CHAPTER 8 – UTILITIES ELEMENT

INTRODUCTION

This Utilities Element presents basic information about the utility systems in the city of Carnation, including solid waste, water, wastewater, stormwater, natural gas, electricity, and telecommunications. The City of Carnation manages its own water system and sewage collection system, but all other utilities are owned and managed by others. Utility services and the provider of these services are shown in Table U–1.

Table U-1: Utility Service Providers

PROVIDER	UTILITY SERVICE
Recology Cleanscapes	Solid waste collection
City of Carnation	Water service, sewage collection, stormwater
Puget Sound Energy	Natural gas distribution and electrical power
Comcast	Telecommunications
CenturyLink	Telecommunications

INVENTORY AND ANALYSIS

This is an inventory and analysis of the following utilities: solid waste, water, wastewater, storm water, natural gas, electricity, and telecommunications.

SOLID WASTE

The King County Solid Waste Management Plan was first adopted in 1975 and has been updated a number of times. The City, by state law, is either required to develop its own solid waste management plan, or to participate in a regional plan. Carnation has adopted and is party to the King County plan. The Plan guides solid waste disposal and future needs in King County.

Landfill. Until the late 1970s the City of Carnation operated its own municipal Landfill to serve city residents. The landfill is located approximately one mile south of the city. Beginning in 1992, the City undertook a project to officially close the landfill. This was financed through a surcharge on solid waste utility bills and a grant from the Washington Department of Ecology. The landfill site entered into a 20-year post-closure period in 1995. Landfill post-closure utility charges continue to be levied on property owners within the city limits to provide financial assurance for ongoing water quality monitoring and maintenance of the site. Monitoring of the closed landfill site will be an ongoing financial responsibility of the City until the end of the post closure period. The City hopes to eliminate billing of the post-closure fees as soon as possible.

The City has entered into a Solid Waste Interlocal Agreement (ILA) with King

County which provides for cooperative management of solid waste and allows the City's waste collector to utilize the Cedar Hills Regional Landfill. The ILA expires in 2028.

The primary planning tool for the King County solid waste system is the 20-year Comprehensive Solid Waste Management Plan. The long range goal of the King County Solid Waste Management Plan is to coordinate regional energy and resource recovery in King County. The current adopted plan was published in November 2001. The 2001 Plan is currently undergoing a 2019 Update which began in June of 2017.

Solid Waste Collection. The City's service provider for solid waste collection is responsible for the collection and disposal of Carnation's solid waste, and all customer support. The City's only involvement with solid waste collection is to monitor the contract. The City contracts with Recology Cleanscapes for solid waste collection and recycling services.

Recycling. The City's service provider also provides curbside recycling and yard/food waste collection services to the City. The City has a goal to achieve a 75% residential waste reduction and recycling rate. Carnation currently averages a 45% residential recycling rate, exclusive of special collection days, which would increase the percentage.

WATER

Introduction. The City of Carnation owns and operates a municipal "Group A" water system with 968 service connections within the Water Service Area, which includes all of the corporate limits of the City plus portions of King County. The water system includes three storage reservoirs, a spring source, a well source and a distribution network. The water system is managed by the Carnation Public Works Department which is responsible for day to day operations and for the implementation of the Comprehensive Water System Plan. The City's Comprehensive Water System Plan (Water System Plan) was developed in 2015 and 2016, and submitted to the Department of Health and King County for agency review in 2017. The next update of the Comprehensive Water System Plan will be due in 2023. Detailed information about the water system and its operating and capital plans can be found in the Comprehensive Water System Plan. This section includes pertinent information from the Water System Plan.

Existing Service Area and CWSP Planning Area. The City of Carnation Planning Area lies within the critical water supply area as outlined in the East King County Coordinated Water System Plan (CWSP). In 2009, the City reduced its water system planning area from 21 square miles to 9 square miles. The City made this reduction because much of the previous planning area was not feasible to serve due to the presence of steep slopes and rivers, and tracts of forest resources which do not require water service. The rest of the planning area was

not economically feasible to serve. See figure 8-1 for the City's designated potable water service area in the Water System Plan. The City currently has a franchise agreement with King County to construct, operate and maintain a water system outside the current City limits. This franchise has been granted until 2039.

Adjacent Purveyors. The only adjacent water purveyor is Ames Lake Water District to the west of the city; however the Snoqualmie River separates the service areas and is a significant geographic impediment. Nearby water purveyors include Water District 119 to the north and Fall City to the south. There are no municipal water purveyors in the vicinity east of the city. No municipal water purveyor is close enough to consider interties.

