



# KINGSTON WASTEWATER FACILITIES PLAN UPDATE ADDENDUM

May 2013

Prepared for  
Kitsap County  
Department of Public Works



Prepared By:



# Kingston Wastewater Facility Plan Update Addendum

Prepared for Kitsap County Public Works

May 2013



5-8-2013



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**KITSAP COUNTY**  
**KINGSTON WASTEWATER FACILITY PLAN UPDATE ADDENDUM**  
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## 1.1 Introduction

The purpose of this report is to revise previous evaluations of the Kingston wastewater collection and conveyance systems prepared for the Kingston Wastewater Facility Plan Update Technical Addendum (Brown and Caldwell, 2007 Addendum). Revisions to the previous work are required to evaluate changes of the boundaries of the Kingston Urban Growth Area (UGA) with associated revisions in population densities consistent with Growth Management Act requirements. See Figure 1 for the UGA boundary adopted by Kitsap County.

This report analyzes the sewer collection system required to provide service within the UGA through 2025. Existing and future sewer infrastructure needs are analyzed from 2010 to 2025 including recommendations for a 6-year (2013-2018) capital improvement program (CIP).

The environmental review for the recommended CIP was undertaken as part of a Growth Management Act (GMA) Remand effort completed by Kitsap County in 2012 as directed by the Growth Management Hearings Board (Board) in Case No. 07-3-0019c. The Kitsap County adopting ordinances, the Comprehensive Plan, the CIP and associated environmental documents were adopted by the Kitsap County Board of County Commissioners on August 29, 2012. Kitsap County was found in compliance with GMA requirements by the Board on November 6, 2012.

## 1.2 Existing Conveyance System

The existing conveyance system services a portion of the Northern UGA. The Southern UGA is currently unsewered. The conveyance system discharges to the Kingston Wastewater Treatment Plant (WWTP) located west of the UGA via a 6-inch forcemain. See Figure 1 for the existing collection system and Figure 2 for a schematic of the existing collection system.

The existing collection system consists of over 12 miles of gravity sewer and force main pipe of which 60% is 8-inch gravity sewer (Table 1-1). The collection system includes six pump stations, the largest of which (LS-71) is located at the old wastewater treatment plant site, receiving all of the wastewater generated in the UGA (Table 1-2). Wastewater from LS-71 is pumped about two miles to the wastewater treatment plant located west of the UGA boundary.

**TABLE 1 – 1 EXISTING CONVEYANCE SYSTEM PIPING**

Pipe Diameter (inch)	Pipe Length (feet)
Gravity Pipe	
6	160
8	38,790
10	1,430
12	3,390
Force Main Pipe	
2	900
4	8,700
6	11,200

**TABLE 1 – 2 EXISTING PUMP STATIONS**

Pump Station	Location	Firm Capacity (gpm)	Number of Pumps	Backup Power Available
41	Appletree Cove NE West Kingston Road	230	2	Yes, from PS71
42	North Kitsap Junior High School District No. 400 NE West Kingston Road	80	2	No <sup>1</sup>
43	North Kitsap School District – Elementary School No. 7 Barber Cut Off Road NE	250	2	No <sup>1</sup>
52	North Kitsap Transportation Facility Siyaya Avenue NE	20	2	No <sup>1</sup>
71	Old Treatment Plant Site Dulay Road NE	400	2 <sup>2</sup>	Yes
72	North Kitsap High School NE West Kingston Road	95	2	Yes

Notes:

- Backup power is not available onsite; however, power can be provided from a portable generator.
- PS 71 is designed to be able to install a third pump when necessary.

### **1.3 Existing Wastewater Treatment Plant**

The Kingston wastewater treatment plant operates under NPDES discharge Permit No. WA-003207-7 issued by Ecology on November 9, 2010 with an expiration date of November 30, 2015. The plant is an oxidation ditch (extended aeration) type activated sludge facility that discharges to Appletree Cove, Puget Sound.

The wastewater treatment plant includes preliminary treatment through a rotary screen and an aerated grit chamber, influent flow measurement with a Parshall flume, biological treatment in two oxidation ditches followed by solids settling in two secondary clarifiers, disinfection with ultraviolet (UV) light disinfection system and effluent flow measurement with a Parshall flume. Solids removed from the secondary clarifiers are thickened by a gravity belt thickener and transported to the County's Central Kitsap WWTP for further treatment and disposal.

