

ORDINANCE No. 395 -2007

AMENDMENTS TO THE KITSAP COUNTY COMPREHENSIVE PLAN, KINGSTON SUB-AREA PLAN, 6-YEAR CAPITAL FACILITY PLAN & KINGSTON WASTEWATER FACILITY PLAN AS IT RELATES TO AN ORDER OF CONTINUING NON-COMPLIANCE FOR CAPITAL FACILITY PLANNING AND FUTURE WASTEWATER CONVENYANCE FOR THE KINGSTON URBAN GROWTH AREA

BE IT ORDAINED:

Section 1. General Findings. The Kitsap County Board of Commissioners (Board) makes the following findings:

1. The Growth Management Act (GMA), pursuant to RCW 36.70A.130(3), requires Kitsap County to "review, at least every ten years, its designated urban growth area or areas, and the densities permitted within both the incorporated and unincorporated portions of each urban growth area." Additionally, "[t]he county comprehensive plan designating urban growth areas, and the densities permitted in the urban growth areas by the comprehensive plans of the county and each city located within the urban growth areas, shall be revised to accommodate the urban growth projected to occur in the county for the succeeding twenty-year period."
2. On December 21, 2005, Kitsap County adopted and expanded the Kingston urban growth area (UGA) to accommodate population and employment projections for the 2025 planning horizon.
3. On February 17, 2006, an appeal was filed with the Central Puget Sound Growth Management Hearings Board (Hearings Board) on the Kingston Sub-Area Plan update.
4. On July 26, 2006, the Hearings Board issued an order of non-compliance with the GMA and remanded the Kingston Sub-Area Plan back to Kitsap County to resolve the following items:
 - i. Complete a countywide 10-Year Update for all unincorporated UGAs;
 - ii. Address reasonable measures prior to expanding UGAs;
 - iii. Remove the sewer-reduction factor from the land capacity analysis; and
 - iv. Complete a capital facility plan consistent GMA goals and requirements.
5. On December 11, 2006, Kitsap County completed its 10-Year Update to the Comprehensive Plan pursuant to RCW 36.70A.130(3) and enacted Ordinance 367-2006, Ordinance 368-2006, Ordinance 369-2006 and Ordinance 370-2006 adopting the 2006 10-year Comprehensive Plan Update, the Draft and Final Environmental Impact Statements, and amendments to Kitsap County Code

Titles 17, 18, and 21. Within these Ordinances, Kitsap County included a countywide capital facilities inventory and needs analysis for the 2025 planning horizon, as well as 6-Year capital facility plan. Within the 10-Year Update the County also addressed all four Kingston Sub-Area Plan remand issues.

6. On March 16, 2007, the Hearing Board declared partial compliance and continuing non-compliance with GMA for the Kingston Sub-Area Plan, as it relates to capital facility provision for 20-Year wastewater conveyance infrastructure within the Kingston UGA. The Hearings Board also ordered that Kitsap County must take legislative action to resolve this non-compliance issue no later than September 17, 2007.
7. In compliance with the Hearings Board's order, Kitsap County has prepared an Addendum to the Kingston Wastewater Facilities Plan ("the Addendum") that plans for additional pump stations and force mains throughout the Kingston UGA. The County expended \$43,450 for the preparation of this Addendum. In addition, the County shall adopt the revisions herein to its comprehensive plan.
8. The Board and County staff have reviewed the existing Capital Facilities Plan (CFP). The Board finds that the existing 6-Year Capital Facility Plan wastewater projects is sufficient in that it identifies secured funding for maintenance and operation of countywide wastewater systems that are directed towards existing and projected growth and development. It should also be noted that the County intends to modify its 6-Year Capital Facility Plan for future major sewer collection system upgrades within the 2025 planning horizon.
9. The Board finds that the implementation of the plans set forth in the Addendum will facilitate and accelerate the provision of public sewer service within the Kingston UGA. In addition, the impending development of Arborwood in the southwest area of the Kingston UGA will lead to additional public sewer lines in that area of the UGA and facilitate connection of other areas.
10. The County intends to continue to research funding mechanisms for the implementation of the plans set forth in the Addendum and anticipates that all properties in the Kingston UGA will be served with urban levels of sewer service by 2025.
11. On August 17, 2007, notice of intent to adopt was submitted to the Department of Community, Trade, and Economic Development.
12. On August 18, 2007, Kitsap County published, with the newspaper of record, a Statement Environmental Policy Act (SEPA) Determination of Non-significance, and a notice of intent to adopt and public hearing. These notices were mailed to interested parties of record, agencies, and affected tribes.
13. On September 3, 2007, the SEPA comment and appeal period closed.

14. On September 10, 2007, the Board, following a timely and effective notice, held a public hearing to consider testimony on the proposed Comprehensive Plan and Kingston Sub-Area Plan policy, 6-Year Capital Facilities Plan, Kingston Wastewater Facility Plan revisions.

Section 2. NOW THEREFORE, BE IT FURTHER ORDAINED, that the Kitsap County Board of Commissioners, based on the foregoing findings, hereby provides amendments to the Kitsap County Comprehensive Plan, 6-Year Capital Facility Plan and Kingston Sub-Area Plan as follows:

1. **Comprehensive Plan, Chapter One, related to the Land Use Chapter is amended herein:**

Renumber existing policies and include new Policy LU-12 as follows:

Policy LU-12 Kitsap County should monitor, along with its Buildable Lands Program, the rate of new wastewater infrastructure expansion within its UGAs.

Goal 5. Provide public services and capital facilities necessary to support planned urban growth at adopted levels of service for the 2025 planning horizon.

Policy LU-14 Require urban-level sanitary sewer service or equivalent wastewater service in all UGAs. Update county-owned and -operated wastewater facility plans to include, not only capacity demand and needs, but also future major collection or conveyance systems for the 2025 planning horizon (existing and projected).

Policy LU-15 Encourage the use of alternative sanitary sewer techniques within UGAs, such as package plants, membrane and drip systems and/or community drainfields, in areas where other sewer provision is not financially feasible. Specifically, evaluate the use of these techniques in areas within the UGA that contain a significant concentration of critical areas, topographic challenges or critical aquifer recharge areas.

Renumber existing policies and include new Policy LU-16 as follows:

Policy LU-16 Coordinate with cities, special purpose districts and service providers to establish future capital facility needs and establish priority areas for funding, as well as define regional and local services through the development of a UGAMA or inter-local agreement. Through these agreements, the County should develop financing partnerships, whether

public or private, for areas of the UGAs that provide urban-level of services and infrastructure development.

Renumber existing policies and include new Policy LU-17 as follows:

Policy LU-17 If area-wide capital facility deficiency is identified, Kitsap County and other applicable service providers shall remedy the deficiency by addressing capital facility planning and long-term funding strategies.

2. Comprehensive Plan, Chapter 11, related to the Capital Facilities Chapter is amended herein:

Policy CF-7 Kitsap County, along with cities and special purpose districts, should develop long-term funding strategies that include, Both but not limited to, the following funding options: existing and future development pay for the costs of needed capital improvements.

1. Existing development (1) pays for the capital improvements that reduce or eliminate existing deficiencies, some or all of the replacement of obsolete or worn out facilities, and may pay a portion of the cost of capital improvements needed by future development, and (2) payments may take the form of user fees, charges for services, special assessments and taxes.
2. Future development pays its fair share of the capital improvements needed to address the impact of its development, and may pay a portion of the cost of the replacement of obsolete or worn out facilities. Upon completion of construction, "future" development becomes "existing" development and contributes to paying the costs of the replacement of obsolete or worn out facilities as described in paragraph 1 of this policy.
3. Future development's payments may take the form of, but are not limited to, voluntary contributions for the benefit of any public facility, impact fees, mitigation payments, capacity fees, dedications of land, provision of public facilities, future payments of user fees, charges for services special assessments and taxes. Future development does not pay impact fees for the portion of any public facility that reduces or eliminates deficiencies existing at the time of approval.
4. Both existing and future development may have part of their costs paid by grants, entitlements or public facilities from other levels of government and independent districts.

5. Reassess the allocation of existing funding sources and prioritize capital facility expenditures.
6. If steps one thru five do not remedy the deficiency of capital facility provision, Kitsap County should evaluate Policy LU-19.

Renumber existing policies and include new Policy CF-21 as follows:

Policy CF-21 In UGAs, Kitsap County, cities, Kitsap County Health District and special purpose districts should jointly prioritize the replacement of on-site systems that serve existing development with sewer or alternative wastewater technologies and should be based upon the risk of failure. Kitsap County, cities, Kitsap County Health District and special purpose districts should analyze public funding options for such conversion and should prepare conversion plans that will enable quick and cost-effective local response to health and pollution problems that may occur when many on-site systems fail in an area.

Renumber existing policies and include new Policy CF-22 as follows:

Policy CF-22 Kitsap County shall develop regulations for development that promote sewer connectivity between UGA parcels or tracts.

