Establishing realistic design criteria is required to satisfy DOH planning requirements, to evaluate the existing water system’s adequacy, and to plan for future water system improvements. The minimum design criteria for the City of Kent (City) water system are in accordance with the standards and requirements set forth by the U.S. Environmental Protection Agency (EPA), Washington State Departments of Health (DOH) and Ecology (DOE), and for the water service area outside the City limits (in unincorporated King County) in accordance with the land use and planning guidelines of King County.

These standards are consistent with the DOH Group A Public Water Systems Waterworks Standards, the South King County Coordinated Water Supply Plan (SKC CWSP) Design and Construction Standards, and King County’s Rules and Regulations relating to Fire Hydrants and Water Mains as authorized under King County Ordinance 5828. In some instances, the City Standards may be more stringent and/or restrictive than the requirements of other agencies, in which case the City Standards shall apply.

Water system facilities constructed within the water service area must also be designed and constructed according to City Standards. The minimum criteria put forth herein do not replace or supersede the City’s Construction Standards, Developer Extension requirements or other codes and requirements associated with development proposals and permits. The City’s most current Construction Standards have been utilized in this summary of design criteria and have been submitted to DOH under separate cover for concurrent review and approval with this Water System Plan. The Construction Standards can also be found on the City’s website:

http://www.ci.kent.wa.us/PublicWorks/Standards/index.asp

The City’s standards and minimum design criteria accommodate anticipated maximum daily demands (MDD), as well as the demands on the system for peak day, peak hour, fire flow and other emergency situations. Minimum design criteria are established for water supply, storage volume, distribution and transmission main capacity and water quality standards. The criteria are used to determine existing deficiencies in the water system and projected water system requirements for the planning area described previously in this document. Chapter 7 summarizes the analyses performed on the system and identified deficiencies in meeting the needs of the current and projected customers of the system.

This Chapter also discusses the City’s project review procedures for both public works and developer extension projects and describes policies and requirements for outside parties. A discussion of the City’s construction standards, construction certification and construction follow-up procedure is also provided.
6.1 **REGULATORY REQUIREMENTS**

### 6.1.1 Federal Requirements

Public Law 93-523, the Safe Drinking Water Act (SDWA), directs the U.S. Environmental Protection Agency (EPA) to establish minimum national drinking water standards limiting the amount of potentially harmful substances which may be present in drinking water sources. These limits are regulated by the State of Washington Department of Health and adhered to by the City of Kent. Complete details of current regulations and the City’s water quality monitoring program are provided in Chapter 9 and in the Appendices to this Plan.

Because of the listing of the Puget Sound Chinook Salmon and Bull Trout as a “threatened species”, rules and regulations under the authority of the Endangered Species Act (ESA) can affect water system operations. As part of its ESA compliance program, the City operates consistent with best management practices as appropriate to protect of endangered species.

### 6.1.2 State of Washington Requirements

The rules and regulations regarding public water supplies are a part of the Washington Administrative Code (WAC) and are adopted pursuant to the provisions in the Revised Code of Washington (RCW) 43.20.050 for the protection of public health. The rules and regulations provide the minimum standards for design, construction, operations and maintenance of public water systems and conform with the Safe Drinking Water Act of 1974 and all subsequent amendments thereto.

The Growth Management Act (GMA) of 1990 (RCW 36.70A) has a direct impact on utility system planning by requiring a complete inventory of existing system facilities and a comprehensive effort toward determining the capability of utility systems to support anticipated growth and a six year plan to finance capital facilities. The GMA requires cities and counties to discuss and plan for seven key elements in their comprehensive plans: (1) Land Use, (2) Housing, (3) Capital Facilities, (4) Utilities, (5) Transportation, (6) Economic Development, and (7) Parks and Recreation. A primary outcome of the growth management planning in King County is the delineation of an Urban Growth Area (UGA) boundary within which an urban level of service is required. GMA rules and regulations will be crucial to projecting future water demands. Because the Retail Water Service Area for the City of Kent is within the UGA, as discussed in Chapter 3, the pressure for growth will remain substantial. In addition, the City is required to plan for the provisions of an “urban level of service” because it serves within the UGA.