Water System Development History. The original source of water was a spring located in a 16-acre tract of the Weyerhaeuser Timber Company. Later, the City purchased the original 16-acres plus an additional 64-acres from Weyerhaeuser. This 80 acre area currently constitutes the spring site and watershed. The original water distribution system was developed by extending water mains as needed to serve the City's growth. The City gradually replaced the old wood stave pipes with steel and asbestos cement pipe. The City is now replacing these steel and asbestos cement pipes with ductile iron pipes, as necessary. Over time, the City's water system has grown to include 968 service connections within the city limits and in the neighboring unincorporated King County. The majority of the connections are residential (89%), but the system also has commercial, industrial and institutional connections (11%). In 2015, the city received an award for the best tasting water in a competition held by the King County Subsection of the Pacific Northwest Section of the American Water Works Association (PNWS-AWWA). Water system improvements in recent years have included two new reservoirs, water main replacements and efforts to improve water use efficiency.

Water Source. The City has a multiple source system with springs as the primary source and a well as the secondary source.

> ***The Springs***: The springs are the primary source of water supply for the City of Carnation's system. The springs are situated within an 80-acre tract owned by the City located about 2.5 miles southeast of the city center. The springs watershed is in the City's jurisdiction, but is surrounded by unincorporated King County. The source of the springs is water fed by an unnamed aquifer flowing through pre-Frasier deposits of sand and gravel. The water from the aquifer surfaces from the ground to form a natural spring at the location of the intake manifolds near the center of the property. In the early 1980s the City constructed a 3-manifold intake system to increase water capacity. The spring source can provide 350 gpm.
>
> In 1998 the City developed two horizontal wells near the springs to supplement the aging spring intake system. The wells are tied into the

existing system and are producing approximately 55 gpm.

The springs have been determined to be not under the direct influence of surface water and are not a groundwater source under the influence of surface water (GWI).

Currently the spring source has the capacity to supply most of the city's daily demands.

The Well. The well is located in Loutsis Park near the intersection of Entwistle Street and Milwaukee Avenue and was constructed in April 1978. The well's pump has a rated capacity of 700 gpm and is activated by pressure drops within the system. The well has historically only been activated during peak usage periods, to replenish low reservoir levels, or to provide fire flow.

Source Protection. Protection of the water source is required under WAC 246-290-135. Both of the City's water sources produce excellent quality drinking water. Both the well and springs have protection programs in place to minimize any potential contamination:

Well Head Protection. The well is located in Loutsis Park near the intersection of Entwistle Street and Milwaukee Avenue. The 6-acre park is owned by the City. The well site is continually monitored by the City and inspected by the Health Department for possible source contamination.

Spring Source Protection. The springs are located in a 51-acre tract of land owned by the City. A portion of the site, including the 200 foot protective radius surrounding the springs, is fenced to prevent intrusion from large animals and to detour people from trespassing onto this area of the site. As with the well site, the springs are continually monitored by the City and inspected by the Health Department for possible source contamination. No source of contamination is allowed to be constructed, stored, disposed of, or applied within the sanitary control area of either the well or springs.

Watershed Control Requirements. The source of the springs is water fed by an aquifer flowing through pre-Frasier deposits of sand and gravel. The water from the aquifer surfaces from the ground to form a natural spring. The springs are not under the direct influence of Surface Water and are not a GWI (Ground Water Under the Influence of Surface Water) source. Continuous sampling and testing has shown no significant occurrence of insects, or other macro organisms, algae, or large diameter pathogens. Also, there has been no indication of rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH correlating to climatological or surface water conditions. Because the source of the

springs is ground water and is neither Surface Water nor Ground Water Under the Influence of Surface Water (GWI), the City is not required to implement Section 4 Watershed Control Program of WAC 246-290-135.

Water Rights. The City of Carnation holds two water rights: a groundwater certificate for the City's water well, and a water right claim for the City's spring source. The claim for the spring source authorizes the City to annually withdraw (Qa) a total of 1,000 acre-feet (325m gpy) with a maximum instantaneous (Qi) withdrawal of 628 gpm. The certificated water right for the well authorizes the City to annually withdraw (Qa) 538 acre-feet (175m gpy) with a maximum instantaneous (Qi) withdrawal (Qi) of 800 gpm. The Washington State Department of Ecology interprets the City's water rights for the well as additive to the springs for instantaneous (Qi) withdrawal, but supplementary to the springs for annual withdrawal (Qa).

Table U-2 Water Rights

Source	WR Document	Ecology ID	Priority Date	Qi (gpm)	Qa (AF/Y)
Spring	Claim	S1-117902CL	Dec. 1916	628	1,000
Well	Certificate	G1-22827C	April 4, 1977	800	538
			Total	1,428	1,000

For water planning purposes the City will plan and forecast based on the authorized 1,428 gpm and an annual limitation of 1,000 af/y. Nothing in the City's Plans are intended to accept Ecology's interpretation, or waive any rights or arguments as to Ecology's interpretation of G1-22827C.