3. Comprehensive Plan, Chapter 12, related to the Kingston Sub-Area Plan is amended herein:

Include new Goal 60 as follows:

Goal 60. Within the Kingston UGA, provide public services and capital facilities necessary to support planned urban growth at adopted levels of service for the 2025 planning horizon.

Include new Policy King-70 as follows:

Policy King-70 Require urban-level sanitary sewer service or equivalent wastewater service in the Kingston UGA. When appropriate, consult the Kingston Wastewater Facilities Plan Addendum for possible locations of future wastewater conveyance systems within UGAs.

Include new Policy King-71 as follows:

Policy King-71 Encourage the use of alternative sanitary sewer techniques within the Kingston UGA in areas where other sewer provision may not be financially feasible. Specifically, utilize alternative sanitary sewer

techniques in areas within the UGA that contain a high concentration of critical-areas, topographic challenges or critical aquifer recharge areas.

4. Comprehensive Plan, Appendix A, 6-Year Capital Facility Plan is amended as follows:

Current Facilities Inventory

An inventory of the existing municipal, county and private wastewater facilities located in Kitsap County is presented in this section. Kitsap County also incorporates by reference the Kingston, Suquamish, Central Kitsap, and Manchester Wastewater Facility Plans and any subsequent amendments herein. This inventory is summarized in Table SS.1. Columns (4) – (6) show the LOS mgd flow design capacity, 2005 existing flow capacity, and corresponding 2005 flow capacity surpluses or deficits for each of the 10 major wastewater management systems in the County. Column (7) shows the existing populations served within each wastewater system.

Kingston Wastewater Facilities

Sewer service in the Kingston area is owned and maintained by Kitsap County. The existing Kingston collection system consists of approximately 38,300 feet of gravity sewer pipe ranging in size from 8 to 12 inches in diameter and approximately 21,650 feet of force main ranging from 4 to 6 inches in diameter. Five pump stations serve the Kingston area. With the scheduled completion of the new Kingston High School in 2007, an additional pump station and force main pipe will be added to the system. Completed in May 2005, the new Kingston wastewater treatment facility is designed to treat an average daily flow of 292,000 gallons per day. This is a 95% increase in capacity from the previous facility, and will accommodate residential and commercial growth in the Kingston area for the next 20 years. The plant utilizes an oxidation ditch, with two rotating stainless steel brushes, for biological treatment. Two oxidation ditches were constructed; one for current flows and one to accommodate future growth (500,000 gallons per day). Only the active ditch contains rotating brushes. Built in conjunction with the new treatment plant and located on the old plant grounds, Pump Station #71 pumps all of the sewage generated in Kingston approximately 1.8 miles to the new plant. Construction of a new outfall into Puget Sound was included in the improvements. Since the previous outfall was damaged during dredging operations by the State ferry system, the new pipe was located well outside the ferry corridor and extended to 165 feet below sea level to limit impacts on shellfish harvesting areas. Waste sludge from the Kingston WWTP is currently trucked to the Central Kitsap WWTP for digestion and treatment. As Table SS.1 (Column 9) shows, the Kingston wastewater system has a current (2005) surplus of 1,280 ERUs (2,925 additional people) which has enough capacity to accommodate the projected 2012 growth population. Future wastewater collection systems, as described in the 2007 Kingston Wastewater Facilities Plan Addendum, include a total of eight new pumping stations, with 47,000 feet of new gravity sewer and force mains, ranging from 4-10 inches in diameter to complete the major sewer collection system for the Kingston UGA.

Sewer Systems Population Allocation

Table SS.2 shows forecasted populations for the sewer service areas, which are defined o

n the proposed land use plan (FEIS Preferred Alternative) and overall population allocation determined by the Kitsap County Regional Coordinating Council. The forecast provides sewer purveyors with a population to plan for during the 20-year planning period determine future demand for sewer facilities and capital improvement costs. Wastewater systems-expansions for the UGAs to accommodate 2025 growth can be accomplished through a combination of additional developer extensions, ULIDs, UGAMAs, and other infrastructure financing alternatives. ~~Note that not all residents located within sewer district boundaries will be sewerred. This is consistent with the current practice and practices in other communities.~~ In general, the unsewered population as a percentage of the total population decreases over the 20-year planning horizon time.

Table SS.2 Kitsap County Sewer Systems Population Allocation Estimates

SEWER FACILITIES	2003	2012	2025
<u>Kingston Service Area</u>			
Sewered	1,530	<u>2,162</u> <u>2,204</u>	<u>4,342</u> <u>5,006</u>
Unsewered ⁽³⁾	1,105	829	622 0

⁽³⁾ Estimate based upon comprehensive plan policy direction and implementation over time, that as density increases and properties are converted from septic systems to sewer /alternative wastewater technology-ai, one quarter of existing septic systems in UGA/LAMIRD's will connect to sewer by 2012 and remaining population one-quarter by 2025. These population sewerred estimates, however, are projections and cannot be construed to require each existing residence to be connected. Nevertheless, the County is proactively planning and developing strategies for sewer service for the entire area by 2025.

Section 3. NOW THEREFORE, BE IT FURTHER ORDAINED, that the Kitsap County Board of Commissioners, based on the foregoing findings, hereby adopts Attachment A as an addendum to the 1995 Kitsap County Kingston Wastewater Facilities Plan.

Section 4. This ordinance is in response to an order filed with the Central Puget Sound Growth Management Hearings Board and is enacted as an exception to the schedule set forth in RCW 36.70A.130 and Kitsap County Code Chapter 21.08.

Section 5. Should any amendment to Comprehensive Plan and associated Land Use map that was passed by the Board during its deliberations on September 10, 2007 be inadvertently left out upon publication, the explicit action of the Board as discussed and passed shall prevail upon subsequent review and verification by the Board.

Effective Date: This Ordinance shall take effect immediately.

Severability: If any sentence, section, provision, or clause of this ordinance or its application to any person, entity or circumstance is for any reason held invalid or unconstitutional, the remainder of the ordinance, or the application of the provision to other persons, entities, or circumstances is not affected.

DATED this 10th day of Sept, 2007.

KITSAP COUNTY BOARD OF COMMISSIONERS





Josh Brown, Chair




Jan Angel, Commissioner



Steve Bauer, Commissioner

ATTEST:



Opal Robertson
Clerk of the Board

Approved as to Form:

Lisa J. Nickel
Deputy Prosecuting Attorney

Attachment A

**Kingston Wastewater
Facilities Plan Update
Technical Addendum**

Presented to:
Kitsap County

By:



August 13, 2007

895-2007

701 Pike Street, Suite 1200
Seattle, WA 98101
206-624-0100

Prepared for: Kitsap County

Project Title: Kingston Wastewater Facilities Plan Addendum

Project No: 133084

Technical Addendum

Subject: Kingston Wastewater Facilities Plan Addendum

Date: August 13, 2007

To: Barbara Zaroff, CIP Project Manager

From: Jean Cutter, Project Manager

Copy to: Barry Loveless, Senior Program Manager, Wastewater

Prepared by: Colleen O. Doten, Justin Twenter and Moe Leavitt

Reviewed by: Jean Cutter

Limitations:

This document was prepared solely for Kitsap County in accordance with professional standards at the time the services were performed and in accordance with the contract between Kitsap County and Brown and Caldwell dated May 24, 2007. This document is governed by the specific scope of work authorized by Kitsap County; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Kitsap County and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

1. INTRODUCTION

This technical memorandum describes an updated addendum to the 1994 *Kingston Wastewater Facilities Plan* and the 1995 addendum to that plan ("1995 Addendum"). This new plan is being completed at the request of Kitsap County to reflect the County's current service area for Kingston and population projections in the 2006 *Kitsap County 10-Year Comprehensive Plan Update* (Comprehensive Plan) and related *Kingston Sub-Area Plan* (Sub-Area Plan). The current service area is the Kingston Urban Growth Area (UGA), which is bounded by Puget Sound to the east (Figure 1-1). A portion of the UGA, north of NE West Kingston Road, is currently served by the Kingston Wastewater Treatment Plant. The remaining portions are serviced by on-site wastewater systems.

A comprehensive view of expanded wastewater conveyance for a twenty-year planning period (until 2025) is presented in this addendum. The recommendations of this addendum assume that sewer service or alternative wastewater techniques will be restricted to the Kingston UGA except where service currently extends outside the UGA, and that the whole UGA will need to be sewerred to support population at the levels indicated in the Comprehensive Plan and Sub-Area Plan.

