to the current disjointed system. A hydraulic and hydrologic model (further discussed in Chapter Five) will provide a basis for a more detailed analysis of the need for such a facility. Project specifics, such as planning, design and construction of the regional facility, should be included in the next Stormwater Comprehensive Plan update.

ENVIRONMENTAL RESOURCES

Wetlands

Wetlands play an important role in providing valuable benefits to the environment and society. There is limited scientific knowledge of wetland functions, so evaluations of individual wetlands are often qualitative and based on professional judgment.

The most common wetland evaluation method in the Pacific Northwest was developed by the U.S. Army Corps of Engineers. Evaluations can be made of the following wetland functions: water quality improvement, storm and flood flow attenuation and storage, hydrologic support, and natural biological support.

Wetlands have the ability to remove sediments from surface waters passing through them, which results in improved water quality in receiving waters. Many wetland plants

and microbial communities associated with plants are able to directly remove pollutants or transform them into less harmful compounds.

Storm and flood flow attenuation helps prevent flooding, reduces streambank erosion, and maintains the necessary hydrologic conditions for wetland plants.

Since stormwater is detained in wetlands, water is released to surface waters and occasionally to groundwater at a slower rate. This attenuates flow rates in streams and can help recharge aquifers, and in some cases can serve as a storage area for irrigation water for agricultural uses.

Wetlands can also provide the necessary hydrologic regime for aquatic organisms and provide habitat resources for wildlife. Biological support by wetlands is essential as many organisms are partially or completely dependent on wetlands for their survival.

In 1996, an environmental scientist reviewed the National Wetlands Inventory map prepared by the U.S. Fish and Wildlife Service, and concluded that the map did not accurately show wetlands within the City. Through subsequent field visits, a small number of wetlands were identified, mostly in the southern portion of the city limits, along the Tolt River. They are documented in the City of Carnation 1996 Comprehensive Plan, and shown on Figure 4-1. The wetlands mainly consist of Tolt and Snoqualmie River riparian areas, drainage channels, depressions, and low-lying drainage areas.

There seems to be an inconsistency between the wetland delineation in the 1996 Carnation Comprehensive Plan and the more recent information from the King County GIS System. This provides a strong basis for new mapping of wetlands, which is further discussed in Chapter Eight.

Other Sensitive Areas

The principal sensitive areas in Carnation and its UGA include wetlands, aquifer recharge areas, rivers, streams, creeks and geological hazard areas. The city is relatively flat and has few geological hazard areas. The exceptions would be the small erosion and landslide areas in the northeastern portion of the city. The City's Municipal Code contains measures to protect sensitive areas.

Vegetation and Wildlife

Several types of vegetation are present within the wetland areas, including types of willow, cottonwood, dogwood, and grasses, among others. Other common vegetation includes deciduous and coniferous trees such as Elm, Cherry, Oak, Maple, Locust, Fir, Cedar, Dogwood, and Walnut, as well as native shrubs and grasses.

The greater Carnation area supports many kinds of fish (Chinook salmon, cutthroat and rainbow trout, white fish, sculpin), birds (waterfowl, songbirds, raptors, etc.), amphibians, reptiles, insects and other invertebrates.

RECOMMENDATIONS

The following is a summary of recommendations based on this chapter, which are further discussed in Chapter Eight:

- A detailed survey of the City's storm drainage system should be completed in order to more accurately document current conditions. This survey would increase the accuracy of storm drainage components presented in Figure 4-1. Information relating to pipes (inverts, lengths, slopes, materials), catch basins (types) and other drainage structures as well as identification of private systems should also be included in a future drainage system study.
- Mapping of the wetlands within the City limits and urban growth areas should be completed. There seems to be an inconsistency between the wetland delineation in the 1996 Carnation Comprehensive Plan and the more recent information from the King County GIS System. The 1996 Comprehensive Plan shows wetlands within the city limits, and the King County GIS data does not. Accurate wetland delineations would generate more realistic theoretical runoff volumes, which is further discussed in Chapter Five.
- The investigation of any hydraulic connectivity between the two previously mentioned ponds would provide a better understanding of the City's drainage system. At this time, it is not clear how the pond near the 60-inch culvert is connected, if at all, to the larger pond north east of the bridge along Fall City-Carnation Road.
- The construction of a regional stormwater facility, which would collect and infiltrate stormwater at a centralized location. A hydraulic and hydrologic model (further discussed in Chapter Five) will provide a basis for a more detailed analysis of the need for such a facility, in conjunction with the next Stormwater Comprehensive Plan update. However, the City should take advantage of favorable opportunities (if they should arise) for a regional facility, even before the analysis is complete. Beneficial opportunities to the City, such as securing a site for the facility, may be created by grants or future developments.

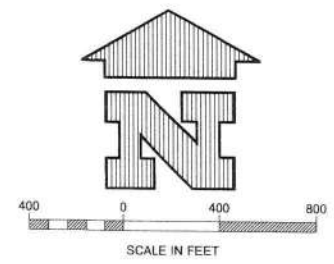
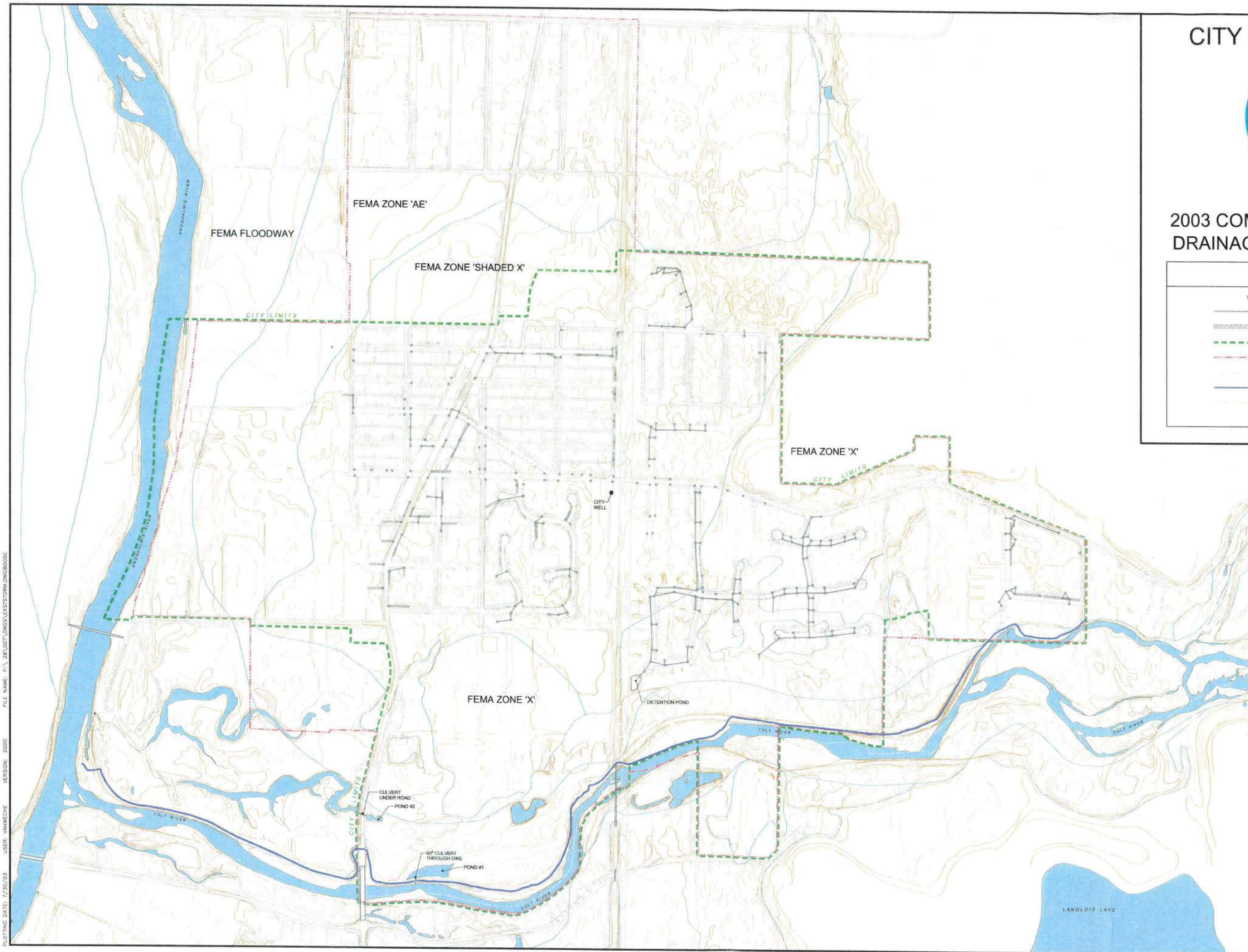
CITY OF CARNATION



FIGURE 4-1
2003 COMPREHENSIVE STORM
DRAINAGE PLAN STUDY AREA

LEGEND

	CATCH BASIN
	STORM PIPE
	INFILTRATION TRENCH
	CONTIGUOUS CITY LIMITS
	UGA BOUNDARY
	FLOOD PLAIN BOUNDARY
	DRAINAGE BASIN BOUNDARY
	10 ft. CONTOUR
	2 ft. CONTOUR



PLOTTING DATE: 7/20/03 USER: VANWECHE VERSION: 2000 FILE NAME: F:\28103\DWG\EXIST\STORM.DWG\BOOSE

Chapter Five
SYSTEM EVALUATION AND RECOMMENDATIONS

Chapter Five

SYSTEM EVALUATION AND RECOMMENDATIONS

INTRODUCTION

This Chapter involves establishing evaluation criteria for future hydrologic and hydraulic modeling based on runoff volumes for each of the major drainage basins. The general characteristics of the City's stormwater system will be discussed, water quantity and quality problems will be identified, and recommendations for addressing them will be made.

HYDROLOGIC ANALYSIS

The hydrologic analysis consisted of estimating the runoff volumes using the King County Runoff Time Series (KCRTS) Program, which is a continuous simulation model and a derivative of the HSPF program. Continuous models are considered more accurate than single event models (HEC-1, SBUH) as they generate a continuous hydrograph from actual long-term rainfall data and other hydrologic conditions. KCRTS is an appropriate analytical tool for this application, as it is applied with mathematical algorithms which define hydrologic processes. It utilizes parameter values that are calibrated using local or regional data. KCRTS is an industry standard in the Puget Sound region, and is user-friendly and well documented.

As mentioned in Chapter Four, the analyzed drainage area consists of two basins, Basin "A" (drains to the Snoqualmie River), and Basin "B" (drains to the Tolt River). Basin "A" is the core drainage basin and covers the majority of the area within the city limits, as well as all three urban growth areas. Basin "B" is significantly smaller, and primarily consists of City land south of the levee along the north bank of the Tolt, as well as portions of land on the south bank of the Tolt River. There are no UGAs within Basin "B". The respective basins are described in more detail in Chapter Four.

Runoff volumes were determined separately for each drainage basin within the city limits, as well as for the UGA. The results are presented in Table 5-3. The volumes were based on areas of impervious surface (primarily pavement and rooftops), till, outwash and wetlands. The impervious surface, till and outwash areas were determined by using AutoCAD and ArcView GIS, and based on USGS soils mapping information. The wetland areas were based on information from the 1996 Carnation Comprehensive Plan. The calculated impervious area was increased by 5%, in order to account for sidewalks and driveways, which were not included in the impervious area calculations. All impervious surface areas used in calculating runoff volumes are assumed to be "effective" or hydraulically connected to a stormwater conveyance structure, such as a gutter, ditch, pipe, etc.

Table 5-1 shows the soils types used in the model, and relates the SCS soils classification to the classification used in KCRS.

TABLE 5-1 EQUIVALENCE BETWEEN SCS AND KCRS SOIL TYPES

SOIL CLASSIFICATION	SCS HYDROLOGIC SOILS GROUP	KCRS CLASSIFICATION
Oridia (Os)	D	Till
Everett (EvB, EvC)	A/B	Outwash
Pilchuck (Pc)	C	Till
Puyallup (Py)	B	Till
Sultan (Su)	C	Till
Alderwood & Kitsap (AkF)	C	Till
Riverwash (Rh) ¹	C	Till
Renton (Re)	D	Till

1. RIVERWASH CLASSIFIED SIMILAR TO PILCHUCK SOILS, BASED ON COMPREHENSIVE PLAN SOILS DESCRIPTION.

Table 5-2 provides a summary of areas used for the hydrologic modeling. Table 5-3 presents the runoff volumes for the 24 hour 2-year, 10-year, and 100-year storms. Note that the areas used for runoff volume determination (Table 5-2) differ from the information presented in Chapter Two, which is based on the City of Carnation 1996 Comprehensive Plan. The areas used for the hydrologic modeling are more representative of existing conditions and result in more conservative runoff volumes. For example, the total impervious area has increased (since 1996) due to recent developments, which would in effect increase the total runoff volume.