Regulations related to accounting practices for municipalities such as the City of Kent are implemented and monitored by the State of Washington Auditor. Recent changes in accepted accounting practices that are expected to affect the Water
Department include the issuance of Government Accounting Standards Bureau statement 34 (GASB 34). Although the implementation of GASB 34 is beyond the scope of this Plan and is being addressed separately by the City's accounting staff, it is important to note that increased infrastructure inventory requirements are an element of GASB 34. Kent maintains a long-term system inventory program utilizing computerized mapping, equipment inventory and a Geographical Information System (GIS). These programs have assisted in compliance with GASB 34 requirements and have been a key element in development of this Plan.

DOH’s “Water System Design Manual” is the primary document governing the sizing and design of public water systems in the State of Washington. This publication sets forth the minimum system plan and reliability considerations. Criteria for distribution system design, water storage and daily supply requirements are summarized in this Chapter.

**6.1.3 King County Requirements**

Because a portion of the Retail Water Service Area is within unincorporated King County, the City must operate within the rules and regulations established by King County for these areas and utilize County planning data in developing growth projections for areas outside the City limits. Specifically, the King County Comprehensive Plan has a direct impact on the planning effort. King County Code Titles 13.24 (Sewer and Water Comprehensive Plans), 14, 21A, and 17.08 have been utilized in the development of this document to ensure that water system operations and construction standards are in conformance with King County requirements. The City must also operate within the terms of its current right-of-way franchise with King County.

**6.2 RELIABILITY STANDARD**

Kent has developed and adopted a reliability standard, as recommended by the Department of Health. The standard requires the Kent water system to be able to meet both current and projected peak day demands with its single largest supply source off-line for at least 72 hours. Due to declining aquifer conditions and constant growth within its service area, Kent has been unable to meet this standard since prior to 1990.

Planning to meet the 72 hour standard with future demands began in the mid 1980’s when Kent determined it would not be able to stay consistent with this reliability standard. The City vigorously pursued additional water rights and explored other alternatives to obtain sufficient sources to meet this reliability standard. A description of the alternatives explored is located in Chapter 4 of this document.
6.3 CONDITIONS OF WATER SERVICE

The City of Kent currently provides water service to customers within its established service area boundary. Additionally, the City maintains metered interties with the City of Renton, the City of Tukwila, Highline Water District, the City of Auburn, Water District #111, and Soos Creek Water and Sewer District. All interties are for two-way flows with the exception of the one with Soos Creek Water and Sewer District.

Service area policies such as developer extension requirements, fee payment responsibilities, design standards and related issues are governed by the Kent City Code and the City of Kent Construction Standards.

6.4 FIRE FLOW REQUIREMENTS

The Washington Administrative Code (WAC) 246-290-230(6), effective April 1999, states the following requirement for public water distribution systems:

“If fire flow is to be provided, the distribution system shall also provide maximum day demand (MDD) plus the required fire flow at a pressure of at least 20 psi (140 kPa) at all points throughout the distribution system, and under the condition where the designated volume of fire suppression and equalizing storage has been depleted.”

For unincorporated areas of the water service area, the SKC CWSP requires SKC purveyors to make available at least 1,000 gallons per minute (gpm) for fire protection. This requirement is also put forth in King County Code 17.08. City fire flow requirements are shown inTables 6-2 and 6-3.

6.5 SOURCE REQUIREMENTS

6.5.1 Source Quantity

The “Water System Design Manual” provided by DOH recommends a source capacity that meets the maximum day demand (MDD) while replenishing the standby storage volume within 72 hours of its depletion.

6.5.2 Water Quality Standards

Table 6-1 identifies the maximum contaminant levels allowed in drinking water supplies as published by the DOH in 2008. Additional requirements of the federal Safe Drinking Water Act (SDWA) which may be in effect but are not yet required for monitoring by the DOH are not included in this table. The City recognizes that additional monitoring requirements are forthcoming and will comply with such requirements as they are implemented by the State of Washington.
### Table 6-1: Maximum Contaminant Levels