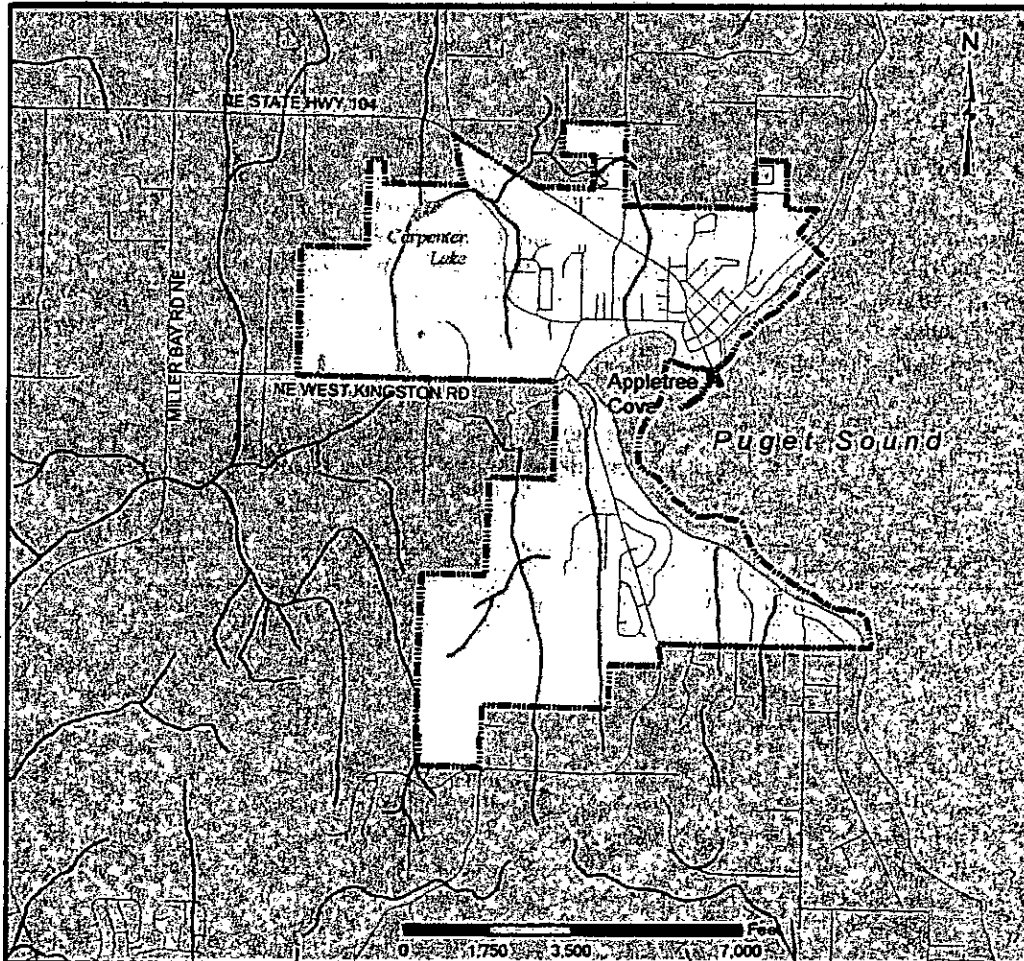


Figure 1-1. Kingston Urban Growth Area

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1.1 Plan Update Goals and Objectives

This plan is being developed to address the following items:

1. The Kingston Wastewater Treatment Plant (WWTP) was built in a location different from that assumed in the March 1995 Addendum. The 1995 Addendum assumed the plant would be built in the northern UGA, west of the downtown core. The plant was built outside the western border of the UGA, south of NE West Kingston Road. Proposed conveyance piping to the plant will need to be changed to reflect the actual WWTP location.
2. The Comprehensive Plan includes a new service area (i.e., Kingston UGA) boundary, and new population projections and new land use designations that affect how the population will be dispersed through the UGA.

In addition to the different WWTP location, pump stations and piping have been built differently (i.e. different location, different sizes), than proposed in the *Kingston Wastewater Facilities Plan*. Therefore, instead of updating what was proposed in the plan, the existing conveyance system was evaluated to determine where additional infrastructure are needed. Section 1.2 describes the existing infrastructure. This new plan was developed to meet the requirements of the Central Puget Sound Growth Management Hearings Board order of continuing non-compliance, *KCRP VI v. Kitsap County, case # 06-3-007*, and to guide the construction of additional conveyance infrastructure for existing and projected growth to 2025.

1.2 Existing Conveyance System

The Kingston WWTP was brought on-line in May 2005. The plant is located on a 29-acre site at the end of Norman Road, to the west of the southern UGA (Figure 1-2). Currently the plant services part of the northern-half of the UGA (north of NE West Kingston Road), as the southern-half of the UGA (south of NE Kingston Road) is completely unsewered. Plant influent enters the head works via a 6-inch diameter force main on Norman Road. The plant effluent flows from the plant, north on Norman Road, east on West Kingston Road, and to the beach at Appletree Cove, where it discharges into Puget Sound. The plant was designed with the capacities shown on Table 1-1.

Table 1-1. Existing Plant Design Capacity

	Design Capacity	Population Equivalent
Design Flow	292,000 gpd	4,800 ⁽¹⁾
Biological oxygen demand (BOD) loading for maximum month	585 ppd	2,900 ⁽²⁾
Total suspended solids (TSS) loading for the maximum month	585 ppd	2,900 ⁽²⁾

gpd = gallons per day

ppd = pounds per day

1. Based on 60 gallons per capita per day.

2. Based on 0.2 pounds per capita per day.

The existing sewerage area (Figure 1-2) and estimated equivalent residential units (ERUs) were provided as geographic information system (GIS) data to Brown and Caldwell from BHC Consultants. A comparison of the GIS ERUs and the County's record of accounts showed the GIS data were missing sewerage parcels. Missing sewerage parcels were added based on conveyance piping. ERUs were assigned to these parcels based on the type of accounts missing and existing land use designation.

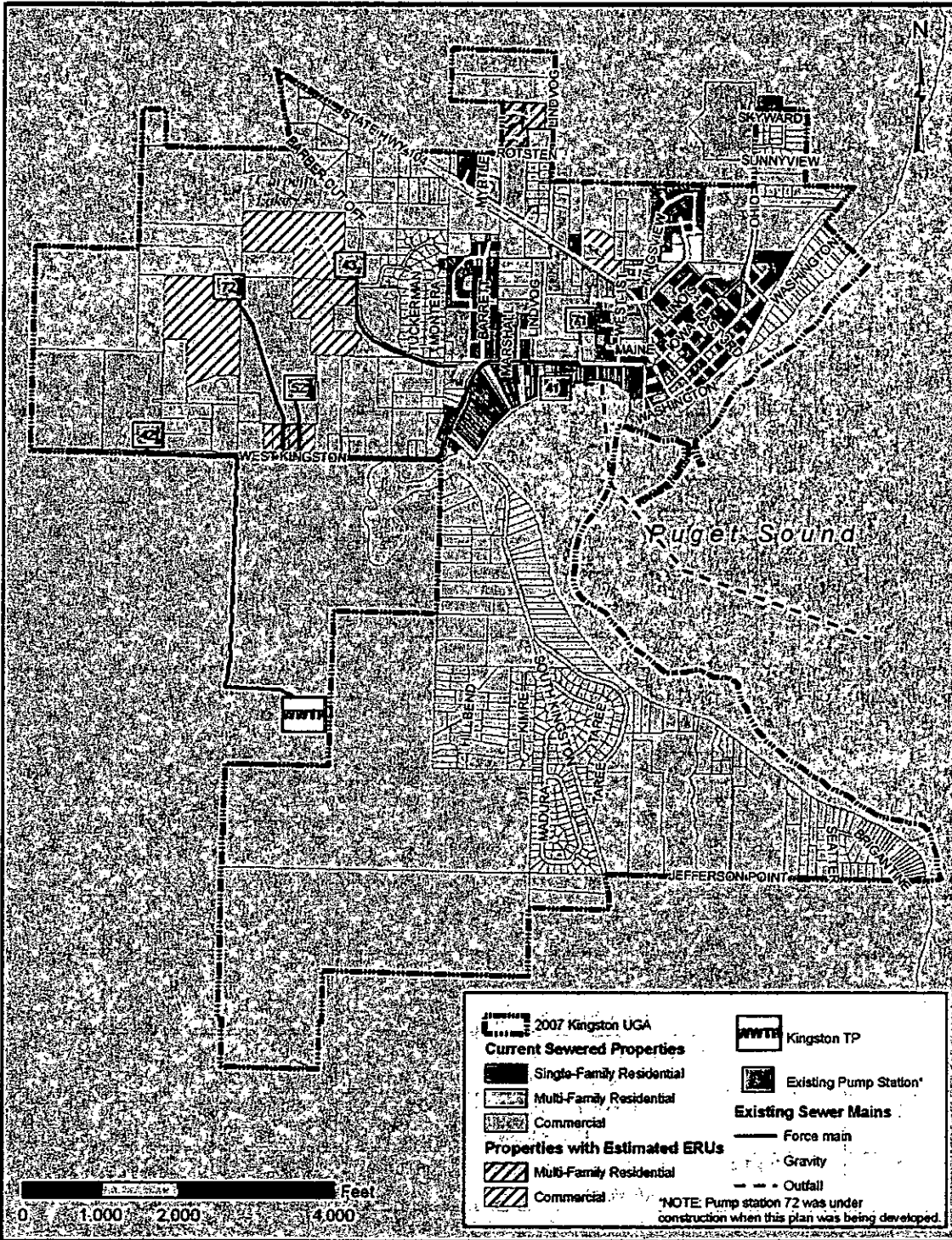


Figure 1-2. Kingston Sewer System

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The entire existing conveyance infrastructure and sewer areas are located in the northern UGA (Figure 1-2). A significant portion of the UGA, including the entire southern UGA, is served by individual septic systems. In the sewer areas, most wastewater flows by gravity or by force main from small pump stations (numbers 42, 43, and 52), to pump station 41, located on the beach of Appletree Cove. Pump station 41 is the oldest pump station in the conveyance system. It previously pumped two-thirds of Kingston flow to the old plant site. When the new plant was constructed, pump station 71 was constructed at the old plant site. Pump station 41 pumps to pump station 71. Pump station 71 also collects additional flow from the area to the north, then pumps all flows to the WWTP. A summary of the conveyance system piping sizes and lengths are shown in Table 1-1.

