

ECONOMIC AND TAX REVENUE IMPACTS OF POTENTIAL FLOODING IN THE GREEN RIVER VALLEY

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SUMMARY OF FINDINGS¹

- There are close to 100,000 jobs in the inundation area with a payroll of \$16 million per day.
- The total value of all output in the inundation area is over \$63 million per day.
- Over 100,000 people commute into or out of the inundation area.
- There are 4,771 retail business sites in the inundation area which generated \$4.7 billion in taxable retail sales in 2008.
- Based on 2008 data, over \$1.2 million per day in sales tax revenue would be lost during a flood event. Of that, \$156,000 per day would be lost to the General Fund, Criminal Justice, MIDD and Metro Transit funds of King County. \$111,000 per day would be lost to the cities of Auburn, Kent, Renton, and Tukwila.
- The assessed value of property in the inundation area was over \$6.7 billion in 2008, generating \$112 million in annual property tax. Property tax revenues would not be immediately affected but could depress new construction in the area and shift the tax burden to other parts of the county.

Background

Residents, businesses, and farms below the Howard Hansen Dam in the Green River Valley have been preparing for a higher risk of flooding. The higher risk is due to water seeping more rapidly through an earthen bank next to the dam after record high water last winter. Until the U.S. Army Corps of Engineers can make permanent repairs it must limit the amount of flood water it stores behind the dam. Recently, a “grout curtain” was installed that has reduced the risk substantially. However, a permanent solution has not

¹ All findings are based on a 25,000 cfs event and 2008 economic data, as detailed in the body of the report.

yet been agreed upon and the risk is still meaningful. This report addresses the economic and tax revenue impacts of flooding if it should occur.

Computer Simulated Flood Scenario

We use a computer simulation scenario constructed by the U.S. Army Corps of Engineers as the basis for analysis. The Corps has generated four potential flooding scenarios showing the level of inundation based on flows on the Green River as measured by the gauge at Auburn. They are 13,900 cubic feet per second (cfs), 17,600 cfs, 19,500 cfs, and 25,000 cfs. A fourth scenario consists of 25,000 cfs plus a levee failure at 180th Street.

For this analysis we have chosen the 25,000 cfs scenario. It is a severe case but not the worst case. Three points to keep in mind:

- The mapped inundation area is based on computer modeling and may vary from actual events.
- The mapped inundation area does not take into consideration recent defenses placed along the river such as levee fortification and sandbagging. Thus the simulated inundation area may be overstated.
- The mapped inundation area assumes all levees hold. If any fail the simulated inundation area may be understated.

A “shape file” with the exact geo-coordinates of the 25,000 cfs scenario inundation area was created by Dennis Higgins of King County Global Information Systems Center (GIS). All data sources were overlaid on this shape file.

Impact on Taxable Retail Sales

The shape file was given to analysts at the Washington State Department of Revenue (DOR). They used the coordinates to gather taxable retail sales figures for all of 2008 in the inundation area.

There are two problems with the reported sales figures of retail establishments in the area. First, the reported address may be the address of the establishment’s accountant, which might be anywhere, even out of state. Chain stores often report a single figure for all of King County. By using employment data from the Washington State Employment Security Department (ESD) the analysts at DOR were able to fairly accurately allocate portions of total retail sales by business location.

Second, the Streamlined Sales Tax Agreement came into effect on July 1, 2008. This legislation converts reporting taxable sales for delivered goods from origin to destination. Hence the calendar year 2008 retail sales data is origin-based in the first half of the year and destination-based in the second half. Origin-based sales – where goods are shipped from - are a better measure of the likely impact of flooding than where goods are delivered to, especially in an area that is a major distribution center. The switch from origin-based to destination-based sales tax for delivered goods means that some jurisdictions will see a revenue gain while others will see a loss. The state

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has elected to make mitigation payments to those jurisdictions that have experienced a loss in 2008. All of the jurisdictions in the inundation area have received mitigation payments; this indicates that destination-based data understates origin-based retail sales in the Green River Valley area. The DOR analysts estimated the mitigation payments to each of the jurisdictions. Their analysis suggests that the 2008 figures should be adjusted upward by factors ranging from 0.02% for unincorporated King County to 23.8% for Kent. We have adjusted the figures accordingly.

Tables 1 displays total taxable origin-based retail sales figures for 2008 in the inundation area. Table 2 displays and the number of business sites generating the sales. **There were 4,771 retail business sites in the inundation area which generated \$4.7 billion in taxable retail sales in 2008.**