**Urban Growth Area**

Kingston UGA Boundary

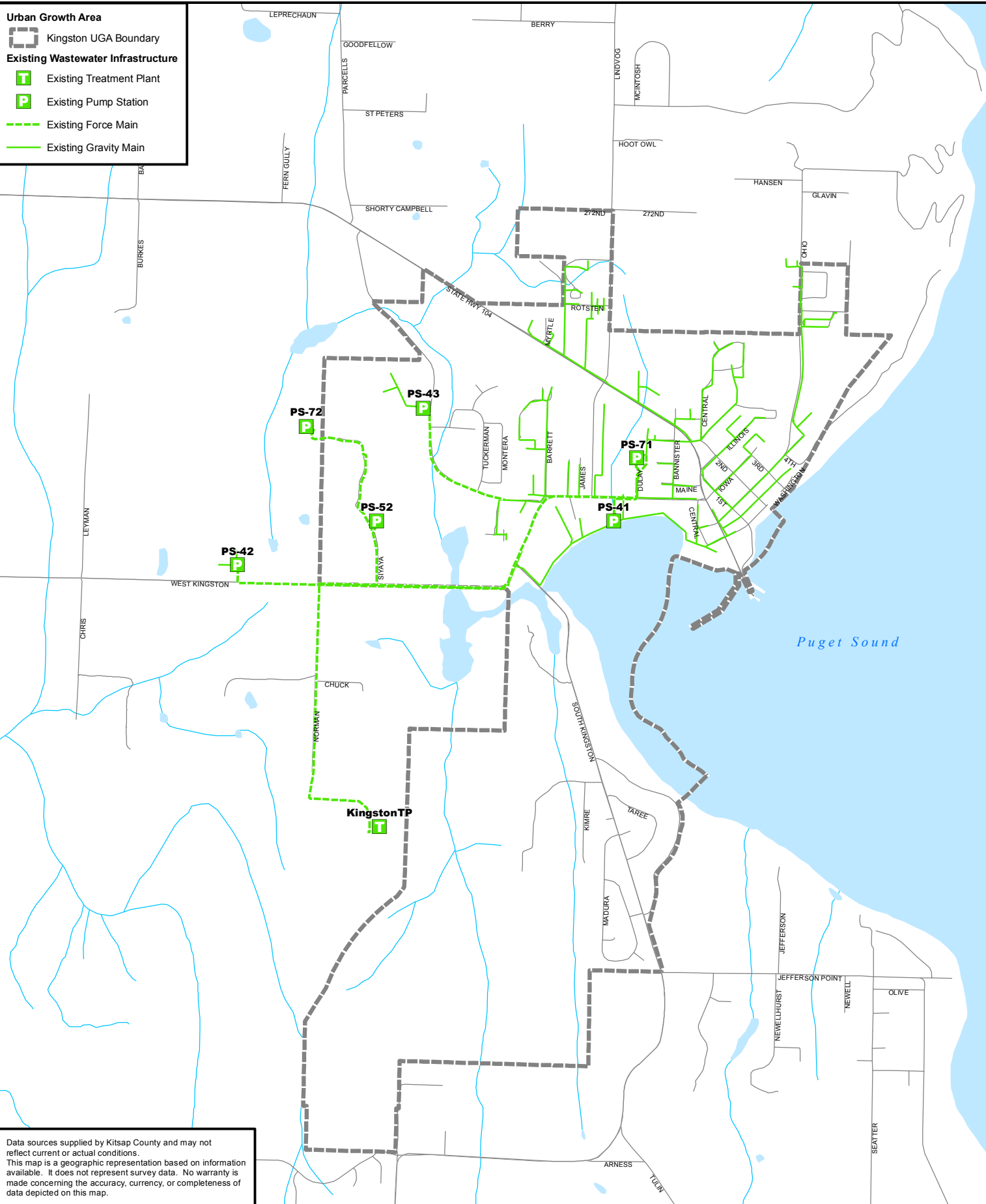
**Existing Wastewater Infrastructure**

Existing Treatment Plant

Existing Pump Station

Existing Force Main

Existing Gravity Main



Data sources supplied by Kitsap County and may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

P:\Mapping\Maps\_Generated\KitsapCounty\Projects\13\_10250\_01\022\maps\Fig 1\_Kingston UGA Exist WW Infrastructure 5.5x11.mxd 3/27/2013 cde@bno

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**Kingston UGA and Existing Wastewater Infrastructure**  
 Kitsap County Public Works  
 March 2013

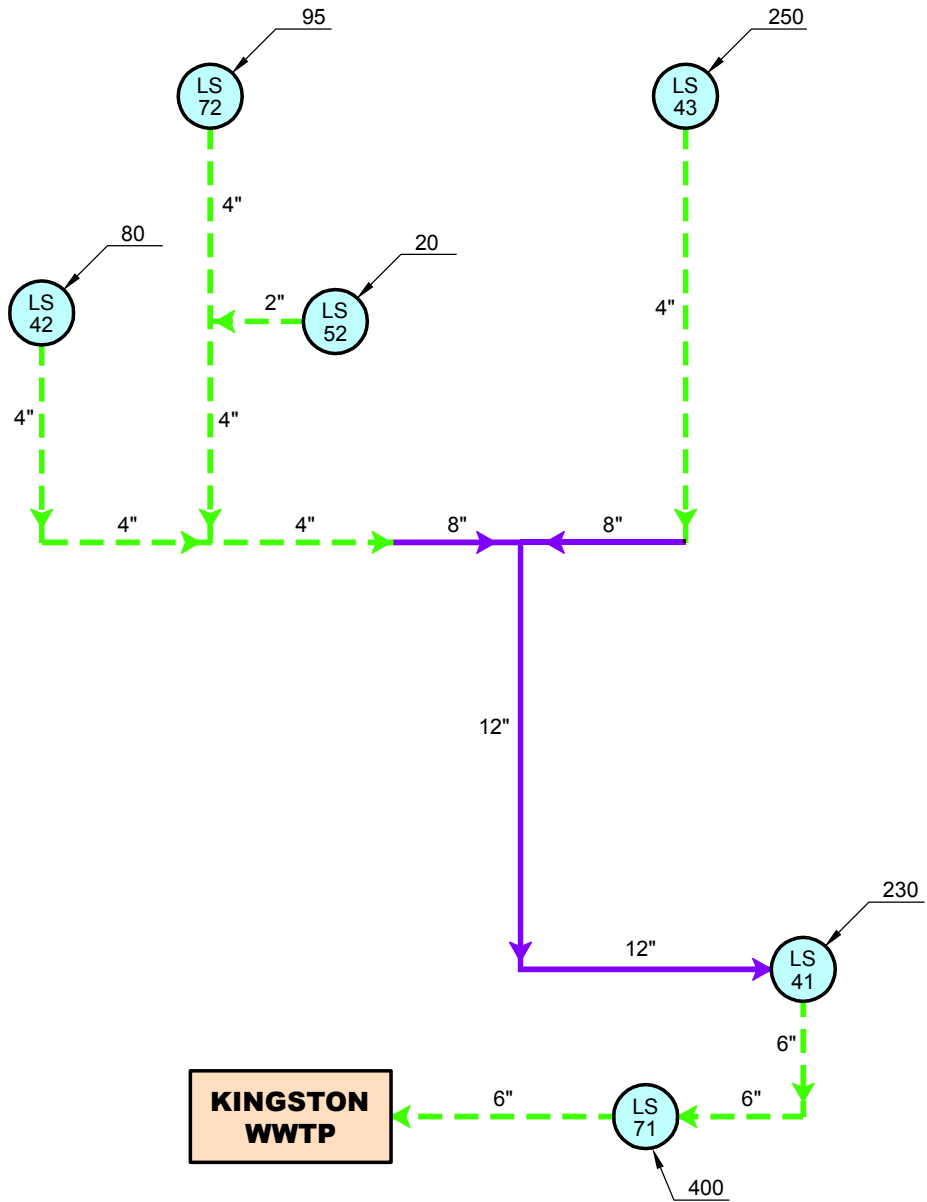
Figure  
**1**



FILE NAME (UPDATED BY) PLOT DATE & TIME  
 S:\LAD\KITSAP COUNTY\12-10250-01 KINGSTON FAC PLAN\DWGS\F12-10250-01 EX SYS FIG 2.DWG (PLS) MAR 19 2013 11:15:23  
 XREFS: NONE

**LEGEND**

-  Gravity Flow
-  Force Main
-  Low Pressure Gravity
-  Lift Station < 1,000 GPM
-  Existing Firm Capacity (GPM)



## CHAPTER 2

# PLANNING AND SERVICE AREA ASSUMPTIONS

---

### 2.1 Planning and Service Area

Wastewater facilities planning for Kingston is based on providing service to the updated Urban Growth Area (UGA) as presented on page two of the Land Use Chapter in Kitsap County's August 2012 Final Comprehensive Plan and Development Regulations. NE West Kingston Road roughly divides the service area into north and south sections. Approximately three-quarters of the service area is currently developed as residential and non-residential (commercial) areas. Fully platted residential blocks are located in the north and south sections. Existing commercial development is located along State Route 104, in the north section of the service area.

Wastewater facilities design requires a reliable estimate of future wastewater flows in the service area. The updated UGA differs from the service area previously defined in both the 1995 Addendum and the 2007 Addendum. The wastewater flow estimates developed for this update are based on an adjusted UGA and a residential population capacity analysis to the year 2025 generated by Kitsap County Department of Community Development (DCD) during the 2012 remand efforts (Kitsap County Board of County Commissioners, 2012). The projected population is segregated into residential and non-residential components that are developed for subbasins within the UGA that correspond to areas draining to lift stations (Figure 3).