Table 1-2. Existing Conveyance System Piping

Pipe Diameter, inch	Length of Pipe, ft
<i>Gravity Pipe</i>	
6	1,420
8	32,500
10	1,460
12	3,830
<i>Force Main</i>	
2	930
4	6,390
6	11,180

The conveyance system currently includes five pump stations. A sixth pump station is under construction. The pumping station locations and capacities are described in Table 1-2 and shown on Figure 1-2.

Table 1-3. Existing Pump Station Capacity

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

1. Firm capacity is the pumping station capacity with the largest pump out of service. Pump capacities are based on pump test data in Appendix A. It is assumed that pump tests were performed under normal operating conditions.
2. Backup power is not available onsite. Power can be provided from a portable generator.

2. PLANNING AND SERVICE AREA

Wastewater facilities planning for Kingston is based on providing service to the updated UGA presented in the Comprehensive Plan and shown on Figure 2-1. 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.

The design of wastewater facilities requires a reliable estimate of future wastewater flows in the service area. The updated UGA differs from the service area previously defined in the 1995 Addendum; thus the wastewater flow estimates for proposed facilities must be updated. The wastewater flow estimates developed for this update are based on population data projected to the year 2025. The project population data were derived directly from land use and population growth data found in the Comprehensive Plan and Sub-Area Plan. The projected population was segregated into residential and non-residential components.

Residential Population

The existing population was estimated based on existing property classification (i.e., land use) designations assigned to tax parcels within the Kingston UGA. In particular, the number of dwelling units associated with each residential property classification was estimated, and that estimate was used to assign dwelling unit counts to tax parcels. An estimate of existing population was produced by combining dwelling unit counts per parcel with an assumed 2.5 persons/dwelling unit for single family property classes and 1.8 persons/dwelling unit for multi family property classes (2006 Updated Land Capacity Analysis). This resulted in a total 2007 population of 2,034. For purposes of comparison, the Sub-Area Plan 2000 total population for the Kingston UGA was 1,871.

Population growth data were provided by Kitsap County Department of Community Development (DCD) for each traffic analysis zone (TAZ) in the Kingston service area. Population growth was added to parcels identified by DCD as vacant/underdeveloped during land capacity analyses. Allocation of population growth to the vacant/underdeveloped parcels was made according to parcel area and the land use density (from the Sub-Area Plan). Population for parcels not identified as vacant/underdeveloped remained unchanged in the future projections. This resulted in a future (2025) residential population projection of approximately 5,006. Projected population was converted to ERUs to generate wastewater flow projections based on 2.5 people per ERU.

For future planning efforts, the residential population projections should be updated based on data available at that time.

Non-Residential Population

All parcels projected to be developed by 2025 and not assigned a residential population were considered non-residential. Estimates of the number of ERUs for existing, sewerred, non-residential parcels were provided by BHC Consultants. Future ERUs for non-residential parcels were estimated based according to the following hierarchy:

1. Future ERUs for parcels identified by DCD to be developed or redeveloped were estimated based on the net developable amount of land. It was assumed commercial properties would generate 1,500 gal/acre/day and industrial parcels would generate 3,000 gal/acre/day. These unit rates were taken from other planning studies (Clallam County) and published sources (Tchobanoglous and Burton, 1991).

2. Future ERUs for existing sewerer properties not identified by DCD to be developed or redeveloped were assumed to be the same as the existing ERUs.
3. Future ERUs for existing unsewerer properties not identified by DCD to be developed or redeveloped were estimated based on similar land uses from sewerer parcels.

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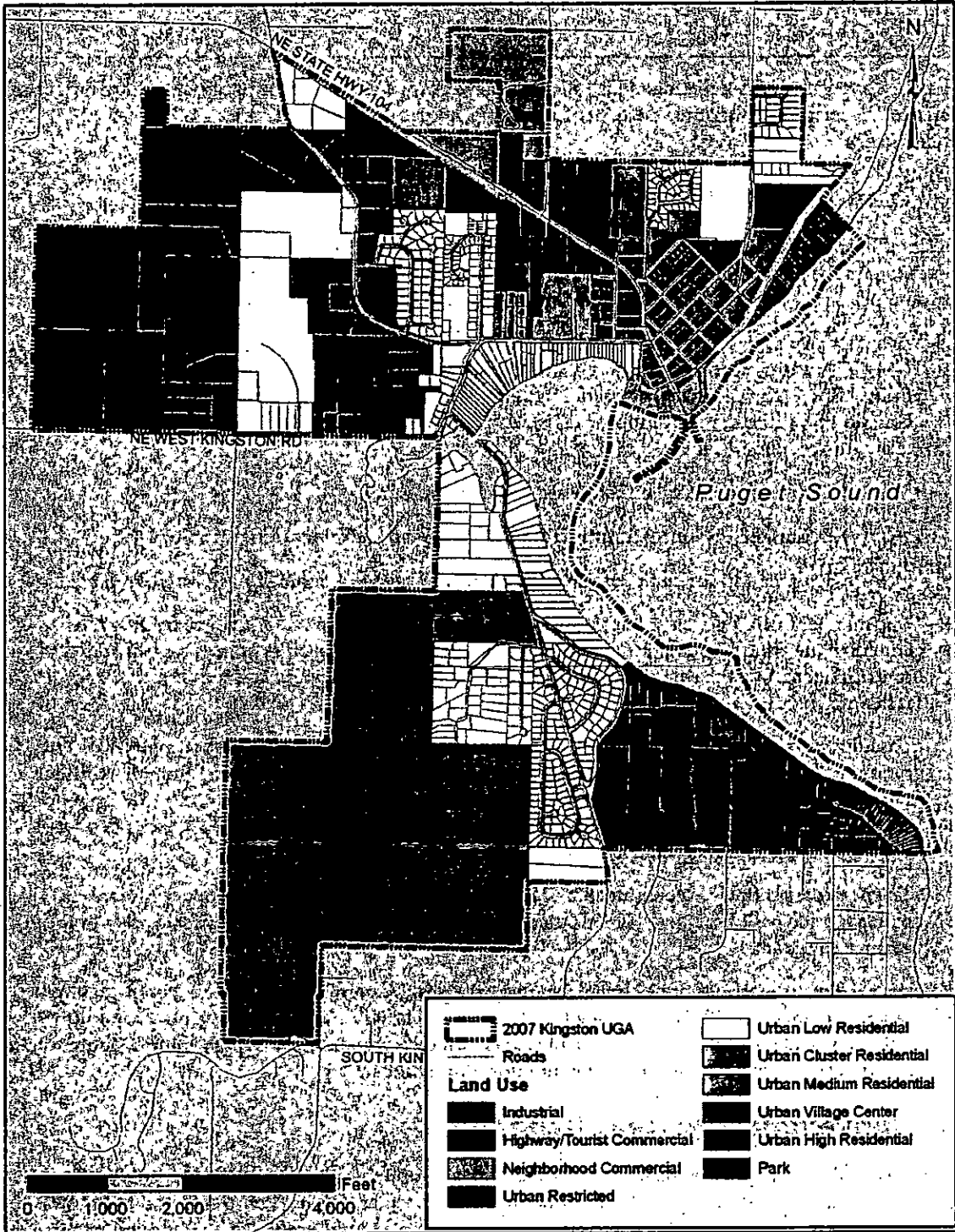


Figure 2-1. Kingston UGA Existing Land Use Designations

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3. DESIGN CRITERIA

After future populations were distributed throughout the UGA, wastewater flow projections throughout the system were developed to check the adequacy of existing conveyance components and to size new components for unsewered areas.