TABLE 5-2 RUNOFF VOLUME MODELING PARAMETERS

AREA (ACRES)	SNOQUALMIE BASIN		TOLT BASIN ¹
	CITY LIMITS	UGA	CITY LIMITS
Till forest	27.4	0	6.6
Till pasture	464.6	150.0	16.6
Outwash forest	6.5	0	0
Outwash pasture	7.7	0	0.03
Wetlands	6.9	1.5	7.5
Impervious (increased 5%)	113.0	20.1	2.4
Total area	626.1	171.6	33.1

1. THERE ARE NO UGAS WITHIN THE TOLT BASIN.

TABLE 5-3 BASIN RUNOFF VOLUMES

RETURN PERIOD	RUNOFF VOLUME (ACRE-FT)		
	SNOQUALMIE BASIN		TOLT BASIN ¹
	CITY LIMITS	UGA	CITY LIMITS
2-year	15.2	14.4	2.5
10-year	109.6	29.3	3.8
100-year	155.6	42.2	7.2

1. THERE ARE NO UGAS WITHIN THE TOLT BASIN.

Although the runoff volumes presented in Table 5-2 are based on USGS soils mapping data, they are significantly larger than the actual runoff volumes that would be generated during a storm. Based on discussions with City staff, this is due to the highly permeable stratum of riverbed deposits underlying large portions of the City. The majority of stormwater runoff infiltrates, which results in a much smaller runoff volume compared to the theoretical volume. It is likely that these permeable deposits are layered over the majority of till and outwash. It is common for areas with a high percentage of impermeable till, such as Carnation, to be associated with high runoff volumes, which can often lead to water quantity problems. However, this is not the case in Carnation, due to the permeable riverbed deposits which provide an excellent medium for infiltration and reduction of stormwater quantity problems. Although the standard method of determining runoff

volume is to use USGS soils classifications, it is recommended to further investigate and accurately quantify the unique soil infiltration characteristics within the study area, and recalculate runoff volumes.

WATER QUANTITY AND QUALITY RECOMMENDATIONS

The City's existing stormwater system is described in detail in Chapter Four. Evaluation criteria for water quantity and quality problems should be consistent with the latest edition of the Department of Ecology Stormwater Management Manual for the Puget Sound Basin, which is adopted by the current Carnation Municipal Code. Several recommendations for water quantity and quality issues are presented below, based on existing conditions.

Water Quantity

Based on discussions with City staff, there are no known water quantity problems in the City, due to the fact that the majority of the stormwater runoff infiltrates. However, it is recommended that both a hydrologic and hydraulic model are developed, in order to provide a basis for the analysis of future system expansion. In the case that the City confronts water quantity problems in the future due to growth, the models could also be used to evaluate drainage improvement solutions.

The hydrologic model could potentially range from use of existing flood flow frequency estimates (where applicable) to basin-specific event modeling analysis. It would be able to evaluate peak flows for specific design storms, in addition to the runoff volume determination. The peak flows and volumes would be critical in completing an accurate conveyance evaluation for existing and proposed drainage systems, including stormwater infiltration system requirements.

The hydraulic model would be based on the peak flow estimates from the hydrologic analysis. It would use conventional analysis methods to evaluate hydraulic capacities of channels, culverts, and other storm drainage systems. The model would be able to identify downstream hydraulic constrictions in the conveyance system.

If water quantity problems occur in the future due to an increase in impervious surfaces, the following criteria could be considered in the assessment of drainage improvement solutions: design flows required for conveyance, existing drainage system capacities and required connections, topographic constraints, adjacent land use, river outfall conditions and hydraulic limitations, potential resource agency permitting needs, desired level of protection and estimated cost of improvements.

Water Quality

Development and urbanization can lead to a wide spectrum of water quality problems, based on an increase in impervious surfaces, which result in an increase in rates and volumes of stormwater runoff. Impervious areas provide a medium for collection and transport of urban pollutants. Roads and parking lots collect oil, grease, tire fragments, heavy metals, sand and grit, which are entrained by stormwater runoff. Biological pollution from livestock (phosphorus and fecal coliform bacteria) is also a common contaminant of urban stormwater runoff.

A water quality assessment should be performed, which would represent an evaluation of the existing water quality within the City and its urban growth area. This should be done

based on field observations as well as review of relevant data and reports. This assessment would be able to identify water quality problems such as non-point source pollution from impervious surfaces, inadequate stormwater treatment facilities, erosion and sediment transport from disturbed areas, pollutant inputs from agricultural lands, pollutant inputs from residences, and accidental discharge of chemicals to the drainage system.

There are no known water quality burdens by Carnation on the Snoqualmie or Tolt rivers, as there is currently no wastewater production and limited urban development. The City is proposing a sewer collection and treatment facility that will be required to comply with all local, state and federal regulations. The City's goal is for the sewer system not to have an adverse effect on stormwater quality.

A contributor to water quality problems is the lack of stormwater treatment systems in the City. The most common situation is street and parking lot runoff that is collected in catch basins and infiltrated without water quality treatment. Oil, grease and other roadway pollutants cause contamination of stormwater which further infiltrates through the soil. This could lead to further soil contamination from the infiltrated stormwater. It is recommended that the testing of soils, especially in the proximity of heavy use streets, is completed.

Based on discussions with City staff, an infiltration drainage structure is located very close to the main City well, on Entwistle Street and Milwaukee Avenue. The drainage structure should be moved in the future, to avoid potential contamination of water in the well by infiltrated stormwater.

Provisions for water quality treatment and protection facilities are now required, based on the adoption of the DOE Manual. However, the development of the majority of the existing stormwater system occurred prior to this adoption, and adequate water quality measures are not implemented within the entire drainage system. For example, only a limited number of catch basins contain measures for oil/water separation. Drainage structures should be upgraded in the future, by retrofitting with water quality best management practices (BMPs). This is often costly, but retrofitting of existing structures could be completed in conjunction with future adjacent developments. The City could require developers to improve off-site structures where needed. Impervious surfaces are an unavoidable component of development, and most water quality problems can be mitigated only with treatment measures.

Agricultural lands in the City have a high potential of affecting water quality, as agricultural activities usually involve the use of fertilizers and pesticides. High concentrations of fecal coliform bacteria and nutrients are present in animal waste, which can greatly impact water quality, depending on the proximity to the waterway. The City could require owners of livestock to install fencing on any waterways through their properties.

Residential parcels are also significant sources of pollution, which is related to over-fertilization, misuse of pesticides, soil disturbance from construction and pet wastes. Excess chemicals and pet wastes are entrained into stormwater runoff, contributing to water quality degradation. Small developments on residential lots often result in ground disturbance, which leads to the transport of exposed soils to the drainage system. The best

solution for reducing these types of water quality problems is to educate homeowners about water quality degradation, which is further discussed in Chapter Seven.

Chemical spills to storm drainage systems, both accidental and intentional, are common with increasing human activity. Potential sources of contamination include automobile use and repair, chemical storage areas, and construction work. Spilled materials can easily infiltrate into the soil, or be transported to the drainage system. Impacts are highly dependent on the amount and type of chemical spilled. The optimal solutions to prevent this type of pollution are structural measures, prevention and public education.

The following materials should not be allowed to enter any surface or sub-surface part of the public and/or private drainage system:

- Petroleum products including but not limited to oil, gasoline, grease, fuel oil, heating oil
- Trash and/or debris
- Pet waste
- Chemicals and/or paint
- Steam cleaning waste
- Washing of fresh concrete for cleaning and/or finishing purposes or to expose aggregate
- Laundry wastes or other soaps
- Pesticides, herbicides, or fertilizers
- Sewerage
- Heated water
- Chlorinated water or chlorine
- Degreasers and/or solvents
- Bark or other fibrous material
- Antifreeze and/or other automotive products
- Lawn clippings, leaves, or branches
- Animal carcasses
- Silt
- Acids or alkalis
- Recreation vehicle wastes
- Dyes without prior permission of the City
- Construction materials

Stormwater pollution can also be controlled through regular maintenance of stormwater facilities as well as the implementation of a public education program, which are further

discussed in Chapters Six and Seven, respectively. When developing Development Standards, the City should also consider modern design techniques that might reduce the negative effects of impervious surfaces, such as semi-permeable pavements, reduced street widths, landscaped cul-de-sacs, and sidewalks on one side of streets.

City staff should carefully review all stormwater pollution prevention plans and temporary erosion and sedimentation control plans, to ensure adequate protection of water quality. The City should ensure that developers are held responsible for failure to adhere to the approved plans, especially during the wet season when the threat of erosion is high.

Theoretically, future developments and an increase in impervious surfaces should not cause significant long-term impacts on surface water quality, if treatment requirements and BMPs from the DOE Stormwater Management Manual are implemented. However, it is likely that future water quality problems will relate to non-point source pollution from impervious surfaces, and erosion and sediment transport from construction sites. The City should focus on addressing problems related to existing developments and older roadways. The allocation of funds and additional personnel for regular maintenance of the drainage system would also enhance the overall water quality. Specific recommended improvements and costs are further discussed in Chapter Eight.

BEST MANAGEMENT PRACTICES (BMPs)

Infiltration trenches are currently widely used in the City, however other BMPs should be implemented in accordance with the City's future Development Standards. They could also include, but not be limited to:

- Infiltration and Filtration BMPs: roof downspout systems and various porous pavements
- Biofiltration BMPs: biofiltration swales or filter strips
- Oil/Water Separators
- Erosion and Sediment Control measures: oversized catch basins and catch basin filters

These BMPs could be used to retrofit existing water quality controls. Retrofitting should be completed in conjunction with the construction of new developments. Parking areas without existing BMPs could include oil/water separators. Streets that receive sediment in the winter months should contain oversized catch basins to prevent grit from being washed downstream. Roadside ditches could be retrofitted with filter strips. These individual improvements are minor compared to the overall benefit of improved water quality of the system, and could be implemented on a case-by-case basis.

SUMMARY OF RECOMMENDATIONS

The following recommendations for water quality and quantity issues should be made based on the information in this Chapter:

Water Quantity

- Develop hydrologic and hydraulic model

Water Quality

- Perform an assessment of stormwater quality
- Perform soils testing for contaminants
- Move infiltration facility from the vicinity of the City well
- Implement water quality Best Management Practices (BMPs) in accordance with the development and implementation of the City's Development Standards
- Provide centralized water quality treatment with the construction of a regional stormwater facility (as discussed in Chapter Four)

Chapter Six
OPERATIONS AND MAINTENANCE

Chapter Six

OPERATIONS AND MAINTENANCE

INTRODUCTION

The goal of an operations and maintenance program is to assure the reliability and increase the life span of the City's drainage infrastructure, extend the life of drainage facilities, protect property and structures against damage, and protect water quality.

This Chapter describes the City's current operations and maintenance standards and provides recommendations for future approaches. It describes current City personnel, equipment, as well as operation and maintenance, monitoring, enforcement and inspection of the stormwater system. The City does not currently have an extensive operations and maintenance program, which provides a strong basis for the implementation of the suggested recommendations.

CURRENT OPERATIONS AND MAINTENANCE STANDARDS

A fully developed stormwater conveyance system does not exist, but a number of measures such as catch basins, underground recharge chambers, and infiltration ponds have been installed in various parts of the City to manage stormwater runoff. The existing infrastructure is generally in poor to fair condition.

Operation and Maintenance Of Existing Stormwater System

Based on information received from the City's Public Works Director, the existing system appears functional and the City is not aware of any stormwater drainage problems. Work related to storm drainage contributes only 5% of the total work performed by the City. Over the past four years, the City has vacuumed catch basins once every three years. Prior to that, maintenance was intermittent and was only performed when a drainage problem occurred. The detention pond in the vicinity of the Swiftwater subdivision is mowed in order to maintain an adequate grass height.

Monitoring, Enforcement and Inspection

There are no existing policies or standards for the monitoring of stormwater quality or quantity. However, the City does respond to calls from the community to investigate and assist in mitigating any stormwater problems.

STAFFING

The City has a three-person field staff, including two journey-level employees and one field supervisor. The City's office staff consists of the City Manager, Public Works Director, Finance Director, City Clerk, Deputy City Clerk and Billing Clerk. The field crew operates and maintains the storm system in addition to the water system, streets, buildings and parks.

EQUIPMENT

The City owns two backhoe loaders, two service trucks, two dump trucks and an assortment of small, portable tools.

RECOMMENDED OPERATIONS AND MAINTENANCE PRACTICES

Operations and Maintenance Standards

The recommendations in this Chapter have been developed to assure that the surface water drainage systems in the City are operated and maintained to provide satisfactory water quality and flow control. These recommended standards identify the type of systems, operations required, frequency of operation and responsibility.

On site inspections of specific areas, equipment, devices, structures, and ponds that may affect the quality and flow of surface water drainage systems should be made. Inspection may be made by request, planned programs and/or as a part of normal maintenance operations.

In general, cleaning of all drainage systems should be performed in order to remove trash, sediment, pollutants, oil and other materials that can affect water quality. All materials in the collection systems, inlets, storage sites, ditches and pipelines that restrict flow should be removed.

All parts of the drainage system should be maintained or replaced to assure that it performs as intended. All physical parts of the drainage system should be constructed and maintained per construction plans approved by the City and the accompanied permits under which the drainage system was constructed. Maintenance should be performed by the City as required if the facility becomes inoperative, or as directed by the Public Works Director.

No washing of public or private streets and parking areas should be permitted unless no other alternative exists to remove undesirable materials. If street washing does indeed occur, it should be performed only upon written approval granted by the Public Works Director, with commitments from the City to clean the nearby drainage pipelines and/or other drainage facilities affected.

More specific recommended standards for particular elements of the drainage system are defined below:

Collection Systems, Pipes, Catch Basins, Manholes and Inlets

The City should be responsible for these drainage systems and they should be inspected annually and during storms as part of the planned operations and maintenance activities.

