RESOLUTION NO. 034-07

A RESOLUTION OF THE CITY OF PORT ORCHARD, WASHINGTON, CONCERNING THE PROVISION OF SANITARY SEWER SERVICE WITHIN PORT ORCHARD'S EXPANDED URBAN GROWTH AREA

WHEREAS, in 2006, Kitsap County adopted a ten year update to its comprehensive land use plan; and

WHEREAS, pursuant to the State Growth Management Act, Chapter 36.70A RCW, Kitsap County expanded the Port Orchard Urban Growth Area (UGA) through the ten year update to accommodate population through the year 2025; and

WHEREAS, the County's ten year update was appealed to the Central Puget Sound Growth Management Hearings Board (CPSGMHB); and

WHEREAS, the CPSGMHB remanded the capital facilities element and plan of the County's comprehensive plan for, among other reasons, more information regarding public sewer service within the Port Orchard UGA; and

WHEREAS, the County was instructed to obtain assurances from the relevant service provider that sanitary sewer service will be adequate and available within the 20-year planning period; and

WHEREAS, the City of Port Orchard provides sanitary sewer service within portions of the Port Orchard UGA and can provide such assurances; now, therefore;

THE CITY COUNCIL OF THE CITY OF PORT ORCHARD, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

1. The City of Port Orchard currently provides sewer service within its corporate limits, as well as to McCormick Woods, selected areas outside the city limits but within its existing UGA, and to the Sidney Glen Elementary School located outside the existing UGA but which service pre-dates the establishment of the City's urban growth boundaries.

2. In 2006, Kitsap County expanded the Port Orchard UGA, as shown in exhibit A-Port Orchard Zoning Map.

3. The City of Port Orchard indicates that the City has sanitary sewer treatment plant capacity of 4,200,000 gallons per day (GPD) during the average day of the maximum month. The treatment plant capacity could serve about 26,000 people. Since the City's treatment plant currently serves both the City and the Karcher Creek Sewer District, the current total population it serves is 9,996. Therefore, the City's treatment plant has capacity for serving additional population in the proposed Port Orchard Expanded UGA.

4. The City of Port Orchard currently has a sanitary sewer collection system, including 24-inch diameter *and smaller* sewer mains and pump stations that extend to the Port

Orchard Expanded UGA. Attached hereto as Exhibit B is a map showing the existing collection system [Figure 5 of the GMA Compliance – Technical Memorandum].

5. The City has the capacity and will serve the Port Orchard Expanded UGA upon the area's annexation to the City, which should occur through 2025.

6. Pursuant to Port Orchard Municipal Code 13.04.040, the City may extend its sewer collection service to property lying within its urban growth area which is not contiguous to City limits upon request and the execution of a utility extension agreement. The party seeking the utility extension is responsible for paying the entire cost of the sewer connection, subject to latecomer reimbursement if applicable.

7. The City's commitment and ability to provide service to the Port Orchard Expanded UGA is demonstrated through the UGA Sewer Service technical report. Attached hereto to as Exhibit D is a copy of the report.

8. Since the City generally relies upon developer extension agreements to finance the extension of sewer collections systems, such extensions are not shown in the City's capital facilities plan, but rather are added once a binding commitment is finalized. Attached hereto as Exhibit C is a map showing the conceptual area of additional service to be added upon requests for developer extension agreements through the year 2020 [Figure 9 from the GMA Compliance – Technical Memorandum]

9. For the reasons set forth above, the city has both the capacity and the ability to serve the Port Orchard Expanded UGA with pubic sanitary sewer service by the year 2025.

PASSED by the City Council of the City of Port Orchard, SIGNED by the Mayor and attested by the Clerk in authentication of such passage this 10th day of December 2007.

Kim E. Abel
KIM E. ABEL, MAYOR

ATTEST:

Michelle Merlino
Michelle Merlino, City Clerk

City of Port Orchard

Comprehensive Sanitary Sewer Plan Update

GMA Compliance – Technical Memorandum

December 2007

BHC Consultants LLC
720 Third Avenue, Suite 1200
Seattle, WA 98104
206-505-3400

Table of Contents

LIST OF TABLES

LIST OF FIGURES

All Figures Are Attached After Text

EXECUTIVE SUMMARY

The area authorized for sewer service in and around the City of Port Orchard includes three areas: area within the existing city limits, the City urban growth area (UGA) as expanded, and the South Kitsap UGA/ULID #6. Responsibility for providing sewer service within this geographic area is shared between the City sewer utility and the Karcher Creek Sewer District. This Technical Memorandum is intended to document the additional sewer facilities required by the City to provide sewer service within that part of the UGA that is the City's responsibility; and to confirm the commitment by the City to provide the sewer service in a timely manner.

For purposes of planning future needs, Kitsap County has divided the entire County into Transportation Analysis Zones (TAZ). Population and employment for each TAZ has been projected by the County for the year 2025 and at build-out under current land use plans with the UGA boundaries as presently defined. This Memorandum identified the TAZ affecting the defined UGA, and where some City sewer responsibility exists. The County 2025 and build-out population and employment projections were extracted for these TAZ. In many cases only part of a TAZ would receive sewer service, and be served by City sewers. Populations and employment projections were apportioned from these TAZ, recognizing that most development would occur within the UGA where parcels receive sewer service.

Historic City records for wastewater flow sent from the Marina Pump Station to the treatment facility operated by the Karcher Creek Sewer District were reviewed. Annual average day wastewater flows were identified and the unit flow attributable to a typical City resident or employee were determined from past population records. Average day wastewater flows for 2025 and build-out conditions were projected. The historic ratio of peak day flow to annual average at the Marina Pump Station was established. The peak flow for 2025 and build-out conditions was projected.

The potential sewer service area tributary to the City sewer system was divided into sewer basins based on drainage topography and sewer service patterns. Existing trunk sewers and principal pump stations conveying wastewater from and through these basins were identified. City records were reviewed to determine the peak hour capacity from the existing pumping capacities plus the tributary pipe sizes and slopes, which then indicated existing peak hour trunk capacity.

Projected peak hour flow in each trunk under build-out conditions was compared with existing capacity available. Where additional capacity was needed, the added trunk sewer size was identified. Capacity needs for 2025 were then compared with existing capacity and with build-out needs to establish trunk sewer upgrade priorities.

These improvements total about $ 10,000,000. At least $ 1,950,000 is projected to be needed within the next six years; and it is possible that more detailed evaluations will indicate that additional improvements should be included in the six-year CIP. The annual average day flow for 2025 is projected to be about 1.47 MGD, and adequate treatment capacity will be built.

A variety of funding options are available to the City to implement the required improvements.

1 INTRODUCTION

1.1 Growth Management Compliance

The City of Port Orchard is preparing to update the Comprehensive Sanitary Sewer Plan. A number of changes have occurred within the City vicinity since the last Plan was prepared in 2000. This Technical Memorandum has been prepared as an initial, interim step to demonstrate compliance with the Growth Management Act (GMA).

Figure 1 shows the immediate vicinity surrounding the City of Port Orchard and the urban growth area (UGA) assigned to the City plus the South Kitsap UGA.

1.2 Goals and Objectives

Demonstrating compliance with the GMA is the goal and the reason for preparation of this Technical Memorandum. To achieve this goal, the Technical Memorandum addresses a sequence of objectives as summarized below:

1 – Growth management area assigned to the City

2 – Population and employment projections

3 – Wastewater flows generated

4 – Conveyance capacity required

5 – Evaluate the capacity of the existing infrastructure

6 – Identify new facilities that will be needed

7 – Develop the conceptual costs of the wastewater facilities needed

Detailed evaluation of the City sewer system will be completed through an update of the Comprehensive Sanitary Sewer Plan scheduled to be prepared during 2008.

Evaluation of the conveyance system will be limited to the trunk sewers serving identified basins. Capacity will be computed based on pipes flowing full. Pump station capacities will be based on one pump out of service and the remaining pumping capacity operating at about 80 percent capacity, which is about 20 hours per day. Velocities in force mains should be in the 2 to 8 feet per second range.

Trunk sewer system capacity will be evaluated on the ability to convey peak hour flow. In the absence of specific defining data, peak hour flow will be defined as 5 multiplied by the average day flow based on the peak day record at the Marina Pump Station. Minimum pipe slope should be sufficient to achieve a velocity of at least 2 feet per second.

2 SEWER SERVICE AREA

2.1 Urban Growth Area

The urban growth area designated by Kitsap County in the City of Port Orchard vicinity is shown on Figure 2. The urban growth area effective February 15, 1999, is delineated as well as the revised urban growth boundary as amended June 11, 2007, following the 10-year update of Kitsap County planning for urban growth management.

Zoning within the City of Port Orchard urban growth area has been established by Kitsap County as shown in Figure 3.

2.2 Existing City of Port Orchard Sewer System

Zoning within the existing city limits is shown on Figure 4. The existing City sewer system is shown on Figure 5, which is derived from the graphic information system (GIS) files maintained by Kitsap County.

These GIS files were prepared by Kitsap County and were assembled by inputting record CAD drawings. Field verification of horizontal and vertical data should be done when time and budget permit. Vertical data available such as manhole lid or invert elevations is very limited; and not all pipe attributes were available, such as pipe diameters and lengths. The resulting GIS files are not sufficient for direct transfer into a hydraulic model to compute hydraulic capacities.

The principal trunk sewers are highlighted on Figure 5 with pertinent characteristics summarized in Table 1. The full pipe capacity in millions of gallons per day (MGD) for each trunk identified in Table 1 is defined by the most limiting pipe segment within that trunk based on City record drawings.

Table 1
Existing Trunk Sewer Capacities

Trunk	Location	From	To	Diameter	Slope	MGD
A	Bay Street	North Bay	Bethel	12	0.2239 %	1.05
B	Bethel Road	Melcher	Bay	10	0.80 %	1.25
C-east	Bay Street	Bethel	Marina PS	18	0.155 %	2.6
C-west	Bay Street	Pt Orchard	Marina PS	24	0.092 %	4.3
D – 1	Port Orchard (old)	Tremont	Bay	12	0.90 %	2.15
D – 2	Port Orchard (new)	Tremont	Bay	12	1.68 %	2.9
E	Pottery & stream	Lippert	Tremont	10	0.37 %	0.83
F	Bay Street	Caseco	Pt Orchard	18	0.155 %	2.6
G	Pottery Avenue	Fireweed	Lippert	10	0.26 %	0.7
H	Tremont Street	Pottery	Pt Orchard	8	0.69 %	0.65
I	Old Clifton Road	Berry Lake	McCormick 1	15	0.067 %	1.05
J	Old Clifton Road	Feigley	McCormick 2	15	1.20 %	4.5
K	McCormick Woods	Marymac	Old Clifton	10	0.30 %	0.77

The City sewer system formerly included a wastewater treatment facility on the waterfront; and the trunk sewers conveyed all flow to that location. The treatment facility was replaced with the Marina Pump Station and wastewater flow was conveyed east through a 15-inch force main to a new treatment facility on City property that is operated by the Karcher Creek Sewer District. The Marina Pump Station operating parameters are summarized in Table 2 from City records.