3.1 Wastewater Flow Projections

Wastewater flow projections were developed from available geographic data (e.g., traffic zone analysis, tax parcels, topography), population projections, and standard assumptions on the unit rates for wastewater generation, peaking factors, and infiltration and inflow (I/I). The wastewater flow projections were developed using the following method:

1. The UGA was disaggregated into subbasins to better determine flow projections from different parts of the UGA. The delineated sewer subbasins are shown in Figure 3-1. Subbasins were delineated based on flow directions from topographic data. In disaggregating the UGA, several factors were taken into account, including:
 - How areas could be tied-into existing infrastructure.
 - Existing roads, since infrastructure will likely be installed in traffic corridors.
 - Tax parcels, since all flow from a tax parcel is likely to be routed to the same trunk line.
2. Total number of ERUs was estimated for each subbasin. ERUs provide a convenient method for combining the contributions from residential and other sources, such as commercial and industrial users. The total was the sum of population divided by 2.5 people per ERU plus the ERUs for non-residential parcels.
3. Base flow was calculated as total number ERUs times a unit wastewater generation factor of 150 gallons per ERU per day. The unit wastewater generation factor was estimated from dry weather flow data from the Kingston Wastewater Treatment Plant from 1991 through 2006 (see Appendix B), which indicated a rate of 60 gallons per capita per day. The wastewater peak design flow was calculated using a diurnal peaking factor of 1.5.
4. The peak design flow was computed by adding an I/I allowance of 1,800 gallons per sewer acre per day to the peak base flow. King County assumes this I/I value for new sewer areas in the 20-year rainfall event.

The wastewater flow projections by subbasin, including the peak design flow required for sizing conveyance facilities, and the number of ERUs to be added to the system is listed in Table 3-1. The peak design flow combines the peak daily base flow and the I/I allowance, which is a conservative approach that assumes that a 20-year storm event coincides with the maximum flow during the day.

3.2 Conveyance System Capacity

The capacity of the existing infrastructure was evaluated based on the peak design flow. Calculated flows in gravity sewers were verified to ensure the flow does not exceed pipe capacity. Pump station capacities were confirmed to ensure each station's firm pumping capacity (i.e., the station capacity with all pumps running except one pump as a standby) was greater than the peak design flow. Force mains capacities were checked to ensure velocities did not exceed eight feet per second (fps).

Table 3-1. Wastewater Flows

Subbasin	Existing			Future - Year 2025		
	Total Sewered Area, acre	Number of ERUs	Peak Design Flow, mgd	Total Sewered Area, acre	Number of ERUs	Peak Design Flow, mgd
Northwest 1	0	0	0	94.7	42	0.18
Northwest 2	119.6	78	0.23	147.6	103	0.25
Northwest 3	0	0	0	33.0	12	0.08
North 1	22.4	4	0.04	65.7	87	0.14
North 2	0.4	1	< 0.01	37.3	75	0.08
North 3	31.8	107	0.08	45.6	207	0.13
North 4	0	0	0	22.3	97	0.06
Northeast 1	46.6	334	0.16	98.7	469	0.28
Northeast 2	7.8	25	0.02	9.5	32	0.02
Northeast 3	61.7	228	0.16	94.6	379	0.26
Northeast 4	0	0	0	13.3	103	0.05
Southwest	0	0	0	341.4	581	0.75
South	0	0	0	166.0	322	0.37
Southeast 1	0	0	0	56.1	91	0.12
Southeast 2	0	0	0	23.6	11	0.04
Totals	290.2	777	0.70	1,249.5	2,610	2.84

1. The existing level of development approximates 2007 conditions.
2. Total existing sewered area is sewered parcels. Total future sewered area is all developed parcels.
3. ERU = equivalent residential unit. An ERU was set equal to 150 gallons per day (2.5 people per ERU times the 60 gallons per capita per day unit wastewater generation rate).
4. The peak design flow equals the ERUs times the 1.5 peaking factor plus the total parcel area times the I/I allowance of 1,800 gallons per acre per day. The peak design flow represents the recommended hydraulic capacity of the conveyance facilities.

New facilities were sized based on the following criteria:

Gravity sewers. Trunk sewers were laid out to provide a minimum velocity of 2 feet per second (fps), when flowing full and sized to carry the peak design flow without surcharge. Diameters of proposed sewers were determined using a roughness coefficient (“n”) of 0.013. Minimum depth of cover was set at 12 feet to provide sufficient fall in lateral sewers from houses with basement utilities. Polyvinyl chloride (PVC) pipes were assumed. Locations of the sewers should allow the flow from a subbasin to flow by gravity to a common point. The locations of the sewers also took into account the existing infrastructure, roadways, and tax parcels.

Pump stations. Hydraulic design of pump stations needs to be compatible with the capacity of associated piping. Although larger pumps may be installed incrementally as required to meet demands, pump stations should be designed for wastewater flows anticipated through the year 2025. To minimize the land area required and to reduce construction costs, pump stations were assumed to comprise wet wells with submersible wastewater pumps and motors. Odor suppression measures assumed included variable speed pumping and self-cleaning wet wells to maintain clean upstream sewers. Pumping stations and electrical switchgear buildings were assumed to be built of reinforced concrete or masonry and intended to blend in with the surrounding areas. Standby power was assumed to be provided.

Force mains. Force mains would be sized to ensure flow velocities between 2 and 8 fps. High-density polyethylene (HDPE) force mains were assumed. The locations of the force mains took into account the existing infrastructure, roadways, and tax parcels.

3.3 Treatment Plant Capacity

Based on the plant design data described in Section 1.2, the plant is sized to serve a population of 2,900 people, with BOD and TSS being the limiting factors. An additional oxidation ditch was constructed, which, when brought on line will double the plant's capacity to accommodate the required future capacity of 5,006 people. When brought on line, the additional oxidation ditch will require the installation of rotating brushes.

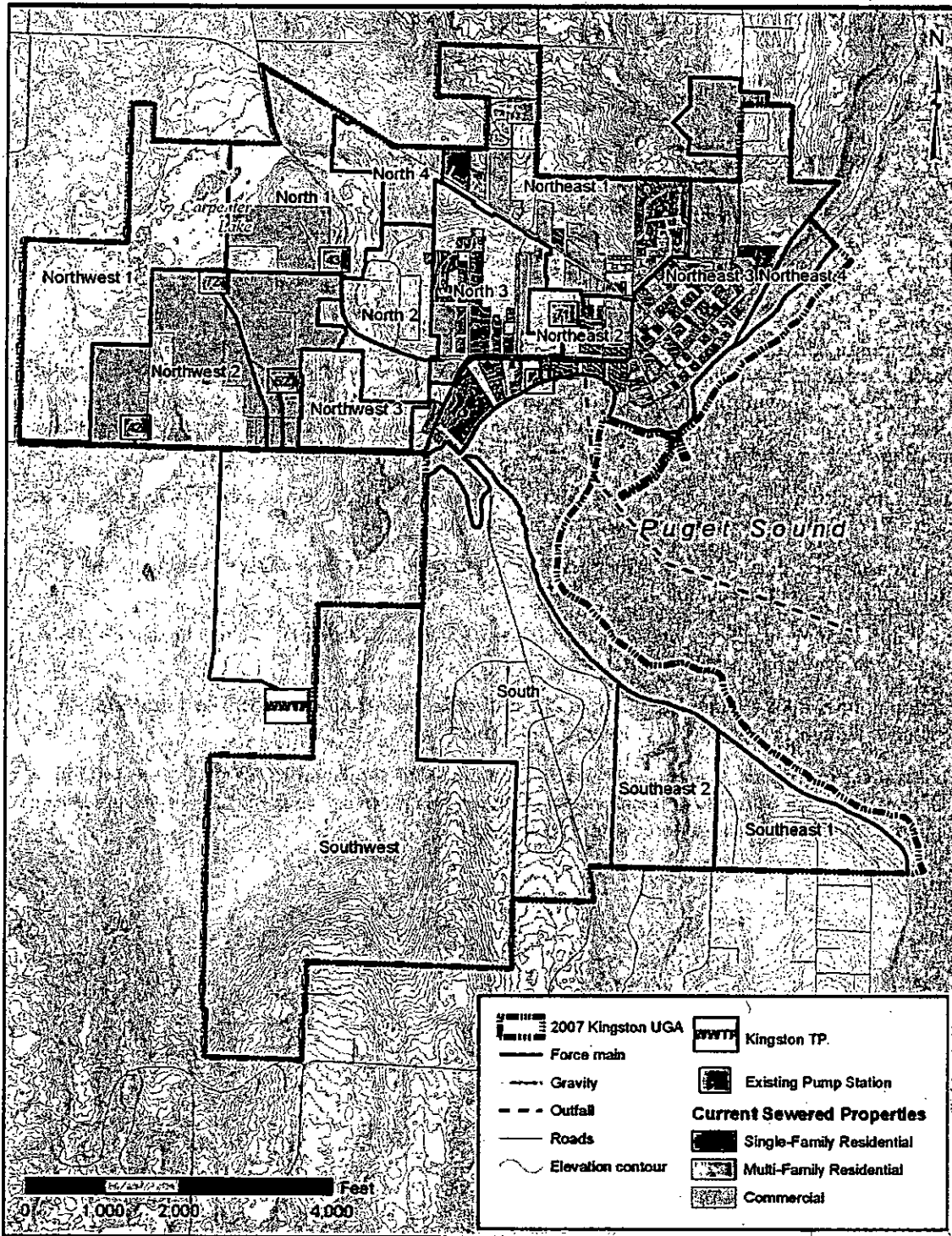


Figure 3-1. Kingston UGA Sewer Subbasins

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4. RECOMMENDED CONVEYANCE SYSTEM

The recommended wastewater conveyance facilities presented in this section would provide sewer service for the population in the Kingston UGA in 2025.