Areas that are plugged or have accumulated materials to impair the capacity of the device or contribute to deteriorating water quality should be mechanically cleaned. For catch basins, this should be performed by the City when the volume reaches 60% of capacity with accumulated materials. For other structures, cleaning should be performed as required, based on inspections.

Leaves and debris should be removed from surface inlets when accumulations impair flow by 20% or more. This task should be performed by the City during storms and weekly from October through December.

Pipelines, Ditches and Culverts

The City should be responsible for maintaining these areas, and they shall be inspected annually and during storms as part of the planned operations and maintenance activities. The City should obtain all necessary environmental permits to perform these tasks.

Each of these areas should be manually cleaned when mechanical devices cannot be used in these areas to remove trash, debris, diseased vegetation, leaves and other materials that affect quality. These tasks should be performed by the City as required based on inspections. Herbicides shall not be used in removing vegetation from open drainage courses. Vegetation removal from open drainage courses shall occur only from June 15 to September 15 unless vegetation is causing blockage to flow that is creating an emergency situation as declared by the Public Works Director.

Plugged and restricted pipelines should be cleaned with a vactor or other rodding systems. This should be performed by the City when pipeline flow is significantly restricted or as directed by the Public Works Director.

Detention Facilities, Oil Separators and Flow Control Devices

The City should be responsible for maintaining these systems annually and during storms. Planned inspections and a status report for each City site should be made each year. The City should retrofit existing catch basins with oil water separators, in order to improve stormwater quality. These BMPs should be implemented annually to several catch basins throughout the City. The associated costs and timing of the retrofits are discussed in Chapter Eight.

Detention Ponds

The detention pond should be cleaned manually if mechanical equipment cannot be used to remove accumulation of materials. This should be performed by the City annually or as directed by the Public Works Director. Brush and debris that restrict any intended flow of water should be removed.

Construction Sites

All sites where construction is occurring should be inspected weekly (at a minimum) to prevent materials from collecting on the streets or in the systems. Both the City and property owner should be responsible for this task.

Parking Areas

All parking areas and catchments should be inspected monthly for debris. Both the City and property owner should be responsible for this task. All parking areas should be cleaned by sweeping or vacuuming to prevent material from entering the drainage systems. This should be done by the City at least semi-annually or more often based on inspections.

Sand on Streets from Snow Removal Operations

All major streets that have had surface treatment during snow or ice storms should be inspected as soon as it is practical after the snow or ice storm. Both the City and property owner should be responsible for this task.

Monitoring, Enforcement and Inspection

The City should enforce the current monitoring measures as described in the Carnation Municipal Code. A focus in the inspection should include the appropriate installation of BMPs throughout the stormwater system (as discussed in Chapter Five), including private properties. Enforcement action should be taken if violations to the CMC are made, depending on the nature of the violation.

Chapter Seven
PUBLIC EDUCATION AND INVOLVEMENT

Chapter Seven

PUBLIC EDUCATION AND INVOLVEMENT

INTRODUCTION

In order to provide information, increase community involvement and awareness, and initiate changes that will protect the quality of Carnation's water resources, the City is proposing to establish a Public Involvement and Education Program. Program activities in general should include involvement with local resident and business volunteers in the protection and enhancement of water resources. These efforts will provide citizens, the City, and other resource management and regulatory agencies with information that will improve the overall health of the City's natural environment.

CURRENT PROGRAM

The City has performed a limited public education program. The City has been primarily focused on project-specific issues. Project information can be found at City Hall, on the City's website, as well as advertised in the local newspaper as needed. The City's Program has been ongoing but not with a particular emphasis on water quality protection.

RECOMMENDATIONS

The public education and involvement program is a process used to create awareness of issues, enhance people's knowledge, understanding, and skills. These programs are related to stormwater management, which aims to influence people's values and attitudes and encourage more responsible behavior. These programs are an effective and powerful tool in the prevention of stormwater pollution.

The City's Program should be divided into two separate categories, by topics and delivery methods, to provide flexibility and tailor each specific activity to the desired outcome. Each topic and delivery method is important in the development of a comprehensive program.

Each topic is designed to inform citizens of the problems associated with stormwater runoff and to encourage their involvement in solving those problems. It is important to understand that these topics may change over time or be added to fit a specific need. The following topics should be considered for use in the Program:

- Education of homeowners and commercial property owners about water quality degradation, based on over-fertilization, misuse of pesticides, chemical spills and soil disturbance from construction and pet wastes
- Recommendations to homeowners and commercial property owners for installing and maintaining on-site stormwater systems

- Recommendations to owners of livestock for installing fencing on any waterways through their properties, as water quality can be affected due to high concentrations of fecal coliform bacteria and nutrients often present in animal waste
- Education of citizens about the use of common household items as cleaning products and their discharge to the stormwater system
- Recommendations to homeowners about using compost in lawn areas, to improve infiltration and reduce runoff

The method by which each specific topic is conveyed can vary depending on the target audience. It is important to fit the appropriate delivery method with the specific topic in order to reach the target audience. Methods to convey such topics include, but are not limited to:

- The City's Newsletter
- The City's website
- Customers utility bills
- Flyers
- Brochures
- Outreach projects
- Public meetings / Neighborhood meetings
- Newspaper advertisements

The City's Program should inform individuals, households and targeted groups of business and industry about steps that can be taken to prevent pollution from stormwater runoff. For example, City staff could educate residents about stormwater pollution by labeling catch basins with warnings about dumping hazardous materials to the stormwater system. It is important that the public is involved in the development, implementation and review of the City's Stormwater Program.

MONITORING PUBLIC EDUCATION AND INVOLVEMENT PROGRAM

Monitoring and evaluating the Program during and after implementation is essential to determine the overall effectiveness. The City should perform a year-end evaluation of the Program topics and delivery methods implemented throughout the year to determine if goals are being met. If the City should determine changes are needed, then new topics and/or delivery methods or enhancements will be implemented to the current Program.

Chapter Eight
CAPITAL IMPROVEMENT PROGRAM

Chapter Eight

CAPITAL IMPROVEMENT PROGRAM

INTRODUCTION

This Chapter includes a description of recommendations evaluated in previous Chapters, and presents them in the form of recommended projects, along with their estimated planning-level implementation costs. Further design-level evaluations of recommended solutions will be required in order to refine the conceptual solution alternatives, which is not within the scope of this Plan. The recommended improvements for the City's stormwater system for the next six years (2004-2009) will be discussed.

Recommendations are based on field reconnaissance of existing system facilities, discussions with City staff and the analysis done in preparing this Plan. This Plan does not identify all the capital improvements required to serve potential new developments within the city limits and urban growth areas. Specific detailed improvement alternatives and single recommended solutions have not been determined. A future, more complete version of this Plan in conjunction with a technical (hydrologic and hydraulic) analysis including facility sizes would provide a basis for this level of system evaluation in the future.

COST ESTIMATE METHODOLOGY

The planning-level cost estimates prepared for this Plan are provided for guidance in project evaluation, funding and implementation. The "order of magnitude" project cost estimates were based on external resources (consultants, scientists, contractors) completing the recommended improvements. The actual project costs may be lower if completed by City staff using City equipment.

The estimates represent average costs for similar types of projects but do not take into account individual variables related to particular projects, which could result in varying actual project costs.

CAPITAL IMPROVEMENT PROGRAM

The improvements addressed in this chapter constitute the recommended Capital Improvement Program for the City of Carnation. The recommended improvements are summarized based on type of improvement (quantity/quality) including a brief description and benefits for each project.

Regulatory/Programmatic Improvements

Development Standards

The City should consider adopting a set of Development Standards to be used in future development proposals that might reduce the negative effects of impervious surfaces, such as semi-permeable pavements, reduced street widths, landscaped cul-de-sacs, and sidewalks on one side of streets. These Standards should include Best Management Practices to be implemented within the City's stormwater system as discussed in Chapter Five. Neighboring municipalities have existing Development Standards which may serve as a model for the development of the City's Standards. Estimated cost: \$20,000

Updated Comprehensive Plan

The City's regulatory program should be reviewed every 5 years to confirm that is meeting the federal, state and local regulations. The conclusions from this review, in addition to the planning and engineering design of proposed capital improvement projects (such as the construction of a regional stormwater facility), will lead to the development of an updated Stormwater Comprehensive Plan. Estimated cost: \$100,000

Below are regulatory/programmatic measures which are not specific capital improvement projects, but which the City should proceed with:

- Adhere to the latest version of the Department of Ecology Stormwater Management Manual for Western Washington, per Carnation Municipal Code
- Monitor the Tri-County 4-d ESA negotiations for revisions to the City's stormwater program based on the outcome of these negotiations
- Continue participation in the Snoqualmie Watershed Forum, which will provide continuity with other Cities in the Snoqualmie Valley
- Adopt the Puget Sound Water Quality Management Plan

Water Quantity Improvements

As noted in Chapter Five, there are no known existing water quantity problems within the City. However, several recommendations can be made in order to more accurately describe the system as well as account for potential problems in the future.

Survey of Existing System

A survey of the City's drainage system in conjunction with existing as-built information would provide a solid foundation for the development of a citywide map of the stormwater system. The survey should include information such as pipe inverts, lengths, materials, catch basin types and rim elevations, and any other drainage structures that would increase the accuracy of storm drainage components presented in Figure 4-1. The survey would also be used for the development of a hydraulic model. It is recommended that the survey is performed in conjunction with the development of the City's sewer system. Estimated cost: \$22,500

Soils Mapping

Based on discussions with City staff, and as noted in Chapter Five, it is likely that a highly permeable stratum of riverbed deposits underlies the majority of till and outwash within the City. This conclusion was made based on the relatively low actual runoff volumes generated, compared to the higher calculated volumes in Chapter Five. The majority of stormwater runoff infiltrates, which is unusual based on the existing USGS soils classification of highly impermeable till. More accurate soils mapping would be able to provide the locations and depths of this permeable stratum, and therefore a more accurate prediction of runoff volumes. It is recommended that the soils mapping be performed in conjunction with the development of the City's sewer system. Estimated cost: \$12,000

Wetland Delineation

There is an inconsistency between the wetland delineation in the 1996 Carnation Comprehensive Plan and the more recent information from the King County GIS System. The 1996 Comprehensive Plan shows wetlands within the city limits and the King County GIS data does not. Furthermore, the 1996 delineation is likely to be outdated which, combined with the inconsistency with King County, provides a strong basis for new mapping. In addition, accurate wetland delineations would generate more realistic theoretical runoff volumes. It is recommended that the wetland delineation is performed in conjunction with the development of the City's sewer system. Estimated cost: \$12,000

Hydraulics of 60-Inch Culvert

A 60-inch culvert exists through the levee by the Tolt River which discharges into a pond just north of the river bank. Based on discussions with City staff, it is likely that this pond is hydraulically connected to another, larger, manmade pond northwest of it. This larger pond, north east of the bridge along Fall City-Carnation Road, most likely discharges through a culvert under Fall City-Carnation Road. Future investigation of this issue and determining any hydraulic connectivity between these two ponds would provide a better understanding of the City's drainage system. Estimated cost (minor surveying, engineering analysis and design): \$8,000

Hydrologic and Hydraulic Model

As described in Chapter Five, there are no known water quantity problems in the city, due to the fact that the majority of the stormwater runoff infiltrates. However, it is recommended that both a hydrologic and a hydraulic model are developed in order to provide a basis for the analysis of future system expansion (such as the construction of a regional stormwater facility). In the case that the City confronts water quantity problems in the future due to growth, the models could also be used to evaluate additional drainage improvement solutions and impacts of future developments. Estimated cost of model development (excluding analysis): \$30,000

Water Quality Improvements

Water Quality Assessment

As mentioned in Chapter Five, a water quality assessment should be performed. This assessment would represent an evaluation of the existing water quality within the City and its urban growth area. It should be done based on field observations as well as review of relevant data and reports and would be able to identify water quality problems such as non-point source pollution from impervious surfaces, inadequate stormwater treatment facilities, erosion and sediment transport from disturbed areas, pollutant inputs from agricultural lands, pollutant inputs from residences, and accidental discharge of chemicals to the drainage system. Estimated cost: \$10,000

Testing of Soils for Contaminants

The lack of stormwater treatment systems in the City could be a contributor to water quality problems. The most common situation is street and parking lot runoff that is collected in catch basins and infiltrated without water quality treatment. It is

recommended that the testing of soils, especially in the proximity of heavy use streets, is completed. Estimated cost: \$25,000

Miscellaneous Water Quality Improvements

An infiltration drainage structure is located very close to the City well on Entwistle Street and Milwaukee Avenue. The drainage structure should be moved in the future to avoid potential contamination of water in the well by infiltrated stormwater. Estimated cost: \$5,000 (including permitting and relocation). Actual construction costs will depend on market conditions and labor and material costs at the time of construction.

As discussed in Chapter Six, the City should retrofit existing catch basins with oil/water separators in order to improve stormwater quality. These water quality BMPs should be implemented annually to catch basins within the City's stormwater system. Estimated cost: \$10,000 per year

Table 8-1 summarizes the recommended improvements including their estimated costs (in Year 2003 dollars) and recommended year of completion.