**Administrated by Washington State Department of Health**

<table>
<thead>
<tr>
<th>Inorganic Chemicals</th>
<th>Primary MCL mg/L</th>
<th>Physical characteristics</th>
<th>MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony (Sb)</td>
<td>0.006</td>
<td>Turbidity</td>
<td>1 NTU</td>
</tr>
<tr>
<td>Arsenic (As)</td>
<td>0.05</td>
<td>Color</td>
<td>15 Color Units</td>
</tr>
<tr>
<td>Asbestos</td>
<td>7 million fibers/liter</td>
<td>Hardness</td>
<td>None Established</td>
</tr>
<tr>
<td>Barium (Ba)</td>
<td>2.0</td>
<td>Specific Conductivity</td>
<td>700 umhos/cm</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>0.004</td>
<td>Total Dissolved Solids</td>
<td>500 mg/L</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>0.01</td>
<td>Radionuclides</td>
<td>MCL (pCi/L)</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>*</td>
<td>Radium 226</td>
<td>3</td>
</tr>
<tr>
<td>Fluoride (F)</td>
<td>4.0</td>
<td>Combined Radium 226 &amp; 228</td>
<td>5</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>*</td>
<td>Gross alpha partical activity (excluding uranium)</td>
<td>15</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>0.1</td>
<td>TTHM</td>
<td>0.10**</td>
</tr>
<tr>
<td>Nitrate (as N)</td>
<td>10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrite (as N)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thallium (Tl)</td>
<td>0.002</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Trihalomethanes**

<table>
<thead>
<tr>
<th>MCL (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Organic Chemicals**

<table>
<thead>
<tr>
<th>MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Inorganic Chemicals

<table>
<thead>
<tr>
<th>Secondary MCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride (Cl)</td>
</tr>
<tr>
<td>Fluoride (F)</td>
</tr>
<tr>
<td>Iron (Fe)</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
</tr>
<tr>
<td>Silver (Ag)</td>
</tr>
<tr>
<td>Sulfate (SO4)</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
</tr>
</tbody>
</table>

---

1. **Source:** WAC 246-290-310

   * Although the state board of health has not established MCLs for copper, lead, and sodium, there is sufficient public health significance connected with copper, lead, and sodium levels to require inclusion in inorganic chemical and physical source monitoring. For lead and copper, the EPA has established distribution system related levels at which a system is required to consider corrosion control. These levels, called "action levels," are 0.015 mg/L for lead and 1.3 mg/L for copper and are applied to the highest concentration in ten percent of all samples collected from the distribution system. The EPA has also established a recommended level of twenty mg/L for sodium as a level of concern for those consumers that may be restricted for daily sodium intake in their diets.

   **The MCL for TTHM is calculated on the basis of running average of quarterly samples.**
6.6 **WATER SYSTEM DEMANDS**

6.6.1 **Maximum Day Demand (MDD)**

Maximum Day Demand shall be determined by the design Engineer on a case by case basis. The analyses conducted as part of this planning effort indicates that 358 gal/ERU is the minimum quantity for maximum day demand. Special consideration of atypical water system users, such as industrial facilities, will be made by the Water Department and may vary significantly.

6.6.2 **Average Day Demand (ADD)**

Average Day Demand shall be determined by the design engineer, but in no case be less than 197 gallons per ERU.

6.6.3 **Peak Hour Demand (PHD)**

Peak Hour Demand is typically expressed as a factor and shall be determined by the design Engineer. The minimum allowable factor shall be 2.89 times the average hour of the average day demand.

6.7 **GENERAL WATER MAIN REQUIREMENTS**

6.7.1 **Pipeline Velocities**

In accordance with DOH recommendations, the City of Kent requires that the design of new distribution mains provide for operating velocities less than or equal to eight feet per second (fps) under Peak Hour Demand (PHD) conditions, unless otherwise specified by the Public Works Director. Like DOH, the City recognizes that velocities may be greater than 8 fps in mains under fire flow conditions, in short sections of main (less than 50 lineal feet), or piping within pump and valve station facilities. Transient analyses should be considered for long sections of transmission main where pipe velocities exceed 8 fps.

6.7.2 **Water Main Extensions**

- All water main extensions shall conform to the design requirements of the City and DOH.
- Water System Plan indicates the location and configuration of the major elements of the existing and proposed City supply mains, distribution system, interties and loops. The exact location or configuration of this system may be modified, provided the proposed system remains consistent with the overall intent of the Plan. Minor modifications to the Comprehensive Plan require specific approval by the Director.
- Mainline extensions will be required when properties do not front on a water main or when the existing main is deemed inadequate for the
proposed use. It is a City policy that the water main is extended to the far edge of the property to be serviced, regardless of where the service connection is to be made.

6.7.3 Water System Design Parameters

- Desirable system working pressure shall be approximately 60-70 psi, but not less than 35 psi under Peak Hourly Demand (PHD). The minimum pressure in the water system under fire flow conditions shall be 20 psi.