Storage. The City of Carnation's water system includes three above ground tank reservoirs, one located at the spring site in the watershed and two located at the city-owned parcel on Entwistle Street. The water system is a multiple source system, which reduces the amount of storage required. The total volume of storage capacity in the three reservoirs is 938,200 gallons. Filling the reservoirs is accomplished by pressure within the city's system.

Table U-3: Existing Water Storage Facilities

Year Constructed	Name/Location	Capacity (gal)	Type	Comments
1990	Entwistle Tank 1	222,000	Reinforced Concrete Standpipe	Offline beginning 2013
2012	Entwistle Tank 2	605,000	Steel Standpipe	In service
2012	Watershed	109,000	Low Level Steel Reservoir	In service, inline with transmission main

The reservoir at the spring site insures continued water service to customers in the southern pressure zone in the event of disruption of the spring source. The second reservoir on Entwistle Street improved fireflow and system redundancy. Currently the city's storage capacity is sized to meet future projected demand.

***Existing* Distribution System.** An in-line pressure reducing valve (PRV) is

located just east of the bridge on the south side of Tolt River and divides the system into two pressure zones. One pressure zone is north of the Tolt River, and the other south. The City's system has one primary transmission main that runs from the springs through the PRV/PSV to the north zone. The water mains include newer 12- and 8-inch mains and older 6- and 4-inch piping, and some very old, small diameter pipes. Most of the 8-inch main is ductile iron pipe and all of the 4-inch piping material is steel. In 2011, the City installed approximately 2,400 linear feet of new ductile iron transmission main from the spring site to 344th Street NE.

Water Quality & Treatment. The water quality within Carnation's water system is excellent from both the well and springs sources. The water from the springs source is chemically treated by a chlorinator installed on an 8-inch pipeline.

The well is a non-chlorinated water source. Since the well and springs are tied into the same piping network, the well water system has a residual chlorine content. However, one of the system deficiencies that was identified in the Water System Plan was the lack of chlorination at the well. In addition, a power outage would prevent the well pump from functioning, which reduces system reliability by taking one of the sources off-line. Future projects to add chlorination and a back-up generator at the well should address these problems.

Testing of both sources for bacteria count is done on a monthly basis. Testing for inorganic, regulated compounds and unregulated compounds is done on a three-year basis. Lead and copper testing is also performed on a three year basis. In general, the quality of water from both the springs and the well water is excellent.

Water System Standards. All improvements to the water system, whether accomplished by Developer Extension Agreements, Utility Local Improvement Districts (ULID's), or other methods, are required to meet minimum design and construction standards established by the City. The standards contained in the City of Carnation "Water-Sewer Technical Standards" manual conform to the requirements of the Washington State Department of Health, City Design Standards and American Public Works Association.

Service Connections. The City serves water customers both inside and outside the city limits and all customers are on metered services. Approximately 81% of the connections are located in the City, and the remaining 19% are located in the PAA and other parts of the City's water service area that are outside City limits. The percentage, types and category of use for these service connections are shown in Table U-1.

Table U-4: Water Service Connections by Account Type

Inside City Limits = 786 connections	Single Family Residential	672	69%
	Multi Family Residential	24	2%
	Non-residential	91	9%
Outside City Limits = 182 connections	Single Family Residential	170	18%
	Multi Family Residential	1	0%
	Non-residential	11	1%
Total Connections		969	(100%)

Source: City of Carnation Utility Billing System, August 2017

Water Demand and Water Use Efficiency. Carnation's water distribution system is old, and as recently as 2008, unaccounted for water was estimated to be as high as 40% within the system. Over the last decade, efforts to reduce unaccounted for water through aggressive leak detection, water main improvements and meter replacement have reduced unaccounted for water to less than 10% of the system's water use. Efforts to increase water efficiency have reduced average total daily demand (ADD) on the system for single family residential customers from approximately 190,000 gallons per day to approximately 172,000 gallons per day, averaged over the last six years.

Water System Capacity. The source, storage, treatment and distribution system must demonstrate the capacity to serve future populations within the water service area. New improvements will be required to address any existing or projected deficiencies; these are listed in the Water Capital Improvements Plan as adopted in the Water System Plan.

WASTEWATER

The City of Carnation sewer system became operational in 2008. Prior to that time, Carnation was one of the few cities that relied on private septic systems for wastewater treatment. The majority of the City's septic systems had been built long before current septic system standards were developed, and incidences of septic system failure and high bacterial counts at local swimming areas led the King County and State Departments of Health to issue Severe Health Hazard Declarations in 1987, and reiterated in 2003 and 2005. Inadequate septic systems had also prevented economic development and an inability to accommodate residential growth at urban densities in accordance with the Growth Management Act.

