OVERVIEW OF WATER/SEWER SYSTEMS

CITY OF HOMER, ALASKA

The City of Homer, through the Public Works Department, strives to provide high-quality water and sewer services, anticipate future demand, and effectively provide for Homer's growth with the extension of water and sewer into areas identified in the land use plan.

Current Status

Water Treatment Plant built in 2006

Public water and sewer service for the city of Homer is provided by the City of Homer Department of Public Works (DPW). In July 2006, a Water and Sewer Master Plan was completed for the City to provide guidance on future improvements and expansions for each of the utilities. According to the 2006 master plan, approximately 64 percent of the occupied homes in the city were served by the public water system and approximately 54 percent were served by the public sewer system. Current estimates, based on Kenai Peninsula Borough GIS information, indicate that 74% of occupied homes are served with public piped water; 61% with public piped sewer.

Water System

Homer operates a Class A public water system. Water is supplied from a dammed surface water source which forms the 37-acre Bridge Creek Reservoir. This is the City's sole water source; no other groundwater wells or other surface sources are operated by the City. It is important to note that groundwater in Homer is generally unsuitable for residential and commercial water wells due to low yields, shallow groundwater, lack of a significant freshwater aquifer, and saltwater in wells. The City established the Bridge Creek Watershed Protection District in an effort to preserve and protect the city's drinking water source. Based on current population growth projections and current water usage, the Reservoir has adequate capacity for the foreseeable future.

Seasonal summer population fluctuations and increased summer water needs cause summer demand to nearly double the wintertime water production. Average winter water production is currently 350,000 gallons per day (0.35 mgd). Peak winter demand is 500,000 gallons per day (.5 mgd). Average summer demand is currently 800,000 gallons per day (0.8 mgd). Summer peak demand is currently 1,000,000 gallons per day (1.0 mgd). The water treatment plant, built in 2009, has the capacity to produce 2,000,000 gallons per day (2.0 mgd). The plant uses "ultra" filtration to produce high quality drinking water that meets or exceeds EPA drinking water standards. Based on historical population growth rates of 2-3% per year, no new treatment plant capacity will be needed for many years.

Treated water is distributed and stored in two water storage tanks, which have approximately 1,750,000 gallons of operational capacity. An additional tank has been designed and will be built

when funding has been identified. These water storage tanks serve as treated water reservoirs for community water demands and fire emergencies.

The water distribution system consists of approximately 60.13 miles of buried pipe. Pipe materials consist of cast iron, ductile iron, polyvinyl chloride (PVC), and high-density polyethylene (HDPE) pipe. Sizes of pipe range from 4 to 18 inches in diameter. The piping is generally confined to the lower areas of Homer except for two corridors which carry the water down from the treatment plant through low density residential development to the higher densely developed areas. Approximately 1,850 customers are served. There are also 445 fire hydrants connected to the city water distribution system.

Homer residents and businesses not on the public water system typically maintain their own wells
or pay to have private contractors haul potable city water to a holding tank. Because groundwater sources are often difficult to find with sufficient production and water quality, many property owners not connected to the City's system choose to purchase hauled water. Water from Homer's distribution system is also hauled to many residences outside of Homer city limits. In 2016, bulk water accounted for approximately 13% of the water billed.

Sewer System

Homer operates a deep shaft wastewater treatment plant (WWTP). The WWTP is designed to treat 880,000 gallons per day on average (.88mgd), but has the capability for treating 1,400,000 gallons per day (1.4 mgd) peak flow. Homer has an intra-city agreement with Kachemak City to provide sewer service. Currently, the WWTP treats an average winter daily flow of 390,000 gallons per day (610,000 gallons per day average summer flow). However, intense rain storms which contribute to inflow and infiltration (I&I) can substantially increase flow to the plant. A record of 1.7 million gallons per day has been recorded, but it is rare to see a flow of over 1.2 million gallons per day.

