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November 29, 2010

TO: **Dave White, King County**
FROM: **Ted Helvoigt, Alec Josephson, and Beth Goodman**
SUBJECT: **Estimates of Economic Impacts of Clean-up Activities Associated with the Lower Duwamish Superfund**

The Lower Duwamish Waterway Group (LDWG), consisting of the City of Seattle, King County, the Port of Seattle, and The Boeing Company, are working with the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) to develop alternative clean-up scenarios for the Lower Duwamish Waterway Superfund site. These results are summarized in the "Draft Final Feasibility Study Lower Duwamish Waterway," prepared by AECOM. The Feasibility Study describes 12 scenarios for cleanup of the Lower Duwamish Waterway.

In a previous study, ECONorthwest developed an analysis of the importance of the Lower Duwamish Waterway for the City of Seattle and King County, summarized in the report "Lower Duwamish Economic Analysis," dated March 2010. The key finding of this report is that the Lower Duwamish Waterway plays a unique role in the regional economy, with 8% of King County's employment located in the Lower Duwamish Waterway and about one-quarter of the County's Manufacturing and Transportation and Warehousing jobs located in the Waterway. The study concluded that clean-up of the Superfund site is important to business investment in the site. Efforts to clean-up the Superfund site that businesses perceive as timely and as having a high probability of success will likely be rewarded with increased investment in the affected area, resulting in increased economic output and jobs. Failure to act efficiently and effectively to clean-up the Superfund site could result in a decline in economic activity within the affected area and throughout the County.

On behalf of the LDWG, King County engaged ECONorthwest to develop estimates of the economic activity associated with each alternative clean-up scenario of the Superfund site. This memorandum presents ***estimates*** of the economic activity for the following geographic areas: King County, the City of Seattle, and the Lower Duwamish Waterway Area (LDW Area).

This study only examined economic activity associated with spending resulting from the clean-up of the Lower Duwamish Waterway. It did not examine at potential negative economic impacts of cleanup on businesses and other entities that will pay the costs of clean-up. The study also did not consider the disruption likely to result from clean-up (e.g., construction noise or traffic delays). While potentially significant, such impacts are very difficult to estimate until the clean-up scenario is selected.

This memorandum is organized into the following sections:

- **Summary of Implications** summarizes the high-level implications of clean-up activities on regional economic outputs and jobs.
- **Methodology** briefly describes the methodological approaches used in this analysis.
- **Results Summary** describes the estimated economic impacts of each clean-up scenario on economic outputs and jobs for King County, the City of Seattle, and the LDW Area.
- **Appendix A: Detailed Results for Each Alternative** provides detailed tables that show the economic impacts of each clean-up scenario for King County, the City of Seattle, and the LDW Area.
- **Appendix B: Estimated Impacts of Marginal Increase in Spending on Selected Activities** describes the affect of increased spending for five clean-up activities.

SUMMARY OF IMPLICATIONS

This section summarizes the implications of the economic and employment effects of clean-up activities of the Lower Duwamish Waterway Superfund site.[1]

- **The principal economic argument for cleaning up the Lower Duwamish Waterway is to promote long-term economic growth for King County and the City of Seattle.** The ECONorthwest report "Lower Duwamish Economic Analysis" concluded that the LDW Area is an important area for King County's economy, with about 8% of County jobs and one-quarter of County Manufacturing and Transportation and Warehousing jobs located in the LDW Area. The LDW Area contains infrastructure, such as Boeing Field and Port of Seattle terminals, that is critical to the long-term economic well-being of the City of Seattle and King County. The report concluded that future private investment in the LDW Area could depend on clean-up (and perceptions about clean-up) of the Superfund site.

  If businesses perceive that clean-up will not occur (or is being mis-handled) the "economic stigma" of being located in or near a Superfund site may result in businesses decreasing their investment in operations in or near the site. Other studies have shown that commercial properties with known or suspected hazardous contamination may have substantial reductions in property value, and that transaction rates for commercial properties adjacent to known contamination sites are statistically significantly lower than for commercial properties in areas without contamination. Officials in Portland recently voiced concerns about the Portland Harbor Superfund cleanup process negatively influencing business investment there and the resulting effects on economic activity throughout the City and region.

- **Job creation and generating economic activity is a secondary argument for cleaning up the Lower Duwamish Waterway.** A relatively short-term effect of the clean-up is creation of local jobs and generation of local economic output associated with cleaning up the Superfund site. However, these relatively short-term economic activities do not represent a compelling economic argument for action in and of themselves. The primary reasons for cleaning up the Superfund site are to restore the environment and to encourage future investment in the LDW Area. Failure to act efficiently and effectively to clean-up the Superfund site could result in a decline in economic activity within the affected area and throughout the County, as seen in other areas with a Superfund site.