Table 1

Taxable Retail Sales Figures for Inundation area, Calendar Year 2008							
Origin-based Adjustment Factor		7.71%	23.76%	3.75%	5.86%	0.02%	
Source: DOR		Auburn	Kent	Renton	Tukwila	Unincorporated	
NAICS	NAICS description	1702	1715	1725	1729	1700	
11	Agriculture, Forestry, Fishing, Hunting	\$ -	\$ 119,190	D	\$ -	D	\$ 119,190
21	Mining, Quarrying, and Oil and Gas Extraction	\$ -	D	D	\$ -	\$ -	\$ -
22	Utilities	D	\$ 24,692,328	\$ -	D	\$ -	\$ 24,692,328
23	Construction	\$ 40,221,610	\$ 63,815,204	\$ 20,905,944	\$ 9,130,016	\$ 1,313,725	\$ 135,386,500
31	Manufacturing - Food, Beverages, Textiles	\$ 801,485	\$ 2,867,813	D	\$ 7,425,130	D	\$ 11,094,428
32	Manufacturing - Wood, Paper, Plastics, Glass	\$ 9,940,727	\$ 45,562,629	\$ 22,680,598	\$ 9,036,410	D	\$ 87,220,363
33	Manufacturing - Metals, Machine Shops, Transportation Equipment	\$ 7,849,016	\$ 122,997,634	\$ 599,573	\$ 9,221,874	\$ 86,474	\$ 140,754,571
42	Wholesale	\$ 114,346,035	\$ 311,190,364	\$ 31,443,958	\$ 108,500,685	\$ 3,648,996	\$ 569,130,038
44	Retail Trade - Autos, Furniture, Clothing, Groceries, Gasoline	\$ 577,962,183	\$ 311,668,148	\$ 485,720,329	\$ 509,885,912	\$ 33,240,238	\$ 1,918,476,811
45	Retail Trade - Sporting Goods, Books, Department Stores, Office Supplies, E-Shopping	\$ 139,198,438	\$ 260,361,112	\$ 69,776,179	\$ 359,801,280	\$ 7,441,260	\$ 836,578,269
48	Transportation and Warehousing - Air, Rail, Truck, & Taxi Transportation	\$ 1,467,685	\$ 5,884,992	\$ 1,542,694	\$ 1,805,960	\$ 155,021	\$ 10,856,351
49	Transportation and Warehousing - Couriers, Warehousing, Storage	\$ 272,232	\$ 3,683,666	D	\$ 29,652	\$ -	\$ 3,985,550
51	Information	\$ 19,050,493	\$ 31,679,042	\$ 18,394,355	\$ 13,546,674	\$ 18,548,700	\$ 101,219,263
52	Finance and Insurance	\$ 5,773,443	\$ 7,248,218	\$ 11,776,340	\$ 1,374,376	D	\$ 26,172,376
53	Real Estate and Rental and Leasing	\$ 17,166,529	\$ 34,996,532	\$ 24,000,173	\$ 17,585,366	\$ 752,330	\$ 94,500,930
54	Professional, Scientific and Technical Services	\$ 4,257,875	\$ 39,564,784	\$ 6,615,995	\$ 10,712,313	D	\$ 61,150,967
56	Administrative and Support and Waste Management and Remediation Services	\$ 5,662,662	\$ 11,755,732	\$ 1,870,385	\$ 5,823,919	\$ -	\$ 25,112,698
61	Educational Services	\$ 2,273,288	\$ 905,238	\$ 13,471,368	\$ 876,146	\$ -	\$ 17,526,041
62	Health Care and Social Assistance	\$ 18,056,672	\$ 6,113,015	\$ 899,620	\$ 3,011,727	\$ -	\$ 28,081,035
71	Arts, Entertainment, and Recreation	\$ 13,944,074	\$ 6,174,264	\$ 1,412,071	\$ 9,894,338	D	\$ 31,424,746
72	Accommodation and Food Services	\$ 74,474,820	\$ 130,968,232	\$ 46,183,844	\$ 173,995,400	\$ 14,727,900	\$ 440,350,196
81	Other Services (except Public Administration)	\$ 32,910,189	\$ 41,577,950	\$ 4,363,869	\$ 5,361,165	\$ 2,319,013	\$ 86,532,187
92	Public Administration	D	\$ 8,155,891	D	D	\$ -	\$ 8,155,891
Sum		\$ 1,085,629,456	\$ 1,471,981,978	\$ 761,657,296	\$ 1,257,018,342	\$ 82,233,657	\$ 4,658,520,729

D = Deleted from data set to maintain confidentiality (less than three firms)

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Number of Business Sites Paying Sales Taxes within Inundation Area							
NAICS		Auburn 1702	Kent 1715	Renton 1725	Tukwila 1729	Unincorporated 1700	Sum
11	Agriculture, Forestry, Fishing, Hunting	-	4	D	-	D	4
21	Mining, Quarrying, and Oil and Gas Extraction	-	D	D	-	-	-
22	Utilities	D	5	-	D	-	5
23	Construction	193	221	34	46	6	500
31	Manufacturing - Food, Beverages, Textiles	9	20	D	13	D	42
32	Manufacturing - Wood, Paper, Plastics, Glass	37	69	12	22	D	140
33	Manufacturing - Metals, Machine Shops, Transportation Equipment	79	125	11	23	3	241
42	Wholesale	150	378	66	137	10	741
44	Retail Trade - Autos, Furniture, Clothing, Groceries, Gasoline	233	226	50	149	47	705
45	Retail Trade - Sporting Goods, Books, Department Stores, Office Supplies, E-Shopping	154	182	31	85	28	480
48	Transportation and Warehousing - Air, Rail, Truck, & Taxi Transportation	15	35	7	11	3	71
49	Transportation and Warehousing - Couriers, Warehousing, Storage	4	18	D	4	-	26
51	Information	11	24	7	16	3	61
52	Finance and Insurance	22	34	11	21	D	88
53	Real Estate and Rental and Leasing	39	46	20	18	3	126
54	Professional, Scientific and Technical Services	65	119	34	45	D	263
56	Administrative and Support and Waste Management and Remediation Services	58	82	19	44	-	203
61	Educational Services	16	12	8	4	-	40
62	Health Care and Social Assistance	56	38	17	27	-	138
71	Arts, Entertainment, and Recreation	14	19	6	9	D	48
72	Accommodation and Food Services	121	204	39	82	16	462
81	Other Services (except Public Administration)	163	152	28	34	7	384
92	Public Administration	D	3	D	D	-	3
	Sum	1,439	2,016	400	790	126	4,771

D = Deleted from data set to maintain confidentiality (less than three firms)

Impact on Tax Revenue

The impact on sales tax revenue of a flooding event is of major interest to state and local jurisdictions, especially in this time of acute budget stress. A flooding event is naturally measured in terms of days of inundation. The next two tables present estimated sales tax revenue on a per day basis. The rate of 9.5% is used for all sectors except Accommodation and Food Services, where the 0.5% King County Food & Beverage (KCF&B) tax is added to the 9.5% to bring it up to 10.0%. Note that some areas are "Non-RTA" and thus have a lower rate of 8.6%; however, we do not have Non-RTA areas identified within the inundation area, so all areas are treated as RTA. Annual tax figures were calculated and divided by 366 (2008 was a leap year).

Table 3 shows that over \$1.2 million per day in sales tax revenue to state and local jurisdictions could be lost during a flooding event. A 25,000 cfs flooding event will likely shut down business in the inundation area for more than one day. A week of shut down will cause the loss of \$8.5 million in tax revenues.