### 2.2 Residential Population

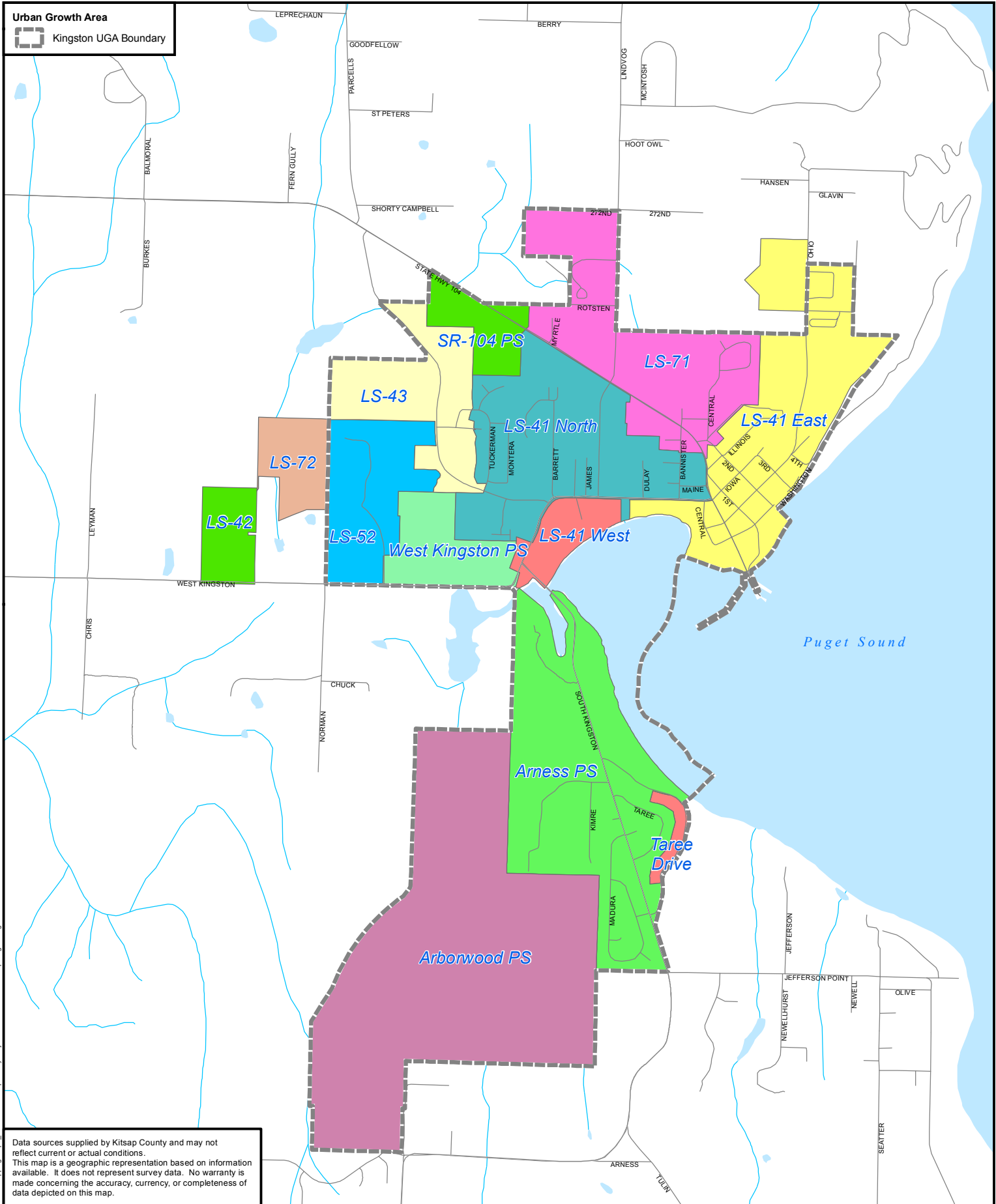
The baseline residential population of 2,050 is based on the 2010 Census and adapted to the remand-adjusted UGA boundary. For the purposes of comparison, the Sub-Area Plan 2000 total population for the Kingston UGA was 1,871.

Population data were provided by DCD for each traffic analysis zone (TAZ) in the Kingston service area. DCD updates to the land capacity analysis during the remand effort, based on updated land use and zoning information, allocated population growth to parcels identified as vacant/underdeveloped according to parcel area and the land use density. This resulted in a 2010 through 2025 residential growth capacity of 2,821, resulting in a projected 2025 residential population of 4,871. DCD-projected growth assumes that 100 percent of the population will be sewered by 2025.

### 2.3 Non-Residential Population

Employment and student data are also incorporated into flow calculations. Berk Consultants provided a 2010 estimate of 632 employees in Kingston, just over 30 percent of the 2010 residential population estimate. The School District was able to confirm how many of those employees work at the school. Projected total 2025 employment of 1,501 is calculated assuming that the number of school employees is not expected to grow, while the remaining employment will remain commensurate with the 2010 population-to-employment ratio.

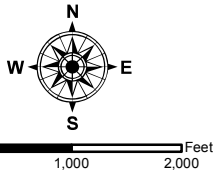
**Urban Growth Area**  
 Kingston UGA Boundary



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P:\Mapping\Maps\_Generated\KitsapCounty\Projects\12\_10250\_01\022.mxd; Fig 3\_Kingston UGA WW Subbasins & E&T.mxd 3/27/2013 ddb@info

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Scale: 0, 1,000, 2,000 Feet



**Kingston UGA**  
**Wastewater Subbasins**  
 Kitsap County Public Works  
 March 2013

Figure  
**3**

## CHAPTER 3

# EVALUATION OF COLLECTION AND TREATMENT FACILITIES

---

### 3.1 Introduction

The population projections were used to develop flows for each subbasin, which were then routed through a spreadsheet flow model to determine if the existing collection system has sufficient capacity and to size any new upgrades needed to meet future conditions. The projected flows were also used to determine the status of available capacity at the wastewater treatment plant relative to the influent flow design criterion stipulated in the NPDES discharge permit.

### 3.2 Wastewater Flow Projections

Wastewater flows were estimated for each subbasin for 2010 and 2025 conditions using the population projections, unit flows, peaking factor, and infiltration and inflow (I&I) rates.

Subbasins were delineated based on mapping data of the existing sewer system and topographic data to estimate the boundaries of future basins. Each lift station has one subbasin contributing directly to it, with the exception of LS-41, which has three subbasins due to the size of the basin and the piping draining to the station.

The following criteria were used to develop the flows:

- 60 gallons/capita/day for residential sewer flow
- 30 gallons/capita/day for employee sewer flow
- 16 gallons/capita/day for student sewer flow
- 1.5 peak hour factor for sewer base flow only (no I&I)
- 1,100 gallons/acre/day for I&I

The results of the flow analysis for each subbasin are presented in Table 3-1 for 2010 conditions and Table 3-2 for 2025 projected conditions. The total annual sanitary flow for 2010 is 70 gpm, or 0.101 mgd, which is within 5% of the average flow at the Kingston WWTP of 0.106 mgd measured in 2010. The average annual flow is projected to increase to nearly 260 gpm, or 0.37 mgd, by 2025 which is an increase of 270%. A corresponding increase in peak hour flows is projected during the planning period.

### 3.3 Conveyance System Capacity

A spreadsheet model was developed to analyze the capacity of the conveyance system and to size upgrades and new infrastructure. The model utilizes Manning's equation to determine the capacity of the gravity sewer mains. The design capacity of the gravity mains was considered to be 80 percent depth, which is equivalent to 87 percent of the hydraulic capacity. The pump station capacities were obtained from the County and compared against the modeled peak hour flows at each pump station. Force main velocities of more than 8 feet/second were considered under capacity.