TABLE 8-1 RECOMMENDED IMPROVEMENTS AND ESTIMATED IMPLEMENTATION COSTS BY YEAR

RECOMMENDED IMPROVEMENT	YEAR OF COMPLETION					
	2004	2005	2006	2007	2008	2009
Development Standards	\$ 20,000					
Comprehensive Plan					\$ 100,000	
Survey		\$ 22,500				
Soils mapping			\$ 12,000			
Wetland delineation			\$ 12,000			
Hydraulics of culvert			\$ 8,000			
Model development				\$ 30,000		
Water quality assessment		\$ 10,000				
Soils testing		\$ 25,000				
Infiltration facility relocation	\$ 5,000					
Catch basin retrofitting	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000

Chapter Nine
FINANCIAL ANALYSIS

Chapter Nine FINANCIAL ANALYSIS

The City of Carnation currently funds existing stormwater related services out of the general fund. The goal of the financial analysis is to establish a funding strategy to meet the capital and operating needs detailed in this Plan. This financial chapter proposes the implementation of a stormwater utility to fund ongoing operational needs and necessary capital investments.

INTRODUCTION

As noted in the November 2000 Comprehensive Sewer and Facilities Plan, “Stormwater management systems are limited to certain parts of the City, the majority of which are found in newer developments and subdivisions.” (Pg. 3-6)

The City currently funds stormwater operations and maintenance activities through the Street Fund, including storm drainage maintenance, repair and maintenance of the stormwater system and street cleaning. In 2003, supplies for stormwater activities are budgeted at \$5,800, or 22% of the total projected expenditures for street maintenance supplies. It may be reasonable to assume that a proportionate share of the ‘General Street Services’, which include salaries, operational and administrative costs totaling \$101,116, are attributable to stormwater. So, \$5,800 in supplies coupled with 22% of General Street Services costs, or \$22,363, equates to a stormwater budget of approximately \$28,163 for 2003. Additionally, \$79,000 is budgeted within the 2003 Street Fund capital projects lists to fund the Stormwater Master Plan.

STORMWATER PROGRAM FUNDING OPTIONS

A number of funding options are available to the City to meet the needs of a stormwater program. These options include the following:

- Street Fund
- General Fund
- Special Assessments /
- Local Improvement Districts
- Special Fees
- General Facilities Charges
- Fees in Lieu of Onsite Detention
- Public/Private Partnerships
- Conventional Debt
- Special Grants and Loans
- Utility Service Charges

As is the case for the City of Carnation, the **street fund** is a common source of funding for stormwater activities. Drainage infrastructure is often constructed with streets, and the street department further tends to provide system maintenance in the right-of-way. However, stormwater management is not the primary function of a street department, and competing demands for these limited funds may not be the most appropriate environment

to actively promote the City's ongoing objectives in stormwater management. It is important to also note that the method of funding the City's street fund, primarily through property tax revenues with supplemental gasoline taxes, does not provide the best linkage between "who pays" and who is served by the stormwater system.

Likewise, the City's **general fund** is primarily supported by tax revenues. As with the street fund, though on a larger scale, non-dedicated funding for stormwater programs is subject to competing demands on an annual basis therefore proving to be an unreliable source for ongoing commitments to operations and maintenance. Again, the method of funding does not provide the best linkage between "who pays" and who is served by the system. In 2003, \$78,280 in property taxes was dedicated to the street fund, along with \$23,649 in vehicle fuel taxes.

Special assessments, as instruments of local improvement districts (LID's), are most appropriate for specific capital improvements that benefit identifiable geographic service areas. By nature, these options are also effectively voluntary, that is, the property-owners choose through a vote whether or not to implement the assessment on themselves. This possible restriction causes program funding to be unreliable, and furthermore, the assessed valuation basis of charging provides only a loose nexus between the amount charged and the benefit received – it can be argued that potential property damage due to stormwater increases relative to the value of the property. Generally, however, property value does not provide an equitable linkage to runoff contribution.

The City could charge **special fees** for operating activities such as inspections. These fees, however, are best applied when they are set to recover the costs, or a portion of the costs, of the specific activity for which payment was received. Special fees are not generally intended to fund an ongoing stormwater program in its entirety, however they would be well suited for the recovery of specific program-related costs.

General facilities charges (GFC's) are one-time fees paid at the time of development and are intended to recover an equitable share of the costs of existing and planned future facilities that provide capacity for growth. They are an essential tool used to recover the cost of growth from growth. In general, recovering a proportionate share of existing facilities from growth reimburses those who funded construction of those facilities. However, in the case of the City of Carnation, most of the stormwater infrastructure has been constructed as a condition of development and donated to the City or funded by property and gas taxes, making it difficult to quantify a share of the infrastructure costs which should be recovered from new development. Over time, as utility rates finance capital projects, directly or through debt service principal payments, it will become appropriate to incorporate the cost of existing facilities into the GFC calculation. During the early period of a fledgling utility, it may only be appropriate to include a share of planned future facilities, proportionate to the available capacity created to serve growth, in the GFC cost basis.

Finally, it is crucial that GFC's adhere to statutory limitations, defined in the RCW, and legal precedents. The imposition of a GFC does not prohibit the City from requiring new development to construct local stormwater facilities as a condition of permitting. Rather,

the City may provide credits against future GFC's to developers who construct stormwater facilities that serve the general stormwater system and exceed the capacity requirements necessary to serve that specific new development.

Another method of funding required capital projects, **fees in lieu of onsite detention**, is most appropriately used to fund regional facilities through the payments of developing properties. These fees are collected when a developing property determines not to construct facilities to mitigate runoff onsite. As such, fees in lieu must be used in concert with requirements for onsite mitigation and a community's goals favoring regional facilities over onsite solutions. When a property does construct such facilities, the fee is not charged. While effective in funding a part of (regional) infrastructure construction, fees in lieu are not a reliable source for ongoing stormwater programming.

A different approach to funding stormwater capital construction is the **public/private partnership** resulting in joint or private funding of specific improvements. This approach helps mitigate the direct impacts of new development. While a popular idea, in practice it is difficult to persuade private development to fund stormwater projects if other funding alternatives are available to the City.

Conventional debt, such as revenue bonds and general obligation (G.O.) bonds, is available to fund stormwater capital construction. While these mechanisms are well suited for funding large capital construction projects, an ongoing revenue stream is required to support the annual debt service owed on the amount borrowed. Furthermore, aside from the financial risk the City undertakes when debt-financing, issuing bonds requires clear political decisions from City leadership. First, the City must be willing to use its limited debt capacity should it seek G.O. debt to fund the program, regardless of whether or not stormwater rate revenues are pledged for debt repayment. Second, the City must be willing to increase its ongoing revenue stream to meet coverage required as a part of legal bond covenants serving revenue bond debt.

As a supplement or alternative to conventional debt service, **special grants and loans** may be an important option for the City. Many state and federal programs are available for applications, including the Centennial Clean Water Fund (CCWF), the Public Works Trust Fund (PWTF), the State Revolving Fund (SRF), the Flood Control Assistance Account Program, and the Federal 319 Non-Point Source Program. These programs draw more applications every year than there are available funds, and they are highly competitive. In 2003, the PWTF awarded \$71.7 million dollars in loans, while the Department of Ecology (DOE) has recommended \$97.8 million in loans and grants for 2004 through the SRF, the Federal 319 Program, and the CCWF. The DOE-administered programs for non-point source pollution use a single application, and the cycle for 2004 funding was from January 2 through March 5, 2003. The PWTF construction loan cycle ended in May (for funding in 2004). Most of the assistance programs award aid in the form of low-interest loans that still require an ongoing revenue stream to support payback.

Through the formation of a **utility and associated enterprise fund**, **monthly service charges** provide a reliable, ongoing revenue stream that can support annual payments and

legal conditions on any debt required to construct facilities. Furthermore, monthly utility rates provide an opportunity to collect from property-owners in proportion to their individual contributions to stormwater runoff.

RECOMMENDED FUNDING STRATEGY

Form a utility and charge ongoing rates sufficient to recover operations costs and capital costs unmet by the following supplementary funding sources.

- **General facilities charges.** Charge GFC's to recover the costs of growth-related capital from new development.
- **Special fees.** Charge special fees to recover costs of inspection and other specific activities.
- **Special Programs.** Actively pursue grants and loans to help fund capital construction.
- **Conventional debt.** Issue general obligation or revenue bond debt as necessary to fund capital construction.
- **Public/private partnership.** Pursue opportunities to leverage private funding for capital construction.

THE UTILITY CHARGE CONCEPT

Under a utility concept, the key instrument recommended in the funding approach, stormwater management costs, or a significant portion of them, would be recovered through ongoing rates to utility customers. For the most part, the utility would be a financially independent entity, free of reliance on the general fund, with all of its revenues dedicated to surface water management operations, maintenance and capital construction.

Utilizing a utility concept, it would be possible for the City to incorporate a mix of the funding options evaluated above, with utility rates as the backbone funding source, special fees for specific activities, GSC's, special grants and loans when available, conventional debt service when necessary, and public-private partnerships. When needed, the utility would provide the City the ability to secure debt supported by reliable rate revenues. By having dedicated resources available to serve programmatic needs, a utility is also well suited to meet regulatory requirements.

Rate Philosophy Options

There are a number of potential bases for charging stormwater rates. These rate bases vary in terms of their defensibility, fairness, ease of implementation / administration, and understandability. Key alternative rate bases are discussed below.

The most common basis for charging stormwater fees throughout the United States is **impervious surface area**. The term refers to hard surface area that prevents or slows

water permeation into the ground. RCW 35.67, the authorization of the stormwater utility concept, allows the imposition of service rates based on contribution of runoff. Impervious surface area is most widely accepted as an appropriate measure of a property's contribution of runoff, providing a clear relationship, or "rational nexus," to service received from a stormwater program. Moreover, engineering analysis provides a clear linkage between impervious surface area and stormwater runoff contributions. Case law, including *Teter vs. Clark County Stormwater Utility* (Washington) and *Long Run Baptist Association vs. Metropolitan Sewer District* (Kentucky), provides legal precedent establishing a correlation between impervious surface area and impact on the stormwater system.

To administer a rate structure based on impervious surface area, data quantifying the applicable area by parcel is required. To minimize administrative and data collection costs, stormwater utilities typically develop a uniform rate for single family residential customers based on the estimated average amount of impervious surface area per developed single family residential parcel – commonly referred to as an equivalent service unit or ESU.

The charge basis for all other customer types is generally actual measured impervious surface area by parcel, expressed as the number of ESUs on the parcel. The rate itself is most commonly calculated as a dollar amount per ESU. As an example, assuming that a charge of \$10 per ESU per month is calculated, each single-family residential customer would be charged \$10 per month. Assuming that this ESU represents a single-family residential average of 3,000 square feet of impervious surface area, a nonresidential customer with 15,000 square feet of impervious surface area would be charged \$50 for five ESUs ($15,000 / 3,000 = 5$).

As an alternative or supplemental measurement of runoff contribution, **density of development** can be used. The term refers to density factors for specific categories of land use that can be applied to parcel size. It may be used in combination with actual impervious surface area measurements to adjust charges depending on the percentage of the parcel covered by hard surface. As an adjusting factor, it is used to acknowledge that, for example, 5,000 square feet of impervious surface on a 6,000 square foot lot more directly impacts the public system than 5,000 square feet of hard surface on a 30,000 square foot lot. As with impervious surface area, density of development is an appropriate charge basis because it adequately quantifies the relationship between the rate paid and the amount of service received.

Assuming the City decides to pursue a stormwater utility, we would recommend that the City implement a fee structure that is based on impervious surface area. The impervious surface fee basis creates a standard of charging that quantifies how different amounts of impervious surface area cause proportionately different impacts on the environment in terms of flooding, water quality, and habitat degradation. By recognizing that relationship, the fee structure basis proportionately charges different customers their share of the system's cost burden and provides an equitable, defensible means of cost recovery for a stormwater utility. In the absence of good data on impervious surface area for City utility customers, we recommend a two-step process, in which the City would

initially estimate the amount of impervious surface area for nonresidential customers by land use and utilize the single-family residential average amount of impervious surface area from a comparable community. These bases could then be replaced by measured impervious surface area over time.

Potential Rate Exemptions and Credits

In some cases, it may be appropriate to allow for adjustments to the service charge based on the characteristics of the customer or of the parcel. When considering such rate adjustments, it is important to remember that a periodic stormwater rate is a fee for service, not a tax. As such, the level of a customer's charge must substantially relate to that customer's proportionate share of the utility's costs. In terms of equity and legal defensibility, it is important to recognize the significance of that type of relationship when defining exemption or credit policies because such policies could potentially move a utility away from the rational linkage between service and fee. The fee-for-service philosophy requires that all who are served by the system pay for that service. We therefore recommend that no credits be offered for the following customer types:

- **Elderly and/or low-income customers.** Developed properties owned by senior citizen and/or low-income customers still contribute runoff that places a cost burden on the utility system.
- **Publicly owned properties** also contribute runoff that places a cost burden on the utility.
- **Tax-exempt properties** are also subject to the general criterion for credit or exemption eligibility, that is, the specific parcel must have characteristics or improvements that reduce the cost of service when compared to similar properties in order to be eligible for cost relief.

Finally, utilities may offer credits for **on-site mitigation of stormwater impacts**. Applicable statute (RCW 35.67.020 and RCW 35.92.020) grants discretion to city legislative bodies in the setting of rates and charges (and, it follows, credits), allowing for the consideration of such factors as differences in the cost and/or character of service provided and capital contributions made to the system. However, the statute says that a city legislative body *may* consider such factors in establishing differences among customers for rate purposes, perhaps enabling a city to legally deny credits for on-site mitigation.