Table 2
Marina Pump Station

Pump	GPM	Horsepower	TDH
1	2600	150	115
2	2600	150	115
3	800	20	37
4	800	20	37

Note: Station has an overflow into Sinclair Inlet

The capacity of the Marina Pump Station is defined by leaving one of the large pumps out of service. The total capacity of the remaining three pumps is something less than the 4,200 GPM total, perhaps about 3,700 GPM or 5.3 MGD.

The remaining City sewage pump stations are shown in Table 3 with the associated parameters including horsepower (HP) and total dynamic head (TDH) derived from City records.

Table 3
Existing Pump Stations

Station	Location	Pump 1			Pump 2			Force Main
		GPM	HP	TDH	GPM	HP	TDH	
Coast to Coast	1207 Bay Street	515	7.5	20	515	7.5	20	---
Tremont Place	281 Tremont Place	60	3	23	60	3	23	---
Eagle Crest	1091 Eagle Crest Pl	100	5	35	100	5	35	---
Cedar Heights	2220 Pottery Avenue	50	7.5	150	50	7.5	150	---
Bravo Terrance	505 Sedgwick Road	180	25	165	180	25	165	6
McCormick #1	1190 Old Clifton Rd	1000	75	122	1000	75	122	16
McCormick #2	2200 Old Clifton Rd	1000	25	60	1000	25	60	16
Canyon Court	512 Cedar Canyon Ct	50	7.5	150	50	7.5	150	---
Harrison Hospital	444 So Kitsap Blvd	350	40	118	350	40	118	---
Golden Pond	385 Golden Pond Rd	137	7.5	78	137	7.5	78	---
Ridge		200	15	90	200	15	90	6
Albertson		176	30	100	176	30	176	6

Notes: Canyon Court PS has a third pump identical to the two pumps shown in Table 3
Albertson PS is currently privately owned, though maybe transferred to the City
Coast to Coast has an overflow into Sinclair Inlet

No overflows have been recorded within the sewer pipe systems or at any pump stations. This record appears to indicate that the existing sewer system has adequate capacity for current conditions.

2.3 McCormick Woods – ULID 6

The area known as McCormick Woods has been developing under the South Kitsap UGA/ULID #6 Sub-Area Plan dated December 8, 2003, as revised in 2006. Land use within this Sub-Area is planned as shown on Figure 6 and is summarized in Table 4.

Table 4
McCormick Woods Land Use Designations

Land Use Designation	Density per Buildable Acre	Gross Acres
Urban Low Residential	4 to 9 dwelling units	1,306
Urban Cluster Residential	4 to 9 dwelling units	905
Urban Medium Residential	10 to 18 dwelling units	78
Urban Village Center	Up to 18 dwelling units	10
Business Park	----	52
Public Facilities	-----	19
Total		2,370

The original houses in McCormick Woods were developed with on-site septic systems. These were converted to septic tank effluent pump (STEP) units discharging to a community drainfield south of Old Clifton Road near the extreme west of the UGA.

Under ULID # 6, the City of Port Orchard agreed to provide sewer service and to assume responsibility for the STEP units. Two pump stations were built to facilitate sewer service, McCormick Woods 1 and McCormick Woods 2, in addition to pipe extensions in Old Clifton Road.

One of these extensions was to the west edge of the UGA to collect effluent from the former drainfield. This drainfild is no longer used and the 8-inch sewer connection into the Old Clifton Trunk sewer has been plugged. A 4-way cross at McCormick Woods and Marymac Drives SW with vales on each leg has the line to the old community drainfield closed so no effluent from the STEP units can go there. All effluent flows through Trunk K into McCormick Woods PS 2.

Additional and subsequent developments north of Old Clifton Road known as McCormick Woods No. 2, or The Ridge, are served through conventional sewers into the Ridge Pump Station, now owned by the City, which discharges into the Old Clifton Road trunk sewer. The new development south of Old Clifton Road enters Trunk I by gravity.

Although shown within an urban growth boundary, McCormick Woods has not been formally assigned to any city for eventual annexation. The City of Port Orchard anticipates annexing this area in the near future contingent on provision of sewer service.

2.4 Karcher Creek Sewer District Facilities

The District operates the wastewater treatment facilities for the City under NPDES Permit WA-002034-6 from the State Department of Ecology under a 1982 contract with the City. The treatment facilities actually consist of three interrelated and complementary systems:

- Activated sludge secondary treatment system
- Membrane bioreactor secondary treatment system production reclaimed water
- Ballasted clarifier for advanced primary treatment system for peak storm flows

These facilities are designed for a flow of 4.2 MGD during the average day of the maximum month with a peak day capacity of 16 MGD. Flows exceeding 6 MGD are treated through the ballasted clarifier to achieve a blended effluent meeting the effluent requirements define in the NPDES permit. The City and the District have agreed that this capacity is to be shared equally.

The highest average daily flows recorded during November and December 2006 were 3.94 MGD and 4.6 MGD during days of measured rainfall of 2.1 and 2.41 inches. Neither flow was sufficient to require operation of the ballasted clarifier. However, the 3 December 2007 storm produced about 12 MGD and the ballasted clarifier performed as designed.

Annual average day flow for 2007 was about 1.5 MGD. The District projects wastewater flow will increase to about 2.3 MGD by 2025 with an average day flow during the maximum month of about 7.7 MGD. Hydraulic capacity will be increased by then to be 16 MGD. The District and the City expect to continue sharing treatment capacity about 50-50 for each agency.

The District also operates an extensive sewerage collection system. Some of the District sewers in the immediate vicinity of City sewers are shown on Figure 5. The existing District boundary for sewer service is highlighted on Figure 5 also shows that some parcels within the city limits are served by the District.

The sewer service area boundary has not been defined by formal agreement, but has evolved as various properties have developed and needed sewer service. Generally speaking, the District expects to eventually extend service further south from Sedgwick Road to the extremities of the urban growth area.

The City expects to provide sewer service east to about Bethel Road. Eventually, the City expects to annex the entire UGA.

2.5 Existing and Planned Sewer Drainage Basins

The ‘Comprehensive Sewer Plan 2000’ divided the City sewer system into four ‘branches’:

- East – the area east of Blackjack Creek
- Central – from Sidney/Tremount intersection northward along Cline Avenue
- South – from Sedgwick/Sidney intersection northward into Port Orchard Boulevard
- West – McCormick Woods and area west of SR 16

These branches each comprise areas tributary to a trunk sewer that still remains in service. However, to evaluate the adequacy of the existing capacity in these trunks and to project future capacity requirements, a finer subdivision of the City sewer service area into sewer basins was employed. These basins and the associated trunk conveyance facilities are described in Table 5, with the basins delineated on Figure 9.

Table 5
Sewer Basins

Basin	Acres	Trunk	Tributary Facilities	Discharge Terminus
1	547	L	Basin 21	Trunk J
2	300	future	none	Trunk I
3	288	future	none	Albertson PS
4	123	A	none	Coast to Coast PS
5	270	B	none	Coast to Coast PS
6	460	C	none	Marina PS
7	178	H	McCormick 1	Trunk D
8	141	D	Trunks E and H	Trunk C
9	245	I	Quadrant PS, McCormick 2, Basins 2, & 15	McCormick 1
10	438	F	none	Trunk C
11	262	E	G	Trunk D
12	247	Albertson	Basin 3	Trunk G
13	131	G	Albertson PS	Trunk E
14	347	E	Bravo Terrace PS	Trunk E
15	67	I	none	Trunk I
16	64	Ridge	none	Trunk I
17	347	J	none	McCormick 2
18	192	J	Basins 1 & 21	McCormick 2
19	105	K	Basin 20	McCormick 2
20	418	K	none	Trunk K
21	300	K	none	Basin 20

3 PROJECTED POPULATION

3.1 Existing Population

Table 6 summarizes the population estimates prepared by the Washington State Office of Financial Management since the 2000 census.

Table 6
Historic Population

Year	Kitsap County		City of Port Orchard		
	Population	Percent Change	Population	Percent Change	Percent of County
2000 Census	231,969	---	7,693	---	3.32
2001 Estimate	233,400	0.60	7,810	1.52	3.35
2002 Estimate	234,700	0.56	7,900	1.15	3.37
2003 Estimate	237,000	0.98	7,910	0.13	3.34
2004 Estimate	239,500	1.05	8,060	1.90	3.37
2005 Estimate	240,400	0.38	8,250	2.36	3.43
2006 Estimate	243,400	1.25	8,310	0.73	3.55
2007 Estimate	244,800	0.58	8,350	0.48	3.41

Table 6 does show a distinct trend for the City of Port Orchard to capture an increasing share of the Kitsap County population. This is in accord with the intent of the Growth Management Act and indicates that current City and County policies are successful.

City sewer service is budgeted based on the mix of commercial and residential customers reduced to the 'equivalent residential units' or ERU. One ERU is defined as the sewage generated by one single family home, estimated at 180 GPD. Table 7 summarizes the historic relationship between residential and commercial customers served by City sewers as estimated by the City Department of Public Works.

Table 7
Equivalent Residential Units for City Sewer System

Budget Year	Total ERU	Residential		Commercial	
		ERU	% Total	ERU	% Total
2006	4,407	3,030	68.8	1,377	31.2
2005	4,319	3,011	69.7	1,308	30.3
2004	4,185	2,895	69.2	1,290	30.8
2003	4,077	2,853	70.0	1,224	30.0
2002	4,201	2,855	68.0	1,346	32.3
2001	4,087	2,791	68.3	1,296	31.7

In addition to the Table 7 ERU numbers, McCormick Woods had an additional 616 ERU in 2005 and 629 ERU in 2006. Thus the total ERU for the City sewer system was 4,935 in 2005 and

5,036 in 2006. Total ERU for the City sewer system through October 2007 is 4,643 units, plus an additional 659 customers in McCormick Woods for a total of 5,302 ERU. Most of the McCormick Woods customers are effluent pump units, which influences the organic loading but does not affect the sewer hydraulic loads as the sewage flow would be similar to regular homes.

The City share of the treatment plant capacity operated by the Karcher Creek Sewer District has been about 45 or 46 percent in recent years.

Typical household size for Kitsap County is reported by OFM to be about 2.5 persons, though Port Orchard may average only about 2.4 persons per household. In both cases, the trend is for continued gradual reductions in the average household size. Table 8 describes an estimate of the share of City population served by the City sewer system.

Table 8
City Population Served by City Sewers
Based on 2.4 Persons per Household

Year	City Population	Residential ERU	Served Population	Percent Served
2006	8,310	3,030	7,272	87.5
2005	8,250	3,010	7,226	87.6
2004	8,060	2,895	6,948	86.2

Table 8 indicates that City sewers are serving a slightly increasing share of the City population. It also may be that most of the population growth within the city limits is occurring in areas served by the City sewer system.