Sewer Treatment Plant (1990)

A study was conducted to better understand the inflow and infiltration (I&I) contribution to Homer's wastewater plant. Inflow is defined as surface water entering the system from various sources (i.e., building sump pumps, roof leaders, foundation drains, or system manhole lids). Infiltration is defined as groundwater entering the system through manhole/pipe cracks, faulty connections, or other openings. The study found inflow/infiltration to be a significant contributor to the overall wastewater collected. During intense rain storms, as much as 50 percent of the overall flows received at the sewer treatment plant may be attributed to inflow and infiltration. During major storm over 1,000,000 gallons per day of flow may be attributed by infiltration and inflow.

The wastewater collection system consists of approximately 65.7 miles of buried gravity sewer mains. Pipe materials consist of asbestos concrete, ductile iron, high density polyethylene

HDPE), and polyvinyl chloride (PVC). About half of the system is constructed with asbestos concrete pipe, especially the oldest sections built in the 1970's. Sizes of pipe range from 6 to 24 inches in diameter, with the majority being 8-inch size mains. The sewer system serves a total of 1,450 customers, In addition, parts of Kachemak City are served by the sewer system under an inter-governmental agreement with the City of Homer.

Because the soils in Homer are silty and relatively impermeable, infiltration is not considered a significant contributor to I&I (pipes and manholes are generally buried in impermeable soils). Inflow is considered to be much more significant, the result of perched groundwater table and generally poor drainage conditions. The lack of inspections of new home construction, poor drainage around homes and business, lack of enforcement provisions in Homer City Code, and the lack of a pipe storm drain systems have led to conditions that have allowed illegal storm drain connections to the sanitary sewer system.

Homer maintains seven sewage pump stations. Lift stations are used to pump sewage from topographical low points to higher portions of the gravity system. There are approximately 11.6 miles of force main pipe from the lift stations. Force main pipes are constructed from ductile iron or high density polyethylene pipe (HDPE) and range from 3 to 6 inches in diameter.

Those Homer residences and business not connected to the public sewer system use on-site wastewater disposal systems. Poor perking soil conditions and a perched groundwater table in Homer are not ideal for on-site systems and many are believed to function poorly. Poorly functioning septic systems have the potential of contaminating surface and ground water, and creating health hazards.

Near-term Priorities

Water: With a relatively new water treatment plant (with adequate capacity), water system near-term priorities should focus on expanding service to areas not served by a piped water system to provide domestic service, fire protection and reduce the potential of health hazards. The high per lot cost of extending water mains into relatively low density residential areas will be problematic. Allowing higher density development in the areas where the water distribution system is being expanded and encouraging infill development in areas already provided with public water infrastructure will be most cost effective, when it comes expansion costs. Spreading the fixed cost of operating and maintaining a water system over a larger number of customers to reduce monthly water fees is best accomplished through infilling.

40' long, 12" HDPE water main sections being "fused" together in preparation for installation along Kachemak Drive

Sewer: Sewer treatment plant priorities should focus on replacing treatment equipment in a 32

year old treatment facility. Sewer collection system near-term priorities should focus on expanding sewer mains to areas not served by a piped sewer system (especially where soil and groundwater conditions make properly functioning on-site systems difficult). The high per lot cost of extending sewer mains into relatively low density residential areas will be problematic. Allowing higher density development in the areas where the sewer collection system is being expanded and encouraging infill development in areas already provided with public sewer will be most cost effective, when it comes to the cost of expansion. Spreading the fixed cost of operating and maintaining a water system over a larger number of customers to reduce monthly water fees is best accomplished through infilling.

Implementation Strategies

Water: Remind stakeholders of the tradeoffs between low density-low impact development and the cost of piped water system improvement infrastructure.

Sewer: Continue upgrading sewer treatment plant equipment to prolong plant life. Reduce inflow by:

1) Incorporate enforcement language into City Code providing penalties for illegal connections to sanitary sewer,
2) Initiate inspections of all new sewer service connections, including building inspections prior to hook-up,
3) Educate the public regarding the costs associated with using expensive sewer treatment plant capacity to treat storm water.
4) Complete smoke testing to identify illegal connections to the sewer system,
5) Enforce the more stringent sewer connection Code provisions.