- Pressure Reducing Valves (PRVs) shall be installed and maintained on water service lines, by the property owner, when system pressures are in excess of 80 psi.

- Minimum diameter of water main for commercial, industrial, multi-family and residential developments shall be eight (8) inches. Six (6) inch diameter mains may be acceptable for looped systems within single family residential areas containing fire hydrants on the eight (8) inch or larger system, and for “dead end” mains servicing less than twenty (20) single family residences where a fire hydrant is not required. The size of main in all cases must be sufficient to meet fire flow requirements as determined by the Fire Marshal.

- Connections to existing water mains shall be accomplished by “Extension”, “Wet Tap” or “Cut In” when mainline valves are required on the existing main. Connection to the existing main shall be per City Standard. No direct connection to the City’s existing water system will be allowed until after purity and leakage tests of the new system have been performed and passed.

- Two cubes for “Pigging” shall be installed in the new water main at the initial connection and at each lateral from the new water main. The Water Division will provide the cubes, they must be picked up by the contractor at the Water Division Shop located at 5821 South 240th Street.

- Dead end mains shall be avoided whenever possible. Where dead end mains are unavoidable, a minimum two (2) inch blowoff assembly is required. Blowoff sizes for various pipe diameters are listed in the City of Kent Construction Standards.

6.7.4 Water Main Location

- Water mains shall be laid at least ten (10) feet horizontally from any existing or proposed sanitary sewer. The distance shall be measured edge-to-edge. Any deviation from this requirement shall meet Washington State Department of Ecology (DOE) and DOH requirements and be allowed only upon approval of the Director.

- Perpendicular water main crossings of sanitary sewers shall be laid to provide a minimum vertical distance of eighteen (18) inches above the sewer line, measured from the bottom of the water line to the top of the sewer line. Where separation between the water line and sewer line is less than eighteen (18) inches, the sewer line shall be ductile iron. All sanitary sewer lines which cross above a water main, regardless of the
separation, shall be ductile iron as well, with no joints within a nominal ten (10) feet of the water main.

- Installation of water mains near other potential sources of contamination will require written approval by the Director on a case by case basis. They would include but not be limited to; storage ponds, land disposal sites for wastewater or industrial process water containing toxic materials or pathogenic organisms, solid waste disposal sites, or any other facility where failure of the facility would subject the water in the main to toxic chemical or pathogenic contamination.

- Water mains shall be located at least five (5) feet away from any other utility, including but not limited to storm drains, power, natural gas, CATV, private fire lines, etc.

### 6.8 VALVES

Water valves are required at the following locations:

- Four hundred (400) foot maximum intervals in commercial/industrial and multi-family residential areas. Locations involving hospitals, medical clinics, and other uses determined by the City of Kent to be critical applications may be required to have intervals reduced.

- Eight hundred (800) foot maximum intervals in residential areas.

- All sides of mainline tees and crosses.

- At all water service, fireline, and hydrant connections to the City main.

- At both sides of all bridge crossings, railroad crossings and casing/bores.

Existing gate valves may be subject to replacement with a new resilient wedge gate valve or a new resilient wedge gate valve installed at the property line per City of Kent Construction Standards at the discretion of the Director.

**6.8.1 Combination Air/Vacuum Release Valves**

Combination air/vacuum release valves shall be located at high points along the main. As a guide, valves are necessary where the difference between high and low points is two (2) feet on a gradual rise, or any abrupt rise. Actual locations should be in accordance with good engineering judgement and approved by the Director. The air inlet/discharge opening shall be thirty six (36) inches above finished grade and provided with a screened downward facing vent opening. It shall be located outside of traffic areas and installed to prevent damage to landscaping and pedestrians.
6.8.2 Blowoffs

Blowoffs shall be located at the dead end of all mains for flushing and “pigging” purposes. Blowoff assemblies must be sized and designed to achieve a minimum velocity of 2.5 ft/sec in the water main. These velocities are to be used as a guideline and do not relieve the Contractor from assuring a clean line. Two (2) inch is the minimum blowoff size.

Where cubes for “pigging” are required in the main line installation, the blowoff size shall be four (4) inch for six (6) through eight (8) inch water mains and six (6) inch for ten (10) through twelve (12) inch water mains. Fire hydrants are preferred in lieu of blowoff devices where flows and pressures warrant a hydrant.