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There is an additional caveat to those mentioned previously. We are in a severe recession that affects the relevance of 2008 figures for inference in 2010. King County's sales tax revenue fell by 16.8% from 2nd Quarter 2008 to 2nd Quarter 2009, for example. The decline has leveled off somewhat in recent months and there are signs of recovery, but activity still remains below 2008 levels as of this writing. Thus the impact of a flood event on sales tax revenue could be overstated. On the other hand, the deletion of utilities and natural resource employers from the data set because of their small number means that the impact is understated.

Table 3

WHERE IT COMES FROM: Per Day Estimated Retail Sales Tax for Inundation area, 2008

Source: DOR							
		Auburn	Kent	Renton	Tukwila	Unincorporated	
NAICS	NAICS description	1702	1715	1725	1729	1700	
11	Agriculture, Forestry, Fishing, Hunting	\$ -	\$ 31	D	\$ -	D	\$ 31
21	Mining, Quarrying, and Oil and Gas Extraction	\$ -	D	D	\$ -	\$ -	\$ -
22	Utilities	D	\$ 6,409	\$ -	D	\$ -	\$ 6,409
23	Construction	\$ 10,440	\$ 16,564	\$ 5,426	\$ 2,370	\$ 341	\$ 35,141
31	Manufacturing - Food, Beverages, Textiles	\$ 208	\$ 744	D	\$ 1,927	D	\$ 2,880
32	Manufacturing - Wood, Paper, Plastics, Glass	\$ 2,580	\$ 11,826	\$ 5,887	\$ 2,346	D	\$ 22,639
33	Manufacturing - Metals, Machine Shops, Transportation Equipment	\$ 2,037	\$ 31,926	\$ 156	\$ 2,394	\$ 22	\$ 36,535
42	Wholesale	\$ 29,680	\$ 80,773	\$ 8,162	\$ 28,163	\$ 947	\$ 147,725
44	Retail Trade - Autos, Furniture, Clothing, Groceries, Gasoline	\$ 150,018	\$ 80,897	\$ 126,075	\$ 132,347	\$ 8,628	\$ 497,965
45	Retail Trade - Sporting Goods, Books, Department Stores, Office Supplies, E-Shopping	\$ 36,131	\$ 67,580	\$ 18,111	\$ 93,391	\$ 1,931	\$ 217,145
48	Transportation and Warehousing - Air, Rail, Truck, & Taxi Transportation	\$ 381	\$ 1,528	\$ 400	\$ 469	\$ 40	\$ 2,818
49	Transportation and Warehousing - Couriers, Warehousing, Storage	\$ 71	\$ 956	D	\$ 8	\$ -	\$ 1,035
51	Information	\$ 4,945	\$ 8,223	\$ 4,774	\$ 3,516	\$ 4,815	\$ 26,273
52	Finance and Insurance	\$ 1,499	\$ 1,881	\$ 3,057	\$ 357	D	\$ 6,793
53	Real Estate and Rental and Leasing	\$ 4,456	\$ 9,084	\$ 6,230	\$ 4,565	\$ 195	\$ 24,529
54	Professional, Scientific and Technical Services	\$ 1,105	\$ 10,270	\$ 1,717	\$ 2,781	D	\$ 15,873
56	Administrative and Support and Waste Management and Remediation Services	\$ 1,470	\$ 3,051	\$ 485	\$ 1,512	\$ -	\$ 6,518
61	Educational Services	\$ 590	\$ 235	\$ 3,497	\$ 227	\$ -	\$ 4,549
62	Health Care and Social Assistance	\$ 4,687	\$ 1,587	\$ 234	\$ 782	\$ -	\$ 7,289
71	Arts, Entertainment, and Recreation	\$ 3,619	\$ 1,603	\$ 367	\$ 2,568	D	\$ 8,157
72	Accommodation and Food Services	\$ 20,348	\$ 35,784	\$ 12,619	\$ 47,540	\$ 4,024	\$ 120,314
81	Other Services (except Public Administration)	\$ 8,542	\$ 10,792	\$ 1,133	\$ 1,392	\$ 602	\$ 22,461
92	Public Administration	D	\$ 2,117	D	D	\$ -	\$ 2,117
	Sum	\$282,806	\$383,861	\$198,329	\$328,652	\$ 21,546	\$ 1,215,195

D = Deleted from data set to maintain confidentiality (less than three firms)

Table 4

WHERE IT GOES: Sales Tax Revenue Allocation by Jurisdiction in Inundation Area, Per Day 2008	
State of Washington	\$ 827,333
King County -Local Option + Criminal Justice	\$ 28,891
MIDD (to KC)	\$ 12,728
King County Metro Transit	\$ 114,554
Regional Transit Authority	\$ 114,554
Auburn - Local Option + Criminal Justice	\$ 26,385
Kent - Local Option + Criminal Justice	\$ 35,889
Renton - Local Option + Criminal Justice	\$ 19,301
Tukwila - Local Option + Criminal Justice	\$ 29,543
Food & Beverage (to KC)	\$ 6,016
Total	\$ 1,215,195

Note: Regional Transit Authority revenue – and also the total – is slightly overstated because some parts of the inundation area are Non-RTA and thus escape the 0.9% RTA tax.

Table 4 shows how tax revenue is allocated by tax jurisdiction. **The King County general fund, criminal justice fund, MIDD and Metro Transit tax amounts to \$156,000 per day from the inundation area, while the cities of Auburn, Kent, Renton and Tukwila receive \$111,000 per day for their local option and criminal justice funds.**

Will any of the lost sales tax revenue snap back after the flood event has passed? We have two events from the past to draw upon for inference. First, there is the Seattle freeze of December 2008 where retail sales came to a virtual halt for more than a week. Very little of that revenue was subsequently made up by most estimates. Of course a nasty recession was just hitting the economy and Christmas spending is discretionary.

The other event is flooding in the Red River Valley of North Dakota. The North Dakota State Tax Commissioner estimates that after the big flood of 1997 rebuilding activities led to a 40% recovery of lost sales tax revenues over the following two quarters. On balance, the Red River Valley event would seem to be a better model for the Green River Valley than the freeze in Seattle. So we could expect some recovery in lost sales tax revenues in the months following a flood event.

