**Electric Utility Comprehensive Plan**

D. Hittle & Associates, Inc. (DHA) was retained by the City of Blaine (City), Washington to

provide an update of the City’s Electric Utility Comprehensive Plan. Since 1995 many things

have changed and this update reflects current conditions, expectations and plans at the City of

Blaine Electric Utility.

Reliable and affordable electricity is important to health, safety and a high quality of life. Providing electricity requires a significant capital investment. Since electric utility investments

are made principally from funds and rates collected from the Electric Utility customers, the

economic sustainability of the investments and their renewals and replacements are critical to the

goal of comprehensive planning. Comprehensive planning requires consistent planning

assumptions between different City and County organizations.

Under the State of Washington comprehensive planning process, the State Office of Financial

Management provides uniform population estimates to the various counties. In Whatcom

County, the County used a consulting firm (Berk) to allocate population and employment

forecasts by various cities and urban growth areas. The Berk High forecast of population and

employment was chosen as the base case for this Comprehensive Plan update. The Berk

medium growth forecast was chosen as a scenario to examine the impact of growth on the

Electric Utility. The base case population and employment forecast results in significantly less

electrical growth than was shown in the 1995 Comprehensive Plan, due to much more modest

growth in population. This means that the electrical growth is less and that the “over loading” of

major electrical primary voltage feeders or circuits is less than was projected in 1995.

Part of the reduction in forecasted load is due to a reduction in the size of the City of Blaine

Urban Growth Area, which has been reduced by the County. Another part is due to the City

appropriately focusing the bulk of its conservation funds on programs in areas where it does the

most social good, such as residential customers, small business and government agencies that are

mostly funded by local tax dollars and changes in energy efficiency of major appliances and new

building codes. Most of the reduced load growth is due to lower population and employment

numbers, however, there is still a healthy amount of growth. Total electric energy sales are

projected to grow from about 73,417 Megawatt hours in 2013 to about 98,066 Megawatt hours in

2036 under the Berk High forecast and base case assumptions. Again, growth in customers

(population/housing & industries) is historically lower than projected in the 1995 Electric Utility

Comprehensive Plan and in the 2006 City-wide Comprehensive Plan Amendment.

Peak electrical demand is forecasted to increase from an actual value in December 2014 of 13.9

MW to about 17.1 MW in 2036 based on the Berk medium population and employment

projections. The peak demand is forecasted to increase to 18.4 MW in 2036 based on the Berk

High population and employment projection. The energy and peak forecast under this

Comprehensive Plan Update were compared to a recent 2015 Bonneville Power Administration

 (BPA) load forecast that was made by different methods and based on a pure time series basis.

Considering the differences in approach the two forecasts show roughly similar results.

The projected peak load was allocated to the four Blaine feeders based on historic loads, areas

served and zoning associated with customer classes. The principal implications of the projected

feeder loadings are that few major system modifications for the purpose of serving load under

normal conditions will be required over the forecast horizon, outside of shifting some load from

Circuit 16 onto Circuits 15 and 17. The most significant issue will be related to reliability in the

event of a Blaine substation outage, where Circuit 11 will be required to serve as much of the

Circuit 15, 16 and 17 loads as possible. This will require either some contingency planning or

discussions with BPA and Puget Sound Energy (PSE) on increasing emergency capacity

available in the event of a PSE Blaine Substation outage.

This does not mean that there are no problems with the Blaine Electric System requiring specific

capital projects. There is Electric System equipment that has deteriorated and is in need of

replacement or refurbishing and there are specific projects for reliability reasons or related to

modest customer growth. The specifics are addressed in the Capital Budget Section 4 of this

Update. The Capital Plan and Budget are divided into two areas. The first is expenditures

between 2016 and 2021. The second is more general in nature between 2022 and 2036. In total,

between 2016 and 2021, we have estimated necessary capital expenditures to be $1,284,100 with

an addition $643,100 in construction equipment for a total of $1,981,200, averaging $$319,00

per year.