In 2002, the City entered into an Inter-local Agreement with King County whereby the County's Wastewater Treatment Division designed, constructed and operates a wastewater treatment plant using membrane bio-reactor (MBR) technology. The City designed, constructed and operates the collection and conveyance system.

The City studied options for the collection and conveyance system, and, due to the flat topography combined with a high water table, a recommendation was made to construct a vacuum system.

The Wastewater Treatment Plant operated by King County uses an advanced treatment technology called a membrane bioreactor or MBR. The plant produces reclaimed water that can be used safely as a drought-proof water source for wetland enhancement and other beneficial uses. Reclaimed water from the Carnation Treatment Plant is discharged to a wetland in King County's Chinook Bend Natural Area, next to the plant's river outfall site at the Carnation Farm Road Bridge.

The Collection System is operated by the City of Carnation Public Works Department. The collection system consists of eleven miles of sewer collection pipe that are collected into in five main trunk lines that transport effluent under vacuum pressure to the vacuum station located at 4301 Larson Avenue. Trunk Lines A through D each serve one of the four quadrants of the City that are divided by the Snoqualmie Trail along the north-south axis and Entwistle Street along the east-west axis. Trunk Lines A through D begin as 4" diameter at the furthest upstream ends and increase in size to 6, 8 and 10 inch diameter as required by the amount of flow that is introduced into the system. A fifth Trunk Line, E, is routed northward from the vacuum station and terminates at the north end of the city limits at Stewart Avenue. Trunk Line E is intended to be extended to provide service to the annexation area north of the City for future development. In the meantime, it provides sewer service for existing customers located on Stewart Avenue.

The Vacuum pump station collects the city's sewage flow and subsequently transports it to the King County Wastewater Treatment Plant that abuts it to the north. The pump station is designed for a peak flow of 975 gallons per minute (gpm). Current usage is 57.8 gpm.

Wastewater Contributors and Characteristics. There are 728 sewer connections served by the City of Carnation sewer system: 634 single family customers, 21 multi-family meters (which provide service to 117 units) and 73 non-residential customers. The wastewater characteristics are typical of a residential community comprised largely of residences, schools, businesses and commercial establishments.

Table U-5: Sewer Service Connections by Account Type

Single-Family Residential Connections	**634**	**87%**
Multi Family Residential Connections	21	3%
Non-residential Connections	73	10%
Total Connections	728	100%

Source: City of Carnation Utility Billing System, August 2017

System Capacity. Both the wastewater treatment plant and the collection and conveyance systems were designed to serve the City of Carnation's forecasted growth within the Urban Growth Area. Both the treatment plant and the collection/conveyance systems are designed to accommodate increases in capacity, including the increased population that would result from approval of the docket request to provide for high density residential development in a previously commercial and industrial use area.

STORMWATER

There are two major drainage basins considered in the 2003 Stormwater Comprehensive Plan. Basin A drains to the Snoqualmie River and covers a majority of area within the city limits as well as all three Potential Annexation Areas. Basin B drains to the Tolt River and is primarily limited to a narrow strip of land south of the levee and covers only 33.1 acres within the city limits.

The City of Carnation does not have a public storm sewer system. Stormwater from impervious surfaces must be infiltrated on-site, which can sometimes be difficult to achieve given localized areas of poorly drained soils and/or seasonal high water tables. Local drainage facilities that collect and convey surface water runoff consist of open channels and roadside ditches, wetlands, infiltration systems and detention ponds. 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. New developments within the City have been utilizing Low Impact Demand techniques for stormwater management.

NATURAL GAS

Puget Sound Energy (PSE) supplies natural gas to six Western Washington counties: Snohomish, King, Kittitas, Pierce, Thurston, and Lewis. Puget Sound Energy provides natural gas service to more than 631,474 customers.

Natural gas is not an essential service, and, therefore, the service is not mandated. Extension of service is based on request and the results of a market analysis to determine if revenues from an extension will offset the cost of construction.

According to PSE rate department, the average house (using natural gas for both heat and hot water) consumes about 1,000 therms per year. Ten therms equals approximately one "mcf" (thousand cubic feet) of gas so 1,000 therms per house equals approximately 100,000 cubic feet of gas per household per year.

When planning the size of new gas mains, PSE uses a saturation model which assumes all new households will use natural gas since 99% of new homes constructed where builders have the choice are using natural gas. PSE forecasts customer additions using a forecast analysis calculation based on PSE's revenue report which is generated by town tax codes established in our Exception Billings

Dept.

It is estimated that PSE currently serves approximately 277 customers in the Carnation area.