The following is a summary of the model characteristics:

- The model is divided into subbasins in order to calculate flow rates at each pump station and at other points in the system to determine deficiencies throughout the planning horizon.

- The model does not take into account backwater effects. If a given pipe is surcharging, it is considered undersized and in need of replacement.
- The model does not account for flow attenuation through the conveyance system, which results in a conservative model, particularly in downstream reaches. Due to the size of the sewer system, it is assumed that flow attenuation will have a minimal impact on the model results.

Wastewater flows for the existing conveyance system based on the modeling analysis are presented in Figure 4 for 2010 flow conditions and in Figure 5 for projected 2025 flow conditions. It appears that the only potential existing capacity problem may be at LS-41 where the 2010 flows are approaching firm pumping capacity. The firm pumping capacities of the other five pump stations appear to be adequate for 2010 peak flows. However, capacity upgrades are required at both LS-41 and LS-71 to convey projected 2025 peak flows.

Projected 2025 flows for new infrastructure to extend service throughout the entire UGA are also shown in Figure 4. New collector sewers, four new pump stations and associated force mains will be required to serve these areas. These new infrastructure improvements are described in Chapter 4.

### **3.4 Wastewater Treatment Plant Capacity**

Facility loading design criteria for influent flow, influent biochemical oxygen demand (5-day BOD) and total suspended solids (TSS) are stipulated in Section S4 of the discharge permit. The maximum month design flow (MMDF) is 0.292 mgd; maximum month influent loadings for BOD and TSS are both 585 pounds per day. The County must submit a plan and schedule for continuing to maintain capacity to Ecology when the actual flow or loading reaches 85% of any one of the design criteria for three consecutive months.

The average annual flow in 2012 was 0.1138 mgd with the maximum month flow in December of 0.2247 mgd, which is 77% of the influent flow design criterion. The average flow for the three highest consecutive months (October through December) was 0.1912 mgd. However, for comparison with the three consecutive month requirement in Section S4 of the discharge permit, the average flow for the three highest consecutive months was 65% of the influent flow criterion, well below the 85% threshold.

The average annual sanitary flow for year 2025 is estimated to increase to 0.37 mgd if population and employment growth occur according to GMA projections. With the addition of infiltration and inflow projected for new service areas, the total average annual flow at the Kingston plant could exceed 0.4 mgd by 2025. Using a maximum month peaking factor of 2 based on 2012 flows, the maximum month flow by 2025 could reach 0.74-0.8 mgd, clearly in excess of the current influent flow design criterion of 0.292 mgd.

The status of maximum monthly flows relative to the 85% flow threshold will be monitored by Kitsap County operations staff as influent flows are measured on a daily basis and reported in monthly Discharge Monitoring Reports (DMRs) to Ecology. Thus, when the 85% threshold is reached, Kitsap County will undertake a program to continue to maintain adequate capacity in accordance with the requirements of Section S4 of the discharge permit.



TABLE 3 – 1 KINGSTON UGA 2010 SUBBASIN FLOWS

Subbasin	Sewered Population	Sewered Employees	Students	Total Sewer Flow (gpm)	Sewered Area (acre)	Infiltration and Inflow (gpm)	Total Peak Hour Flow (gpm)
LS-41 West	66	0		3	10.0	7.6	12
LS-41 East	284	262		17	41.3	31.5	57
LS-41 North	267	93		13	41.2	31.4	51
LS-42	0	70	686	9	22.3	17.0	31
LS-43	0	52	438	6	22.4	17.1	26
LS-52	0	4	46	1	10.3	7.9	9
LS-71	206	73		10	37.3	28.5	44
LS-72 <sup>(3)</sup>	0	78	865	11	26.4	20.2	37
<b>Totals</b>	<b>823</b>	<b>632</b>	<b>2,034</b>	<b>70</b>	<b>211</b>	<b>161</b>	<b>266</b>

**TABLE 3 – 2 KINGSTON UGA 2025 SUBBASIN FLOWS**

<b>Subbasin</b>	<b>Sewered Population</b>	<b>Sewered Employees</b>	<b>Students</b>	<b>Total Sewer Flow (gpm)</b>	<b>Sewered Area (acre)</b>	<b>Infiltration and Inflow (gpm)</b>	<b>Total Peak Hour Flow (gpm)</b>
<b>LS-41 West</b>	119	0		5	20.7	15.8	23
<b>LS-41 East</b>	788	446		42	96.8	74.0	137
<b>LS-41 North</b>	502	440		30	111.9	85.4	131
<b>LS-42</b>	0	70	686	9	22.3	17.0	31
<b>LS-43</b>	157	52	438	12	62.6	47.8	67
<b>LS-52</b>	29	4	46	2	10.3	7.9	11
<b>LS-71</b>	698	314		36	103.6	79.2	133
<b>LS-72<sup>(5)</sup></b>	0	78	865	11	26.4	20.2	37
<b>SR-104</b>	113	97		7	22.3	17.0	27
<b>West Kingston</b>	79	0		3	36.8	28.1	33
<b>Arness</b>	795	0		33	156.2	119.3	169
<b>Arborwood</b>	1558	0		65	309.6	236.5	334
<b>Taree</b>	32	0		1	4.7	3.6	6
<b>Totals</b>	<b>4,870</b>	<b>1,501</b>	<b>2,034</b>	<b>257</b>	<b>984</b>	<b>752</b>	<b>1,137</b>