Property Values and Property Taxes

The Washington State Department of Revenue used the shape file to capture the assessed valuation and tax due of the properties in the inundation area. The assessed values are for 2009 for taxes due in 2010. The actual rate for taxes due in 2010 have not been calculated and the rate for 2009 has been used in lieu. All properties within the boundary of the flood inundation area are included in this estimate (even if the property, or a portion thereof, may be elevated above the flood waters).

Table 5

	PARCELS	ASSESSED LAND VALUE	ASSESSED BUILDING VALUE	TAXABLE LAND VALUE	TAXABLE BUILDING VALUE	TAXDUE	AVERAGE LEVY RATE PER \$1,000
AUBURN							
Commercial	1,353	\$ 754,628,100	\$ 1,463,103,300	\$ 634,727,300	\$ 1,308,082,500	\$ 21,510,575	\$ 11.07
Residential	2,845	\$ 266,101,400	\$ 310,562,500	\$ 248,529,100	\$ 303,172,900	\$ 5,985,384	\$ 10.85
Auburn Total	4,198	\$ 1,020,729,500	\$ 1,773,665,800	\$ 883,256,400	\$ 1,611,255,400	\$ 27,495,959	\$ 11.02
KENT							
Commercial	1,807	\$ 1,770,690,600	\$ 3,614,802,188	\$ 1,568,053,743	\$ 3,218,976,910	\$ 51,292,581	\$ 10.71
Residential	728	\$ 88,625,300	\$ 44,635,500	\$ 75,852,830	\$ 45,171,300	\$ 1,285,503	\$ 10.62
Kent Total	2,535	\$ 1,859,315,900	\$ 3,659,437,688	\$ 1,643,906,573	\$ 3,264,148,210	\$ 52,578,084	\$ 10.71
RENTON							
Commercial	416	\$ 684,565,600	\$ 972,826,800	\$ 554,671,100	\$ 835,372,600	\$ 13,836,564	\$ 9.95
Residential	15	\$ 1,475,000	\$ 581,000	\$ 726,000	\$ 581,000	\$ 13,010	\$ 9.95
Renton Total	431	\$ 686,040,600	\$ 973,407,800	\$ 555,397,100	\$ 835,953,600	\$ 13,849,574	\$ 9.95
TUKWILA							
Commercial	396	\$ 679,294,600	\$ 1,059,067,834	\$ 638,296,600	\$ 1,035,888,034	\$ 17,800,296	\$ 10.63
Residential	10	\$ 965,000	\$ 818,000	\$ 914,000	\$ 772,700	\$ 17,449	\$ 10.34
Tukwila Total	406	\$ 680,259,600	\$ 1,059,885,834	\$ 639,210,600	\$ 1,036,660,734	\$ 17,817,745	\$ 10.63
KING COUNTY							
Commercial	27	\$ 12,675,700	\$ 2,080,900	\$ 10,370,866	\$ 2,073,400	\$ 143,231	\$ 11.51
Residential	142	\$ 27,399,500	\$ 5,529,000	\$ 8,977,271	\$ 5,274,000	\$ 163,647	\$ 11.48
King County Total	169	\$ 40,075,200	\$ 7,609,900	\$ 19,348,137	\$ 7,347,400	\$ 306,877	\$ 11.50
Commercial Total	3,999	\$ 3,901,854,600	\$ 7,111,881,022	\$ 3,406,119,609	\$ 6,400,393,444	\$ 104,583,248	\$ 10.66
Residential Total	3,740	\$ 384,566,200	\$ 362,126,000	\$ 334,999,201	\$ 354,971,900	\$ 7,464,993	\$ 10.82
TOTAL	7,739	\$ 4,286,420,800	\$ 7,474,007,022	\$ 3,741,118,810	\$ 6,755,365,344	\$ 112,048,240	\$ 10.67

"King County" refers to the unincorporated portions within the flood inundation area.

The assessed value of property in the inundation area is over \$6.7 billion, generating \$112 million in annual property tax revenue. A flood event could damage fixed structures enough to lower assessed valuations in the area. How that might impact property tax revenue depends on whether jurisdictions are able to shift the tax burden elsewhere through levy rates. It could have a ripple effect throughout the county, but quantifying it at this stage is not possible. Also, if a permanent solution is not reached it could impact new construction in the area – again it is not possible to quantify at this stage.

Employment in the Inundation Area

The Puget Sound Research Council (PSRC) used the shape file to estimate the number of "covered" employees who work in the inundation area. Covered employment refers to positions covered by the Washington Unemployment Insurance Act. The Act exempts the self-employed, proprietors, corporate officers, military personnel, and railroad workers, so those categories are not included in the dataset. This also does not include

employees who live in the inundation area but work outside it. The breakdown by industry and jurisdiction is contained in the table below. There are over 86,000 covered jobs in the inundation area.

Covered employment accounts for approximately 85-90% of all employment. So the figures in the table below could be adjusted upwards by 10-15% to account for all employment in the area. Also, some employers are not included to protect confidentiality guarantees. **This would bring the number of jobs in the area close to 100,000.**