A carefully structured credit system can provide incentives for new and existing development to provide facilities and services that serve their own developed property while improving stormwater management Citywide. However, it is prudent to limit the provision of credits to an amount approximating that which is a truly saved cost to the utility. The issue of cost saving directly relates to the policy decision of whether credits should be provided for on-site mitigation that *meets* or *exceeds* City standards.

The criteria for receiving credits should include that stormwater facility requirements built for the sake of obtaining development approval must effectively reduce the utility's

costs *above and beyond* the required amount called for in granting development approval. The cost of *meeting* City standards should be considered as a “cost of doing business,” since this only erases the extra damage created by building the private property in the first place. The amount of credit, which should never exceed the monthly charge, should be determined by the *extent* to which the on-site facility *reduces utility costs above and beyond what would be saved with facilities constructed as a normal condition of development approval*.

Rate Analysis

Presuming the City proceeds with an impervious surface area rate basis, the rate calculation becomes straightforward – rates will be based on the amount of actual or assumed impervious surface area on the parcel. The rate is then expressed as a dollar amount per equivalent service unit (ESU), with an ESU equal to the average amount of impervious surface area on the City’s developed single-family residential parcels. The total of annual unfunded program costs, or the rate revenue requirement, is divided by the total number of equivalent service units in the customer base (adjusted to account for likely credits granted). The result may be divided again by twelve to convert it to a monthly figure.

$$\boxed{\text{Monthly Rate}} = \boxed{\text{Annual Program Revenue Requirement}} \div \boxed{\text{Total Number of ESUs}} \div \boxed{\text{Twelve (months)}}$$

Perhaps the most important concept in rate setting is the concept of the revenue requirement. The revenue requirement in any given year is the total amount of rate revenue needed to meet a utility’s defined financial obligations. The revenue requirement establishes the amount of the rate. Further, any adjustments in rates must be tied to changes in the revenue requirement. Rate adjustments cannot be made arbitrarily or in a way that generates a profit. Rather, adjustments in rates should be initiated by either a change in the cost of service provided or a change in the level of service provided by the utility.

As stated previously, the City’s current stormwater related activities include storm drainage maintenance, repair and maintenance of the stormwater system and street cleaning. Other current City activities, such as grass buffering the roadside, may also be considered a benefit to the stormwater system.

Typically, stormwater program activities include the following. All would have a direct impact on the total revenue requirement.

- **Capital Construction:** The Capital Improvement Program (CIP) will be directed by infrastructure needs identified in this Facilities Plan.
- **System Maintenance:** The City will need to continue to perform stormwater maintenance, likely increasing the level of service.

- **Water Quality Management:** Water quality management will require the City to dedicate funding to public education, illicit discharge detection, construction site controls and best management practice development.
- **Public Education:** Public education includes expenditures for public awareness brochures / flyers regarding stormwater program needs, costs and rates.
- **Plan Review, Inspection, and Engineering & Planning:** This function involves implementation of the projects identified in this facilities plan in a manner that is consistent with water quality and quantity control policies and programs.
- **Finance / Billing / Accounting / Payroll:** These are utility support functions related to stormwater data processing, invoicing, remittance handling and accounting.
- **Policy Requirements:** As a self-sustaining enterprise, a stormwater utility must maintain adequate reserves to meet revenue and expenditure ebbs and flows. Further, the City will likely wish to create capital reserves to house GFC revenues and accumulate funds for anticipated capital projects or for replacement of existing infrastructure as it reaches the end of its useful life.

In order to define the total number of equivalent service units, the denominator in the rate calculation, the City will need to first conduct a representative sampling survey of single-family residences, measuring the amount of impervious surface area, and deriving an average. This average will then be used to define one ESU. All nonresidential properties must be measured to determine the total impervious surface area of each property. This surface area is then expressed as a number of ESUs. If the City decides to provide credits for nonresidential properties exceeding the City's stormwater mitigation and control standards, then the total number of ESUs should be reduced to reflect this credit.

It is estimated that the approximate impervious surface area within the existing City limits is 115.4 acres. Using an assumed ESU value of 3,000 square feet of impervious surface area, then the City would have an initial customer base of approximately 1,675 ESUs¹. Further assuming that 10% of the total will be lost to credits for on-site mitigation, then the City could generate approximately \$90,450 in annual rate revenue if the monthly rate is \$5 per ESU². A range of revenue estimates is provided in Table 9-1 below for comparative purposes only.

This example presumes that the same rate will apply throughout the service area. If cost differentials warrant, it is also possible (and in some cases, desirable) to use the same general approach to calculate basin-specific rates – recovering specific costs incurred in a basin from the customers in that basin.

¹ 115.4 acres X 43,560 / 3,000 = 1,675

² (1,675 – 167.5) X \$5 X 12 = \$90,450

TABLE 9-1 REVENUE ESTIMATES

MONTHLY RATE	ESTIMATED ANNUAL REVENUE
\$2.50	\$45,225
\$5.00	\$90,450
\$7.50	\$135,675
\$10.00	\$180,900
\$12.50	\$226,125

CONCLUSION

The City has several funding options available to meet some or all of its stormwater program needs. As discussed above, some of these funding options are limited and/or restricted. Forming a stormwater utility creates a reliable and dedicated funding source to meet both operational and capital stormwater needs. We recommend that the City form a utility, establish an ongoing stormwater rate, and supplement rate revenues (thereby minimizing required rates) with the following funding sources:

- General facilities charges;
- Special fees;
- Special Programs;
- Conventional debt;
- Public/private partnerships.

In order to form a utility, the following general steps are recommended:

- Develop a policy framework for the utility;
- Calculate rates and GSC's;
- Solicit public involvement and input;
- Adopt utility formation and rate ordinance(s).

APPENDICES

APPENDIX "A"

SEPA CHECKLIST

RECEIVED

AUG 25 2003

ROTHHILL ENGNR. PARTNERS, LLC
BELLEVUE, WA

WAC 197-11-970 Determination of nonsignificance (DNS).

DETERMINATION OF NONSIGNIFICANCE

Description of proposal: CITY OF CARNATION STORMWATER COMPREHENSIVE PLAN

THE CITY OF CARNATION 2003 STORMWATER COMPREHENSIVE PLAN ADDRESSES THE CITY'S STORMWATER MANAGEMENT PLAN AND OUTLINES RECOMMENDATIONS FOR AN EFFECTIVE STORMWATER PROGRAM AND STORMWATER IMPROVEMENTS. THE PRIMARY PURPOSES OF THE PLAN ARE TO DOCUMENT THE CITY'S PLANNING DATA , ANALYZE THE CURRENT REGULATORY REQUIREMENTS AND IMPACTS ON THE CITY, RECOMMEND REVISIONS TO EXISTING POLICIES AND CITY ORDINANCES TO MEET REGULATORY REQUIREMENTS, DOCUMENT THE CITY'S MAJOR DRAINAGE BASINS AND EXISTING STORM DRAINAGE FACILITIES WITHIN EACH BASIN, DOCUMENT EXISTING STORM DRAINAGE PROBLEMS WITHIN THE CITY, DETERMINE RUNOFF VOLUMES FOR THE MAJOR DRAINAGE BASINS, DOCUMENT OPERATION AND MAINTENANCE PRACTICES, DOCUMENT PUBLIC EDUCATION AND INVOLVEMENT PROGRAMS, SUMMARIZE RECOMMENDED IMPROVEMENTS IN A CAPITAL IMPROVEMENT PLAN

Proponent: CITY OF CARNATION

Location of proposal, including street address, if any:

THE PROPOSED STORMWATER COMPREHENSIVE PLAN ADDRESSES ISSUES FOR THE ENTIRE CITY OF CARNATION.

Lead agency: CITY OF CARNATION

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

[] There is no comment period for this DNS.

[X] This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 20 days from the date below. Comments must be submitted by September 15, 2003.


Responsible Official: Bill Brandon

Position/Title: City Manager

Phone: (425) 333-4192

Address: City of Carnation
4621 Tolt Avenue
PO Box 1238
Carnation, WA 98014-1238

Date: AUGUST 25, 2003

Signature:  _____

[X] There is no agency appeal.

ENVIRONMENTAL CHECKLIST

Purpose of Checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant. Requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers to provide additional information reasonably related to determining if there may be significant adverse impact.

Use of Checklist for Nonproject Proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," and "affected geographic area," respectively.

A. **BACKGROUND**

1. Name of proposed project, if applicable:

CITY OF CARNATION STORMWATER COMPREHENSIVE PLAN

2. Name of applicant:

CITY OF CARNATION

3. Address and phone number of applicant and contact person:

CITY OF CARNATION
4641 TOLT AVENUE
PO BOX 1238
CARNATION, WA 98014-1238
ATTN: BILL BRANDON, CITY MANAGER

4. Date checklist prepared: AUGUST 19, 2003

5. Agency requesting checklist:

KING CONSERVATION DISTRICT
WASHINGTON STATE DEPARTMENT OF ECOLOGY

6. Proposed timing or schedule (including phasing, if applicable):

THE STORMWATER COMPREHENSIVE PLAN IS EXPECTED TO BE ADOPTED IN FALL 2003.

7. Do you have any plans for future additions, expansion, or further activity related to, or connected with this proposal? If yes, explain.

NO. THE STORMWATER COMPREHENSIVE PLAN DEFINES STORMWATER ISSUES WITHIN THE CITY. FUTURE PROPOSALS WILL BE EVALUATED AS THEY OCCUR.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

NONE FOR THIS PROPOSAL. FUTURE PROJECTS PROPOSED IN THE CITY MAY REQUIRE, DEPENDING UPON THE SCOPE OF THE PROJECT, THEIR OWN ENVIRONMENTAL EVALUATION.

WITH BOTH PRIVATE AND PUBLIC DEVELOPMENT, IT IS ANTICIPATED THAT SEPA DETERMINATIONS AND ANALYSES WILL OCCUR ON A PROJECT-BY-PROJECT BASIS, AS REQUIRED.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

NONE KNOWN.

10. List any government approvals or permits that will be needed for your proposal, if known.

CARNATION CITY COUNCIL
WASHINGTON STATE DEPARTMENT OF ECOLOGY (ADVISORY)
KING CONSERVATION DISTRICT

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

THE CITY OF CARNATION 2003 STORMWATER COMPREHENSIVE PLAN ADDRESSES THE CITY'S STORMWATER MANAGEMENT PLAN AND OUTLINES RECOMMENDATIONS FOR AN EFFECTIVE STORMWATER PROGRAM AND STORMWATER IMPROVEMENTS. THE PRIMARY PURPOSES OF THE PLAN ARE TO DOCUMENT THE CITY'S PLANNING DATA , ANALYZE THE CURRENT REGULATORY REQUIREMENTS AND IMPACTS ON THE CITY, RECOMMEND REVISIONS TO EXISTING POLICIES AND CITY ORDINANCES TO MEET REGULATORY REQUIREMENTS, DOCUMENT THE CITY'S MAJOR DRAINAGE BASINS AND EXISTING STORM DRAINAGE FACILITIES WITHIN EACH BASIN, DOCUMENT EXISTING STORM DRAINAGE PROBLEMS WITHIN THE CITY, DETERMINE RUNOFF VOLUMES FOR THE MAJOR DRAINAGE BASINS, DOCUMENT OPERATION AND MAINTENANCE PRACTICES, DOCUMENT PUBLIC EDUCATION AND INVOLVEMENT PROGRAMS, SUMMARIZE RECOMMENDED IMPROVEMENTS IN A CAPITAL IMPROVEMENT PLAN

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any applications related to this checklist.

THE PROPOSED STORMWATER COMPREHENSIVE PLAN ADDRESSES ISSUES FOR THE ENTIRE CITY OF CARNATION. CARNATION IS LOCATED SECTIONS 15, 16, 21 AND 22, TOWNSHIP 25 NORTH, RANGE 7 EAST, W.M., IN KING COUNTY, WASHINGTON, AT THE CONFLUENCE OF THE TOLT AND SNOQUALMIE RIVERS.

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY**B. ENVIRONMENTAL ELEMENTS****1. EARTH**

- a. General description of the site (circle one): **FLAT, ROLLING, hilly, STEEP SLOPES**, mountainous, other (_____).

- b. What is the steepest slope on the site (approximate percent slope)?

APPROXIMATELY 6 PERCENT.

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

CITY WIDE THE SOILS ARE AS FOLLOWS:

ORIDIA SILT LOAM (OS) – SLOPES LESS THAN 2 PERCENT.

PILCHUCK LOAMY FINE SAND (PC) – SLOPES LESS THAN 2 PERCENT

RENTON SILT LOAM (RE) – SLOPES 0 TO 1 PERCENT

RIVERWASH (RH)

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

KING COUNTY GIS INFORMATION INDICATES SEISMIC, EROSION AND LANDSLIDE HAZARD AREAS AT THE NORTHEAST END OF THE CITY.

- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

THIS PLAN DOES NOT REQUIRE FILLING OR GRADING. THE ISSUE OF FILLING AND GRADING WILL BE ADDRESSED BY THE INDIVIDUAL PROJECT CHECKLISTS AS THEY ARE REQUIRED.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

NOT AS A RESULT OF THIS PLAN. THE ISSUE OF EROSION CONTROL WILL BE ADDRESSED AS REQUIRED BY THE INDIVIDUAL PROJECT CHECKLISTS AS THEY OCCUR.