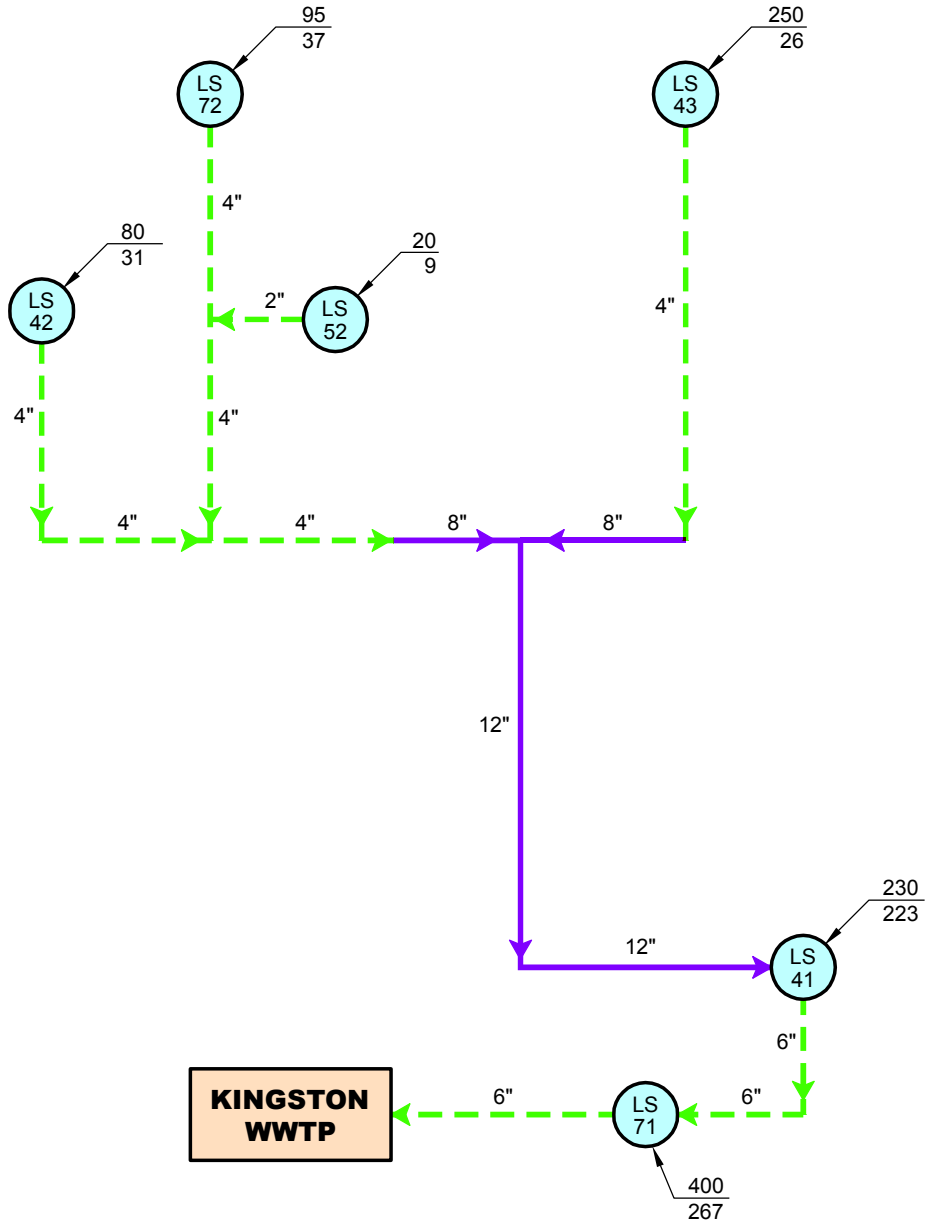
**LEGEND**

-  Gravity Flow
-  Force Main
-  Low Pressure Gravity



Lift Station < 1,000 GPM

Existing Firm Capacity (GPM)  
Existing 2010 Peak Inflow (GPM)



FILE NAME (UPDATED BY) PLOT DATE & TIME  
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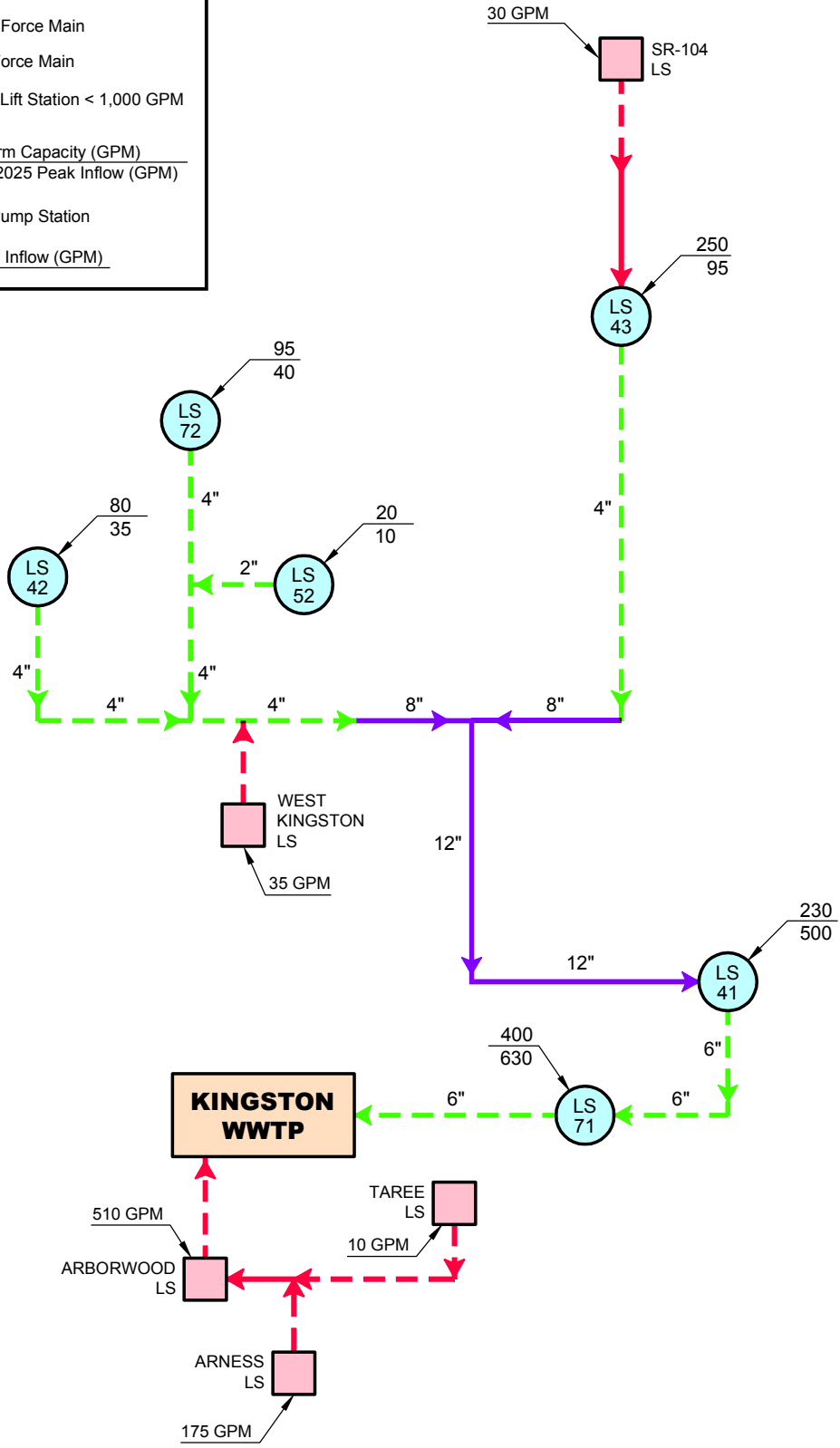
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FILE NAME (UPDATED BY) PLOT DATE & TIME  
 S:\LAD\KITSAP COUNTY\12-10250-01 KINGSTON FAC PLAN\DWGS\F12-10250-01 EX-NEW PS FIG 5.DWG (GOC) MAR 28 2013 11:16:32  
 XREFS: NONE

**LEGEND**

- Existing Gravity Flow
- Future Gravity Flow
- Existing Force Main
- Future Force Main
- Existing Lift Station < 1,000 GPM
- $\frac{\text{Existing Firm Capacity (GPM)}}{\text{Projected 2025 Peak Inflow (GPM)}}$
- Future Pump Station
- $\frac{\text{2025 Peak Inflow (GPM)}}{\text{2025 Peak Inflow (GPM)}}$



#### **4.1 Recommended Conveyance System Improvements**

The recommended conveyance system improvements would provide sewer service to the entire UGA by 2025. The UGA is divided into two general regions: the northern UGA, and the southern UGA. The northern UGA has some existing infrastructure but it does not provide sewer service to all parcels. The southern UGA has no existing conveyance infrastructure. **Figure 5** shows a map of the proposed upgrades for the existing system and new infrastructure to extend service throughout the UGA.