Table 6

Covered Employment Estimates in Inundation Area			
Source: PSRC			
NAICS Code	Description	Employment Within the Inundation Area	Employment in King County Outside the Inundation Area
11	Agriculture, Forestry, Fishing, Hunting	D	D
21	Mining, Quarrying, and Oil and Gas Extraction	-	453
22	Utilities	D	D
23	Construction	6,695	64,611
31	Manufacturing - Food, Beverages, Textiles	3,156	12,536
32	Manufacturing - Wood, Paper, Plastics, Glass	5,288	10,210
33	Manufacturing - Metals, Machine Shops, Transportation Equipment	13,438	67,917
42	Wholesale	15,694	44,958
44	Retail Trade - Autos, Furniture, Clothing, Groceries, Gasoline	5,285	67,581
45	Retail Trade - Sporting Goods, Books, Department Stores, Office Supplies, E-Shopping	1,441	36,893
48	Transportation and Warehousing - Air, Rail, Truck, & Taxi Transportation	5,366	31,352
49	Transportation and Warehousing - Couriers, Warehousing, Storage	2,126	8,335
51	Information	1,661	80,863
52	Finance and Insurance	1,149	48,141
53	Real Estate and Rental and Leasing	1,278	25,345
54	Professional, Scientific and Technical Services	2,983	96,852
55	Management of Companies & Enterprises	1,426	25,049
56	Administrative and Support and Waste Management and Remediation Services	3,945	39,888
61	Educational Services	939	16,723
62	Health Care and Social Assistance	3,925	112,426
71	Arts, Entertainment, and Recreation	338	21,084
72	Accommodation and Food Services	3,409	91,460
81	Other Services (except Public Administration)	1,579	42,524
Gv	Government	4,403	68,724
Ed	Education	546	81,708
Total	All Sectors	86,382	1,098,990
City		Inundation Area	
	Auburn	7,529	
	Kent	53,782	
	Renton	20,474	
	Tukwila	4,202	
	Unincorporated King County	394	
	Total	86,382	

D = Deleted because of confidentiality constraints (three or less firms). Note that the Totals include the deleted employment estimates.

The Value of Economic Output in the Inundation Area

We employ an “input-output model” to estimate the overall value of economic activity in the inundation area. An input-output model takes all inputs, such as labor and materials, and links them to all outputs, including outputs from one process used as inputs in another process. It also incorporates inputs from outside King County (“imports”) and outputs delivered outside King County (“exports”). This gives a fuller picture of the value-added of economic activity in a particular geographic area.

Alexander Rist of the King County Department of Natural Resource Planning (DNRP) updated the IMPLAN input-output model with 2008 data to estimate the value-added of all economic activity in King County by sector. Employment data from the previous table was then used to calculate the “shock” of the sudden cessation of economic activity in the inundation area. This produces estimates of total dollar losses within the inundation area. These estimates are contained in the following table.

The value of output in the inundation area is over \$63 Million per day. Employee compensation is close to \$16 million per day.

Table 7

Economic Value in Inundation Area Per Day, 2008					
Source: DNRP					
NAICS Code	Description	Output	Employee Compensation	Proprietor Income	Other Property Type Income
11	Agriculture, Forestry, Fishing, Hunting	-	-	-	-
21	Mining, Quarrying, and Oil and Gas Extraction	-	-	-	-
22	Utilities	-	-	-	-
23	Construction	\$ 2,824,294	\$ 1,037,391	\$ 184,709	\$ 102,253
31	Manufacturing - Food, Beverages, Textiles	\$ 4,913,388	\$ 783,224	\$ 88,977	\$ 387,329
32	Manufacturing - Wood, Paper, Plastics, Glass	\$ 8,232,571	\$ 1,312,321	\$ 149,084	\$ 648,984
33	Manufacturing - Metals, Machine Shops, Transportation Equipment	\$ 20,920,819	\$ 3,334,904	\$ 378,855	\$ 1,649,215
42	Wholesale	\$ 9,810,687	\$ 3,443,921	\$ 306,894	\$ 1,341,512
44	Retail Trade - Autos, Furniture, Clothing, Groceries, Gasoline	\$ 1,647,675	\$ 542,073	\$ 37,897	\$ 320,103
45	Retail Trade - Sporting Goods, Books, Department Stores, Office Supplies, E-Shopping	\$ 449,253	\$ 147,801	\$ 10,333	\$ 87,279
48	Transportation and Warehousing - Air, Rail, Truck, & Taxi Transportation	\$ 2,461,554	\$ 797,298	\$ 104,483	\$ 301,099
49	Transportation and Warehousing - Couriers, Warehousing, Storage	\$ 975,263	\$ 315,888	\$ 41,396	\$ 119,295
51	Information	\$ 2,640,272	\$ 634,865	\$ 57,766	\$ 629,817
52	Finance and Insurance	\$ 900,142	\$ 252,421	\$ 40,590	\$ 200,163
53	Real Estate and Rental and Leasing	\$ 1,014,913	\$ 55,002	\$ 47,882	\$ 521,228
54	Professional, Scientific and Technical Services	\$ 1,178,190	\$ 493,422	\$ 150,084	\$ 75,103
55	Management of Companies & Enterprises	\$ 989,801	\$ 467,804	\$ (115)	\$ 148,376
56	Administrative and Support and Waste Management and Remediation Services	\$ 925,702	\$ 445,670	\$ 34,127	\$ 140,139
61	Educational Services	\$ 141,730	\$ 62,402	\$ 5,396	\$ 7,861
62	Health Care and Social Assistance	\$ 1,124,285	\$ 531,294	\$ 79,784	\$ 117,284
71	Arts, Entertainment, and Recreation	\$ 65,133	\$ 20,179	\$ 2,359	\$ 6,668
72	Accommodation and Food Services	\$ 646,258	\$ 221,792	\$ 12,455	\$ 85,698
81	Other Services (except Public Administration)	\$ 364,379	\$ 135,220	\$ 15,974	\$ 45,563
Gv	Government	\$ 1,062,098	\$ 809,763	\$ -	\$ 115,087
Ed	Education	\$ 131,707	\$ 100,416	\$ -	\$ 14,272
Total	All Sectors	\$ 63,420,113	\$ 15,945,071	\$ 1,748,931	\$ 7,064,328

Commuter Patterns Into and Out of the Inundation Area

The final piece of analysis is on the disruption of commuter patterns that a flooding event would cause. We break down commuters into two groups: those that live in the inundation area and commute to jobs outside the area, and those that live outside the area and commute to jobs inside the area. Those who live outside the inundation area and normally traverse the area to get to jobs outside the area are not considered.

We use data from the US Census Bureau on the number of commuters. The census counts estimate that over 87,000 daily commuters will be disrupted by a flooding event. However, the total census count for workers employed in the inundation area is about 13% less than the PSRC estimates. This is because Census only counts primary jobs and not second jobs, among other things. If we also take into account the fact that PSRC data on covered employees is 10-15% below the true employee total, the numbers of all commuters are well over 100,000.