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

NOT APPLICABLE TO THIS PLAN. THE ISSUE OF IMPERVIOUS SURFACE WILL BE ADDRESSED BY THE INDIVIDUAL PROJECTS AS THEY OCCUR.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

DOES NOT APPLY TO THIS PLAN.

2. **AIR**

- a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.

NONE AS A RESULT OF THIS PLAN.

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

- c. Proposed measures to reduce or control emissions or other impacts to air, if any.

DOES NOT APPLY TO THIS PLAN.

3. **WATER**

- a. Surface

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

KING COUNTY GIS INFORMATION INDICATES THE PRESENCE OF SMALL WATER BODIES AT THE NORTH AND SOUTH ENDS OF THE CITY. THE TOLT RIVER RUNS EAST TO WEST AT THE SOUTH END OF THE CITY AND THE SNOQUALMIE RIVER RUNS SOUTH TO NORTH AT THE WEST SIDE OF THE CITY. THE TOLT RIVER FLOWS INTO THE SNOQUALMIE RIVER, WHICH FLOWS INTO THE SNOHOMISH RIVER, WHICH FLOWS INTO PUGET SOUND.

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

DOES NOT APPLY TO THIS PLAN. NI CAPITAL IMPROVEMENT PROJECTS LISTED IN THE PLAN WOULD REQUIRE WORK WITHIN 200 FEET OF THESE WATERS.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

NONE.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities, if known.

NO.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

THE FEMA FLOOD INSURANCE RATE MAP (FIRM) INFORMATION INDICATES THAT AREAS OF THE CITY TO THE NORTH, WEST AND SOUTHEAST LIE WITHIN A 100 YEAR FLOODPLAIN.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

DOES NOT APPLY TO THIS PLAN.

b. Ground:

- 1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities, if known.

THERE WILL BE NO GROUNDWATER WITHDRAWALS AS A RESULT OF THIS PLAN.

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage: industrial, containing the following chemicals ... ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

NO WASTE MATERIALS WILL BE DISCHARGED INTO THE GROUND AS A RESULT OF THIS PLAN. RELOCATION AND REPLACEMENT OF AN EXISTING INFILTRATION STORMWATER SYSTEM FACILITY IS DESCRIBED IN THE PLAN AS A CAPITAL PROJECT FOR FUTURE IMPLEMENTATION.

c. Water Runoff (including storm water):

- 1) Describe the source of runoff (including storm water) and method of

collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

RUNOFF IS PRIMARILY COLLECTED FROM CITY STREETS AND PRIVATE PROPERTY DRAINING INTO THE RIGHT-OF-WAY. CITYWIDE, THE RUNOFF RANGES FROM 17.7 ACRE/FEET FOR A 2-YEAR, 24-HOUR STORM TO 113.4 ACRE/FEET FOR A 100-YEAR, 24-HOUR STORM.

THE CITY HAS A MISCELLANEOUS COLLECTION OF OPEN DITCHES, CULVERTS, CATCH BASINS, WETLANDS AND INFILTRATION SYSTEMS, AS WELL AS A DETENTION POND. THERE ARE NO OUTFALLS TO EITHER RIVER AND INFILTRATION HAS HISTORICALLY PROVEN VERY EFFECTIVE.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

NO WASTE MATERIALS WILL BE DISCHARGED INTO GROUND OR SURFACE WATER AS A RESULT OF THIS PLAN. IMPROPER USE OF PUBLIC FACILITIES IS DISCOURAGED, BUT COULD POTENTIALLY RESULT IN WASTE MATERIALS BEING INFILTRATED INTO THE GROUND, BUT THE PLAN WILL NOT DIRECTLY LEAD TO SUCH ACTIVITY.

- d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

THE PROPOSED STORMWATER COMPREHENSIVE PLAN ADDRESSES THE ISSUES OF SURFACE, GROUND AND RUNOFF WATER IMPACTS CITY WIDE. SPECIFIC EROSION CONTROL MEASURES WILL BE DISCUSSED BY INDIVIDUAL PROJECTS AS NEEDED.

4. PLANTS

- a. Check or circle types of vegetation found on the site:

CITY WIDE, ALL TYPES OF VEGETATION CAN BE FOUND. SPECIFIC TYPES WILL BE ADDRESSED BY INDIVIDUAL PROJECT CHECKLISTS AS NEEDED.

deciduous tree: alder, maple, aspen, other (birch)

evergreen tree: fir, cedar, pine, other (redwood)

shrubs

grass

pasture

crop or grain

wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other ()

water plants: water lily, eelgrass, milfoil, other ()

other types of vegetation

- b. What kind and amount of vegetation will be removed or altered?

NONE AS A RESULT OF THIS PLAN.

- c. List threatened or endangered species known to be on or near the site.

NONE.

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

DOES NOT APPLY.

5. **ANIMALS**

- a. Circle any birds and animals that have been observed on or near the site or are known to be on or near the site:

CITY WIDE THE FOLLOWING SPECIES HAVE BEEN OBSERVED OR ARE KNOWN TO BE IN THE VICINITY.

birds: HAWK, HERON, EAGLE, SONGBIRDS, other (OSPREY)

mammals: DEER, bear, elk, beaver, OTHER (COYOTE, RACCOON)

fish: bass, SALMON, TROUT, herring, shellfish, other) (____)

- b. List any threatened or endangered species known to be on or near the site.

THE WASHINGTON STATE DEPARTMENT OF FISH AND WILDLIFE PRIORITY HABITAT INFORMATION INDICATES THE PRESENCE OF EAGLES, HERONS AND SOME SPECIES OF SALMON, AND BULL TROUT.

- c. Is the site part of a migration route? If so, explain.

THE TOLT AND SNOQUALMIE RIVERS ARE DESIGNATED AS WILDLIFE CORRIDORS BY THE WASHINGTON STATE DEPARTMENT OF FISH AND WILDLIFE.

- d. Proposed measures to preserve or enhance wildlife, if any:

THE PLAN IS INTENDED TO PRESERVE THE ENVIRONMENT BY IMPROVING WATER QUALITY. WATER QUALITY. SPECIFIC SPECIES WILL BE ADDRESSED BY INDIVIDUAL PROJECT CHECKLISTS AS NEEDED.

6. **ENERGY AND NATURAL RESOURCES**

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

NO FORMS OF ENERGY WILL BE REQUIRED FOR THIS PLAN. ALL FACILITIES IN THE PLAN OPERATE BY GRAVITY.

- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

NO.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

DOES NOT APPLY TO THIS PLAN.

7. **ENVIRONMENTAL HEALTH**

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

DOES NOT APPLY TO THIS PLAN.

- 1) Describe special emergency services that might be required.

NONE ARE ANTICIPATED.

- 2) Proposed measures to reduce or control environmental health hazards, if any:

RELOCATION AND REPLACEMENT OF SOME INFILTRATION FACILITIES NEAR A CITY-OWNED WATER SUPPLY WELL ARE LISTED IN THE CAPITAL IMPROVEMENT PROGRAM AS FUTURE PROJECTS.

b. Noise

- 1) What types of noise exist in the area that may affect your project (for example: traffic, equipment, operation, other)?

NONE.

- 2) What types and levels of noise would be created by, or associated with, the project on a short-term or long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

DOES NOT APPLY.

- 3) Proposed measures to reduce or control noise impacts, if any:

DOES NOT APPLY.

8. **LAND AND SHORELINE USE**

- a. What is the current use of the site and adjacent properties?

THE MAJORITY OF THE CITY IS RESIDENTIAL, WITH COMMERCIAL AND SMALL BUSINESS AREAS, PARK AND OPEN SPACE AREAS, COMMUNITY FACILITIES AND VARIOUS VACANT LOTS.

- b. Has the site been used for agriculture? If so, describe.

YES. SOME AREAS TO THE WEST AND SOUTH OF THE CITY ARE ZONED R-A, RESIDENTIAL-AGRICULTURAL.

- c. Describe any structures on the site.

THERE ARE MANY DIFFERENT TYPES OF STRUCTURES WITHIN THE CITY INCLUDING HOMES, BUSINESSES AND ALL TYPES OF STRUCTURES FOUND IN A SMALL CITY.

- d. Will any structures be demolished? If so, what?

NO. DOES NOT APPLY TO THIS PLAN.

- e. What is the current zoning classification of the site?

THE CURRENT CITY ZONING CLASSIFICATIONS ARE:

R-A, RESIDENTIAL AGRICULTURAL
SR-12.5, RESIDENTIAL SINGLE FAMILY
UR-7.5, URBAN RESIDENTIAL SINGLE FAMILY
RMHP, RESIDENTIAL MOBILE HOME PARK
MFR, MULTI-FAMILY RESIDENTIAL
CBD, CENTRAL BUSINESS DISTRICT
MU, MIXED USE
LI/M, LIGHT INDUSTRIAL/MANUFACTURING

- f. What is the current comprehensive plan designation of the site?

URBAN.

- g. If applicable, what is the current shoreline master program designation of the site?

THE AREAS AROUND THE TOLT AND SNOQUALMIE RIVERS HAVE BEEN DESIGNATED AS CONSERVANCY AREAS.

- h. Has any part of the site been classified as an "environmentally sensitive"

area? If so, specify.

DOES NOT APPLY TO THIS PLAN; HOWEVER FEMA HAS DESIGNATED A MAJOR PORTION OF THE CITY AS A FLOODPLAIN AREA. THERE ARE ALSO EROSION AND LANDSLIDE AREAS AT THE NORTHEAST END OF THE CITY. SENSITIVE AREAS WILL BE ADDRESSED AS NEEDED ON AN INDIVIDUAL PROJECT BASIS.

- i. Approximately how many people would reside or work in the completed project?

NONE.

- j. Approximately how many people would the completed project displace?

NONE.

- k. Proposed measures to avoid or reduce displacement impacts, if any:

DOES NOT APPLY.

- l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

THE PROPOSAL IS TO CREATE A STORMWATER COMPREHENSIVE PLAN WITH WHICH INDIVIDUAL PROJECTS MUST COMPLY.

9. HOUSING

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

NONE.

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

NONE.

- c. Proposed measures to reduce or control housing impacts, if any:

DOES NOT APPLY.

10. AESTHETICS

- a. What is the tallest height of any proposed structure(s), not including antennas: what is the principal exterior building material(s) proposed?

DOES NOT APPLY.

- b. What views in the immediate vicinity would be altered or obstructed?

NONE.

- c. Proposed measures to reduce or control aesthetic impacts, if any:

DOES NOT APPLY.

11. **LIGHT AND GLARE**

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

NONE AS A RESULT OF THIS PLAN.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

- c. What existing off-site sources of light or glare may affect your proposal?

NONE.

- d. Proposed measures to reduce or control light and glare impacts, if any:

DOES NOT APPLY.

12. **RECREATION**

- a. What designated and informal recreational opportunities are in the immediate vicinity?

WITHIN THE CITY AND SURROUNDING AREAS, VALLEY MEMORIAL PARK, THE TOLT RIVER-JOHN McDONALD PARK, THE SNOQUALMIE VALLEY TRAIL, THE TOLT RIVER, AND THE SNOQUALMIE RIVER OFFER RECREATIONAL OPPORTUNITIES. THE GIRL SCOUTS OPERATE CAMP RIVER RANCH SOUTH OF THE TOLT RIVER ADJACENT TO REMLINGER FARMS.

- b. Would the proposed project displace any existing recreational use? If so, describe.

NO.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

DOES NOT APPLY.

13. HISTORIC AND CULTURAL PRESERVATION

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

NONE KNOWN.

- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

NONE KNOWN.

- c. Proposed measures to reduce or control impacts, if any:

DOES NOT APPLY.

14. TRANSPORTATION

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on-site plans, if any.

FALL CITY-CARNATION ROAD AND TOLT AVE ARE THE MAIN ACCESS ROADS INTO AND OUT OF THE CITY.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

THE CITY IS SERVED BY METRO TRANSIT ROUTES 922 AND 929 THAT RUN ALONG TOLT AVE. (SR 203).

- c. How many parking spaces would the completed project have? How many would the project eliminate?

DOES NOT APPLY.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

DOES NOT APPLY.

- g. Proposed measures to reduce or control transportation impacts, if any:

DOES NOT APPLY.

15. **PUBLIC SERVICES**

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

- b. Proposed measures to reduce or control direct impacts on public services, if any.

DOES NOT APPLY.

16. **UTILITIES**


- a. Circle utilities currently available at the site: ELECTRICITY, natural gas, WATER, REFUSE SERVICE, TELEPHONE, sanitary sewer, SEPTIC SYSTEM, other.

- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

THE STORMWATER COMPREHENSIVE PLAN DESCRIBES APPROPRIATE STORMWATER MANAGEMENT, PROCEDURES AND POLICIES TO SUPPORT STORMWATER MANAGEMENT AND FACILITIES IN THE CITY BUT IS NOT A PROPOSAL FOR UTILITY CONSTRUCTION.