#### **4.2 Existing System Infrastructure Upgrades**

Several upgrades to the existing sewer collection system will be necessary to provide capacity under future flow conditions. In addition, some upgrades are desired in order to make maintenance of the system easier.

##### ***Pump Stations***

###### *LS-41*

Peak hour flows into LS-41 are projected exceed firm pumping capacity early in the planning period, increasing to 500 gpm by 2025. In addition, LS-41 has reached the end of its design life. Therefore, a full station upgrade including higher capacity pumps, a flow meter, new electrical equipment, new controls, new piping and appurtenances, and a new wet well is recommended.

###### *LS-71*

Peak hour flows into LS-71 are projected to exceed current firm pumping capacity in 2016 and increase to 630 gpm by 2025. The station is relatively new, therefore it is assumed that the control and wet well are in sufficient condition and do not need to be replaced. Recommended upgrades include higher capacity pumps, new electrical equipment, and new influent piping and appurtenances.

##### ***Flow Meter Vaults***

Currently only LS-71 has a flow meter vault. It is recommended that flow meters located in underground vaults be installed at LS-42, LS-43, LS-52, and LS-72.

##### ***Gravity Sewers and Force Mains***

###### *MH at NE California Street*

A new manhole is recommended to be installed where a 6-inch gravity line tees into an 8-inch gravity line between manholes B28-4035 and B28-4034. The new manhole would facilitate cleaning and maintenance. This project was described in the 2007 Addendum.

###### *MH at E 3rd Street*

Manhole A28-3014 is buried under a wall on private property. A new manhole is recommended to be installed downstream of this manhole to facilitate cleaning. The existing manhole should be excavated and inspected if cleaning is still difficult after installation of the new manhole. This project was described in the 2007 Addendum.

*MH at LS-41*

There is a 45-degree bend with no manhole in the 10-inch gravity sewer upstream of LS-41 between manholes B28-4013 and B28-4012. A manhole or cleanout should be installed at this point to facilitate cleaning and maintenance. This project was described in the 2007 Addendum.

### **4.3 New Conveyance System Infrastructure**

Five new pump stations and associated force mains will be required to service the UGA. These facilities are described for the northern UGA and southern UGA in the following paragraphs.

#### ***Northern UGA***

Two new pump stations are proposed to service the Northern UGA: the SR-104 Pump Station and the West Kingston Pump Station.

##### *SR-104 Pump Station*

The SR-104 Pump Station will collect flow from a basin in the northwest portion of the UGA and will discharge to LS-43. This facility will be a small pump station with a firm pumping capacity of 30 gpm.

##### *West Kingston Pump Station*

The West Kingston Pump Station will collect flow from a basin adjacent to West Kingston Road and will discharge to LS-41. This facility will also be a small pump station with a firm pumping capacity of 35 gpm.

#### ***Southern UGA***

Three new pump stations are proposed to service the Southern UGA. Jefferson Pump Stations 1 and 2 are no longer needed to service the revised UGA boundary.

##### *Arborwood Pump Station*

The Arborwood Pump Station will be a medium sized facility serving the entire Southern UGA and pumping directly to the WWTP. It will be built with the Arborwood Plat, which has permitting approval from the County. Approximately 65% of the flow will be from the new development, and 35% will be from the Arness PS. The cost for the new pump station and force main will be shared between the developer and the County.

##### *Arness Pump Station*

The Arness Pump Station will be a smaller facility with a firm pumping capacity of 175 gpm discharging to the Arborwood Pump Station described above. It will collect flow from the Taree Pump Station and the Arness basin.

##### *Taree Pump Station*

The Taree Pump Station will be a small grinder pump station collecting flow from the Taree basin. This facility will have a firm pumping capacity of 10 gpm and will discharge to the new Arness Pump Station.

#### ***Wastewater Treatment Plant Improvements***

The Kingston WWTP Reclaimed Water project consists of the addition of facilities to produce reclaimed water for reclamation and reuse purposes in the Kingston UGA. Potential reclamation/reuse opportunities include wetlands enhancement, streamflow augmentation and golf course irrigation. The first phase of the improvement program will be a pre-design effort that will be completed during 2013-2014.

**Urban Growth Area**

- Kingston UGA Boundary

**Existing Wastewater Infrastructure**

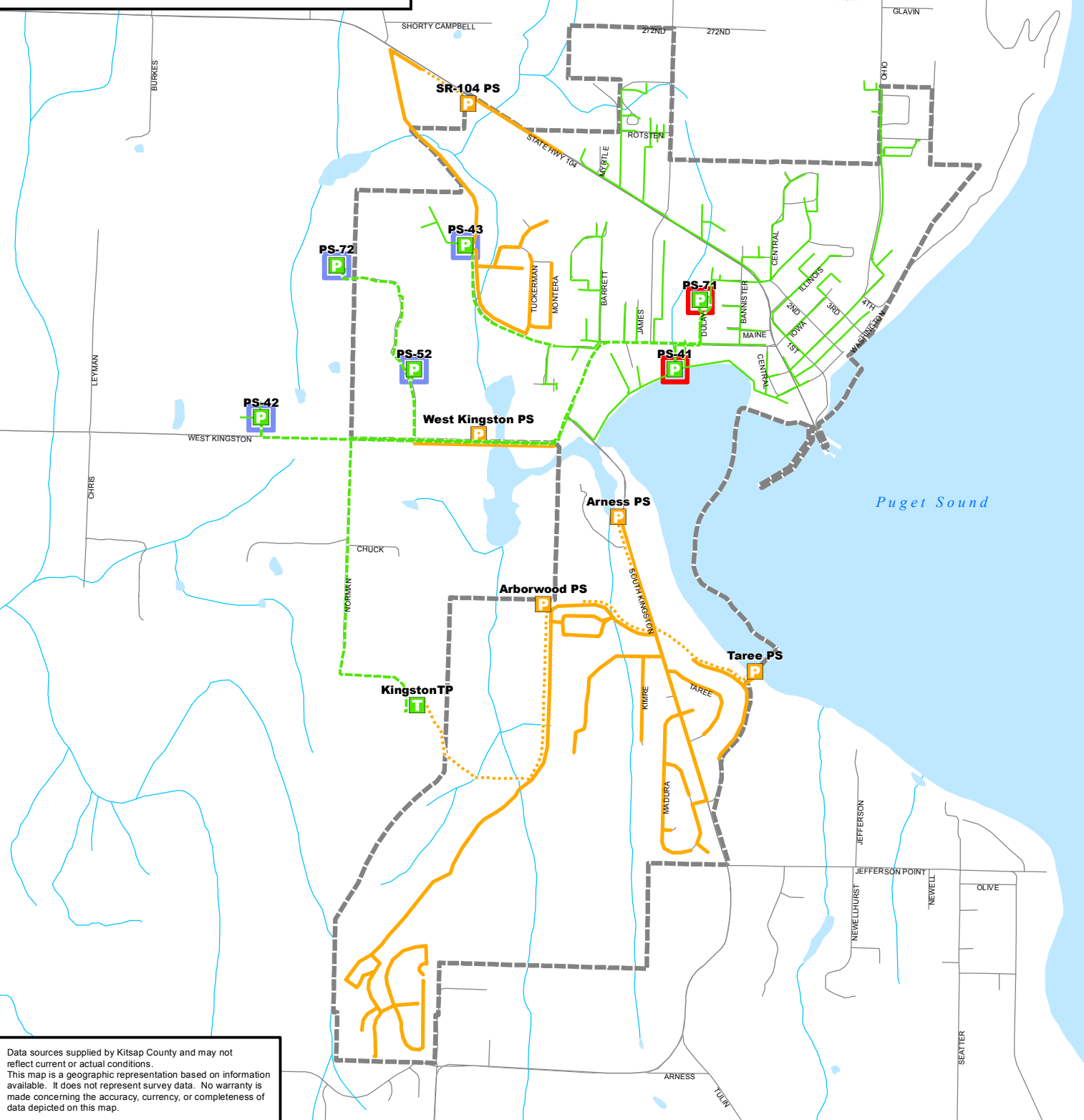
- Existing Treatment Plant
- Existing Pump Station
- Existing Force Main
- Existing Gravity Main