Existing Distribution System. The Pacific Northwest (Washington, Oregon, and Idaho) receives its natural gas from a wide range of sources in North America. Sixty percent (60%) of the region's natural gas supply comes from British Columbia and Alberta in the north; 40% comes from domestic sources including the San Juan Basin in New Mexico/Texas in the south. The Pacific Northwest consumes 380 billion cubic feet of natural gas per year.

Natural gas is supplied to the City of Carnation from Redmond City Gate Station. The back-bone feed is a 6" main coming from the Ames Lake area along NE Tolt Hill RD, located at southwest corner of the City. In 2009, PSE installed about 1.5 miles of 8" IP main (Notification 109027910) along Redmond- Fall City RD (from 292 AV SE northerly to SE 8 ST) to reinforcement this general area.

High pressure (HP) supply lines (measuring 16", 12", 8", 6", and 4" in diameter) transport gas from gate stations to district regulators. The pipe material is typically steel wrap (STW). No high pressure gas lines are located within the city limits of Carnation.

District regulators (DR) reduce high pressure to typical distribution operating pressures of 60 to 25 psi. Distribution pressures are typically called intermediate pressures (IP). There are no district regulators within the Carnation city limits.

Distribution mains are fed from the district regulators. These typically are 8", 6", 4", 2", and 1-1/4" diameter lines. The pipe material typically is polyethylene (PE) or steel wrapped (STW). Puget Sound Energy has approximately 6.5 miles of main serving the City of Carnation.

Individual residential service lines are fed by distribution mains and are typically 5/8" in diameter. Individual commercial and industrial service lines are typically 1-1/4" or 2" in diameter.

ELECTRICITY

Puget Sound Energy supplies electrical service to more than 982,000 customers throughout Western Washington and Kittitas County. Carnation is currently supplied with enough electricity to satisfy the demand for electrical power. The transmission and distribution of electricity to Carnation and other rural communities in the Snoqualmie Valley is delivered by Puget Sound Energy (PSE) and regulated by the Washington Utilities and Transportation Commission. Currently, the substation has the capability to provide 20 MVA (units of electrical demand), and can be upgraded to 25 MVA. The current load on the substation from Carnation

and the surrounding area is approximately 10 MVA. According to PSE, 1 MVA can typically provide enough electrical power for approximately 230 households, based on normal usage. Carnation anticipates less than 2 MVA of additional electrical demand upon the Tolt substation over the next 20 years. However, the Tolt Substation's service area includes residents and businesses halfway between Carnation and substations located in Duvall and Fall City, as well as those in Carnation. Additional growth in the County along with Carnation's growth may eventually necessitate construction of a new facility.

Existing Transmission and Distribution System. Transmission of electrical power is supplied to the City of Carnation and the surrounding area from the Snoqualmie – Stillwater 115 kV transmission line. The 115 kV transmission line voltage is stepped down to 12.5 kV at the Tolt Substation where it is distributed to the City of Carnation and the surrounding area. The Tolt substation is located on Entwistle St in Carnation. The 12.5 kV distribution system consists of 3 circuits out of the Tolt substation. There are currently three different circuits coming out of Tolt substation. Two of them are running at about 75% their peak capacity and the third circuit is about 30% its capacity. There is room for growth on all of them.

TELECOMMUNICATIONS

Carnation is served by a variety of telecommunication companies. CenturyLink provides local calling services and DSL internet service, and is able to extend lines on demand. For calls to areas outside of the local area, residents may choose from a variety of long distance service providers. Cable television and broadband internet service is offered in Carnation through Comcast. Wireless telecommunications are supplied to Carnation residents by a variety of wireless services, including Sprint, AT&T and Verizon.

FUTURE NEEDS AND ALTERNATIVES

This is an inventory and analysis of the future capital needs for the following utilities: solid waste, water, wastewater, storm water, natural gas, electricity, and telecommunications.

SOLID WASTE

The solid waste collection and disposal system is adequate to meet Carnation's needs. The City will continue to monitor and contract with service providers throughout the planning period. King County is currently evaluating future solid waste alternatives beyond 2022. As discussed previously, the City currently contracts with Recology Cleanscapes.

WATER

The source, storage, treatment and distribution system must demonstrate the capacity to serve future populations within the water service area. New improvements will be required to address any existing or projected deficiencies;

these are listed in the Water Capital Improvements Plan as adopted in the Water System Plan.

Table U-6 shows Carnation future water demands, based on Table 3.12 of the 2015 Comprehensive Water System Plan. It should be noted that these demands were forecast assuming that water use efficiency (WUE) goals would not be met.