4.1 Recommended New Conveyance Infrastructure

While growth within the Kingston UGA will generally be influenced by county-wide, comprehensive planning, specific growth patterns occurring within the UGA will be less predictable and could differ significantly from the growth patterns assumed for this study.

Northern Portion of the UGA

Five new pump stations are proposed. Four of these are in locations similar to four pump stations in the 1995 Addendum and have been labeled with the same names: Carpenter Lake pump station, West Kingston pump station, SR-104 pump station, and Barber pump station. Carpenter Lake pump station will service the northeastern UGA. It will pump to pump station 72, which is currently under construction. The capacity of pump station 72 may need to be increased to accommodate this additional flow.

West Kingston pump station will collect flow to the east of pump station 52. The force main will discharge to the gravity line that pump stations 42, 72, and 52 discharge to.

SR-104 pump station will collect flow from the North 4 subbasin. The force main will discharge to the gravity line flowing to pump station 43.

Barber pump station will collect flow from southern end of Barber Cut Road. The force main will discharge to the gravity line that pump station 43 discharges to.

The fifth pump station, Woldermere pump station, will collect flow from the Northeast 4 subbasin. The force main will discharge to a gravity line on East 3rd Street.

The conveyance infrastructure proposed for the northern UGA is shown on Figure 4-1. It was assumed that if the County does not own land at the proposed locations, that it can be acquired. It is also assumed three-phase power is available at all proposed pump station sites.

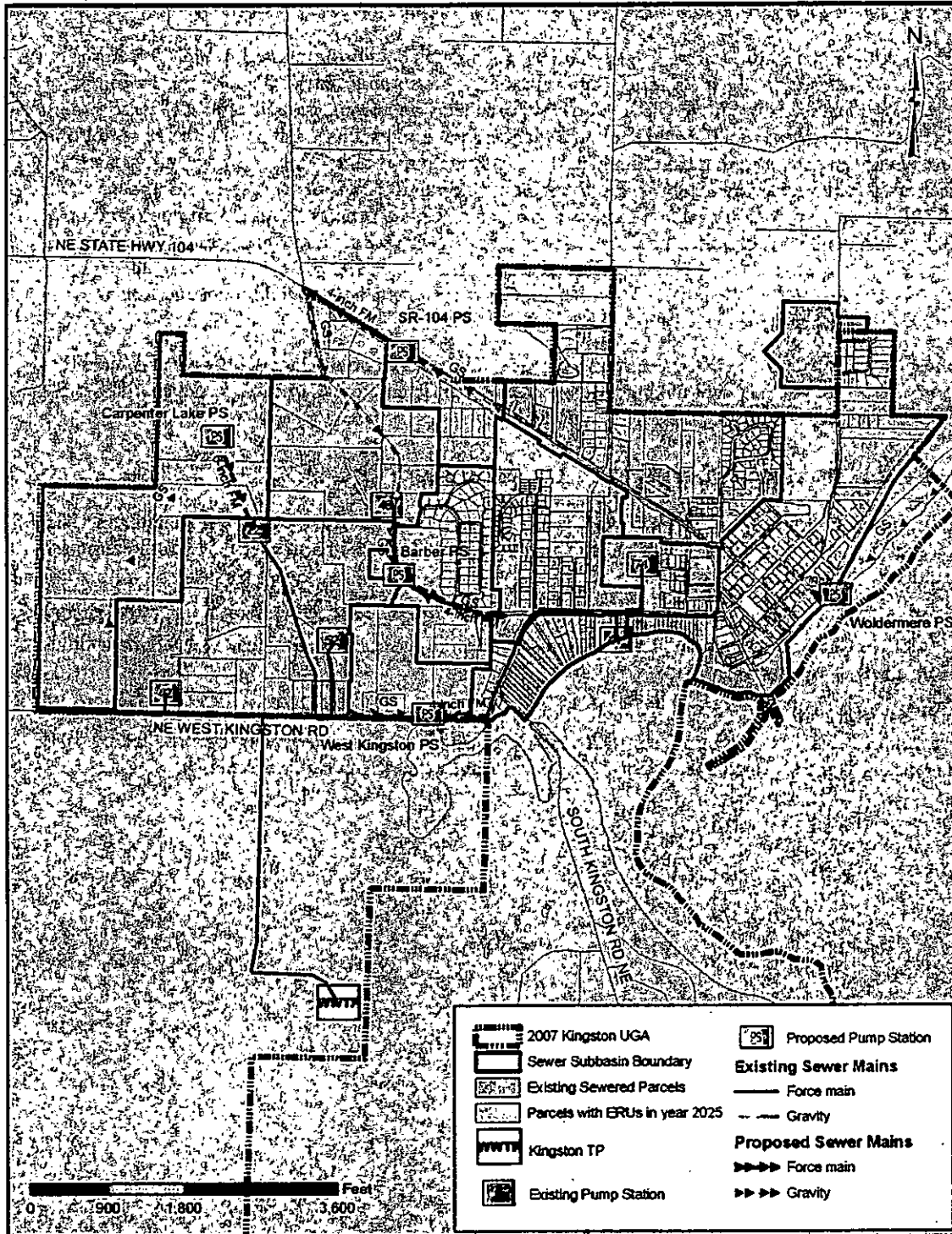


Figure 4-1. Northern Portion of the UGA Proposed Infrastructure

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Southern Portion of the UGA

Three new pump stations are proposed. These are the same pump stations proposed in the 1995 Addendum: Jefferson pump stations 1 and 2 and Arness pump station. Arness pump station will be the main pump station providing service to the southern UGA. A new force main will be constructed from the Arness pump station, on South Kingston Road, to the treatment plant. Two pump stations will be built on Jefferson Point Road, in the locations proposed in the Addendum. Jefferson pump station 1 will be located approximately 1,400 feet east of the intersection of Jefferson Point Road and South Kingston Road, near an unnamed stream. Jefferson pump station 2 will be located approximately 2,500 feet east of Jefferson pump station 1, near the 90 degree bend in the Jefferson Point Road right-of-way. Two new force mains and four new gravity sewers are proposed to serve the remainder of the southeastern UGA. The Southwest subbasin is planned to be developed by one entity. Conveyance infrastructure will be installed by them and their construction plans are not yet available.

The conveyance infrastructure proposed for the southern UGA is shown on Figure 4-2. It was assumed that if the County does not own land at the proposed locations, that it can be acquired. It is also assumed three-phase power is available at all proposed pump station sites.

4.2 Recommended System Upgrades

Four problem areas with the existing gravity conveyance piping were identified by County maintenance staff. Problem areas are shown on Figure 4-3. The problem description and recommended mitigation measure are provided below.

1. A 6-inch gravity line tees into a 12-inch gravity line on NE California Street, between manholes B28-4035 and B28-4034. There is not a manhole at the tee location. Line cleaning is difficult. A manhole should be installed.
2. There is 6-inch clay line on Ohio Street that discharges to an 8-inch line. There is a housing project upstream of the 6-inch line that has installed an 8-inch line but has not tied into the system due to the limited capacity of the 6-inch line. The 6-inch line should be replaced with an 8-inch line.