Using water from blowoffs requires a use permit, meter and check valve assembly issued by the Water Division. Persons using water illegally will be prosecuted.

6.9 FIRE FLOW

All fire flow rates and duration shall be determined by the City of Kent Fire Prevention Division on a case by case basis. The minimum fire flow rates and associated durations for King County and the City are shown on Tables 6-2 and 6-3. Figure 3-1 shows the minimum fire flows required throughout the service area by generalized zoning classification.

In accordance with DOH requirements, the Kent City code defines “Fire Flow” as the measure of the sustained flow of available water for fighting fire at a specific building or within a specific area at 20 psi residual pressure.

<table>
<thead>
<tr>
<th>Zoning Classification</th>
<th>Rate and Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1,000 gpm for 120 minutes</td>
</tr>
<tr>
<td>Commercial</td>
<td>As determined by King County Fire Marshall</td>
</tr>
<tr>
<td>Industrial</td>
<td>As determined by King County Fire Marshall</td>
</tr>
</tbody>
</table>

Note: Fire Flows Requirements are identified in Title 17 of the King County Code.
### TABLE 6-3: CITY OF KENT MINIMUM FIRE FLOW RATES AND DURATION
APPLIES TO RETAIL WATER SERVICE AREA WITHIN KENT CITY LIMITS

<table>
<thead>
<tr>
<th>Classification</th>
<th>Rate and Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(^1)Residential</td>
<td>1,000 or 1,500 gpm for 60 minutes</td>
</tr>
<tr>
<td>Commercial</td>
<td>3,500 gpm for 180 minutes</td>
</tr>
<tr>
<td>Industrial</td>
<td>3,250 gpm for 240 minutes</td>
</tr>
</tbody>
</table>

**Note:** Fire Flows are determined by the Kent Fire Marshall on a case by case basis. The volumes and durations listed above are averages only.

\(^1\)Where fire flow availability is greater than 1,000 gpm but less than 1,500 gpm, the Fire Marshall requires the residence to be sprinklered.

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### 6.10 FIRE HYDRANTS

#### 6.10.1 Hydrant Location

Fire hydrant locations shall be reviewed and approved by the Fire Marshall prior to plan approval. In general, fire hydrants shall be installed at the following locations:

- At all street intersections.
- Six hundred (600) foot maximum intervals in single family residential area.
- Three hundred (300) foot intervals in multi-family and commercial areas.
- Upstream of a fire line vault, if an existing hydrant is not available within fifty (50) feet of the Fire Department connection.
- At locations noted on the approved project site plans.
- At other locations as directed by the Fire Marshal.

#### 6.10.2 Hydrant Connections

Connections to the existing main shall be as follows:

- Hydrant leads shall be Class 52 ductile iron.
- Hydrant leads shall not exceed fifty (50) feet in length.
- Wet tap connection with heavy-duty tapping sleeve and resilient wedge tapping valve is required.
- No service connections are allowed to hydrant leads.
- Using water from hydrants requires a use permit, meter and check valve assembly issued by the Water Division. Persons using water illegally will be prosecuted.
6.10.3 Hydrant Assemblies

- Fire hydrant assemblies shall be as follows per City Standard:
- Assemblies shall be shackled on runs eighteen (18) feet or less, or restrained with an approved type of mechanical restrained joint on runs longer than eighteen (18) feet, to the mainline.
- Public fire hydrants shall be painted white.
- Private fire hydrant assemblies require an approved Double check Detector Assembly located on private property.
- Private fire hydrants shall be painted yellow.

6.11 CROSS CONNECTION CONTROL

There shall be no cross connection whatsoever between the City water distribution system and any unapproved pipes, wells, pumps, private hydrants, tanks, non-potable fluid or any other contaminating materials that may backflow into the water system.

6.11.1 Backflow Prevention

The degree of public health protection required must be commensurate with the degree of hazard presented. In situations of known or potential physical or toxic health hazards, air gap separation and/or reduced pressure backflow assemblies shall be required. Double check valve assemblies or pressure vacuum breakers are generally utilized where aesthetic or detrimental effects on water quality may occur. Each water system connection has unique problems arising from location, climatic conditions, service demands, and other factors. Consequently, each cross-connection shall be examined on an individual basis and the City shall make the final determination as to the degree of Backflow protection required.