3.2 Kitsap County Population and Employment Projections

Kitsap County has identified a series of Transportation Analysis Zones (TAZ) for the entire County, an excerpt of which is shown as Figure 7. The TAZ associated with the City of Port Orchard, the urban growth area served by the City sewer system, and McCormick Woods are shown in Figure 8.

As part of transportation analysis, population and employment projections for Kitsap County are distributed among all TAZ for 2025 conditions and for Build-out at current land use planning densities by County Planning. The resulting projections have been assembled as summarized in Table 9.

Table 9
Population and Employment by TAZ

TAZ	Area in Acres	Basins	2025 Projections		Build-Out Projections	
			Population	Employment	Population	Employment
154	222	4 & 5	1,104	380	1,111	398
156	59	6	170	775	170	775
158	51	4 & 5	224	106	225	105

TAZ	Area in Acres	Basins	2025 Projections		Build-Out Projections	
			Population	Employment	Population	Employment
159	96	5 & 6	177	521	177	522
161	29	6	30	461	30	480
162	56	6 & 8	215	104	215	117
163	182	8 &10	342	37	342	39
164	273	7, 8, 10	1,194	710	1,195	714
165	39	6	231	913	232	914
166	72	5 & 6	415	48	415	49
168	58	5	114	527	120	537
169	314	7,10, 11	1,186	22	826	29
170	53	6 & 8	349	133	350	133
171	28	6	57	7	57	7
172	18	5	34	43	24	49
173	148	5, 6, 8	254	206	842	223
180	72	6 & 8	655	26	725	47
181	60	5 & 6	86	2	655	2
182	119	5	105	124	287	266
183	481	9	681	195	800	693
188	1,043	9, 16, 17	826	75	826	827
191	694	17	382	12	476	191
194	109	6, 7, 11	1,212	400	1,213	89
195	141	7 & 11	427	490	427	401
197	43	6	90	2	96	4
199	28	5	163	384	173	384
201	304	9 & 13	210	135	220	373
202	335	11 & 14	2,053	364	2,072	383
203	294	14	468	79	839	850
211	1,338	3, 12, 13	1,229	114	619	1,054
212	108	12 & 13	54	119	61	608
215	1,296	2, 15, 19, 20, 21	2,569	89	4,150	92
216	2,013	1, 18, 21	2,997	0	3,526	0
217	336	14	1,203	263	2,108	986
223	468	12	242	73	280	376
225	217	3 & 12	230	155	250	362
Totals	**11,194**	**---**	**21,969**	**8,094**	**26,134**	**13,079**

Some anomalies can be seen as the projections move from 2025 to Build-Out conditions. Some residential properties will convert to commercial use, and some existing commercial land uses will evolve. These differences are not deemed significant for the sewer system as a whole, or even for specific sewer trunks.

3.3 Projected Growth Distribution by Basin

The TAZ population and employment projections are proportioned among the sewer basins to generate wastewater flow into the trunk sewer system. Of course some TAZ are not entirely with the City sewer service area so only part of the area, population, and employment shown in Table 10 will actually contribute to the City sewers. The resulting distribution of population and employment follow specific parcels and are not directly related to proportional areas. Some portions of certain basins and the relevant TAZ can not be developed due to sensitive area concerns. The resulting assumed distributions are summarized in Table 10.

Table 10
Population and Employment Projects by Basin

Basin	2025 Projections		Build-Out Projections	
	Population	Employment	Population	Employment
1	1,199	0	1,410	0
2	642	18	1,038	618
3	530	39	361	247
4	508	178	512	186
5	611	925	935	1,035
6	2,319	2,664	2,832	2,707
7	1,117	554	937	422
8	942	411	957	426
9	513	139	585	536
10	1,166	288	1,022	293
11	1,986	600	1,955	343
12	240	289	195	1,318
13	173	92	115	513
14	1,824	373	2,059	801
15	257	9	415	9
16	165	8	165	83
17	387	40	401	452
18	599	0	705	0
19	385	36	623	37
20	771	27	1,245	28
21	1,113	0	1,535	0
Totals	17,447	6,690	19,989	9,954

The resulting projections of population and employment shown in Table 10 allow wastewater flows to be projected for the two future conditions.

Some anomalies are noticeable for several basins between the 2025 Projections and the Build-Out Projections. The population and employment data should be reviewed as part of the Comprehensive Sanitary Sewer Plan Update during 2008. Revisions may then be made to selected basins, which may produce some revisions in the wastewater flows generated.

4 WASTEWATER FLOWS

4.1 Historic Wastewater Flows

As was noted above, all wastewater from the City sewer system passes through the Marina Pump Station to reach the Karcher Creek Wastewater Treatment Facility. Flow at the pump station is metered. Wastewater flow for Port Orchard is seasonal, as it is for most western Washington communities. Late summer from July through September is usually quite dry and flows are minimal. Early winter brings significant rainstorms and wastewater flow rises accordingly.

Review of metered wastewater flow over several recent years allows four flow parameter to be identified that are useful in projecting future flow conditions:

- The total annual flow defines the average daily flow.
- Summer minimal flows defines the approximate sewage component
- Winter flows during periods without significant rain, less the summer minimum, defines the infiltration component
- Winter flow during or following a significant rainstorm defines the rain-induced infiltration inflow component

Selected City flow records for the Marina Pump Station are summarized in Table 11.

Table 11
Marina Pump Station Flow Summary
Monthly Average Flow in Millions of Gallons per Day

Month	2007	2006	2005	2004
July	0.680	0.658	0.657	na
August	0.654	0.633	0.643	0.675
September	na	0.641	0.651	0.683
Average	0.667	0.644	0.650	0.679
January	0.902	1.266	0.843	1.037
February	0.742	0.849	0.728	0.794
November	na	1.128	0.792	0.722
December	na	1.001	0.991	0.856
Average	0.822	1.061	0.839	0.852
Maximum Day	2 Jan @ 1.964	14 Dec @ 3.367	18 Jan @ 1.754	10 Dec @ 2.075
Rain inches	na	2.41	1.50	2.15

Note: Flow data are not available for some months, and other months are incomplete.

The early December 2007 storm event was likely an abnormal occurrence. The maximum daily flow was recorded on 4 December 2007 was 4.34 MGD, which is within the existing station capacity of 3,700 GPM as discussed in Section 2.2. Average daily flows over entire years for the City sewer system are computed as shown in Table 12 for the calendar years 2004, 2005, and 2006 from City records for the Marina Pump Station.

Table 12
Annual Average Daily Flow in MGD

Month	2006	2005	2004
Jan	1.266	0.843	1.037
Feb	0.849	0.728	0.794
Mar	0.744	0.766	0.758
Apr	0.702	0.796	0.687
May	0.692	0.726	0.714
Jun	0.684	0.695	0.700
Jul	0.658	0.657	0.000
Aug	0.633	0.643	0.675
Sep	0.641	0.651	0.683
Oct	0.644	0.681	0.000
Nov	1.128	0.792	0.722
Dec	1.001	0.991	0.856
Total	9.642	8.969	7.626
Average	**0.804**	**0.747**	**0.763**

As shown in Table 12, the 2006 calendar year included three months with flows averaging more than 1.000 MGD. These high months may have been unusual due to severe rainstorms such as the event on December 14th when 2.41 inches of precipitation was recorded. These severe events form the benchmarks to gage the capacity of the sewer system. No overflow occurred during that event any where in the City sewer system – meaning, the sewer system has adequate capacity to accommodate such peak storm events.

4.2 Existing Unit Flows

Annual average daily flows as shown in Table 12 divided by the number of ERU described in Section 3.1 for the referenced year, including McCormick Woods, provides the unit flow in gallons per day per ERU. These computations are summarized in Table 13.

Table 13
Average Day Flow per ERU

	2006	2005	2004
Annual Average Day Gallons	804,000	747,000	763,000
ERU	5,036	4,935	4,830
Gallons per ERU	160	151	158

Table 13 indicates that on an annual average day basis, each equivalent residential unit connected to the City sewer system contributes about 160 gallons. At the City housing rate of

2.4 persons per household, the historic per capita wastewater generation rate has been about 67 GPD per person, which is similar to other communities in the Puget Sound area.

Wastewater flow per employee is a more difficult value to derive. Commercial flow varies widely. Retail stores may generate little wastewater. Food establishments and some industries may generate high flows per employee. Even establishing the number of employees within city limits poses challenges. Puget Sound Regional Council has employment data; however the basis of PSRC data collection changed between 2004 and 2005, which resulted in significantly different employment numbers. This is the best employment data available and does provide a basis for estimating the average wastewater flow generated as summarized in Table 14 based on 160 GPD per ERU divided by the Employees per ERU for the relevant year.

Table 14
Wastewater Flow per Employee

Year	Employment	Commercial ERU	Employees per ERU	GPD per Employee
2006	4,778	1,377	3.5	45.7
2005	4,873	1,308	3.7	43.2
2004	2,108	1,290	1.6	100.0
2003	1,910	1,224	1.6	100.0

The data for 2005 and 2006 appears to be the most complete in terms of an accurate estimate of employment connected to City sewers. An average day wastewater flow of 45 GPD per employee is believed to be similar to the experience of other Puget Sound jurisdictions and will be used for this analysis.

4.3 Peaking Factors

Comparison of the maximum day events recorded in recent years defines the peak day factors experienced by the City sewer system. These comparisons are summarized in Table 15.

Table 15
Historic Peak Day Factor for City Sewer System

Peaking Elements	2006	2005	2004
Peak Day of Year in MGD	3.367	1.754	2.075
Average Day of Year in MGD	0.804	0.747	0.763
Peak Day Factor	4.2	2.3	2.7

Available data is not sufficient to establish the peak hour flow for the City sewer system. The peak hour factor needs to recognize that the storm hydrograph as it moves through the sewer system may coincide with the diurnal peak for the day. Accordingly, the peak hour factor for the City sewer system is estimated at 5 multiplied by the average day flow. For the year 2006, the peak hour flow is estimated to have been about 5 x 0.804 MGD = 4.2 MGD. This rate is within the existing capacity of the Marina Pump Station as discussed with Table 2. Since the station

was able to accommodate the 14 December 2006 event without an overflow, this peaking factor is believed to be appropriate.

4.4 Projected Wastewater Flows

Wastewater flows are projected to future conditions to identify the sewerage facilities needed to accommodate residential and commercial developments based on the land uses established by current zoning for the urban growth area tributary to the City sewer system.

Build-out conditions were projected first to establish the maximum capacities needed as summarized in Table 16 assuming future unit flows are similar to those recorded in the past based on the basin delineation shown in Figure 9.