Table U-6: Projected Average and Maximum Daily Demand (without WUE)

	2015	2020	2025	2035
ADD *(Average Daily Demand) (gpd)*	232,000	306,000	365,000	418,000
MDD *(Maximum Daily Demand (gpd)*	582,000	765,000	912,000	1,045,000
Annual (MG)	84.8	111.7	133.2	152.4

The Supply Analysis found in Chapter 6 of the Water System Plan concludes that the City's available water rights and capacity of the two water sources are sufficient to serve future forecasted demand. The assumption is made that as demand grows, the supplemental well may be utilized more fully. However, given the reduction in overall water use that has recently been achieved, this may not occur as early as expected within the twenty year planning horizon.

WASTEWATER

The wastewater treatment plant owned and operated by King County and the collection and conveyance system owned and operated by the City of Carnation have both been sized to accommodate future build-out of the Carnation Urban Growth Area and according to the Wastewater Treatment Division, have adequate capacity to serve increased population that could result from approval of the 2015 amendment to the Future Land Use Map. The technologies utilized can be expanded beyond that capacity if needed. It should be noted that unlike water service that can be provided outside of the City's jurisdiction, sewer service is restricted to urban areas. There are a few exceptions to that rule. For example sewer service can be expanded outside the urban growth area to a public school system, or to a tribal reservation.

STORMWATER

The City is contemplating the formation of a stormwater utility to maintain stormwater facilities, and recover the existing and future costs of storm and surface water management within the city. A small scale community stormwater facility may be appropriate to provide for stormwater management within the commercial core, as this area has been found to have soils that are poorly drained and has limited area for stormwater facilities to be located. To form a new utility, it will be necessary to isolate the costs of stormwater system operations and capital needs, and forecast them over time. In order to have a defensible user fee, it is also important to charge customers proportionally based on their relative contribution

to runoff. This objective is most often met by basing stormwater fees on impervious surface area, so the development of reliable customer information will be crucial to program success.

NATURAL GAS

Puget Sound Energy (PSE) maintains a minimum pressure delivery through intermediate pressure mains from a design standard of approximately 15 psi. If the pressure drops below 15 psi, there are several methods of increasing the pressure in the line, including:

a. Looping the distribution and/or supply lines to provide an alternative route for the gas to travel to an area needing additional supply. This method often involves construction of high pressure lines, district regulators, and intermediate pressure lines.

b. Installing lines parallel to existing lines to supplement supply of natural gas to a particular service area.

c. Replacing existing pipelines to increase volume. (This includes efforts to replace low pressure cast iron systems with intermediate pressure plastic systems.)

There are three types of construction for maintenance or installation of new facilities:

a. New or replacement of existing facilities due to increase capacity requirements due to new building construction and conversion from alternate fuel.

b. Main replacement to facilitate improved maintenance of facility.

c. Replacement or relocation of facilities due to municipal and state projects.

d. PSE makes an effort to coordinate construction work with municipal projects in order to minimize cost and impacts to surrounding community. Due to franchise agreements, PSE is required to relocate existing facilities which is costly and usually unplanned. Improved coordination decreases this occurrence.

The average gas customer growth rate has been around 1.5% in the last five years. PSE anticipates the growth rate in this area to be the same (1.5%) in the next five years. Based on the 1.5% growth rate, there is no expectation to do system capacity improvements in the area in the next five years. The natural gas system improvements serving the Carnation area should operate without capacity issues for the next five years. There are no major natural gas projects currently

anticipated to serve customers in the City of Carnation.

Puget Sound Energy will continue to review projects proposed by the City of Carnation and may choose to take advantage of an opportunity when projects are scheduled.

ELECTRICAL POWER

The existing Snoqualmie – Stillwater 115 kV transmission line consists of small copper wire, with many of the poles nearing the end of their useful life. The future plans include replacing the older poles and the small copper wire with larger aluminum wire. This will increase both the capacity and reliability of the line. Future plans include rerouting the Snoqualmie – Stillwater 115 kV transmission line into Puget Sound Energy's planned Novelty substation. The reroute of this line would take place approximately half way between Carnation and Duvall along the existing BPA right-of-way. The line would be renamed "Snoqualmie – Novelty 115 kV" line at that time. Future plans also include an expansion of the Tolt Substation when the demand on the Tolt substation reaches approximately 16 or 17 MVA. Puget Sound Energy will increase capacity by adding a second transformer at this location.

Additional property will be required to accommodate this expansion. It is currently envisioned that the existing 115 kV transmission line would not be upgraded to 230 kV.

The 12.5 kV distribution system is expanded as additional customers are added, i.e. single family residences, platted developments, commercial businesses, etc.

At the winter peak load period the Tolt substation is currently running at about half its rated capacity so there's plenty of room for growth in the area.