Backflow protection assemblies proposed for use can be found on the current list of approved assemblies by the Washington State Department of Health. All Backflow assemblies are required to be tested annually by a Washington State certified Backflow assembly tester. Copies of inspection reports shall be provided to the City.

6.11.2 Premise Isolation

Where the City determines protection of the public water distribution system is necessary a Backflow Preventer shall be installed at the property line commensurate with the degree of hazard as defined in WAC 246-290-010. Installation of Air Gap’s shall be approved by submitted drawings in accordance with the latest edition of the Cross Connection Control Manual, Pacific Northwest Section AWWA. DCVA’s and RPBA’s shall be in accordance with Standard Detail 3-13(a) in the City’s Construction Standards.
6.11.3 Irrigation System

Cross-connection protection is required for all irrigation systems. In general, pressure vacuum breaker assemblies may be acceptable for some irrigation system applications. Pressure vacuum breakers need to be freeze protected. In areas of flooding, on hillside installations, or where injection systems are used, double check valve assemblies or reduced pressure Backflow assemblies are required.

6.12 STORAGE REQUIREMENTS

Storage requirements are based on three components: Equalizing Storage, required to supplement production from water sources during periods of high demand; Standby Storage, required as a backup supply in case the largest source is out of service; and, Fire Storage, required in order to deliver fire flow for the required duration.

According to the Group A Public Water Systems Waterworks Standards, released by DOH, the minimum amount of storage required shall be the total combined amount of the equalized storage, standby storage, and fire storage. Chapter 7 provides a complete analysis of the City’s water storage requirements and existing capacities. Figure 6-1 provides a schematic illustration of storage requirements.
6.12.1 Operational Storage

Operational storage is the volume of water available to supply the system under normal operating conditions while the source is considered “off”. This volume varies according to the sensitivity of the water level sensors controlling the source pumps and the configuration of the tanks designed to provide the required volume while preventing excessive cycling of the pump motor(s).

6.12.2 Equalizing Storage

The volume of equalizing storage must be sufficient to meet hourly water system demands in excess of the rate of supply and must be at an elevation sufficient to meet these demands at a minimum delivery pressure of 30 psi. The amount of required equalizing storage is to be calculated in accordance with the DOH Minimum Sizing Guidelines for Public Water Supplies.

6.12.3 Standby Storage

Standby storage is required in order to augment the available supply of water during a period of restricted flow from the supply source. Restriction of flow may be caused by a pumping equipment failure, supply line failure, maintenance or repair, or other condition which causes interruption in the supply.

6.12.4 Fire Flow Reserve Storage

Fire reserve storage must be equal to the amount of water required to accommodate fire demand under a specified duration of time. Fire flow requirements are determined by the City Fire Marshall and Table 6-3 puts forth the minimum fire flow requirements used for analysis purposes in this water system planning effort.

6.12.5 Dead Storage

Dead storage is the amount of water not available at the minimum design pressure to the highest elevation served by the storage facility. Dead storage is not considered when determining volumes to provide operational, equalizing, standby or fire suppression storage.

6.13 TELEMETRY SYSTEMS

Telemetry systems must be compatible with the City’s existing SCADA system. The system must provide discrete status, continuous analog reporting, and control capability which is both sending and receiving. It must also have an integral backup power supply able to sustain communication for a 24 hour period.
6.14 BACKUP POWER REQUIREMENTS

Backup power shall be provided at all sources or pumping stations which are required to be operational during power failures in order to meet system reliability requirements, or to continuously maintain a positive distribution system pressure.

6.15 PROJECT REVIEW PROCEDURES

Depending on the project type, the City employs two different procedures to review proposed improvement projects. Project types include public works projects and developer extension projects. The review procedure for each project type is discussed in the following sections.

6.15.1 Public Works Projects

Projects that require public works contracts must be developed and reviewed as part of a comprehensive water system planning effort according to the requirements outlined for water districts in Section 57.16.010 of the RCW. The DOH 1997 Planning Handbook (Planning Handbook) indicates that public works projects must be identified based on either a water system or water quality analysis. For this planning effort, the water system analysis is described in Chapter 7, and the water quality requirements are discussed in this Chapter. Projects that are identified based on these analyses must subsequently be assessed and prioritized relative to each other before being selected for implementation.

Several considerations are given to assess proposed public works projects. The following considerations are those recommended by DOH in the Planning Handbook.