**Proposed Infrastructure Upgrades**

- Pump Station Upgrade
- Flow Meter Installation

**Future Wastewater Infrastructure**

- Future Pump Station
- Future Force Main
- Future Gravity Collector



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P:\Mapping\Maps\_Generated\KitsapCounty\Projects\13\_10250\_01\022.mxd; Fig. 6 Kingston 2013-2025 WW Conveyance Sys. Improv. 8.5x11.mxd 3/28/2013 clobelino

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North arrow and scale bar (0 to 2,000 Feet).



**Kingston 2013-2025 Wastewater Conveyance System Improvements**  
 Kitsap County Public Works  
 March 2013

Figure 6

#### 4.4 Cost Summaries

Table 4-1 summarizes the estimated project costs of upgrading and expanding the sewer system to provide sewer to the entire UGA service area. Costs do not include land acquisition.

**TABLE 4 – 1 KINGSTON IMPROVEMENT PROJECTS**

Description	Length (feet)	Capacity (gpm)	Estimated Cost
Pump Stations			
LS-41 (replacement)	-	500	\$775,000
LS-71 (upgrade)	-	630	\$414,000
Flow Meter Vaults	-	-	\$190,000
SR-104 PS	-	30	\$815,000
West Kingston PS	-	35	\$815,000
Arness PS	-	175	\$815,000
Arborwood PS	-	510	\$913,000
Taree PS	-	10	\$768,000
Force Mains			
4-inch SR-104 FM	800	-	\$1,369,000
4-inch West Kingston FM	100	-	\$27,000
4-inch Arness FM	4,200	-	\$886,000
8-inch Arborwood FM	2,700	-	\$1,002,000
2-inch Taree FM	1,400	-	\$373,000
Gravity Sewers			
15-inch LS-71 Influent Piping	50	-	\$43,000
8-inch to LS-43	5,200	-	\$2,033,000
8-inch to SR-104 PS	1,300	-	\$522,000
8-inch to West Kingston PS	1,800	-	\$720,000
8-inch to Arness PS	12,000	-	\$4,671,000
8-inch to Arborwood PS	14,000	-	\$5,450,000
8-inch to Taree PS	1,800	-	\$720,000
Maintenance Projects			
MH at NE California Street	-	-	\$15,000
<b>Total Collection System</b>			<b>\$23,366,000</b>
<b>Wastewater Treatment Plant</b>			<b>\$500,000</b>
<b>Total UGA Project Costs</b>			<b>\$23,866,000</b>

## **CHAPTER 5**

# **CAPITAL IMPROVEMENT PROGRAMS**

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### **5.1 Recommended Capital Improvement Programs**

The Kingston conveyance system improvements recommended in Chapter 4 are prioritized in a 6-year capital improvement program (CIP) for the period from 2013 to 2018 and a CIP for the remainder of the planning period from 2019 through 2025. The prioritization of projects is based on the capacity evaluation of facilities and on discussions with Kitsap County staff concerning operations and maintenance issues. The locations of the CIP projects are shown in Figure 7 with estimated expenditures in the 2013-2025 planning period listed in Table 5-1.

### **5.2 Six-Year (2013-2018) Capital Improvement Program**

The 6-Year CIP consists of all of the improvements identified in Chapter 4 for the existing system (Section 4.2). These improvements are the upgrades at LS-41 and LS-71 (including the influent pipe), the installation of flow meter vaults at LS-42, LS-43, LS-52 and LS-72 and the installation of three new manholes.

The total estimated costs for the 6-year CIP are about \$1.5 million, of which nearly \$1.2 million is for the two pump station improvement projects.

### **5.3 2019-2025 Capital Improvement Program**

The remaining CIP projects identified to extend service throughout the Kingston UGA are scheduled for construction in the 2019-2025 timeframe. Most of these projects are required to provide sewer service to the southern UGA. It is difficult to identify when these projects will be required as the timing is dependent on actual population growth in the UGA.

The total estimated costs for the 2019-2025 CIP are nearly \$22 million, with 75% of the costs for about 6.5 miles of new 8-inch gravity collectors. The five new pump stations account for about 20% of the CIP costs.

**TABLE 5 – 1 KINGSTON UGA 2013-2025 CAPITAL IMPROVEMENT PROGRAM**

Project Name	2013	2014	2015	2016	2017	2018	Total 2013-2018	2019-2025	Total 2013-2025
<b>Existing Pump Stations</b>									
LS-41	\$30,000	\$60,000	\$342,500	\$342,500			\$775,000		<b>\$775,000</b>
LS-71	\$16,000	\$32,000	\$183,000	\$183,000			\$414,000		<b>\$414,000</b>
Flow Meter Vaults			\$7,000	\$15,000	\$84,000	\$84,000	\$190,000		<b>\$190,000</b>
<b>Flow Meter Vaults</b>									
SR-104 PS								\$815,000	<b>\$815,000</b>
West Kingston PS								\$815,000	<b>\$815,000</b>
Arness PS								\$815,000	<b>\$815,000</b>
Taree Grinder PS								\$768,000	<b>\$768,000</b>
Arborwood PS								\$913,000	<b>\$913,000</b>
<b>Total Pump Stations</b>	<b>\$46,000</b>	<b>\$92,000</b>	<b>\$532,500</b>	<b>\$540,500</b>	<b>\$84,000</b>	<b>\$84,000</b>	<b>\$1,379,000</b>	<b>\$4,126,000</b>	<b>\$5,505,000</b>
<b>Existing Pipelines</b>									
MH at NE California Street <sup>(1)</sup>	\$15,000						\$15,000		<b>\$15,000</b>
MH at E 3rd Street <sup>(1)</sup>	\$15,000						\$15,000		<b>\$15,000</b>
MH at LS-41 <sup>(1)</sup>	\$15,000						\$15,000		<b>\$15,000</b>
LS-71 Pipe	\$2,000	\$3,000	\$19,000	\$19,000			\$43,000		<b>\$43,000</b>
<b>New Forcemains</b>									
SR-104 FM								\$1,369,000	<b>\$1,369,000</b>
West Kingston FM								\$27,000	<b>\$27,000</b>
Arness FM								\$886,000	<b>\$886,000</b>