Table 16
Projected Build-Out Wastewater Flow in Trunk Conveyance Facilities

Trunk Facility	Contributing Basins	Avg. Day GPD	Peak Factor	Peak Hour Flow Build-Out Capacity Needed
A	4	43,000	5.0	0.213 MGD
B	5	109,000	5.0	0.546 MGD
Coast to Coast	4 & 5	152,000	5.0	0.759 MGD & 633 GPM
C-east	6 & Coast PS	463,000	5.0	2.317 MGD
C-west	D & F	1,194,000	4.5	5.375 MGD
D	8 + E & H	1,113,000	4.5	5.007 MGD
Marina PS	C-east & west	1,658,000	4.5	7.460 MGD & 6,217 GPM
Bravo Terrace	14-S	23,000	5.0	0.115 MGD & 96 GPM
E	11, 13, & 14-N + Bravo & Albertson	351,000	4.5	1.903 MGD
F	10	82,000	5.0	0.408 MGD
G	3 & 13	108,000	3.0	0.327 MGD
Albertson PS	3 & 13	108,000	3.0	0.323 MGD & 269 GPM
H	7 + McCormick PS 1	678,000	4.5	3.052 MGD
McCormick 1	I	597,000	4.5	2.684 MGD & 2,237 GPM
Ridge PS	16	15,000	5.0	0.074 MGD & 62 GPM
I	2, 9, 15 + Ridge & McCormick 2	597,000	4.5	2.684 MGD
McCormick 2	J & K	420,000	5.0	2.099 MGD & 1,749 GPM
J	1, 17, & 18	189,000	5.0	0.945 MGD
K	19, 20, & 21	231000	5.0	1.155 MGD

Future peaking factors may decline from the historic factors identified in Table 15 and used in Table 16. Some decline can be expected simply as sewer systems increase in size and the local peaks become averaged with the broader system. New constriction is anticipated to allow less infiltration and inflow to enter the sewers, which is a major contributor to peak flows. Some rehabilitation of existing sewers will also occur, which should at least allow the existing sewers to maintain the historic peaking factors and may reduce these factors somewhat. Accordingly, a

peak factor of 5 multiplied by average day flow is believed appropriate for extremities of the system. This factor will decrease to about 4.5 as more trunks are combined. Commercial areas will be an exception since their peaking factors are normally much smaller and a factor of 3 is believed appropriate.

Conditions were then projected for 2025 to establish the facilities needed in a more immediate timeframe as summarized in Table 17.

Table 17
Projected 2025 Wastewater Flow in Trunk Conveyance Facilities

Trunk Facility	Contributing Basins	Avg. Day GPD	Peak Factor	Peak Hour Flow
A	4	42,000	5.0	0.210 MGD
B	5	83,000	5.0	0.413 MGD
Coast to Coast	4 & 5	125,000	5.0	0.623 MGD & 519 GPM
C-east	6 & Coast PS	395,000	5.0	1.976 MGD
C-west	D & F	1,070,000	4.5	4.816 MGD
D	8 + E & H	979	4.5	4.406 MGD
Marina PS	C-east & west	1,465,000	4.5	MGD & GPM
Bravo Terrace	14-S	10,000	5.0	0.052 MGD & 43 GPM
E	11, 13, & 14-N + Bravo & Albertson	381,000	4.5	1.715 MGD
F	10	91,000	5.0	0.455 MGD
G	3 & 13	66,000	3.0	0.199 MGD
Albertson PS	3 & 13	66,000	3.0	0.199 MGD & 166 GPM
H	7 + McCormick PS 1	516,000	4.5	2.323 MGD
McCormick 1	I	417,000	4.5	1.874 MGD & 1,562 GPM
Ridge PS	16	11,000	5.0	0.057 MGD & 48 GPM
I	2, 9, 15 + Ridge & McCormick 2	417,000	4.5	2.083 MGD
McCormick 2	J & K	303,000	5.0	1.515 MGD & 1,263 GPM
J	1, 17, & 18	148,000	5.0	0.741 MGD
K	19, 20, & 21	155,000	5.0	0.774 MGD

The projected peak hour flows shown in Tables 16 and 17 allow the existing conveyance facilities to be evaluated for adequate capacities to accommodate future flow conditions.

Average day flow in 2025 is projected from the population projection shown in Table 10 at 67 GPD per capita, plus the projected employment at 45 GPD per employee. The 2025 average day flow projection is 1.47 MGD, which is about 83 percent above the average day flow recorded at the Marina Pump Station for 2006 as shown in Table 12. Further evaluation during updating of the Sewer Plan during 2008 may determine that the unit flows are too large, and reduce the total.

The projected annual average day flow for the Build-Out Projection shown in Table 10 is about 1.79 MGD, which is about 22 percent above the 2025 projected average day flow.

5 CONVEYANCE SYSTEM

5.1 Conveyance Facilities Required for Build-Out

Build-out conditions were projected first to establish the maximum capacities needed in the various trunk sewer components as summarized in Table 18.

Table 18
Projected Trunk Capacities Needed for Build-Out Conditions

Trunk	Existing System Capacity			Build-Out Capacity Needed		
	Diameter	Slope %	MGD	Peak MGD	Slope	Diameter
A	12	0.2239	1.05	0.213	Adequate	
B	10	0.80	1.25	0.546	Adequate	
C-east	18	0.155	2.6	2.317	Adequate	
C-west	24	0.092	4.3	5.375	0.092	27
D-old	12	0.90	2.2			
D-new	12	1.68	2.9	5.007	Adequate	
E	10	0.37	0.83	1.903	0.37	15
F	18	0.155	2.6	0.408	Adequate	
G	10	0.26	0.72	0.327	Adequate	
H	8	0.69	0.65	3.052	0.69	15
I	15	0.067	1.05	2.684	0.35	15
J	15	1.20	4.5	0.945	Adequate	
K	10	0.30	0.77	1.155	0.30	12

Capacity needed for build-out conditions at the principal pump stations in the City sewer system are summarized in Table 19.

Table 19
Projected Pump Station Capacities Needed for Built-Out Conditions

Station	Existing GPM	Required GPM	Station Adequacy	Existing Force Main - inches	Force Main Needed - inches
Coast to Coast	515	633	no	none	lift into trunk
Bravo Terrace	180	96	ok	6	Adequate
Albertson	176	269	no	6	Adequate
Ridge	200	46	ok	6	Adequate
McCormick 1	1,000	2,237	no	16	Adequate
McCormick 2	1,000	1,749	no	16	Adequate
Marina	3,500	6,217	no	15	Adequate

Force mains shown in Table 19 may be adequate with velocities less than 8 feet per second at the Build-Out peak pumping rate. The resulting dynamic head loss and power requirements to use the existing force mains may warrant some replacements though.

5.2 Conveyance Facilities Required for 2025

Table 19 also indicates that several pump stations will need additional capacity under projected Build-Out conditions. Conditions were then projected for 2025 to establish the facilities needed in a more immediate timeframe as shown in Table 20.

Table 20
Projected Facility Capacities Needed for 2025 Conditions

Facilities Exceeded at Build-Out		Pipe Capacity Available/Required in MGD			
Trunks	**Improvement**	**Existing**	**Build-Out**	**2025**	**Upgrade Needed**
C-west	1	4.3	5.375	4.816	Yes
E	2	0.83	1.903	1.715	Yes
H	3	0.65	3.052	2.323	Yes
I	4	1.05	2.684	2.083	Yes
K	----	0.77	1.155	0.774	No
Pump Stations		**Pumping Capacity Required in GPM**			
Coast to Coast	----	515	633	519	No
Albertson	----	176	269	166	No
McCormick 1	5	1,000	2,237	1,562	Yes
McCormick 2	6	1,000	1,749	1,263	Yes
Marina	7	3,500	6,217	5,495	Yes

Table 20 indicates that under the current routing of wastewater flows, Trunks C-west, E, H, and I plus the three larger pump stations will needed to be upgraded before 2025.

5.3 Conveyance Improvement Priorities

The magnitude of difference between 'Existing Capacity' and 'Capacity Required in 2025' is an approximate indicator of the urgency when these existing conveyance upgrades will needed. The indicated priorities are approximately as follows:

1. Trunk H at 3.6 x existing
2. Trunk E at 2.5 x existing
3. Trunk I at 2.0 x existing
4. McCormick 1 at 1.6 x existing
5. Marina PS at 1.6 x existing
6. McCormick 2 at 1.3 x existing
7. Trunk C-west at 1.1 x existing

5.4 Proposed Trunk Sewer Alignments

Three of the four trunk alignments indicated in Table 20 as needing to be upgraded before the year 2025, can be addressed as summarized below, and Trunk I may not require attention:

- Trunk C-west extends east in Bay Street from Port Orchard Boulevard to Marina Pump Station. The added hydraulic capacity can probably be achieved most cost-effectively

though pipe bursting the existing 24-inch pipe to become 27-inch diameter and reconnecting the sewer services along this alignment.

- Trunk E extends south from the Port Orchard Boulevard intersection with Tremont Street up the creek and wetlands to Pottery Avenue and thence south to Fireweed Street. The wetlands make reconstruction by any method along the existing alignment questionable as to obtaining environmental permits. A more realistic approach to adding capacity may be to construct a new pump station on Pottery Avenue at Lippert Drive with the force main extending north in Pottery Avenue to join Trunk H in Tremont Avenue.

- Trunk H extends west in Tremont Street from Port Orchard Boulevard under SR 16 to McCormick Woods Pump Station 1 and thence as Trunk I up Old Clifton Road to McCormick Woods Pump Station 2. Two alternative approaches seem to warrant consideration for adding capacity along this alignment:

  A. One alternative is simply the reconstruct the pipes and pump stations as presently aligned to provide the capacities shown in Tables 18 and 19.

  B. Alternatively, McCormick Woods Pump Station 2 can be reconstructed to direct flow to a new satellite treatment facility reclaiming Class A water to be reused for irrigation of the McCormick Woods Golf Course. Treatment could be provided through a membrane bioreactor (MBR) treatment facility. A subsurface irrigation system can be used which should be functional year-round. Sludge from the MBR can be discharge through the existing Trunk I to the McCormick Woods Pump Station 1 and through the rest of the City sewer system to the Karcher Creek Treatment Facility.

The Alternative B approach for Trunk H/I capacity would remove about 2.0 MGD of peak hour flow from the rest of the City sewer system. That exclusion would remove the need to add capacity to Trunk C-west and would reduce the Build-Out capacity needed at the Marina Pump Station to about 4,800 GPM, which possibly can be accommodated within the existing station structure.

Washington State now requires reuse of wastewater be considered in all general sewer plans. However, implementation of an MBR treatment facility would be a major change in the operation of the City sewer utility. The technology is well-proven; however, there are a number of issues to be resolved besides just the capital cost comparisons. Some of these are outlined below:

- Acceptance of reclaimed water at the golf course
- Rate structure to pay the cost of operating the MBR facility
- Revisions to the City agreement with the Sewer District regarding wastewater treatment capacity and operations

These are issues that can be resolved during the next calendar year when the Comprehensive Sanitary Sewer Plan is updated.