C. **SIGNATURE**

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Date Submitted: 8-19-03

D. SUPPLEMENTAL SHEL. FOR NONPROJECT ACTIONS

- (1) How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

THIS PROPOSAL, THE CITY OF CARNATION STORMWATER COMPREHENSIVE PLAN, WILL NOT ADVERSELY AFFECT THE ENVIRONMENT. THE PLAN SETS THE STAGE FOR ORDERLY FUTURE DEVELOPMENT WITHIN THE CITY.

Proposed measures to avoid or reduce such increases are:

PROPOSED FUTURE PROJECTS WILL BE REVIEWED AND ADDRESSED BY THE CITY AS PROJECTS COMMENCE. ADDITIONALLY, DEVELOPMENT AND GROWTH WILL BE MONITORED AND CONTROLLED BY THE CITY OF CARNATION.

- (2) How would the proposal be likely to affect plants, animals, fish, or marine life?

THE PLAN IS INTENDED TO STRUCTURE FUTURE STORMWATER MANAGEMENT TO AVOID AND MINIMIZE ADVERSE IMPACTS.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

PROPOSED PROJECTS WILL BE REVIEWED AND ADDRESSED BY THE CITY AND OTHER APPROPRIATE AGENCIES AS THEY COMMENCE.

- (3) How would the proposal be likely to deplete energy or natural resources?

DOES NOT APPLY TO THIS PLAN.

Proposed measures to protect or conserve energy and natural resources are:

THE PLAN IS INTENDED TO ANALYZE CURRENT POLICIES AND ORDINANCES TO ASSIST THE CITY IN ACHIEVING THESE GOALS.

- (4) How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

THE STORMWATER COMPREHENSIVE PLAN WILL NOT AFFECT THE CURRENT USAGE OF SITES. FUTURE PROJECTS WITHIN THE CITY WILL NEED TO ADDRESS THESE CONCERNS MORE SPECIFICALLY.

Proposed measures to protect such resources or to avoid or reduce impacts are:

FUTURE PROJECTS WILL BE REVIEWED AND ADDRESSED BY THE CITY AND OTHER APPROPRIATE AGENCIES AS THE PROJECTS COMMENCE.

- (5) How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

THIS STORMWATER COMPREHENSIVE PLAN DOES NOT ALLOW OR ENCOURAGE USES INCOMPATIBLE WITH EXISTING PLANS. THIS PLAN WILL SET THE PARAMETERS BY WHICH FUTURE PROJECTS WILL BE EVALUATED.

Proposed measures to avoid or reduce shoreline and land use impacts are:

CONFORMANCE TO APPLICABLE CITY OF CARNATION GUIDELINES AND ZONING REQUIREMENTS, AND OTHER REGULATIONS WOULD BE REQUIRED WHEN FUTURE DEVELOPMENT OCCURS.

- (6) How would the proposal be likely to increase demands on transportation or public services and utilities?

THE STORMWATER COMPREHENSIVE PLAN DOES NOT CONFLICT WITH ANY KNOWN ENVIRONMENTAL LAWS. DEVELOPMENT AND GROWTH WHICH MAY FOLLOW WILL BE IN ACCORDANCE WITH ENVIRONMENTAL RESTRICTIONS, AS WELL AS LOCAL GUIDELINES.

Proposed measures to reduce or respond to such demand(s) are:

GROWTH IS TO BE GUIDED BY THE CITY OF CARNATION COMPREHENSIVE AND COMMUNITY PLANNING. UTILITIES AND SERVICES MAY BE EXTENDED AND EXPANDED TO MEET THESE PROJECTED NEEDS.

- (7) Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

THE STORMWATER COMPREHENSIVE PLAN DOES NOT CONFLICT WITH ANY KNOWN ENVIRONMENTAL LAWS. PORTIONS OF SOME OF THE PROJECTS MAY REQUIRE A UTILITY EXCEPTION FOR MINOR VARIANCES TO PORTIONS OF THE SENSITIVE AREAS ORDINANCE. DEVELOPMENT AND GROWTH WHICH MAY FOLLOW WILL BE IN ACCORDANCE WITH ENVIRONMENTAL RESTRICTIONS, AS WELL AS COUNTY AND CITY PLANNING GUIDELINES.

APPENDIX "B"

GRANT AGREEMENT

**AGREEMENT FOR AWARD
OF NONCOMPETITIVE GRANT
Snoqualmie Watershed Forum
City of Carnation**

This Agreement is made between the King Conservation District Number 9, a municipal corporation in King County, Washington, located at 935 Powell Ave. SW, Renton, WA 98055 (referred to herein as "District"), and the City of Carnation, a municipal corporation in King County, Washington, located at P.O. Box 1328, Carnation WA 98014 (referred to herein as "Recipient"), for the purposes set forth herein.

SECTION 1. RECITALS

1.1 Whereas, the District is a special purpose district organized and existing under authority of Chapter 89.08 RCW. The District engages in and provides certain conservation activities that are authorized and described in RCW 89.08.220; and

1.2 Whereas, on December 15, 1997, the Metropolitan King County Council enacted King County Ordinance No. 12959 which, among other things, provides for the distribution of noncompetitive grant funds from a portion of the special assessments imposed by King County Ordinance No. 12959 and collected by the District pursuant to Chapter 89.08 RCW; and

1.3 Whereas, on November 19, 1998, the District adopted Resolution No. 98-20 relating to the policy and procedures governing the District's award of any noncompetitive grants authorized by King County Ordinance No. 12959; and

1.4 Whereas, King County's Regional Water Quality Committee which was formed for the purpose of addressing and responding to regional environmental needs has established regional funding principles to be considered during the process of awarding noncompetitive grants; and

1.5 Whereas, certain Watershed Forums (i.e., Lake Washington/Cedar River, Green/Duwamish, Sammamish, Snoqualmie and Central Puget Sound) have been established by King County Council Motion No. 9681 and through the voluntary association of agencies and entities situated within a particular watershed basin or area for the purpose of addressing and responding to environmental needs within their respective watershed basins and in the region by cooperative efforts.

1.6 Whereas, the District has reviewed the grant application submitted by Recipient and has determined that the application meets the requirements of the RWQC's regional funding principles and the District's policy and procedures for awarding noncompetitive grants; and

1.7 Whereas, the Snoqualmie Watershed Forum of which the Recipient is a member has reviewed the grant application submitted by Recipient and has determined that the application meets the RWQC's regional funding principles.

1.8 Whereas, the District and Recipient desire to enter into this Agreement for the purpose of establishing the terms and conditions relating to the District's award of a noncompetitive grant to Recipient.

SECTION 2. AGREEMENT

2.1 The District agrees to award Recipient a grant in the total amount of Eighty six thousand Dollars (\$86,000.00) from 1998 Assessments. Grant funds shall be used by Recipient solely for the performance of the work described in Exhibit A which is attached hereto and incorporated herein by this reference. The District shall pay the grant funds to Recipient within five (5) business days after District's receipt of a fully executed Agreement.

2.2 Recipient represents and warrants that it will only use the grant funds for the work described in Exhibit A. Recipient shall be required to refund to the District that portion of any grant funds which are used for unauthorized work.

2.3 Recipient acknowledges and agrees that the grant funds may only be expended on work which shall be entirely within the District's jurisdictional boundaries. The following municipal entities are not within the District's jurisdictional boundaries: Enumclaw, Federal Way, Milton, Pacific, Skykomish and Tukwila. Prior to the expenditure of any grant funds and commencement of any work, Recipient shall confirm with the District that the site of any work to be performed under this Agreement is within the jurisdictional boundaries of the District. Recipient shall be required to refund to the District that portion of any grant funds which are used for work performed outside the District's jurisdictional boundaries.

2.4 In the event the scope of work authorized by this Agreement includes the use of grant funds to purchase houses located on real property within a flood hazard area, Recipient acknowledges and agrees that grant funds may only be used for such purposes if the houses to be purchased were constructed before floodplain mapping or sensitive areas regulations were in place for that area. Recipient shall be required to refund to the District that portion of any grant funds which are used for unauthorized purposes.

2.5 Recipient shall be required to submit to the District a final report which documents the Recipient's completion of the work in conformance with this Agreement within thirty (30) days after the completion of the work. The final report shall, among other things, summarize the project's successes and shall address the regional benefits accomplished by the work. The final report shall also identify any obstacles or challenges which were encountered during the work, along with general recommendations regarding ways to avoid such obstacles or challenges in the future. If requested, Recipient agrees to provide the District with interim progress reports from time to time, at reasonable intervals.

2.6 Recipient shall be required to submit to the District a summary of project expenses using the Budget Accounting and Reporting System for the State of Washington ("BARS") within thirty (30) days after completion of the work. If requested, Recipient agrees to provide the District with additional interim financial reports from time to time, at reasonable intervals.

2.7 Recipient's expenditures of grant funds shall be separately identified in the Recipient's accounting records. If requested, Recipient shall comply with other reasonable requests made by the District with respect to the manner in which project expenditures are tracked and accounted for in Recipient's accounting books and records. Recipient shall maintain such records of expenditures as may be necessary to conform to generally accepted accounting principals and to meet the requirements of all applicable state and federal laws.

2.8 The District or its representative shall have the right from time to time, at reasonable intervals, to audit the Recipient's books and records in order to verify compliance with the terms of this Agreement. Recipient shall cooperate with the District or its representative in any such audit.

2.9 Recipient shall retain all accounting records and project files relating to this Agreement in accordance with criteria established in the Revised Code of Washington and the Washington State Archivist.

2.10 Recipient shall ensure that all work performed by Recipient or its employees, agents, contractors or subcontractors is performed in a manner which protects and safeguards the environment and natural resources and which is in compliance with local, state and federal laws and regulations. Recipient shall implement an appropriate monitoring system or program to ensure compliance with this provision.

2.11 Recipient agrees that in the event a court of competent jurisdiction finds that the imposition or collection of the special assessments authorized by King County Ordinance No. 12959 unlawful and orders the repayment of such assessments, Recipient agrees to reimburse the District for the full amount of the grant award, including any interest which may be awarded by the court.

2.12 The grant funds awarded under this Agreement shall be considered a loan, secured by the full faith and credit of the City of Carnation and must be repaid, with interest calculated at the same rate as paid by the Washington State Investment Pool, upon demand, in the event Recipient does not complete its evaluation and revision of the Stormwater Management Plan/and Best Management practices relating to the Design and Construction Standards and Specifications for Construction within three (3) years from the date of this Agreement.

2.13 Recipient agrees to indemnify, defend and hold harmless the District, its agents, officers, officials and employees from all claims, alleged liability, damages, losses to or death of person or damage to property allegedly resulting from the acts of the Recipient or any of its employees, agents, contractors or subcontractors in connection with this Agreement.

2.14 Recipient agrees to acknowledge the District as a source of funding for this project on all literature, signage or press releases related to said project.

SECTION 3. GENERAL PROVISIONS

3.1 This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

3.2 This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof. No prior or contemporaneous representation, inducement, promise or agreement between or among the parties which relate to the subject matter hereof, which are not embodied in this Agreement shall be of any force or effect.

3.3 No amendment to this Agreement shall be binding on any of the parties to this Agreement unless such amendment is in writing and is executed by the parties.

3.4 Each party warrants and represents that such party has full and complete authority to enter into this Agreement and each person executing this Agreement on behalf of a party warrants and represents that he/she has been fully authorized to execute this Agreement on behalf of such party and that such party is bound by the signature of such representative.

sign

DISTRICT:

By WB Nicoll
Name _____
Title _____
Date 10-13-99

Approved as to Form:

DISTRICT LEGAL COUNSEL:

By Eric C. Framedt
Name Eric C. Framedt
Date 10/11/99

RECIPIENT:

By David H. Hunter
Name David H. Hunter
Title Mayor
Date 10/5/99

Approved as to Form:

RECIPIENT'S ATTORNEY:

By Michael Karber
Name Michael Karber
Date 10/5/99

EXHIBIT A

Project Name: <u>Stormwater Management Plan/Manual</u>	Contact: <u>Woody Edvalson</u>
Applicant: <u>City of Carnation</u>	Title: <u>City Administrator</u>
Principal Partners (if any): _____	Address: <u>PO BOX 1328</u>
	<u>Carnation, WA 98014</u>
Total Project Cost: <u>\$86,000 + \$1,400 City Allocation</u>	Phone: <u>(425) 333-4192</u>
Project Start Date: <u>August 15, 1999</u>	Fax: <u>(425) 333-4336</u>
Project End Date: <u>August 15, 2000</u>	E-mail: <u>admin@ci.carnation.wa.us</u>

1. Project Description (200 words or less):

Part I -- Complete the evaluation and revision of the existing City of Carnation Stormwater Management Plan/Manual and Best Management Practices related to the City's Design and Construction Standards and Specifications for Construction. Part II -- Develop a recommendation for permanent funding of stormwater improvements associated with the revised Stormwater Management Plan/Manual.

2. Project Objectives (indicate how project meets one or more criteria in RCW 89.08 and District's Strategic Plan Initiatives):

The authorizing legislation for conservation districts as codified in RCW Title 89 includes a preamble that identifies stormwater runoff-related needs for conservation district formation. In part, Section 89.08.010 says, "...that failure by any land occupier to conserve the soil and control erosion upon his lands may cause a washing and blowing of soil from his lands onto other lands and makes the conservation of soils and control of erosion on such other lands difficult or impossible, and that extensive denuding of land for development creates critical erosion areas that are difficult to effectively regenerate and the resulting sediment causes extensive pollution of streams, ponds, lakes and other waters."