	Where Workers Live who are Employed in the Inundation Area	
Source: Census Bureau	Count	Share
Auburn city, WA	3,106	4.1%
Bellevue city, WA	1,273	1.7%
Cascade-Fairwood CDP, WA	1,950	2.6%
Des Moines city, WA	1,324	1.7%
East Hill-Meridian CDP, WA	1,932	2.5%
Federal Way city, WA	3,536	4.6%
Kent city, WA	6,612	8.7%
Renton city, WA	2,526	3.3%
Seattle city, WA	6,810	8.9%
Tacoma city, WA	3,686	4.8%
All Other Locations	43,495	57.0%
Total	76,250	100.0%

Table 8

	Where Workers are Employed who Live in the Inundation Area	
Source: Census Bureau	Count	Share
Auburn city, WA	838	7.71%
Bellevue city, WA	600	5.52%
Federal Way city, WA	295	2.71%
Kent city, WA	1,841	16.94%
Redmond city, WA	229	2.11%
Renton city, WA	745	6.85%
SeaTac city, WA	304	2.80%
Seattle city, WA	2,242	20.63%
Tacoma city, WA	315	2.90%
Tukwila city, WA	557	5.12%
All Other Locations	2,904	26.72%
Totals	10,870	100.00%

Table 9**GIS Figures**

We conclude with four figures created by King County GIS using census data. Together they illustrate the size and scope of the potential impact visually. In many ways this is more compelling than tables of numbers.