6 RECOMMENDED IMPROVEMENTS

6.1 Opinion for Six-Year Capital Improvement Program

Section 5.3 indicates that three sewer trunks will need at least double the existing capacity before the year 2025. Some of these improvements should be addressed in the six-year capital improvement program (CIP) by about the year 2013.

These CIP decisions necessarily mean decisions should also be made regarding construction of an MBR treatment and reuse facility for McCormick Woods. The treatment capacity is based on the average day during the maximum month of the design year, which is usually about 1.3 multiplied by the annual average day. This would be about 400,000 GPD for the average day of the maximum month during 2025, based on about 1.3 x the projected average day flow from McCormick Woods Pump Station 2. Capacity would need to be expanded at build-out to about 550,000 GPD. Treatment capacity can be provided in modular units bought and installed as flows increase, although the structure with associated piping for build-out capacity should be included in the initial construction. The estimated project cost for the treatment and reuse system maybe be about $ 6,000,000.

Construction of the MBR facility would mean no improvements would be need to Trunk C-west or to Trunk I, or to the McCormick Woods Pump Station 1. If so, the 2025 capacity needed for the Marina Pump Station would be about 4,440 GPM, which is about the existing capacity. These facilities may have a project cost of about $ 4,000,000. However, in addition to the direct comparison of project costs, several other considerations deserve attention:

- Irrigation of the golf course currently uses water from a well that could become a potable water source, which has a significant dollar value.
- Below market interest rate loans or even grants may be available to implement water reuse facilities, so the funding availability would affect the life cycle cost comparison.
- At some point, additional treatment capacity would be required at the Karcher Creek treatment facility in lieu of the MBR at McCormick Woods.
- The ‘green’ image created through water reuse at the golf course has some value to the City of Port Orchard, and some environmental value in reducing discharge of secondary effluent into Sinclair Inlet, which may help relations with Tribes and other groups.

Besides updating the Comprehensive Sanitary Sewer Plan in accordance with WAC 173-240-050, a facilities plan in accordance with the State Revolving Fund (SRF) checklist will be required to develop the preliminary design for the McCormick Woods MBR treatment facility and the Class A water reuse system. An expanded SEPA Checklist may provide adequate environmental review for these projects.

Some additional property rights will be needed for the Pottery Pump Station, the McCormick MBR facility, and the McCormick irrigation site within the privately owned golf course. The actual sites for these facilities have not been established. Specific locations will affect facilities like force main lengths and pumping horsepower required, so only opinions are currently available.

Subject to the above assumptions, Table 21 summarizes the projects that appear to require construction before 2025.

Table 21
Potential Capital Improvement Program

Project	Improvement	Description	Opinion of Construction Cost	Opinion of Project Cost
1	Sewer Plan	WAC 173-240-050	$ none	$ 80,000
2	Facilities Plan	for MBR plant	none	120,000
3	Trunk H	2,400 LF x 15-in	500,000	600,000
4	Trunk E: Pottery PS	1,400 GPM x 50 HP	400,000	600,000
	Force Main	2,500 LF x 12-in	300,000	400,000
5	McCormick 2 PS	1,270 GPM x 50 HP	300,000	400,000
6	McCormick MBR	0.4 MGD w/o sludge	3,000,000	4,000,000
7	Irrigation System	60,000 LF x 1-in	1,500,000	2,000,000
8	I/I Exist Pipe Rehab	$ 25,000 annually	---------	150,000
9	Exist PS Upgrades	two pump stations	---------	150,000
	Estimated Total	----------	$ 6,000,000	$ 10,000,000

Our opinion of construction costs as shown in Table 21 are based on recent construction bids in the Puget Sound area for similar work, including state sales tax and contingencies for 2007 prices. However, the facilities described are only developed in a cursory manner and may change when more detailed engineering is performed.

Our opinion of project costs include engineering design, construction oversight, property acquisitions, permit applications, environmental review, and project contingencies. These costs will be revised as the project specific requirements become better defined. Financing costs are not included as these costs depend on the financing program actually adopted.

The six-year CIP should include at least Projects 1, 2, 3, and 4 plus Project 8, which may total about $ 1,950,000 in project costs. However, more careful evaluation during preparation of the Comprehensive Sanitary Sewer Plan Update of the peak wastewater flow through the McCormick 1, McCormick 2, and Marina Pump Stations may indicate the MBR facility will need to be started before 2013 and should be included in the CIP.

6.2 Facilities Planned for 2025

Any facilities shown in Table 21 and not implemented under the six-year CIP as described in Section 6.1 will need to be completed before 2025. No additional capacity improvements beyond those listed should be needed to the trunk system or the pump stations.

Some maintenance and safety upgrades would still be required for several pump stations. Rehabilitation of the sewer collection and conveyance system would still be required to reduce infiltration and inflow.

6.3 Planed Facilities for Build-Out Conditions

Tables 18 and 19 indicate the capacities needed to accommodate projected peak hour wastewater flow under build-out conditions based on the urban growth area as presently defined and the established land use densities. Conveyance facilities to be built under the six-year CIP or other programs should adhere to these capacity requirements unless different requirements are established in future land use plans or development agreements.

6.4 Sewer Extension into Undeveloped Basins

New sewer extension will be needed to serve developments envisioned for several basins in and adjacent to McCormick Woods as shown on Figure 10 and outlined below:

- Basin 1 – DE-1 may require 2 pump stations in series to reach Trunk J
- Basin 2 – DE-2 will be pumped to Trunk I, though could be into Trunk K
- Basin 3 – DE-3 will be pumped to the Albertson PS
- Basin 10 – DE-10 will have gravity sewer north into Trunk F
- Basin 17 – DE-17 will require 2 separate pump station systems to reach Trunk J

Major land developers will be preparing site-specific plans for street layouts, residential lot distribution, commercial parcels, sensitive area delineations, required setbacks with buffers, and other land use decisions for approval by the permitting authorities. These land use decisions, and the timing of when specific parcels are developed will influence the sewer collection facilities within these basins. Some basins may use traditional gravity sewers, perhaps supplemented by one or more local pump stations, as has been the case for Basins 15 and 16. Other basins may consider alternative, innovative collection systems such as E-1 grinder pumps for individual homes, or vacuum sewer systems. The City of Port Orchard has decided that no additional STEP units will be allowed. Any of these sewer collection technologies can be compatible with an MBR treatment facility and reuse of the water.

Basin 10 presents a different development challenge, and for the extension of sewers. Trunk F currently extends about 2,500 feet west in Bay Street from Port Orchard Boulevard. This sewer can be extended further by using a pump station. However, most of the properties fronting Bay Street have steep slopes and may not be suitable for development. More suitable sites exist on the plateau about 200 feet above sea level. These parcels are separated by the Ross Creek gorge from other developments with sewer service west of Pottery Avenue. Either an additional pump station will be needed for the plateau to transfer wastewater into Basin 7, or a sewer can be laid down the steep slope west of Ross Creek to connect into Trunk F. These decisions need to be made in association with the interests of the property owners some time before 2025, and may or may not involve participation by the City for over-sizing or late-comer financing.

Some coordination Between the City and the Karcher Creek Sewer District will be required as properties are developed along the fringes of their two sewer service areas to establish which agency will serve which properties. These sewer extensions are not expected to require financial investment by the City.

6.5 Wastewater Funding Options

The City of Port Orchard faces a challenge over the next 20-years in the funding of major wastewater collection systems. Existing funding mechanisms for wastewater improvements are limited, but many opportunities are available or can be made available. Table 22 summarizes a number of these existing opportunities and includes a description, maximum possible funding, requirements for voter approval, whether they are currently utilized and any specific issues with their usage. Implementation of these strategies could raise the additional revenue needed.

Table 22
Wastewater Funding Options

Funding Option	Description	Maximum Funding (over 20 years)*	Voter Approval Required?	Currently Utilized?	Usage Issues
EXISTING REVENUES					
Water-Sewer Operating Fund	Rates for use of the sewer system to pay for maintenance, operation and capital expenses.	Sewer Rates by class	No	Yes	Funds are collected from customers to operate the system.
Cumulative Reserve Fund for Water-Sewer	General Facility Fee - Charges are based upon Equivalent Residential Units (ERUs). Residential households are equivalent to one ERU.	Current Fees $2770	No	Yes	Funds are collected from new users to mitigate impact of new demands on the sewer system.
Cumulative Reserve Fund for Water-Sewer	Wastewater Treatment Facility Fee - Charges are based upon Equivalent Residential Units (ERUs). Residential households are equivalent to one ERU.	Current Fees $3230	No	Yes	Funds are collected from new users to help pay the debt for facility expansion and to mitigate impact of future facility construction costs.

Funding Option	Description	Maximum Funding (over 20 years)*	Voter Approval Required?	Currently Utilized?	Usage Issues
Increase Connection Fees	See Cumulative Reserve Fund for Water-Sewer	Current Fees- $2770 $3230	No	Yes	Revenue from connection fees is typically utilized for providing capital projects.
Joint Wastewater Treatment Facility	West Sound Utility District and the City of Port Orchard jointly pay based on contributing ERUs towards the maintenance and operation of the facility.	Current ERU Rate $18.50	No	Yes	**Each entity collects its own sewer service revenues and then pays the facility the agreed rate per ERUs.**
Developer Extensions	Extension and improvements to the wastewater conveyance system would be bourne upon developments.	Dependent on specific project costs and expenses	No	Yes	May have agreement to reimburse developer directly from connection fees. May use agreement to collect additional fees from subsequent users and reimburse the developer within 15 years.

* Funding are gross estimates in 2007 Dollars.

Funding Option	Description	Maximum Funding (over 20 years)*	Voter Approval Required?	Currently Utilized?	Usage Issues
OTHER FUNDING MECHANISMS					
Real Estate Excise Tax (REET)	Dedicate some portion of future funding from this revenue stream to WW projects.	$1M - $2M	No	No	REET funding is currently used for a portion of City Hall debt, land acquisition and some facility projects.
General Obligation Bonds (Non-Voted)	Non-voted debt is pledged by the full faith, credit and resources of the government and paid by general revenues	Limitation of indebtedness 1.5% of assessed value – currently 10,010,007	No	No	Uses are for capital purposes and maintenance and operation.
General Obligation Bonds (Voted)	Voted debt is paid from annual levies in excess of property tax limitations.	2.5% of assessed value for utility debt limitations – currently 20,358,344	Yes	No	Uses are for capital purposes and maintenance and operation.
Revenue Bonds	Payment is made exclusively from revenues or fees	Affordability within rate structure	No	No	Provides for costs of acquisition, construction, improvement, maintenance, repair or operation.

Funding Option	Description	Maximum Funding (over 20 years)*	Voter Approval Required?	Currently Utilized?	Usage Issues
Local Improvement District (LID)	The maximum amount of a LID, not to exceed total cost of the improvement, with funding coming from assessments on properties within the benefited district.	Dependent on specific project costs and expenses	No	No	All property included within the district shall specially benefit by the local improvement.
Utility Local Improvement District (ULID)	The maximum amount of an ULID, not to exceed total cost of the improvement, with funding coming from assessments on properties within the specified district.	Dependent on specific project costs and expenses	No	No	All property included within the district shall specially benefit by the utility local improvement.