There are no plans at this time to expand capacity in the Carnation area. PSE is confident it has enough capacity to handle future growth rates.

PSE continually monitor outages in the area and will generate projects to improve reliability should problems arise. Currently there are no reliability issues.

TELECOMMUNICATIONS

There are no shortages in the existing or future capacity of the telecommunication services for Carnation at this time. The existing network of telecommunication lines, including telephone, cable television, and broadband internet access has sufficient capacity to accommodate increases in development or subscription. The limitation in providing services would stem from lack of a direct hook-up from a specific residence to the television or telephone line. Some wireless telecommunications providers have sought to improve service within the Carnation area by constructing new wireless facilities, such as the recently permitted panel

antennas to be constructed by Verizon on the roof of City Hall.

UNDER GROUNDING UTILITY WIRES.

Development Regulations currently require new utilities to be placed underground with some exceptions (CMC 15.60.350). The under grounding of existing above ground utilities is difficult and costly. The cost will vary greatly depending on site specific factors. The burden of the cost falls on the utility company and on the individual property owner. The utility's cost would involve burying the utility, while the property owner would be responsible for preparing the utility system within the building for conversion, as well as bearing a portion of the cost of extending the service utility from the primary distribution line to the property.

Under grounding power line along SR203 (Tolt Avenue) in the downtown was included in the Tolt Corridor Plan and is being undertaken as part of the SR 203 Tolt Avenue CBD Improvement Project.

GOALS AND POLICIES

GOAL U1

To ensure that the energy, communication, and solid waste disposal facilities and services needed to support current and future development are available when they are needed.

Policy U1.1 The City does not provide energy, communication or landfill disposal services. These facilities and services are currently provided by private companies and King County. To facilitate the coordination of these services, the City should discuss and exchange population forecasts, development plans and technical data with the agencies identified in this plan.

Policy U1.2 Carnation adopts the following Level of Service Standards for utility services:

A. Collection service for garbage, recyclable materials, and yard waste shall be available to all properties within the City. Level of service provisions shall be included in franchise/license agreements with solid waste haulers. Cooperatively work with King County and related agencies for an adequate system of collection and disposal of hazardous wastes, and public education regarding hazardous wastes.

B. For electrical service, coordinate land use and facility planning with Puget Sound Energy to allow for siting and construction of distribution facilities that provide sufficient amounts of

electrical power with minimal periods of service interruption.

C. For natural gas, promote the continued extension of distribution lines within the city by PSE. Coordinate land use and facility planning to allow for eventual siting and construction of natural gas distribution conduits along roadways which are undergoing construction.

D. For telecommunications, including telephone, cellular telephone, cable television, and Internet services, advocate the development or maintenance of facilities necessary to provide services as needed to accommodate population growth and advancements in technology. Include level of service provisions in franchise/license agreements with providers of cable television services. For cellular telephone service, work with providers to enhance the range of the regional service area by encouraging the installation of a network of repeater towers in the Snoqualmie Valley.

Policy U1.3 New development shall be allowed only when and where all public utilities are adequate, and only when and where such development can be adequately served by essential public utilities without reducing level of service elsewhere.

Policy U1.4 Coordinate Carnation's Land Use Element with the facility/utility planning activities of the service providers, including Puget Sound Energy, CenturyLink, Comcast, solid waste collection provider, the King County Solid Waste Division and city operated utilities, by ensuring that these providers of public services and private utilities use the Land Use Element of this Plan in planning future facilities. Adopt procedures for the City's review of and comment on proposed actions and policies by these public and private providers of public services.

GOAL U2

To provide an adequate and effective recycling program to serve the needs of Carnation residents, which maintains public health, environmental and land use quality.

Policy U2.1 The City shall strive to educate public and private sector developments about on-site recycling options, and shall encourage the use of recycled products, and support ongoing special event recycling.

Policy U2.2 The City shall strive to decrease the amount of solid waste entering

land fill sites, extend the useful life of regional landfills and transfer stations, and minimize natural resource depletion by continuing solid waste recycling programs and participating in the procurement of recycled products.

GOAL U3

To minimize impacts associated with the siting, development, and operation of utility services and facilities on adjacent properties and the natural environment.

Policy U3.1 Utility service providers should design utility infrastructure and facilities in a way that does not damage or destroy the functions or features of the impacted properties, by, for example, providing buffers between public and private uses.

Policy U3.2 Electric power substations and other essential public facilities should be sited, designed, and buffered (through screening and/or landscaping) to fit in harmoniously with their surroundings. When sited within or adjacent to residential areas, special attention should be given to minimizing noise, light and glare impacts. Visual and land use impacts resulting from electrical, communication and other above ground essential public facility system upgrades shall also be mitigated.