- Health Standards. The project must conform with and support all applicable regulations and standards.
- Land Use. The project must conform with and support applicable plans and policies.
- Quantity. The adequacy of a future water source resulting from the improvement project must be evaluated.
- Reliability. The amount of increase to system reliability based on the improvement project should be evaluated with respect to the system’s desired level of reliability.
- Costs. The project’s capital costs should be evaluated along with annual operation and maintenance costs.
- Regional Benefit. The project’s ability to help meet regional goals (e.g., multi-purpose benefits such as flood control and recreation), in addition to meeting local water system needs, should be reviewed.
- Environmental Effects. If the project could create detrimental environmental impacts, these impacts need to be defined. In addition, an
assessment should be made to determine whether the negative impacts can be mitigated.

- **Flexibility.** The project’s responsiveness to changed land use, water demand, and other resource management decisions should be evaluated. The potential for phased implementation should also be considered.

- **Implementation.** The project’s potential to be publicly accepted, easily designed, constructed, and financed should be reviewed.

- **Life Expectancy.** The project’s expected duration of operation should be estimated.

- **Risk.** The risks of selecting and not selecting the project for implementation should be assessed, considering health risks, economic risks, and reliability of service.

- **Operation and Maintenance.** The ability to operate, maintain and make connections and repairs to the facility in a cost-effective manner.

After each project has been assessed, an attempt is made to rank the projects in order of priority. During this prioritization step, the greatest attention is generally given to projects that directly affect public health. After the projects have been ranked, decisions are made about which projects should be implemented, when they should be implemented, and which projects should be deferred for reconsideration at a later date.

### 6.15.2 Developer Extension Projects

Developer extension water projects are primarily limited to distribution main improvements. These developer-funded projects do not have to be explicitly reviewed by DOH and discussed within the context of a comprehensive water system plan. They only have to be implicitly included in the comprehensive water system plan by including the City design and construction standards required for these projects. Accordingly, the City’s Water Construction Standards (Standards) for design and construction of City facilities are included as an attachment to this plan, by reference. The Standards were approved by DOH in 2006, when the City’s 2002 Comprehensive Water System Plan was approved. Any modifications made to the Standards since 2006 are approved by DOH through the adoption of this plan for subsequent developer extension projects.

Any extension, addition or modification of the City water system requires the completion of a Developer Extension Agreement with the City. Developer Extension Agreements are also required for the construction of plat improvements required by the subdivision code, construction of new streets or (excluding private service connections) within public rights-of-way or easements, or any utility installation that the City has determined must be owned and operated by the City.
Upon review of the proposed development, the Director of Public Works shall make the determination of when a mainline extension is required and the extent of improvements necessary.

The procedure to receive Development Extension Approval is as follows:

- The developer or his agent shall meet the Director of Public Works or his designated representative to verify the extent of improvements required. Compliance with the appropriate Comprehensive Plans and the procedure to complete a developer extension agreement with the City will be discussed at the meeting. Water or sewer extensions outside the City Limits, but within the City’s franchise area, may require approval of the King County Boundary Review Board prior to extension. If Boundary Review Board approval is required, a meeting with the City of Kent Property Manager is necessary to discuss the procedures.

- The developer shall retain a civil engineer registered in the State of Washington to prepare the engineering plans, specifications and cost estimates for the mainline utility and/or street improvements. The engineering plans shall conform to the general criteria and standards as outlined in the Standard Specifications.

- Design plans are submitted to the Property Management Division. Prior to engineering review of the design plans, the developer must execute the application for permission to extend utilities, complete the engineering agreement contained within the packet and pay 50% of the plan check fees. Following receipt of the design plans, the developer will receive a Developers’ Extension Guide Packet and instructions on how to proceed with the project.

- Following review and approval of the design plans by the Director of Public Works, the developer shall secure all necessary outside agency approvals.

After all necessary permits and approvals have been secured and verified, and all documents (i.e. warranty, bonds, easements, insurance…) and fees as required by the City have been submitted, a preconstruction meeting with the appropriate Public Works staff is scheduled. Following construction completion the following must be submitted:

- As built plans prepared by a Professional Land Surveyor registered in the State of Washington must be submitted.
- Bill of Sale.
- Addendums to the Bill of Sale.
- City Inspector’s Preliminary Project Approval.
- Final walk-thru field inspection of the completed public improvements is scheduled with the City’s Project Engineer, contractor, inspector and the Operations Division. A punch list is prepared and upon completion of this punch list, the contractor must notify the inspector for final acceptance of the constructed improvements.
• The Public Works Department will then schedule the project on the Council agenda for official City and Council acceptance of the public improvements. Upon acceptance by the City Council, performance bonds and other cash bonds are then released upon submittal of the required maintenance bonds as outlined in the Developer's Extension Packet.