Funding Option	Description	Maximum Funding (over 20 years)*	Voter Approval Required?	Currently Utilized?	Usage Issues
Federal Grants	Grant funding from the federal government. Programs include: • USDA Water & Waste Disposal Grant • USEDA Public Works Construction Grant • HUD Brownfields Economic Development Initiative (BEDI)	Average community grant eligibility is roughly $600,000 per project, with limit typically $1M per project	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: • Centennial Clean Water Fund (CCWF) • Public Works Trust Fund • Clean Water Revolving Fund (SRF)	CCWF – Limit $5M per project, 0-100% Grant. SRF – Loan limit 50% of Fund to any one Applicant. FY2008 program is $45.2M.	No	No	Many are competitive with many jurisdictions seeking the same funding. Grants are comparatively small, and programs are primarily low interest rate loans. Greater Hardship results in lower interest rate or lower matching funds requirement.

City of Port Orchard
WASHINGTON

Comprehensive Sanitary Sewer Plan Update

GMA Compliance Technical Memorandum

Legend

- City of Port Orchard
- Port Orchard UGA
- Unincorporated Urban Growth Area
- City of Bremerton
- Water Bodies
- Rivers & Streams
- Roads

0 2,500 5,000 10,000 Feet

N

Data Sources: Kitsap County
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.

MAP DATE: DECEMBER 13 2007

Port Orchard Vicinity Map

Figure 1

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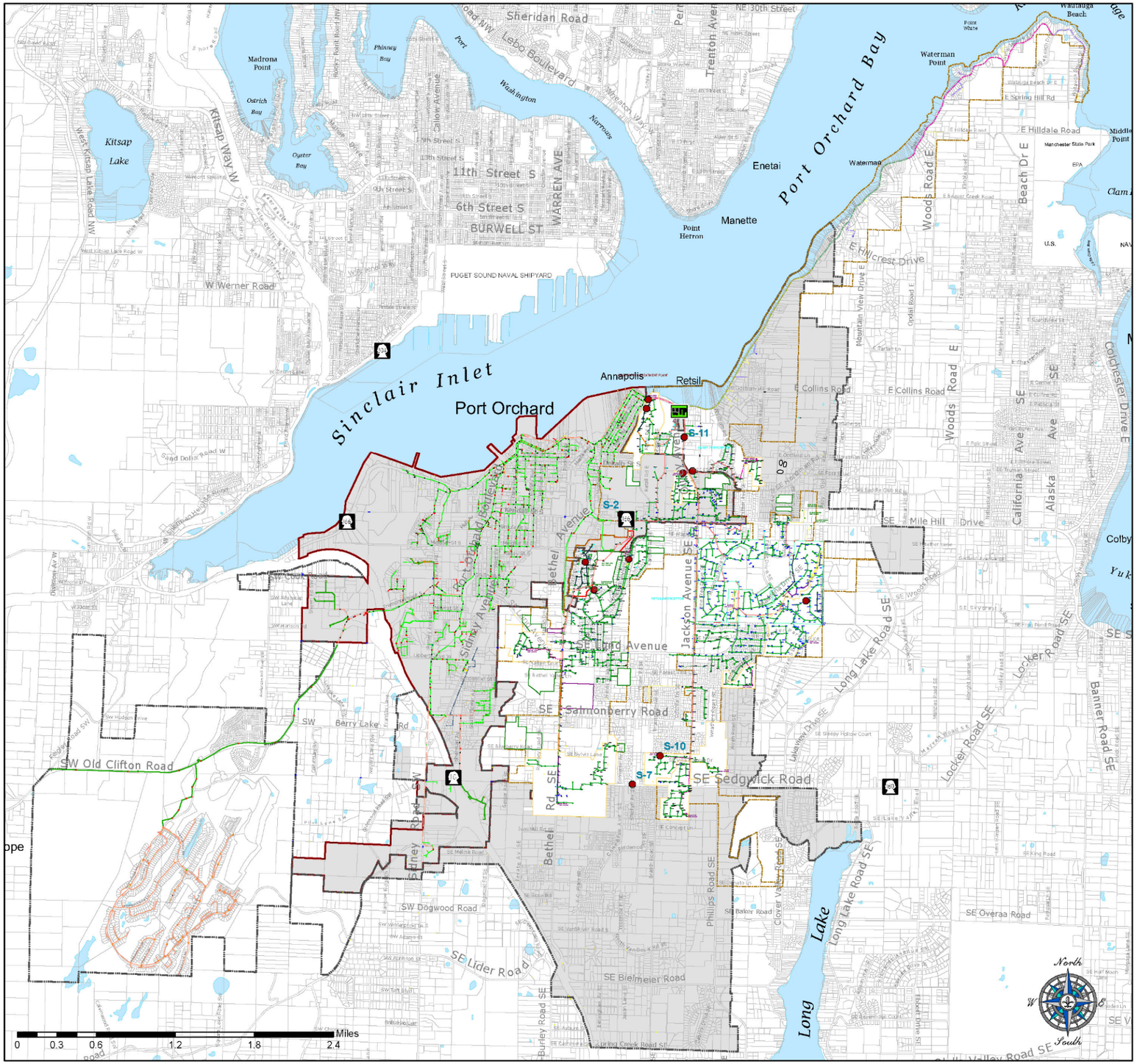
Port Orchard Urban Growth Area



Kitsap County Department of Community Development
614 Division Street, MS-36, Port Orchard, Washington 98366
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- Joint Wastewater Treatment Facility
- Karcher Creek CIP Projects
- Karcher Creek District Boundary
- Unincorporated Urban Growth Area
- Incorporated City
- Karcher Creek Mains to Repair
- Tax Parcels
- Bay, estuary, Puget Sound
- Lake, Pond, Reservoir, Gravel pit or quarry filled with water
- Port Orchard UGA Expansion Area

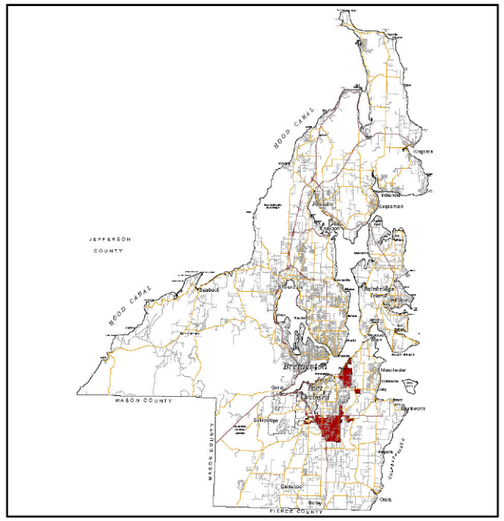
This map was created from existing map sources, not from field surveys. While great care was taken in using the most current map sources available, no warranties of any sort, including accuracy, fitness, or merchantability accompany this product. The user of this map assumes responsibility for determining its suitability for its intended use.

* THIS MAP IS NOT A SUBSTITUTE FOR FIELD SURVEY *

DRAFT

Sewer Data provided by Kitsap County Information Services/GIS in collaboration with Karcher Creek Sewer District and the City of Port Orchard

Map Date: September 2007



City of Port Orchard
WASHINGTON

Data Sources: Kitsap County
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.

MAP DATE: DECEMBER 13 2007

Port Orchard Urban Growth Area

Figure 2

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PORT ORCHARD URBAN GROWTH AREA

KITSAP COUNTY, WASHINGTON

Zoning

Expansion Areas per 10-Year Update

Effective February 15, 1999
Amended June 11, 2007

DRAFT

City of Port Orchard
WASHINGTON

Figure 3

Industrial
Highway/Tourist Commercial (10-30 DU/Ac)
Mixed Use (10-30 DU/Ac)
Urban Restricted (1-5 DU/Ac)
Urban Low Residential (4-9 DU/Ac)
State Highway
Arterial
Collector
Rail
Unincorporated Urban Growth Area
Incorporated City
Urban Growth Area pre 10-Year update
Ownership Tax Parcels

0 0.125 0.25 0.5 0.75 1 Miles

KITSAP COUNTY COMPREHENSIVE PLANNING MAP SERIES

This map represents the Zoning Map adopted with Kitsap County's Comprehensive Plan as approved by the Kitsap County Board of Commissioners on May 7, 1998.

This map is effective as of June 11, 2007 superceding previous zoning maps.

The zone designations are defined in the text of Kitsap County Ordinance No. 216-1998 (Zoning Ordinance) which is available from the Department of Community Development.

NOTE:
This map was developed for general land use planning purposes. The user of this map must assume responsibility for determining its suitability for other purposes.

Amendments:
February 8, 1999 Forest Resource Lands
April 19, 1999 Suquamish Rural Village
May 10, 1999 Modified Joint Planning Areas
July 21, 1999 Port Gamble Rural Historic Town
June 10, 2002 Manchester Community Plan
June 10, 2002 Ord No. 274-2002 Comprehensive Plan/Zoning Amendments
September 8, 2003 Res No. 168-2003 (Map Corrections)
December 8, 2003 Ord No. 311-2003 Comprehensive Plan/Zoning Amendments
October 25, 2004 George's Corner Commercial LAMIRD
October 25, 2004 Ord No. 326-2004 Comprehensive Plan/Zoning Amendments
December 22, 2005 Ord No. 352-2005 Comprehensive Plan/Zoning Amendments
December 11, 2006 Ord No. 370-2006 10-Year Update
June 11, 2007 Ord No. 384-2007 Repeal of Urban Holding Zone (UHA)