These mitigation measures shall apply to existing facilities when substantial improvements and/or upgrading are proposed in the future.

Policy U3.3 The City shall encourage or require implementation of resource conservation practices and best management practices during the construction, operation, and maintenance of utility structures and improvements.

Policy U3.4 Adopt regulations that establish a process for identifying and siting essential public facilities, such as solid waste or recycling handling facilities, waste water treatment plants and power substations. Cooperatively work with surrounding municipalities and King County during the siting and development of facilities of regional significance.

Policy U3.5 The impacts from utility lines on the visual and physical environment should be mitigated by requiring the under grounding of utility lines to minimize clutter and the obstruction of views in new developments.

Policy U3.6 Development Regulations will include requirements that all existing

overhead utilities are to be relocated during street widening or changes in alignment and placed underground, except when enforcement would be overly burdensome due to economic or technological factors found to exist at a site; and if the terms of the franchise agreements conflict with the requirement for underground placement of utilities.

Policy U3.7 Through the Land Use Code, the City shall ensure environmentally sensitive, safe, and reliable utility service that is aesthetically compatible with the surrounding land uses and results in reasonable economic costs.

Policy U3.8 The City will recognize the difference between utility lines serving individual customers, distribution lines carrying power from a substation to the customer service line, and transmission lines carrying power from generating source to a substation. In recognition of these differences, the City will exempt the under grounding of utility lines over a certain voltage from any under grounding ordinance.

GOAL U4

To provide and maintain safe, reliable and cost-effective water and wastewater systems to serve the needs of Carnation residents.

Policy U4.1 The City will continue to upgrade its water system to ensure efficient water use and good management of the water system, in accordance with federal and state regulations.

Policy U4.2 The City will continue to manage and maintain its wastewater collection and conveyance system in accordance with Department of Ecology standards and regulations.

Policy U4.3 Treated effluent from any wastewater system developed within Carnation should be discharged through available environmentally safe means, including reclaimed water where feasible and appropriate. The City shall continue to work cooperatively with King County as they maintain and operate the Carnation wastewater treatment plant.

Policy U4.4 In the event the City wishes to sell surplus water to adjacent water utilities, the City shall negotiate an inter-local service agreement setting forth the terms and limitations of the sale of the surplus water.

GOAL U5

Promote and achieve reasonable levels of energy conservation and

conversion throughout the Carnation community.

Policy U5.1 Encourage planning and location of future facilities to accommodate future growth and to minimize incompatibility with surrounding land uses; joint use agreements among public and private utility providers for coordinated facility planning are also encouraged. The Utilities Element would be updated at least as required by the Growth Management Act to reflect changing regulatory conditions, load forecasts, and technology in cooperation with service providers.

Policy U5.2 Conserve land, energy and natural resources by minimizing sprawl and encourage the replacement of energy and water saving appliances.

Policy U5.3 Streets, water, and sewer extensions should be designed to provide service to the maximum area possible with the least length of extension.

GOAL U6

To process permits and approvals for utility facilities in a consistent, fair and timely manner and in accordance with Development Regulations and other pertinent standards and guidelines.

Policy U6.1 The City shall promote, where feasible, the co-location of new public and private utility distribution facilities in shared trenches, and coordinate construction timing to minimize disruptions and cost.

Policy U6.2 The City will provide timely effective notice to utilities to encourage coordination of public and private utility trenching activities for new construction and maintenance and repair of existing roads.

Policy U6.3 The City will encourage provision of an efficient, cost effective and reliable utility service by ensuring land will be made available for the location of utility lines, including location within transportation corridors.

Policy U6.4 The City will promote the extension of distribution lines to and within the Potential Annexation Area, and coordinate land use and facility planning to allow siting and construction of natural gas distribution lines within rights-of-way which are being dedicated or within roads which are being constructed or reconstructed.

Policy U6.5 The City will ensure that all maintenance, repair, installation, and replacement activities by utilities are consistent with the city's critical areas ordinances.

Policy U6.6 The City will encourage communication among the Washington Utilities and Transportation Commission (WUTC) and utilities regulated by the WUTC regarding the requirements of the Growth Management Act, especially the requirement that service be provided concurrently with or in advance of demand.

Policy U6.7 The City shall encourage system design practices intended to minimize the number and duration of interruptions to customer service.

GOAL U7

Surface water management activities should address quantity and quality of water entering the natural environment.

Policy U7.1 The City should minimize water quality degradation through education programs and implementation of Best Management Practices to reduce pollution entering surface waters.

Policy U7.2 Stormwater facilities required of new development should be designed and built in accordance with the City's adopted stormwater manual. Design should be conservative to allow for effective for low-cost, long term performance and maintenance. Low impact stormwater facilities should be encouraged where feasible and cost-effective.