Generally for a sustainable electric system, we would expect that expenditures on the distribution

system should average on the order of about $330,000 (in 2016 dollars) per year in capital

expenditures. Some years should be higher, some lower. We have minimized 2016 to 2021

expenditures in consultation with key staff.

As part of the Comprehensive Plan, a projection of the Electric Utility’s future revenue

requirements was developed to evaluate the ability of the Electric Utility to fund the estimated

capital improvement expenditures on a sustainable basis (Section 5 Financial Plan). The sources

of funds that the Electric Utility would typically use to pay capital expenditures are annual

revenues, contributions in aid of construction from customers, draws upon the Capital Reserve

Fund and new borrowings. Based on the forecast using County provided (Berk) population and

employment and the resulting electric sales forecast and peak demand forecast we have provided

a hypothetical revenue stream that matches a capital expenditure stream and future operations

costs.

Although electric rates could be adjusted in a number of different ways (e.g. every year, every

three years, or more heavily to specific customer classes, etc.), on average revenues are

forecasted to need to increase 2.6% per year between 2017 and 2036 to achieve the necessary

revenue amount associated with the capital expenditure plans. Average revenues are not specific

rates. It is important to acknowledge that the 2.6% annual revenue increase is mostly driven by

the assumed increases in BPA costs and assumed inflationary impacts on other operating costs of

the Electric Utility.

The financial plan presented in this report indicates that if the Electric Utility were to fund the proposed capital expenditures either with revenues or with a combination of revenues and new debt, average electric revenues would need to be increased over time on average at a level

slightly above the assumed rate of general inflation. This is a reasonable level of increase in

electric revenues for publicly-owned electric utilities in the Pacific Northwest.

**Comprehensive Water System Plan**

This *Comprehensive Water System Plan* *Update* for the City of Blaine (City) brings together information regarding the existing water system and future projections into an organized document. This document will be used for the planning and prioritization of improvements within the City’s water service area. This plan has been prepared in accordance with the requirements of the Washington Administrative Code (WAC) 246-290-100, as revised pursuant to the 2003 “Municipal Water Law”, the April 1997 Washington Department of Health (DOH) *Water System Planning Handbook*, and the June 2009 DOH *Water System Design Manual,* and in the context of the 2016 Whatcom *County Coordinated Water System Plan* (*CWSP*).

The City’s water system (DOH System ID No. 07300U) is a public system dedicated to providing water to residential and commercial customers both within the City’s boundaries and within unincorporated areas of Whatcom County. The City’s water system has operated since the 1920s and encompasses a combination of rural and urban areas. Historically, customers have been full-time, part-time summer and commercial in nature. The City’s retail water service area includes approximately 8,700 acres.

Existing System

The City’s water sources include twelve production wells and two additional City-owned wells that were drilled in 1991. The production wells supply water to five storage reservoirs, then from the reservoirs to the service area through the network of transmission and distribution mains. As of December 2018, there were 2,846 connections or 8,758 equivalent residential units (ERUs). Within the water system there also are four active booster pump stations and interties with two adjacent purveyors: Birch Bay Water and Sewer District and Bell Bay Jackson Water Association.

The current water service area is generally from the U.S./Canada border on the north to the resort community of Birch Bay along the south and west of Interstate 5 (see Figure 1.2). Land use within the service area is shown on Figure 2.1.

Annual water usage (as Average Day Demand or ADD, in million gallons per day, mgd) from 2009 to 2018 is shown in Table 1. An equivalent residential unit (ERU) represents the amount of water consumed by a typical city single-family residence. The average water usage for a single-family residence was determined to be 180 gallons per day for the City’s system. The ratio of Maximum Day Demand (MDD) to ADD is 2.2. The ratio of peak hour demand (PHD) to MDD is approximately 1.3.