**TABLE 5 – 1 KINGSTON UGA 2013-2025 CAPITAL IMPROVEMENT PROGRAM**

<b>Project Name</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>Total 2013-2018</b>	<b>2019-2025</b>	<b>Total 2013-2025</b>
Taree Grinder FM								\$373,000	<b>\$373,000</b>
Arborwood FM								\$1,002,000	<b>\$1,002,000</b>
<b>New Gravity Collectors</b>									
Gravity to LS-43								\$2,033,000	<b>\$2,033,000</b>
Gravity to SR-104 PS								\$522,000	<b>\$522,000</b>
Gravity to West Kingston PS								\$720,000	<b>\$720,000</b>
Gravity to Arness PS								\$4,671,000	<b>\$4,671,000</b>
Gravity to Taree								\$720,000	<b>\$720,000</b>
Gravity to Arborwood								\$5,450,000	<b>\$5,450,000</b>
<b>Total Pipelines</b>	<b>\$47,000</b>	<b>\$3,000</b>	<b>\$19,000</b>	<b>\$19,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$88,000</b>	<b>\$17,773,000</b>	<b>\$17,861,000</b>
<b>Kingston WWTP</b>	<b>\$250,000</b>	<b>\$250,000</b>					<b>\$500,000</b>		<b>\$500,000</b>
<b>Total for UGA</b>	<b>\$93,000</b>	<b>\$95,000</b>	<b>\$551,500</b>	<b>\$559,500</b>	<b>\$84,000</b>	<b>\$84,000</b>	<b>\$1,467,000</b>	<b>\$21,899,000</b>	<b>\$23,866,000</b>
Notes: (1) Projects from previous Kingston Wastewater Facilities Plan Update (2) Year 1: Planning, 5% of cost (3) Year 2: Design and Permitting, 10% of cost (4) Years 3 and 4: Construction, 85% of cost									



**Urban Growth Area**

Kingston UGA Boundary

**Existing Wastewater Infrastructure**

Existing Treatment Plant

Existing Pump Station

Existing Force Main

Existing Gravity Main

**2013-2018 CIP**

Pump Station Upgrade

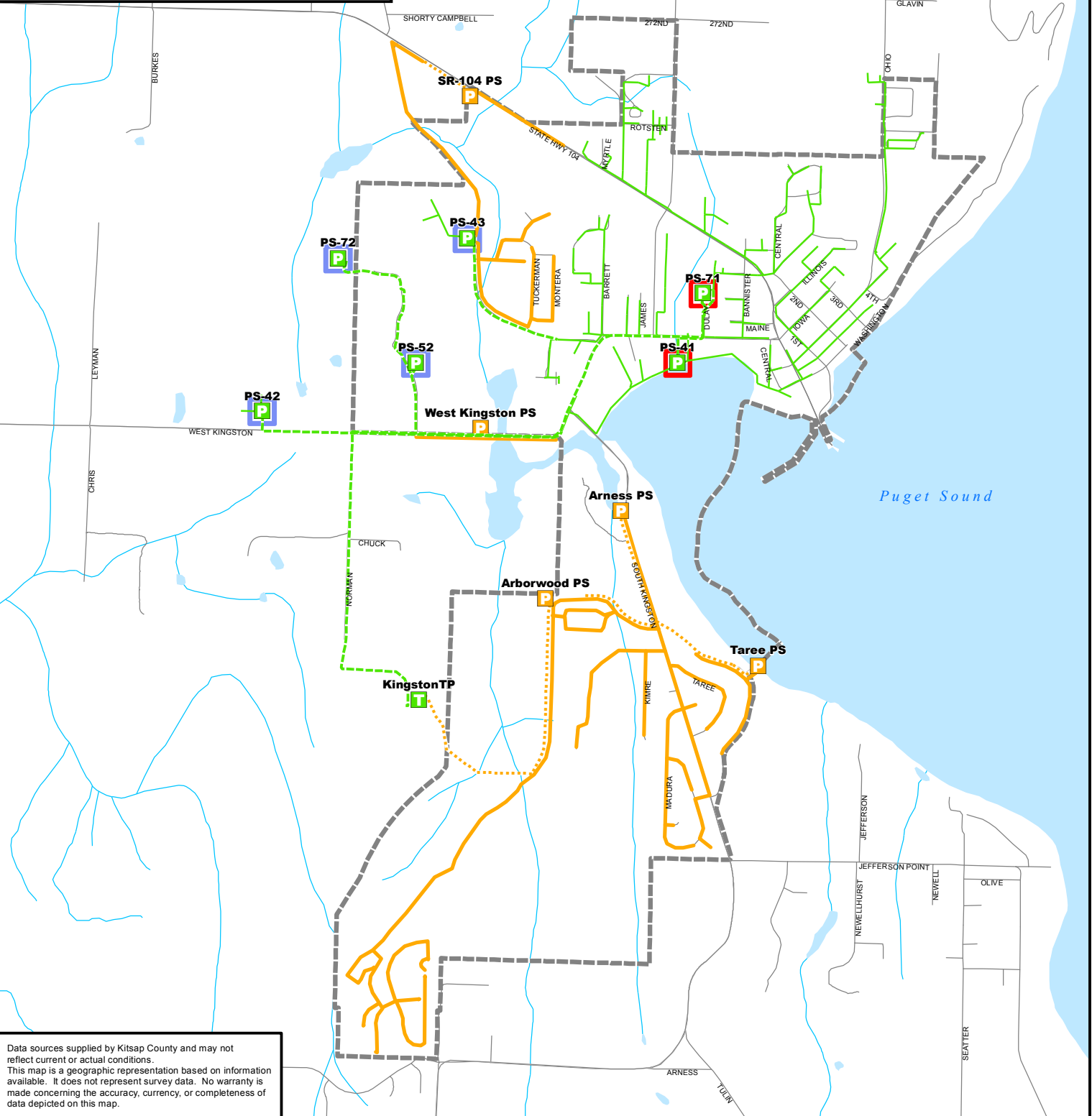
Flow Meter Installation

**2019-2025 CIP**

Future Pump Station

Future Force Main

Future Gravity Collector



Data sources supplied by Kitsap County and may not reflect current or actual conditions. This map is a geographic representation based on information available. It does not represent survey data. No warranty is made concerning the accuracy, currency, or completeness of data depicted on this map.

P:\Mapping\Maps\_General\KitsapCounty\Projects\13\_10250\_01\022.mxd; Fig 7\_Kingston WW 6-Yr CIP & 2019-2025 CIP 8.5x11.mxd 3/28/2013 dclentfno

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North arrow and scale bar (0, 1,000, 2,000 Feet).



**Kingston Wastewater 6-Year CIP and 2019-2025 CIP**  
 Kitsap County Public Works  
 March 2013

Figure 7

## REFERENCES

Brown and Caldwell, 2007, "Kingston Wastewater Facility Plan Update Addendum"

Growth Management Hearings Board, November 6, 2012, "Order Finding Compliance Re: Ordinances Nos. 493-496" Case No. 07-3-0019c (Suquamish II)

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