### 6.15.3 Latecomers Agreements

Any person who constructs a water, sewer, storm drainage or street extension at the direction of the City, in excess of that which is required to meet minimum standards or which meets minimum standards and will benefit properties abutting the new improvements may, with the approval of the Director of Public Works, enter into a contract with the City which will allow the Developer to be reimbursed for that portion of the construction cost that benefits the adjoining properties and/or is in excess of the minimum standard. The format for a Latecomers Agreement must be submitted for review and approval by the City prior to plan approval to be considered. The City shall be reimbursed for all costs associated with the review and approval of the Latecomers Agreements.

The developer is responsible for preparing the Latecomers Agreement for City review and approval. The City will be responsible for recording the Latecomers Agreement. The Agreement shall include a list of those properties which will benefit from the improvements, a map outlining and designating these properties, legal descriptions as required by the City, and backup data supporting the costs submitted. The City will collect the Latecomers Fee from persons wanting to connect or use said public improvements and subsequently sees that the developer receives the payment.

### 6.16 Utility Connection Permits

The connection of private services to the City of Kent Utility System requires the issuance of the following permits:

• **Water Meter Permits** - Prior to the construction of a domestic water service, the owner or authorized agent, shall obtain a Water Meter Permit from the City. Permits will not be issued for connection to a new main until the system is ready for Council acceptance (except for projects where multiple buildings are approved for phased occupancy). For large, new developments, no permits will be issued until As-builts are in, walk-thru inspections are completed and the Bill of Sale is Council ready.

• **Fire Hydrant Permit** - Prior to the installation of a public fire hydrant, the owner/agent shall obtain a Fire Hydrant Permit from the City and approval from the City Fire Marshal.

• **Fireline Connection Permit** - Prior to the installation of a private sprinkler system, private yard hydrant or connection to a City water main, the owner/agent shall obtain a Fireline and/or Yard Hydrant Connection Permit and approval from the City Fire Marshal. Fireline and/or yard hydrant plans are jointly approved by both the Fire Department and Public Works Department.
• Outside Agency Permits - In addition to the permits listed above, the developer is responsible for securing and abiding by the conditions imposed by permits required by outside agencies. These permits include County and State DOT right-of-way permits, Hydraulic Permits, Shoreline Permits, Corps of Engineers, Department of Fisheries Permits, etc.

• King County right-of-way permit - For water extensions in King County right-of-way, the Owner shall obtain a King County right-of-way permit prior to the preconstruction meeting. Conditions and requirements set forth by the County shall comply with in accordance with King County Road Standards. The City and the Contractor must schedule and attend a preconstruction meeting with King County right-of-way inspection staff prior to starting any work. Permit and Inspection Fees charged to the City by the County will be billed to the Contractor or owner in full. All construction and restoration must be completed to the satisfaction of the County and City.

• Deduct, Water Use Only, and Backflow Assembly Permits - Prior to the installation of a water use only, deduct meter and Backflow assembly the owner/agent shall obtain a Water Service Permit from the City.

6.17 TEMPORARY WATER SERVICE

In accordance to City Code Section 7.02.180, when water service is required for a specific short-term duration, upon approval of the director of public works, a temporary water meter may be obtained from the water utility.

Such meters shall only be used for a designated project and shall be promptly returned to the water utility upon completion of the project or at the end of sixty (60) days, whichever comes first. The meters are to be returned in the same condition as when rented, and the user shall be held responsible for any damage thereto including paying all repair or replacement costs. While in the user’s possession, the user shall be solely responsible for the meter and as such, should it be lost or stolen, the user shall pay the water utility the cost of its replacement.

The Director of Public Works shall require that a cash bond be deposited with the city prior to receipt of a temporary meter. The amount of the bond shall equal the replacement cost of the respective meter. Upon return of the meter, and following the payment of all outstanding charges including any meter repair or replacement costs, the cash bond shall be released back to the user.

Temporary meters may be moved from one (1) hydrant to another within the same project; provided, the water utility is notified in advance of the proposed relocation and that hydrant wrenches are used to make all connections and disconnections.