Map Date: June, 2007

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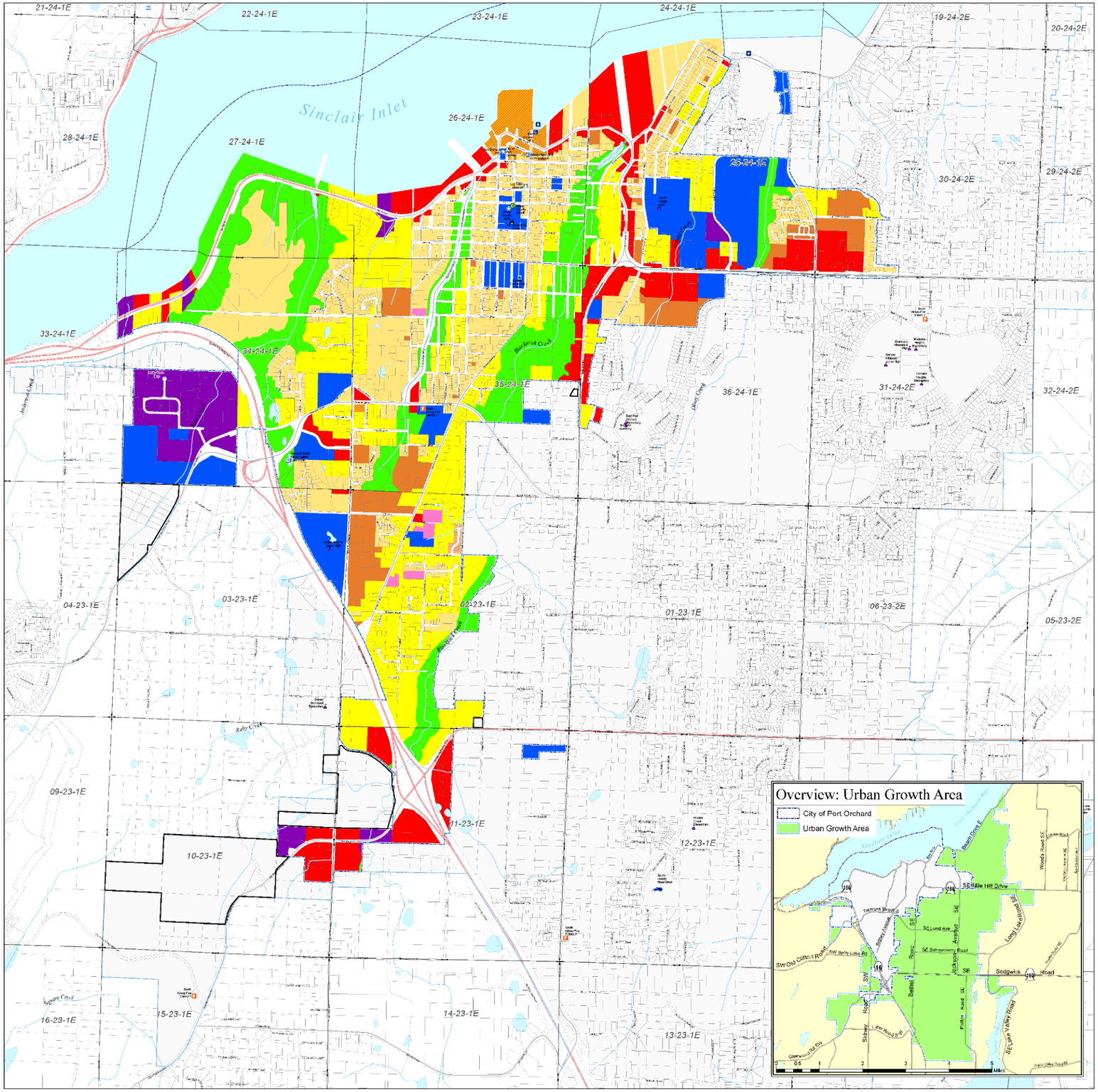


Legend

- City of Port Orchard
- Urban Growth Area
- Real Property Tax Accounts
- Future Annexations
- Streams
- Lakes

Public Land Survey System

- Section Corner
- East/West Section Monument
- North/South Section Monument
- Sections

Law Enforcement

- Police Departments
- Kitsap County Corrections Center
- Kitsap County Sheriff
- WA State Patrol

Fire Station Facilities

- Staffed Fire Station
- Volunteer Fire Station

Zoning

- Residential Mobile Home Park
- Residential 4.5 Units/Useable Acre
- Residential 8.0 Units/Useable Acre
- Residential 12.0 Units/Useable Acre
- Residential 20.0 Units/Useable Acre
- Commercial- Retail/Office
- Mixed Use District
- Employment- Industrial/Office
- Community Facilities
- Greenbelt Including Openspace/Conservation

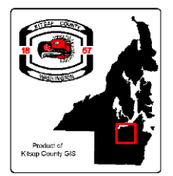
Community Facilities

- Schools
- County Road Shed
- Government
- Museum
- Public Library
- Community Center
- Senior Center
- Teen Center
- Fairgrounds
- Hospital
- Urgent Care Clinic
- Red Cross
- Solid Waste Disposal
- Ferry Terminal
- Sewage Treatment Plant

Map created for City of Port Orchard by:

Kitsap County Department of Information Services
Geographic Information System Division (GIS)
614 Division Street, MS-21 Port Orchard, Washington, 98366-4614
GIS Office: (360) 337-4782 Fax: (360) 337-4555
http://www.kitsapgov.com/gis

Data Sources:
City of Port Orchard
Kitsap County GIS
Zoning.mxd
Map Date: 07/2007



1:9,000

0 0.25 0.5 0.75 1 Miles

City of Port Orchard
WASHINGTON

Data Sources: Kitsap County
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MAP DATE: DECEMBER 13 2007

City of Port Orchard Zoning

Figure 4

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City of Port Orchard
WASHINGTON

Marina
Coast to Coast
Eaglecrest
Golden Pond
Canyon Ct
Tremont Place
McCormick Woods #1
Harrison Hospital
Cedar Heights
The Ridge
McCormick Woods #2
Bravo Terrace
Albertson

Legend

- Pump Stations
- Sewer Gravity Trunks
- Sewer Force Mains
- Sewer Pipes
- City of Port Orchard
- Port Orchard UGA
- Unincorporated Urban Growth Area
- Karcher Creek District Boundary
- City of Bremerton
- Parcels - Kitsap Co June 07
- Water Bodies
- Rivers & Streams
- Contours 5ft

1 inch equals 2,500 feet

0 1,000 2,000 4,000 Feet

Data Sources: Kitsap County
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.

MAP DATE: DECEMBER 13 2007

Existing Sewer System

Figure 5

P:\Mapping\Maps_Generated\Port_Orchard_0710096_PR\maps\Drafts_Nov30200715_ExistSewerSystem.mxd

South Kitsap UGA/ULID #6

County Proposed Land Use

Proposed Comprehensive Plan

- Mineral Resource (1 DU/20 Ac)
- Forest Resource Lands (1 DU/40 Ac)
- Interim Rural Forest (1 DU/20 Ac)
- Rural Protection (1 DU/10 Ac)
- Rural Residential (1 DU/5 Ac)
- Limited Areas of More Intense Development
- Urban Restricted (1-5 DU/Ac)
- Urban Low Residential (4-9 DU/Ac)
- Urban Medium Residential (10-18 DU/Ac)
- Urban High Residential (19-24 DU/Ac)
- Urban Reserve (1 DU/10 Ac)
- Urban Cluster Residential (4-9 DU/Ac)
- Village Center (5-18 DU/Ac)
- Commercial
- Industrial
- Urban Industrial Reserve
- Business Park
- Parks (P)
- Public Facilities
- Airport (A)
- Incorporated Cities

- Proposed ULID #6 Boundary
- Tax Parcels

Arterial Type

- State Highway
- Principal Arterial
- Major Arterial
- Major Collector
- Collectors
- Neighborhood Roads

November 20, 2003

Kitsap County Department of Community Development
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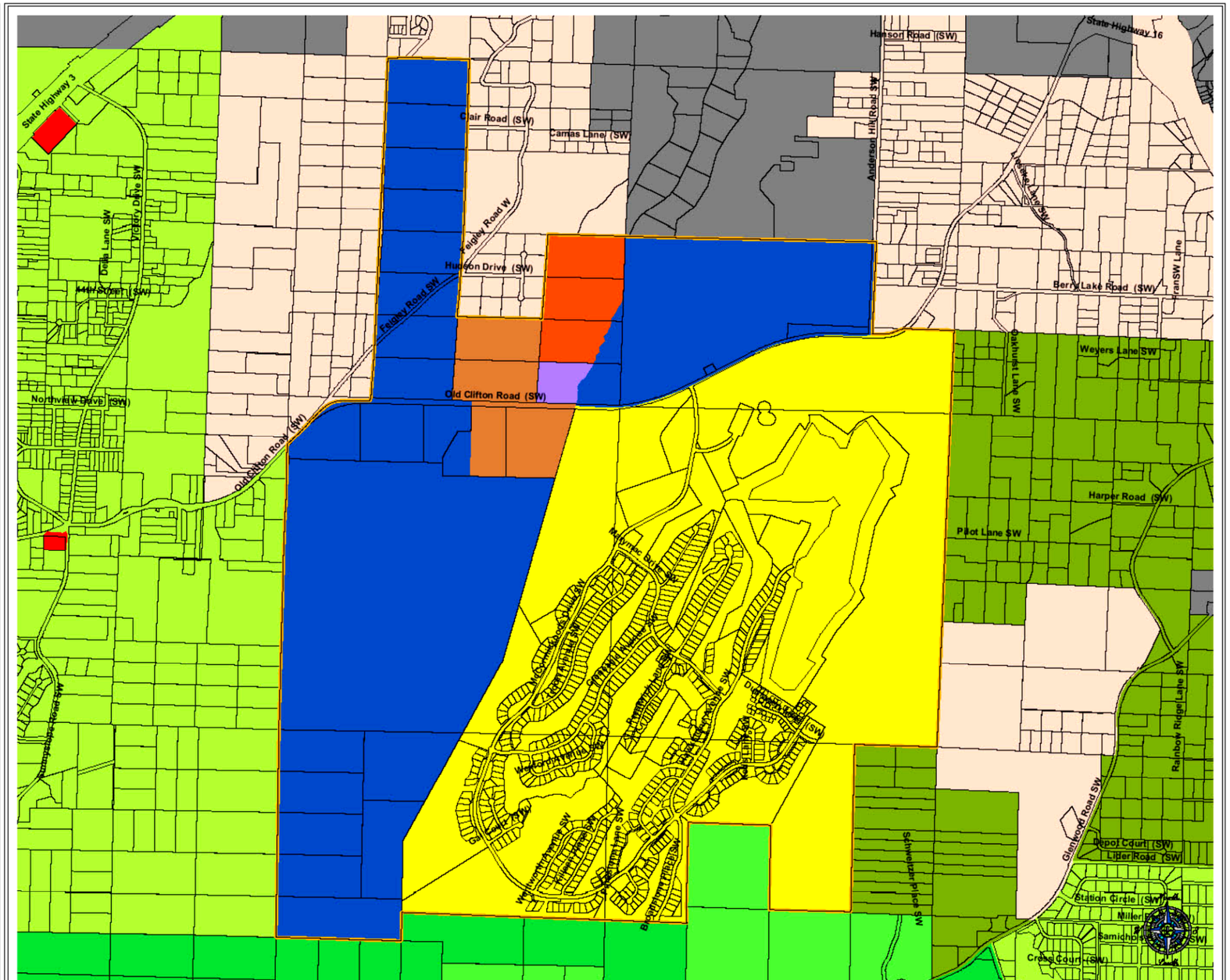
1,000 500 0 1,000 2,000 3,000 Feet



Data Sources: Kitsap County
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MAP DATE: DECEMBER 13 2007