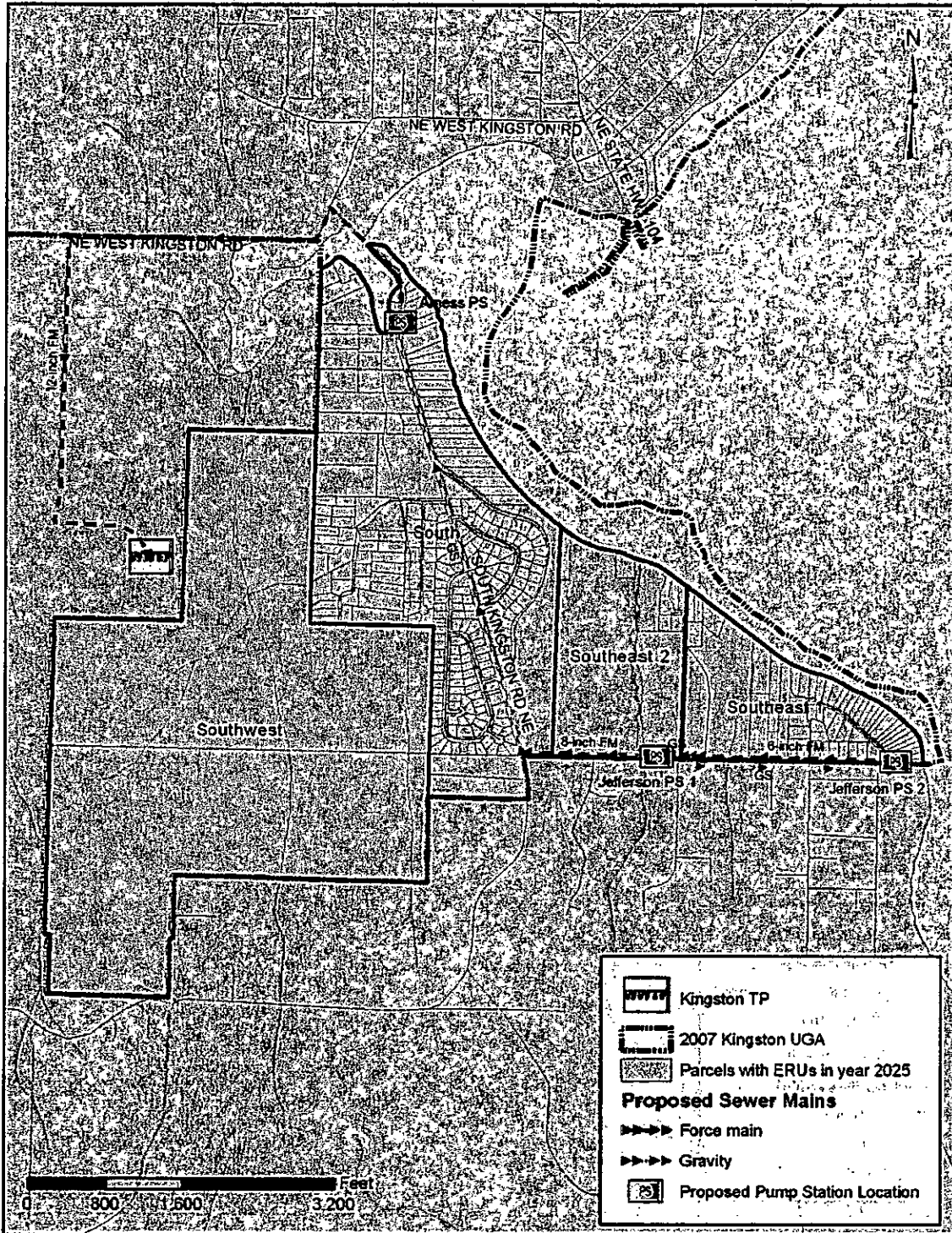


Figure 4-2. Southern Portion of the UGA Proposed Infrastructure

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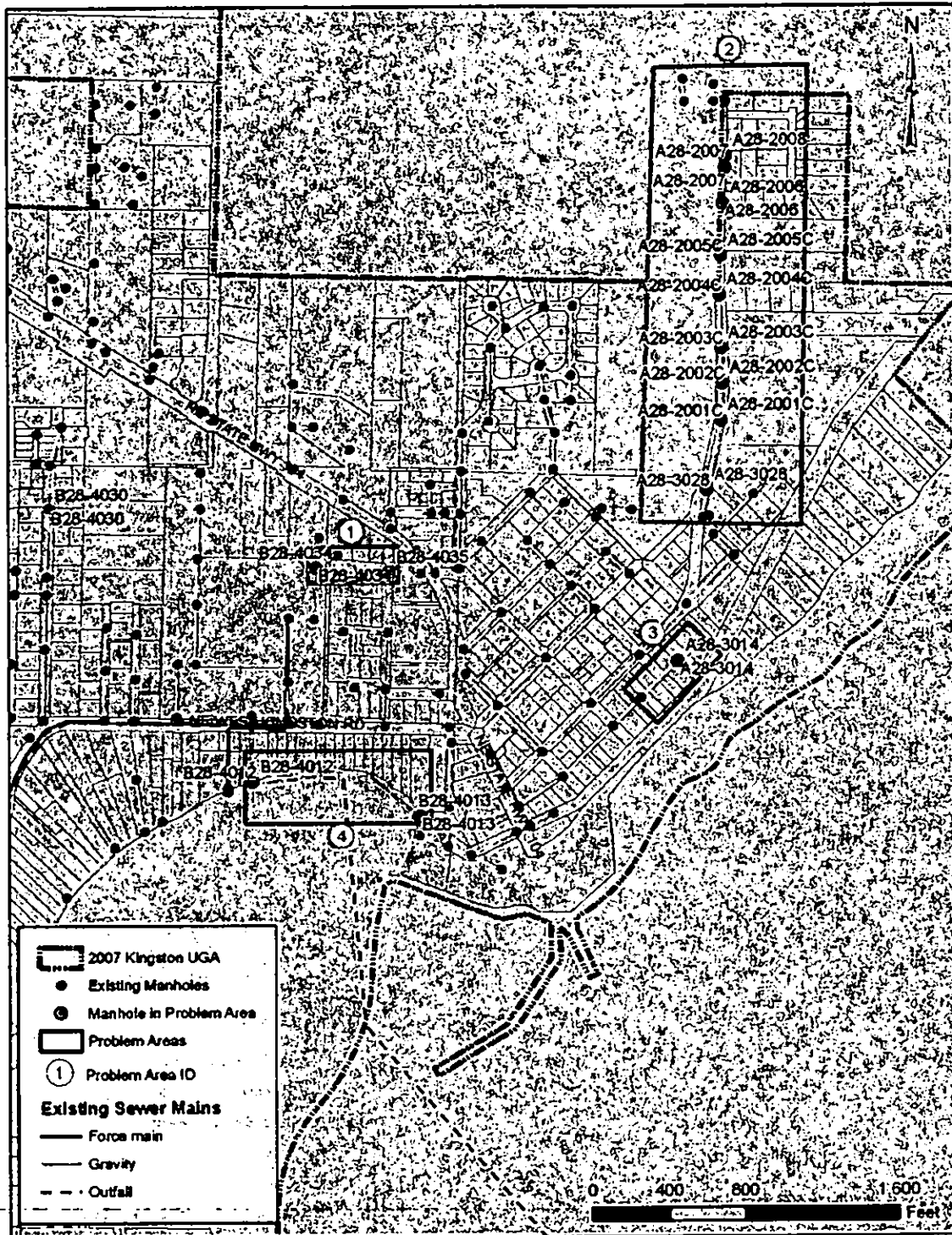


Figure 4-1. Existing Infrastructure Problem Areas



3. A manhole (A28-3014) is buried under a wall on private property. Line cleaning is difficult. A manhole should be installed downstream in East 3rd Street right-of-way. If cleaning is still difficult, the buried manhole should be excavated and inspected to ensure the bottom is channeled, allowing for easier movement of cleaning equipment.
4. A 10-inch gravity sewer, to pump station 41 (between manholes B28-4013 and B28-4012) has a 45 degree bend with no manhole. Line cleaning is difficult. A structure should be installed in the bend. The hydraulic grade line in the pipe should be estimated to determine an appropriate structure (e.g., manhole versus vault with flanged cleanout wyes). The project will need to consider permitting requirements for working in close proximity to Puget Sound.

In addition to existing gravity conveyance, pump station 41 should be replaced. It is a factory-built facility that will be over 50 years old in 2025. Pump stations of this type typically do not have long service lives, especially in potentially-corrosive environments like its beachfront location. It has been assumed that the pump station would be replaced with a pump station equipped with constant-speed submersible pumps. Power will be rerouted to nearby overhead lines. Standby power would continue to be supplied from pump station 71. The force main from pump station 41 to pump station 71 should also be replaced with an 8 inch force main to accommodate 2025 flows. Alternatively, a second 6-inch line could be installed to increase capacity and provide redundancy.

Pumping station 71 has two pumps. However, the second pump adds only 5 to 10 gallons per minute of flow capacity when both pumps are running. The firm capacity of this pump station is less than the projected flows. Decreasing head loss (i.e., installing a larger diameter force main) should be considered as well as installing a third pump to accommodate future flows.

4.3 Cost Summaries

Construction cost estimates for the recommended conveyance system additions and improvements are presented in Table 4-1. Costs are based up an update to the unit costs in the 1995 Addendum. Unit costs were adjusted to today's dollars using the Engineering News Record Construction Cost index of 8,626. Cost of infrastructure not proposed in the 1995 Addendum is based on material costs from local suppliers.