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| **TABLE 1** |
| **Historical Water Use - Average Day Demand** |
|  |  |  |  |  |  |  |  |  |  |
| **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** |
| 1.64 | 1.48 | 1.40 | 1.41 | 1.37 | 1.44 | 1.64 | 1.65 | 1.58 | 1.57 |
| (millions of gallons per day) |

FUTURE WATER DEMAND AND WATER CONSERVATION

Future water demands for the District were estimated by forecasting growth in customer classes. Water demands were calculated by estimating the number of future connections then multiplying that number by the water demand per ERU. Water demands were calculated for each customer type then combined for a total system demand. Residential population was forecast to increase at a rate of 2.72% for single-family residences, 2.72% for multi-family residences, and 2.72% for senior/disabled. The historical and projected annual distribution system leakage is 7.5% of the annual volume of water supply.

The projected total ADD and MDD are as indicated in Table 2 (without conservation impacts) and Table 3 (with conservation).

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| **TABLE 2** |
| **Forecast Water Demands, without Conservation** |
|  |  |  |  |  |  |  |
|  | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** |
| ADD | 1.79 | 1.84 | 1.88 | 1.93 | 1.98 | 2.03 |
| MDD | 3.68 | 3.78 | 3.88 | 3.98 | 4.08 | 4.19 |
| PHD | 3,342 | 3,426 | 3,512 | 3,600 | 3,691 | 3,784 |
|  |  |  |  |  |  |  |  |
|   | **2025** | **2026** | **2027** | **2028** | **2033** | **2038** |
| ADD | 2.09 | 2.14 | 2.20 | 2.26 | 2.57 | 2.87 |
| MDD | 4.30 | 4.41 | 4.52 | 4.64 | 5.28 | 5.90 |
| PHD | 3,880 | 3,978 | 4,079 | 4,183 | 4,742 | 5,280 |
| (MDD and ADD in million gallons per day, PHD in gallons per minute) |

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| **TABLE 3** |
| **Forecast Water Demands, with Conservation** |
|  |  |  |  |  |  |  |
|  | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** |
| ADD | 1.72 | 1.72 | 1.77 | 1.81 | 1.86 | 1.90 |
| MDD | 3.52 | 3.55 | 3.64 | 3.73 | 3.82 | 3.92 |
| PHD | 3,195 | 3,202 | 3,280 | 3,360 | 3,442 | 3,526 |
|  |  |  |  |  |  |  |  |
|   | **2025** | **2026** | **2027** | **2028** | **2033** | **2038** |
| ADD | 1.95 | 2.00 | 2.05 | 2.10 | 2.38 | 2.64 |
| MDD | 4.01 | 4.11 | 4.22 | 4.32 | 4.89 | 5.44 |
| PHD | 3,612 | 3,700 | 3,790 | 3,883 | 4,385 | 4,863 |
| (MDD and ADD in million gallons per day, PHD in gallons per minute) |

The City has had a conservation program in place since 1991, with efforts significantly increasing in 1998. The Water Use Efficiency (WUE) Program has been prepared and updated as part of this water system plan update in accordance with the Municipal Water Law and DOH rules (WAC 246-290-800). The WUE Program identifies goals and measures for enhanced water conservation. The goals of the current conservation program at the City are:

* Reduce peak season demand by 1% each year for 2019
* Reduce Add/ERU from 180 gpd as forecast to 165 by 2020 and maintain at 165 through 2028
* Maintain distribution system leakage at or below 7.5 percent

System Analysis and capital improvement program

The City’s system-wide demand for MDD will be met under current source capacity through 2028, if growth and water use is as forecast. Adequate water rights, with all sources in service, are available to meet forecast MDD through 2038. Additional wells and/or well capacity is recommended for near-term reliability and long-term needs.

The current water rights for the City are shown in Tables 4.5 and 4.6. The City currently has water rights to an instantaneous withdrawal of 5,300 gpm. The City has several water rights applications on file, dating back to 1991.