City of Port Orchard
WASHINGTON

South Kitsap UGA/ULID #6 Sub-Area Plan

Figure 6

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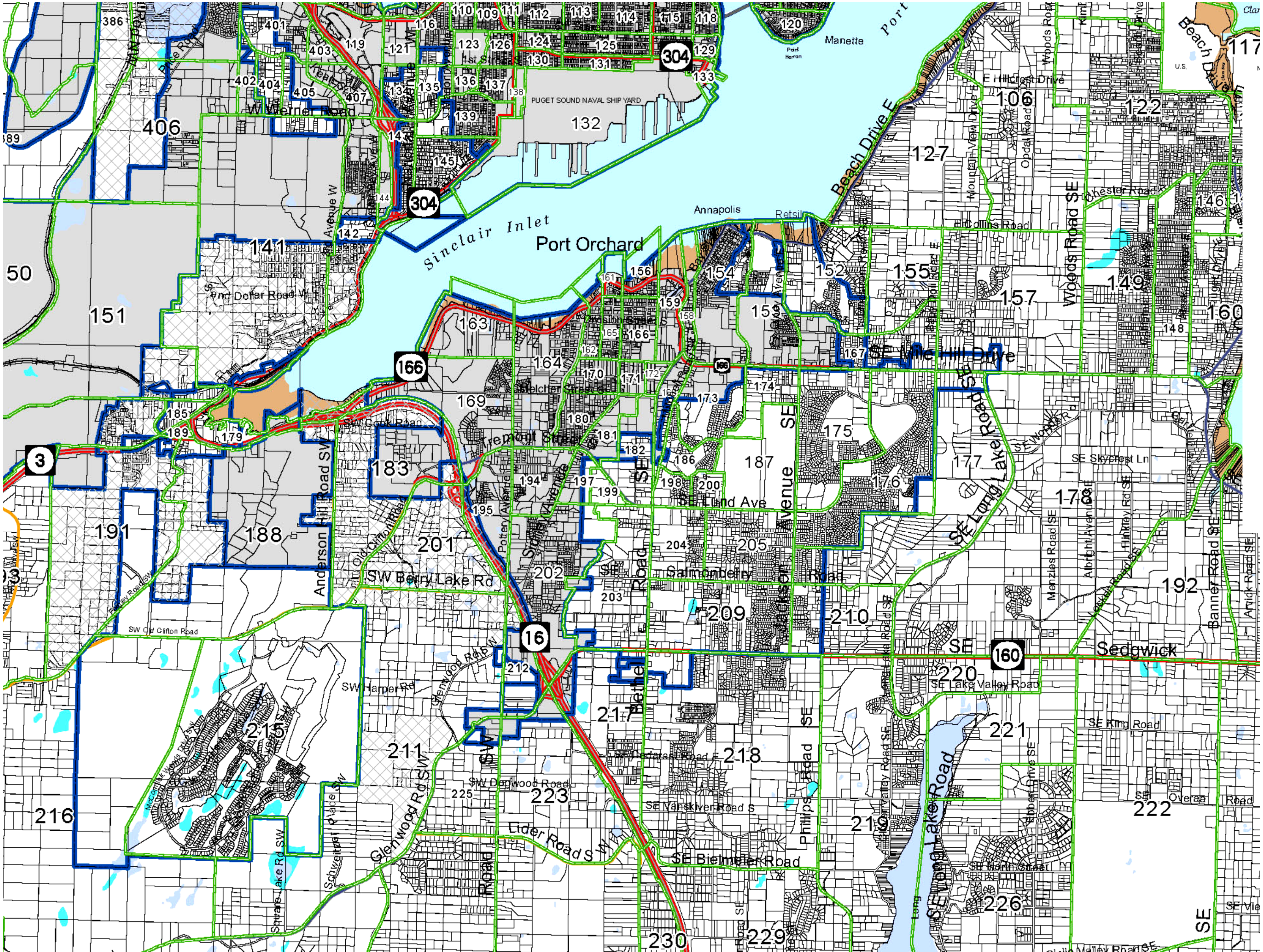

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City of Port Orchard
WASHINGTON

Data Sources: Kitsap County
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MAP DATE: DECEMBER 13 2007

Kitsap County TAZ Map Excerpt

Figure 7

City of Port Orchard
WASHINGTON

N

Legend

- TAZ - Studies
- City of Port Orchard
- Port Orchard UGA
- Unincorporated Urban Growth Area
- Karcher Creek District Boundary
- City of Bremerton
- Parcels - Kitsap Co June 07
- Water Bodies
- Rivers & Streams
- Roads

1 inch equals 3,000 feet

0 1,500 3,000 6,000 Feet

Data Sources: Kitsap County
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.

MAP DATE: DECEMBER 13 2007

Transportation Analysis Zones

Figure 8

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City of Port Orchard
WASHINGTON

Marina
Coast to Coast
Eaglecrest
Golden Pond
Canyon Ct
Tremont Place
McCormick Woods #1
Harrison Hospital
Cedar Heights
The Ridge
McCormick Woods #2
Bravo Terrace
Albertson

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 1 2 3

A B C D E F G H I J K

SAND DOLLAR RD W
W STATE HY 16
SW COOK RD
W BENS LN
SW OLD CLIFTON RD
FEIGLEY RD SW
MCCORMICK WOODS DR SW
CLENEAGLE WAY SW
SW HARPER RD
SW LIDER RD
SE LIDER RD
SE SEDGWICK RD
SE BAKER RD
SE VAN SKIVER RD
SE LUND AV
SE HORSTMAN RD
JACKSON AV SE
PERU AV E
BAY ST
SW BAY ST
WEST AV
HAROLD DR SE
SIDNEY RD SW
DOGWOOD RD SE
CLEAWOOD RD SW
BETHEL RD SE
BRASCH RD SE
PHILLIPS RD SE
CLOVER VALLEY RD SE
CREEK VIEW CT SE
LAKEVIEW DR SE
LONG LAKE RD SE
ANDERSON HILL RD SW
LIESEKE LN SW

Legend

- Pump Stations
- Sewer Gravity Trunks
- Sewer Force Mains
- Sewer Pipes
- Sewer Basins
- City of Port Orchard
- Port Orchard UGA
- Unincorporated Urban Growth Area
- Karcher Creek District Boundary
- City of Bremerton
- Parcels - Kitsap Co June 07
- Water Bodies
- Rivers & Streams

1 inch equals 2,500 feet

0 1,000 2,000 4,000 Feet

Data Sources: Kitsap County
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.

MAP DATE: DECEMBER 13 2007

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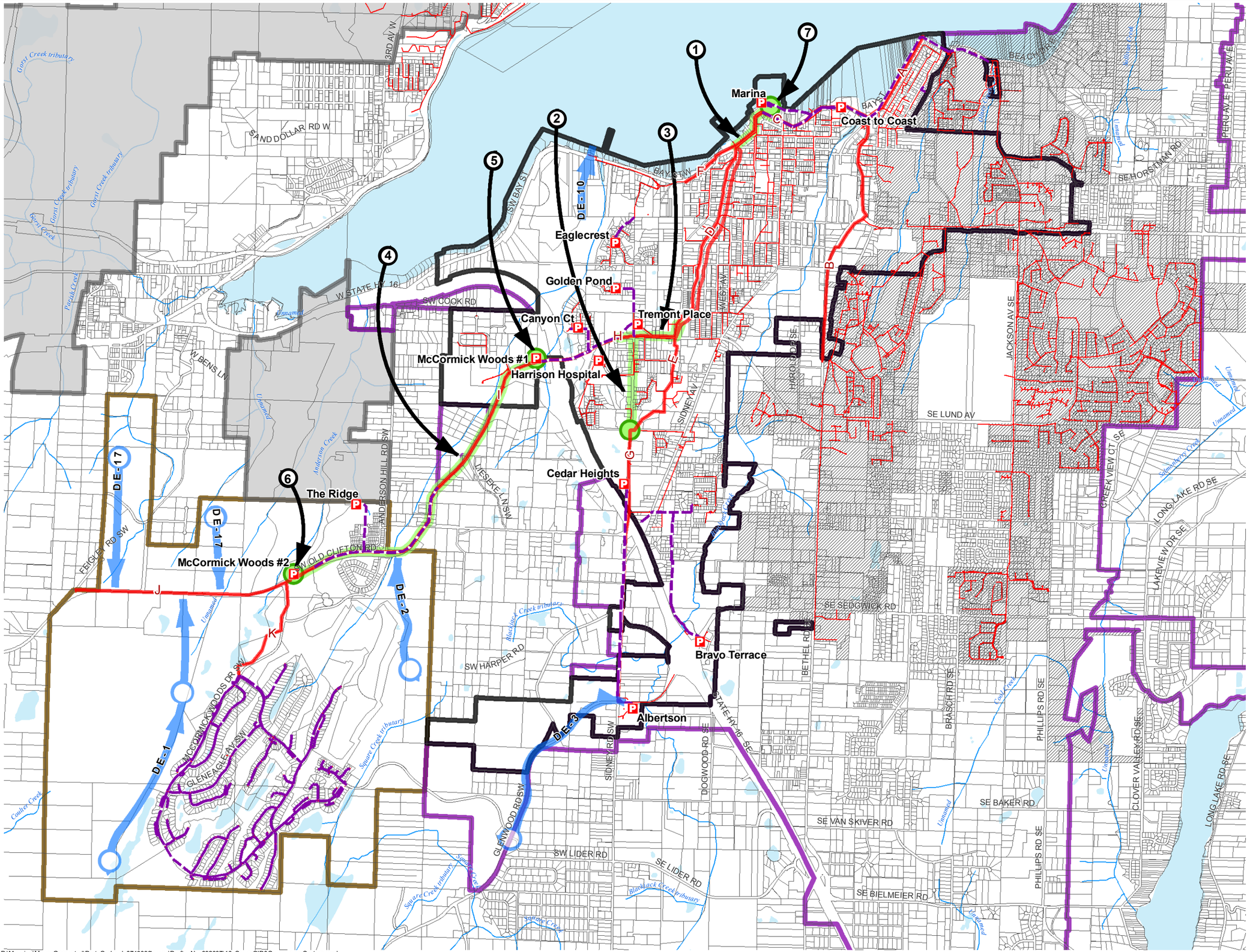
Sewer Basins & Conveyance System

Figure 9



City of Port Orchard
WASHINGTON

LEGEND

CAPITAL IMPROVEMENTS

- Pump Station
- Trunk Upgrade
- Developer Extensions & Pump Stations
- Improvement Number from Table 20

EXISTING SEWER SYSTEM

- Pump Station
- Sewer Gravity Trunks
- Sewer Force Mains
- Sewer Pipes

BASE MAP

- City of Port Orchard
- Port Orchard UGA
- Unincorporated Urban Growth Area
- Karcher Creek District Boundary
- City of Bremerton
- Parcels - Kitsap Co June 07
- Water Bodies
- Rivers & Streams

1 inch equals 2,500 feet

0 1,000 2,000 4,000 Feet

Data Sources: Kitsap County
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MAP DATE: DECEMBER 13 2007

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Sewer CIP & Conveyance System

Figure 10