Table 4-1 Estimated Cost of Recommended Conveyance Facilities

Subbasin	Description	Length, feet	Capacity, mgd(a)	Estimated cost, \$1,000(b)
Pumping Stations				
NW1, NW2, NW3, N1, N2, N3, N4, NE2, NE3, NE4	Pump Station 41 (replacement)		1.27	2,000
NW1, NW2, NW3, N1, N2, N3, N4, NE1, NE2, NE3, NE4	Pump Station 71 (upgrade)		1.55	600
NW1	Carpenter Lake Pump Station		0.18	450
NW3	West Kingston Pump Station		0.06	225
N2	Barber Pump Station		0.08	225
N4	SR-104 Pump Station		0.06	225
NE4	Woldermere Pump Station		0.05	300
SW, S, SE 1, SE 2	Amess Pump Station		0.54	1,500
SE 1, SE 2	Jefferson-1 Pump Station		0.15	1,500
SE 2	Jefferson-2 Pump Station		0.11	650
Force Mains				
NW1, NW2, NW3, N1, N2, N3, N4, NE2, NE3, NE4	8-inch Replacement (PS 41)	1,100		149
NW1, NW2, NW3, N1, N2, N3, N4, NE1, NE2, NE3, NE4	10-inch Replacement (PS 71)	9,990		1,399
NW1	6-inch (Carpenter Lake PS)	1,200		152
NW3	4-inch (West Kingston PS)	750		91
N2	4-inch (Barber PS)	1,400		169
N4	4-inch (SR-104 PS)	1,350		169
NE4	4-inch (Woldermere PS)	360		163
S, SE 1, SE 2	10-inch (Amess PS)	8,650		1,211
SE 1, SE 2	8-inch (Jefferson-1 PS)	1,400		189
SE 2	6-inch (Jefferson-2 PS)	2,100		268
Gravity Sewers				
SW, S, SE 1, SE 2	18-inch (to Amess PS)	4,700		705
SE 1, SE 2	8-inch (to Jefferson-1 PS)	400		44
SE 2	8-inch (to Jefferson-2 PS)	1,400		154
N1	8-inch (to 43 PS)	2,900		319
NW1	8-inch (to Carpenter Lake)	2,600		286
NW3	8-inch (to West Kingston PS)	500		55
NW3	8-inch (to West Kingston PS)	940		103

TABLE 4-1 ESTIMATED COST OF RECOMMENDED CONVEYANCE FACILITIES

Table 4-1 Estimated Cost of Recommended Conveyance Facilities

N2	8-inch (to Barber PS)	1,200		132
N4	8-inch (to SR-104 PS)	1,330		146
NE4	8-inch (to Woldemere PS)	1,700		187
N2	8-inch (to Barber PS)	550		61
NE3	8-inch Replacement (in Ohio Avenue)	2,500	0.30	300
NE3	SSMH Rehab (A28-3014)			5
NE1	48-inch SSMH (between B28-4035 and B28-4034)			10
NE3	48-inch SSMH (between B28-4013 and B28-4012)			10
Subtotal: New construction				9,240
Repair and replacement				4,453
Subtotal				13,693
Mobilization, 5 percent				685
Subtotal				14,378
Land				208
Subtotal				14,586
Contingency, 40 percent				5,834
Subtotal				20,420
Sales tax, 9 percent				1,838
Subtotal				22,258
Engineering and administration, 30 percent				6,677
Total project costs				28,935

(a) Pumping station capacities noted here are at peak-hour wet weather flow rates. Gravity sewer capacities are those flow rates obtainable in pipes which are flowing full without surcharge. Force main capacities are not presented.

(b) ENR-CCI 8626 (June 2007).

4.4 Alternative Wastewater Technologies

The Kitsap County Comprehensive Plan encourages the use of urban-level alternative wastewater technologies in UGAs, where public sewer connection is not financially feasible due to topographical and other challenges. These technologies may provide additional environmental benefit, through restoration or preservation of critical aquifer recharge areas and critical areas by reintroducing potable water back into the ground for infiltration. Many areas within the UGA have some presence of critical areas, however large-scale environmental complexes are generally found in subbasins North 2, Northwest 1, Northwest 3, portions of the Northeast 3 and Northeast 4 (along the shoreline), and Southeast 1 and 2. These subbasins are further recognized through their zoning of Urban-Restricted (1:5 dwelling units per acre) due to the large presence of critical areas and could be considered prime candidates for future exploration of use of alternative wastewater technologies. The location of these areas within the Kingston UGA is identified in Figure 2-1. If alternative wastewater technologies do not provide 1) ample cost-benefit ratios, and/or 2) enhanced critical area restoration or preservation, then standardized conveyance systems as noted in Figures 4-1 and 4-2 should be utilized.

4.5 Potential Funding Strategies

Existing and additional revenue strategies that Kitsap County may consider are summarized in Table 4-2. Implementation of these strategies could raise additional revenue; while others would affect the land use and zoning designations. These funding strategies are analyzed at a planning-level and will allow Kitsap County to achieve a balance between land use, wastewater finance and level-of-service standards.

Table 4-2. Potential Revenue Strategies

Funding Option	Description	Maximum Funding (over 20 years, in 2007 dollars)	Voter Approval Required?	Currently Utilized?	Usage Issues
Reallocation of Existing Revenues					
General Fund	Move funding from other departments to fund wastewater projects.	Unknown	No	No	Requires significant cuts in other departments and programs and level-of service.
Wastewater Improvement Fund	Move funding within the wastewater capital improvement plan to fund specific projects.	\$5.4M	No	Yes	Funds are collected from Newcomer's Assessments to expand treatment capacity for new users.
Wastewater Construction Fund	Move funding within the wastewater capital improvement plan to fund specific projects.	\$15.3M	No	Yes	Funds are collected from operating transfers, Improvement Funds, loan proceeds, and a portion of other sewer service revenues.
Real Estate Excise Tax (REET)	Dedicate some portion of future funding from this revenue stream to wastewater projects.	\$8.7M - \$15.4M	No	No	REET funding is currently used for a wide number of facility projects. The low end of the range is based upon Board of County Commissioner policy of maintaining a surplus equal to the previous years bonding obligations. The high end of the range would require that policy to be discontinued.
Tax Increases					
Utility Local Improvement District (ULID)	The maximum amount of an ULID is unlimited with funding coming from voter-approved assessments on properties within specified district.	Unlimited	Yes	Yes	Require 51% vote from property owners within specified district.

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Table 4-2. Potential Revenue Strategies					
Funding Option	Description	Maximum Funding (over 20 years, in 2007 dollars)	Voter Approval Required?	Currently Utilized?	Usage Issues
Other Mechanisms					
Federal Grants	Grant funding from the federal government. Programs include: <ul style="list-style-type: none"> USDA Water & Waste Disposal Grant USEPA Public Works Construction Grant HUD Brownfields Economic Development Initiative 	Unknown	No	No	These are competitive and decision-criteria often require declared environmental hazard and/or depressed economic conditions.
State Grants	Grant funding from Washington State. Programs include: <ul style="list-style-type: none"> Centennial Clean Water Fund Public Works Trust Fund Clean Water Revolving Fund 	Unknown	No	Yes	Many are competitive with many jurisdictions seeking the same funding. Grants are comparatively small, and programs are primarily low interest rate loans.
Land Use Measures – Reduce UGA Size	UGAs could be contracted to reduce required capacity improvements.	Unknown	No	No	Requires amendment to countywide planning policies; countywide Comprehensive Plan and environmental impact statement.
Incorporation	Much of the proposed urban growth area (UGA) boundaries are expected to be incorporated during the 20-year planning period. As these wastewater systems leave County jurisdiction, the responsibility for their funding moves to the respective city.	Unknown	No	Yes	Probably not applicable to Kingston in twenty-year horizon.
Developer Extensions	Extension and improvements to the wastewater conveyance system would be borne upon developments.	Unknown	No	Yes	Expensive and requires the ability and mechanisms to achieve higher-density in the UGAs.

4.6 Conclusion

This Addendum plans for the installation of additional wastewater conveyance infrastructure to serve the Kingston UGA. When implemented, the additional pump stations and force mains will facilitate the installation of conveyance systems into currently unsewered areas and will reduce the costs of those conveyance systems. In accordance with Comprehensive Plan policies, Kitsap County will continue to explore funding options to implement the plans set forth in this Addendum and extend public sewer

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throughout the Kingston UGA. Future development of the Arborwood urban area is expected to further extend the sanitary sewer conveyance system into the southwest basin of the UGA (Figure 4-2). Significant portions of the Kingston UGA, which were included within the UGA prior to the Sub-Area Plan, are designated as urban restricted areas (Figure 2-1). This designation indicates that there are significant critical areas in those areas. Thus, some of those areas may be more appropriately served by alternative wastewater treatment systems, due to lower density levels and the protection of critical areas. With the extension of sanitary sewer conveyance system and the implementation of alternative wastewater treatment systems, the UGA is expected to be fully served by 2025.

REFERENCES

Kitsap County 10-Year Comprehensive Plan Update, December 2006.

Kitsap County 10-Year Comprehensive Plan, Draft & Final Environmental Impact Statements, August & December 2006.

Kingston Wastewater Facilities Plan, March 1995.

2005 Final Kingston Sub-Area Plan Update, December 2005.

Brown and Caldwell. *Port Angeles Eastern Urban Growth Area Wastewater Feasibility Study*. February 2005.

Tchobanoglous, G. and FL Burton. *Wastewater engineering; treatment, disposal and reuse*. 1991.

Updated Land Capacity Analysis, October 2005; Amended pursuant to Central Puget Sound Growth Management Hearing Board Order No. 06-3-007.