The City performs all water quality monitoring of the water supply, storage and distribution system. Currently the City operates a gas chlorine disinfection system to chlorinate the source water.

The City operates five storage reservoirs located throughout the water service area. Four of the reservoirs are standpipes and one is a buried concrete tank with exposed dome roof. The condition and configuration of the existing reservoirs was reviewed, and some deficiencies were noted. Capital projects to address these deficiencies have been developed.

The City has updated its telemetry system, allowing remote monitoring by the operators. Reservoirs are filled from automated well and booster pump operations and booster pumps operate automatically to maintain appropriate pressure inn closed pressure zones.

The City’s distribution system is made of five pressure zones extending from the western portion of the Semiahmoo Spit area to the eastern boundary of the City’s service area. A sixth zone is proposed to serve development in the northeast corner of the City.

The major transmission of water from the City’s well field to the core distribution system is via two transmission mains – a 16-inch in Pipeline Road and a parallel 12-inch in Sweet Road. An additional transmission main is the City’s 14-inch pipeline that travels under Drayton Harbor to the Semiahmoo Spit. The major transmission mains are within the 171 pressure zone, therefore the City has four booster pump stations that provide service to customers located in higher pressure zones.

The City has established certain standards for extension of water mains within the water service area. The standard forms and requirements can be found in the City’s *Development Guidelines and Public Works Standards* document. These standards are updated periodically. The portion of the City’s design standards and construction specifications related to the water system are contained in Appendix M.

By reference, the *Development Guidelines and Public Works Standards,* in its entirety, is incorporated in this plan. Current copies of the *Development Guidelines and Public Works Standards* are available for review at the City’s Public Works office or on-line on the City’s web page.

The storage facilities and transmission and distribution system were analyzed to determine their ability to provide for existing and forecast water demand, while providing appropriate service pressure to all customers.

The City’s existing model was created by an unknown party and passed along to the City upon a change in engineering consultants. The model was revised to include missing components of the piping network and refined to reflect a more current distribution of demand. The model analyzed the current and forecast demands for MDD, PHD and MDD with fire flow for the years 2018 through 2028 (every other year) and for 2033 and 2038. The fire flow criteria within the City limits for new development is 1,000 gpm with a minimum system pressure of 20 psi.

The analysis revealed deficiencies in the source capacity, water treatment, storage, telemetry, and the distribution system. A 10-year capital improvement plan was developed to address these deficiencies (see Table 4 for summary). Those system deficiencies are summarized in Section 3.4 and proposed improvements are discussed in Section 3.5 and Chapter 8.

OPERATION AND MAINTENANCE

The City of Blaine’s water system consists of a fully metered distribution system, 12 production wells, one water treatment system, five storage reservoirs, and four booster pump stations. The water system operates automatically. The Operations Supervisor and staff monitor system operations, investigate unusual operating conditions, collect source production data, monitor booster pump stations and reservoirs, complete distribution system maintenance, test water quality, respond to customer calls regarding water quality, quantity, and leaks, respond to alarms from telemetry, participate in annual training, and conduct conservation program activities.

The City has a preventative maintenance program, equipment and supplies for operating and maintaining the water system, a comprehensive monitoring plan, emergency response plan, safety procedures, cross-connection control program, customer complaint response program, and record keeping and reporting per WAC 246-290-480 regulations. These programs are discussed in detail within Chapter 6.

Financial Plan

The City has operated its water system since it was first constructed in the 1920s. The City is responsible for managing its own financing, investment and accounting functions for the water system as well as other departments. The City finances improvements through the use of developer financing, combination financing by the City and developers, revenue bonds, and grant/loan funds.

The City should continue to update the water rate model each year with new projects and activities in order to confidently determine growth and revenue forecasts that adequately support the revenue requirements of the City. Water rates should also be reviewed annually to determine if a rate increase will need to be assessed to account for the revenue needs.