Figure 1 – Where Jobs Are Located in the Inundation Area

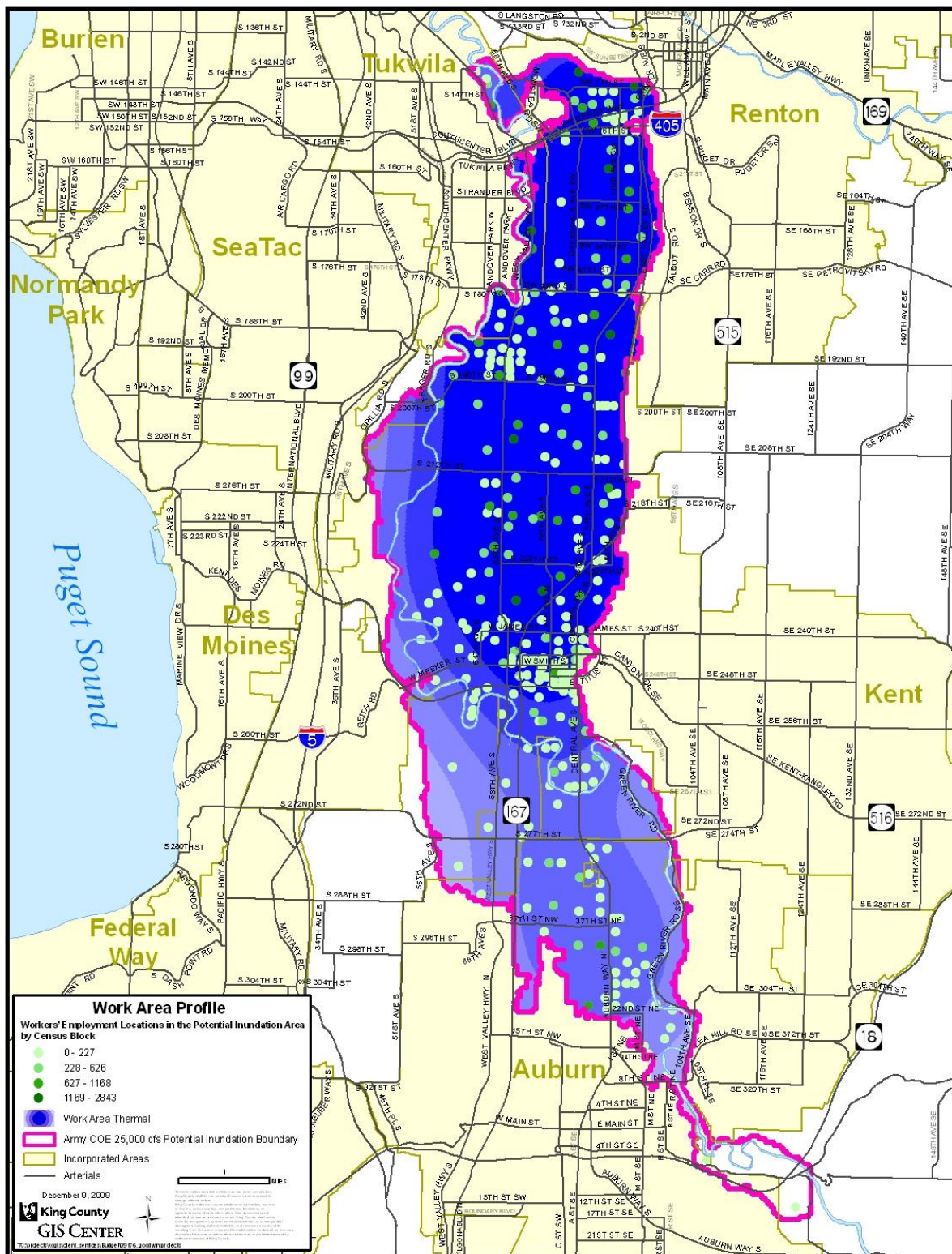


Figure 2 – Where People Live in the Inundation Area

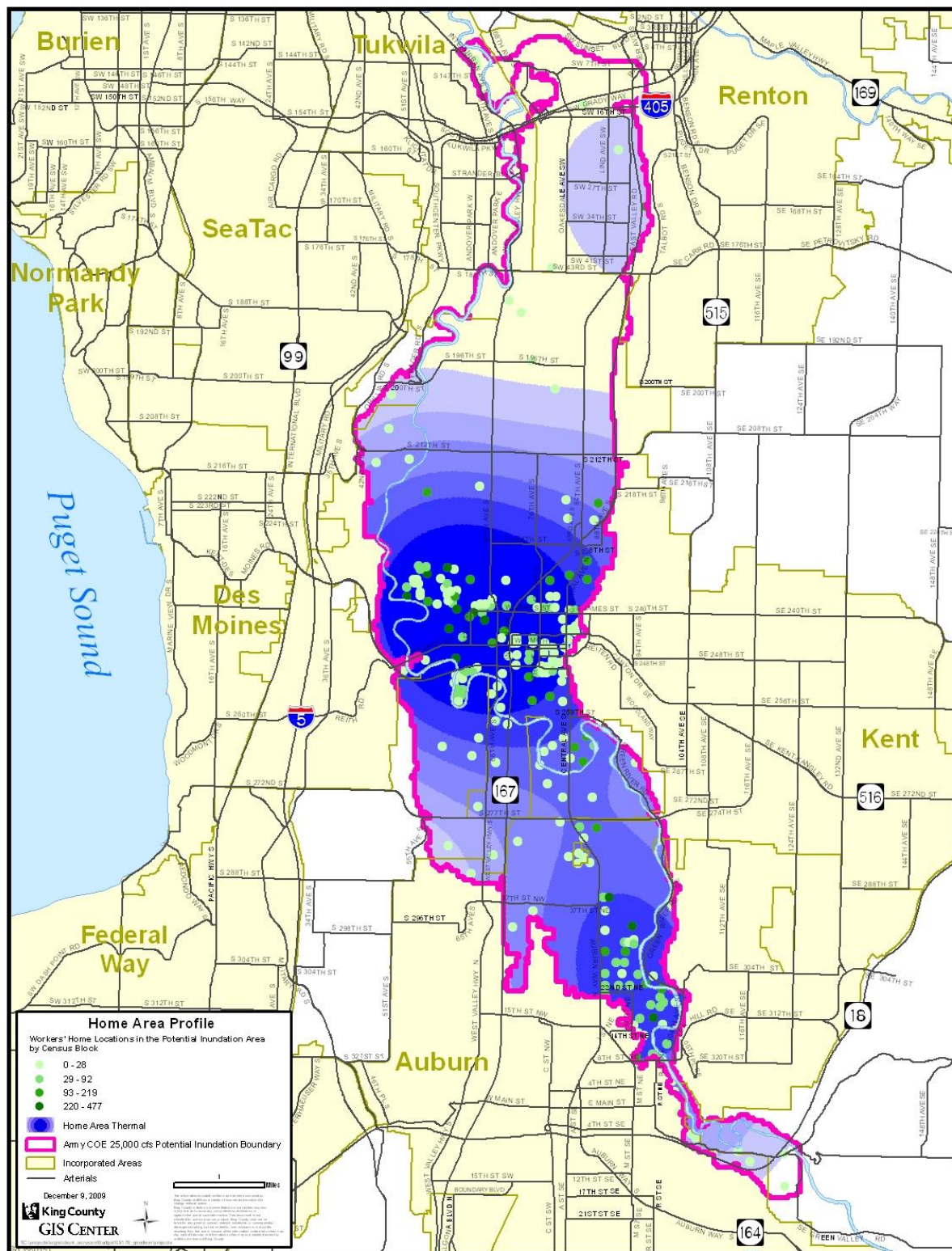


Figure 3 – Where People Live Who Commute Into the Inundation Area

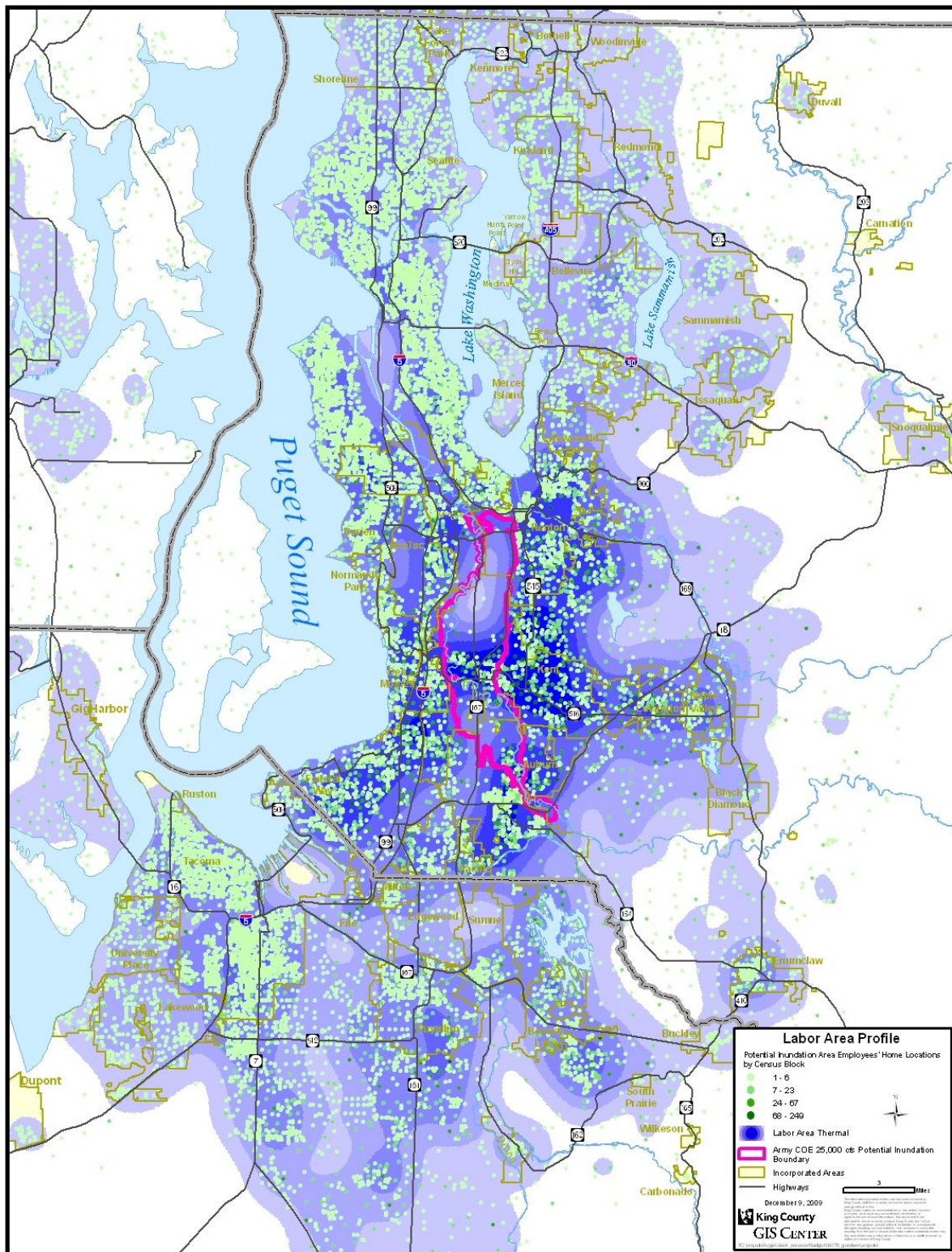
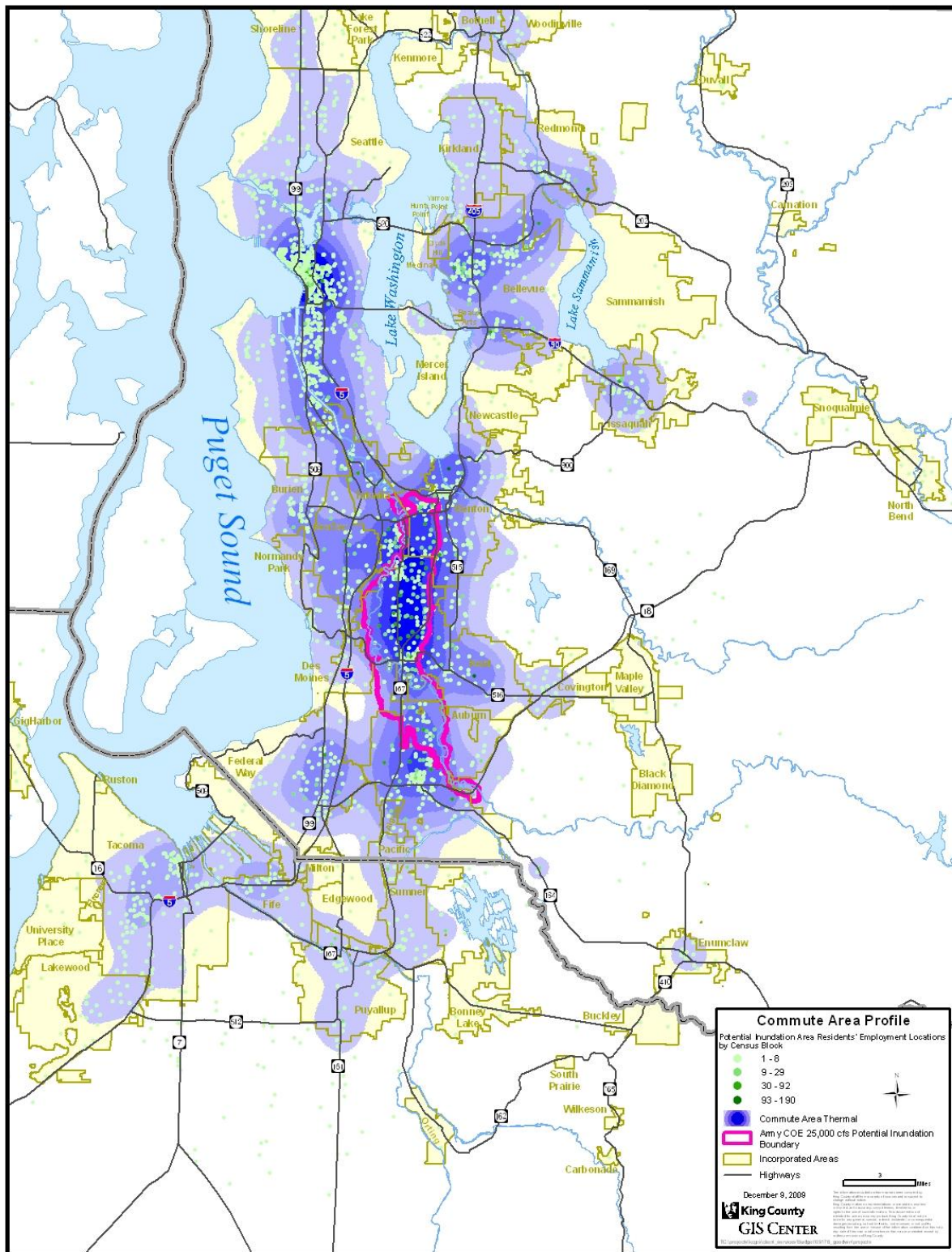


Figure 4 – Where People Work Who Live in the Inundation Area



Data Sources and Acknowledgements

Data Sources

- U.S. Army Corps of Engineers scenario map at http://www.nws.usace.army.mil/PublicMenu/Doc_list.cfm?sitenam e=HHD&pagenam e=Green_River_Maps
- The geo-coded shape file and color contour maps were generated by Dennis Higgins and Toni Carpenter of the King County Global Information Systems Center (GIS).
- Sales tax data was obtained from the Washington State Department of Revenue (DOR). Tom Christensen, Ray Philen, and Matthew Bryan were the principal analysts.
- Property values and taxes were obtained from Tom Christensen of the DOR.
- Employment data was obtained from Michael Jensen at the Puget Sound Research Council (PSRC). Tim Norris of the Washington State Employment Security Department (ESD) also contributed.
- The value of output and employment compensation in the inundation area was estimated by Alexander Rist of the King County Department of Natural Resource Planning (DNRP) using the IMPLAN input-output model.
- Commuter and residential location patterns were estimated by Heath Hayward of the U.S. Bureau of the Census.

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