The preamble further identifies the impacts of erosion on spawning beds, food and habitat for fish, and declares that the policy of the legislature is to "...provide for the prevention of flood water and sediment damages, and for furthering agricultural and nonagricultural phases of conservation, development, utilization, and disposal of water..."

King Conservation District Policy and Procedure for the Award of Municipal and Watershed Noncompetitive Grants from the District's Special Assessment states that "Natural resource conservation projects proposed by Municipalities and Watershed Forums shall address: ...iii) To carry out preventative and control measures and works of improvement for the conservation of renewable natural resources...". Section iv) also speaks of "preparing and keeping current a comprehensive long-range program recommending the conservation of renewable resources of the District. Such programs shall be directed toward...the prevention or reduction of sedimentation and other pollution in rivers or other waters..."

Strategic Initiatives Section iii) Assistance for Municipalities says that the "King Conservation District will assist cities within King County by providing a full range of technical experts to assist them in addressing natural resource issues—experts that the cities may not otherwise be able to employ due to budget constraints." The City lacks adequate revenues to hire the technical expertise required to update its stormwater management plan. Once the technical expertise is provided and the plan completed, a stormwater utility will provide ongoing funding for the improvements required to maintain and or improve the environment.

Section iv) Extending Responsible Stewardship a) *Population Growth and Increased Urbanization* says that the "District will actively promote workable solutions that help minimize the effects of population growth and increased urbanization on the natural environment." Part c) *Support for Regional Conservation Initiatives*, adds that the "District will join in regional conservation initiatives, lending its leadership and expertise on issues such as ... preserving and restoring fish habitat, protecting and restoring water quality in watersheds...". Neither the Snoqualmie nor the Tolt Rivers are primarily located in the City of Carnation, yet the City's impact on these regional resources will be acutely felt without the appropriate assistance. The Snoqualmie Watershed Forum has recognized the benefits to the watershed for this proposal and has given its unanimous recommendation to the Conservation District.

This proposal will address the conservation and management of the natural renewable resources of sub-surface and surface waters and related biological habitats by updating, promulgating and enforcing regulations for stormwater management and developing a mechanism for funding the needed stormwater facilities.

3. Project Activities and Measurable Results:

Project Activity I: Development of Comprehensive Stormwater Management Plan/Manual

A. The City shall hire a consultant to do the following:

- 1) Review the existing Stormwater Plan/Manual and existing Best Management Practices for Construction;
- 2) Define the Department of Ecology's stormwater regulatory requirements;
- 3) Revise existing Stormwater Management Plan/Manual to bring it into compliance with the Department of Ecology's stormwater requirements; and
- 4) Prepare a SEPA Checklist.

Measurable Results

- A. The City shall submit a draft and final Stormwater Management Plan/Manual and Construction Best Management Practices to the Department of Ecology for review.
- B. The City shall submit a SEPA checklist to the Department of Ecology for review.
- C. The project will be completed by August 15, 2000.

Project Activity II: Study and Recommended Stormwater Financing Source for Improvements

A. The City shall develop a source of funding for the operation of an effective stormwater/water quality program as follows:

- 1) Identify and evaluate financial alternatives including a stormwater utility fee schedule for residential and commercial development; and
- 2) Develop an appropriate utility rate structure based on final analysis. Incorporate the rate structure into a draft ordinance implementing a new monthly rate and developer general facility charges.


Measurable Results

- A. Draft ordinance shall be submitted to the City for review and further implementation by August 31, 2000.
- B. City shall develop stormwater utility for adoption by November 30, 2000.

4. Budget Expenses

Draft and Final Plan	\$72,400*
Financing Recommendations	\$10,000
Overhead	\$ 5,000
Total Expenses	\$87,400*

* Includes \$1400 of King Conservation District fees levied within the City of Carnation


Harwood T. Edvalson, City Administrator

5/24/99
Date

APPENDIX "C"

FEMA LETTER OF MAP REVISION (LOMR)



Federal Emergency Management Agency

Washington, D.C. 20472

RECEIVED

MAY 06 2002

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:

Case No.: 02-10-336P

CITY OF CARNATION

The Honorable Stuart Lisk
Mayor, City of Carnation
P.O. Box 1238
Carnation, WA 98014

Community: City of Carnation, WA
Community No.: 530076
Panels Affected: 53033C0418 G, 0419 G, and
0420 G

Effective Date of **MAY 01 2002**
This Revision:

102-D

Dear Mayor Lisk:

The Federal Emergency Management Agency (FEMA) has initiated a revision to the effective Flood Insurance Rate Map (FIRM) for King County, Washington and Incorporated Areas (the effective FIRM for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In correspondence dated March 12, 2002, Mr. Lawrence Basich, P.E., Hydraulic Engineer, of the FEMA Region X Office in Bothell, Washington, requested that the FIRM be revised to show the effects of an updated hydraulic analysis for your entire community. This area is shown on the FIRM as a Special Flood Hazard Area (SFHA), an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), designated Zone AO, an SFHA subject to shallow flooding with average flood depths determined to be between 1 foot and 3 feet.

All data required to complete our review of this request were submitted with letters from Mr. Basich. Because this Letter of Map Revision (LOMR) is based on flood hazard information meant to improve upon that shown on the flood map or within the flood study, and does not partially or wholly incorporate manmade modifications within the SFHA, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and in the effective Flood Insurance Study (FIS) report. We have revised the FIRM to modify the zone designation of the base flood for your community from Zone AO (Depth 1) to Zone X (shaded), an area of moderate flood hazard outside the SFHA. The modifications are shown on the enclosed annotated copies of FIRM Panels 53033C0418 G, 53033C0419 G, and 53033C0420 G. This LOMR hereby revises the above-referenced panels of the effective FIRM dated December 6, 2001.

Because this revision request also affects the unincorporated areas of King County, a separate LOMR for that community was issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panels as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

A review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panels and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM and FIS report to which the regulations apply and the modifications described in this LOMR.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Director, Mitigation

Division of FEMA in Bothell, Washington, at (425) 487-4682. If you have any questions regarding this LOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,



Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Federal Insurance and
Mitigation Administration

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Federal Insurance and
Mitigation Administration

Enclosures

cc: The Honorable Ron Sims
King County Executive

Mr. Steve Munson
City Planner
City of Carnation

Mr. Joseph Weber, C.F.M.
Federal Emergency Management Agency,
Region X

FLOODING EFFECTS FROM SNOQUALMIE RIVER

REVISED AREA ZONE AE

ZONE X

CITY OF CARNATION 530076

KING COUNTY UNINCORPORATED AREAS 530071

328TH DRIVE NE

15

NE 60TH STREET

326TH AVENUE NE

327TH AVENUE NE

328TH AVENUE NE

NE 47TH STREET

ZONE X

REVISED AREA

ZONE X



APPROXIMATE SCALE IN FEET

500 0 500

ENTWHISTLE STREET

STREET

KING COUNTY CITY OF CARNATION

ZONE X

326TH AVE NE

NE 42ND STREET

332ND AVENUE NE

NE 40TH PLACE

ZONE X

ZONE X

NE 40TH PLACE

ZONE AE

98 100 102 104

Levee

Levee

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

KING COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 419 OF 1725 (SEE MAP INDEX FOR PANELS NOT PRINTED)

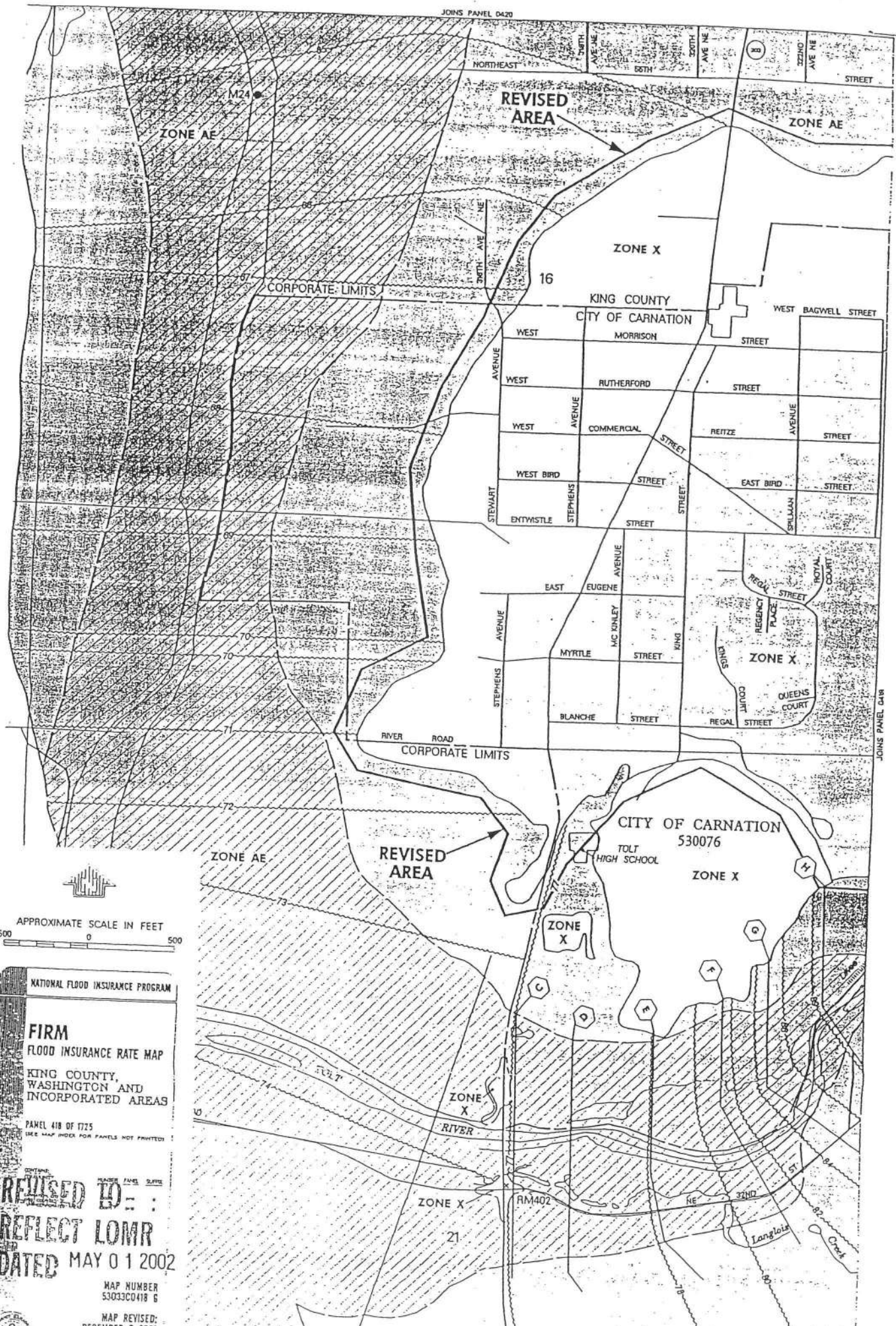
CONTAINS: COMMUNITY NUMBER PANEL SUFFIX DATE C DATE G

REVISED TO REFLECT LOMR DATED MAY 0 1 2002

MAP NUMBER 53033C0419 G

MAP REVISED: DECEMBER 6, 2001





APPROXIMATE SCALE IN FEET
 500 0 500

NATIONAL FLOOD INSURANCE PROGRAM
FIRM
 FLOOD INSURANCE RATE MAP
 KING COUNTY,
 WASHINGTON AND
 INCORPORATED AREAS
 PANEL 418 OF 1725
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

REVISED TO REFLECT LOMR DATED MAY 01 2002

MAP NUMBER
 53033C0418 6
 MAP REVISED:
 DECEMBER 6, 2001

APPENDIX "D"

ADOPTING RESOLUTION

CITY OF CARNATION

RESOLUTION NO. 287

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CARNATION, KING COUNTY, WASHINGTON, ADOPTING THE STORMWATER COMPREHENSIVE PLAN DATED OCTOBER 2003.

WHEREAS, the City of Carnation received a Non-Competitive Grant from the Snoqualmie Watershed Forum on April 21, 1999, for the completion of a Stormwater Management Plan for the City; and

WHEREAS, a City of Carnation Stormwater Comprehensive Plan has been completed by Roth Hill Engineering Partners, LLC, and Financial Consulting Solutions Group, Inc.; and

WHEREAS, a copy of the draft Stormwater Comprehensive Plan and SEPA Checklist was submitted to the Washington State Department of Ecology for review on August 25, 2003; and

WHEREAS, after appropriate incorporation of comments from reviewing agencies, the City Council also reviewed the plan and finds that it is appropriate for the City of Carnation.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Carnation, King County, Washington, as follows:

The document entitled, "City of Carnation Stormwater Comprehensive Plan – October 2003" as prepared by Roth Hill Engineering Partners, LLC, and Financial Consulting Solutions Group, Inc, is incorporated herein by this reference as though fully set forth, and is hereby approved and adopted by the City of Carnation as its Stormwater Comprehensive Plan.

ADOPTED by the City Council of the City of Carnation, King County, Washington at its regular open public meeting held on this 7th day of October, 2003.



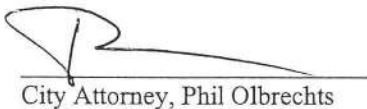
Mayor, Stuart Lisk

Attest:



City Clerk, Mary Otness

Approved as to Form:



City Attorney, Phil Olbrechts