[1] This LDW Area includes the PSRC-identified Duwamish Manufacturing/Industrial Center (MIC) and some adjacent areas. It was approximated using available blocks of economic and demographic data, which do not correspond to watershed boundaries. The methodology section of this memorandum describes the boundaries of the LDW Area in detail.

- **In the short-run, clean-up activities at the Superfund site will impose costs and negative impacts on businesses and residents of the LDW Area and surrounding areas.** Businesses and residents of the LDW Area, as well as nearby parts of Seattle, will shoulder some of the costs of clean-up and may be inconvenienced by construction (e.g., noise, transportation delays, etc.). The costs and inconveniences may cause businesses to delay making investments, move out of the LDW Area, or (in a few extreme cases) go out of business. This analysis does not attempt to quantify the potential negative impacts because, until a clean-up alternative is selected, there is too much uncertainty to quantify negative impacts. The analysis focuses on the impact of clean-up related spending on job creation.
- **The project duration affects the annual economic effects of clean-up activities.** The majority of spending and work will occur during the construction phase of the project, which varies among the scenarios from four years to 45 years. The annual average economic affects (in terms of economic output and personal income during the construction period) are larger for alternatives with a shorter construction period than for scenarios with a longer construction period, even though several of these alternatives have lower total costs. For example, average generated annual personal income related to clean-up activities in King County is about $26 million annually for Alternative 2 (shorter construction period) and $14 million annually for Alternative 6 (longer construction period).
- **The majority of economic benefits from spending on clean-up activities will begin to accrue after construction begins.** There is some uncertainty about when the project will begin. Given the need to select a preferred alternative and other requirements of the Environmental Protection Agency (EPA), it is reasonable to assume that the project will not start for seven to 10 years from 2010.
- **The amount of work that will be done by firms located within King County is not knowable with certainty at this point.** While the majority of work is expected to be done by firms located in King County, until the preferred clean-up scenario is selected, uncertainty will remain about the amount that will be spent on the project and the mix of clean-up activities (e.g., the amount of dredging and capping that will be done). Estimates for where economic activity would be generated in this analysis were based on locations of businesses in regional economic models as well as research on the locations of firms with requisite skills and specialized capital equipment (e.g., specialized dredging equipment). However, until the project begins and firms are hired to do the work, it is not clear how much of the project work will be done by firms located in King County, the City of Seattle, or the LDW Area. This will depend on numerous factors, including the availability of firms with skilled labor and specialized equipment in King County, as well as the project bidding process. In this analysis, we assumed that firms located in King County would do the work, where possible.
- **Much of the clean-up spending may be allocated to firms located in King County.** Based on our analysis and the current economic composition, as much as three-quarters of spending may be allocated to firms located within King County and 60% allocated to firms in the City of Seattle. Less than 20% of total spending will occur at firms located within the LDW Area (which includes the boundaries of the Duwamish Manufacturing/Industrial Center). Spending on some clean-up activities, especially landfill costs, will take place outside of King County.

- **Annual project spending and job creation is small relative to the overall economy in King County and the Lower Duwamish Area.** While the absolute spending on the clean-up (ranging from about $200 million to $1,300 million for the entire project) is very large, the impact of the clean-up activity on an annual basis relative to King County's entire economy is relatively small. For any of the clean-up scenarios, the associated economic output, personal income, and jobs account for less than 1% of economic output, personal income, and jobs in King County, Seattle, and the LDW Area. For example, the largest number of jobs in King County resulting from clean-up in any of the scenarios is nearly 1,000 part-year jobs.[2] In comparison, King County had nearly 1.2 million jobs in 2008. The increase of employment resulting from clean-up would not be noticeable in the County (or City) unemployment rate. The economic importance of spending on clean-up activities is not diminished by its small share of overall economic output and personal income in King County.
- **Many of the regional jobs are likely to be accrue outside the LDW Area.** About 80% of the clean-up jobs in King County are likely to be located in the City of Seattle and about one-quarter are likely to be located in the LDW Area. For example, the largest number of jobs resulting from clean-up in any of the scenarios is nearly 250 part-year jobs, compared to the LDW Area's approximately 106,000 jobs.
- **Many of the jobs will be full-time part-year jobs.** The in-water construction period is assumed to be a window of 88 working days. The majority of jobs will occur during the construction window, resulting in full-time (35 hours or more per week) but part-year jobs. Some jobs may be year-round. The types of jobs resulting from the project includes: construction, dredging, truck driving, hazardous waste management, engineering and environmental consulting.
- **Many of the jobs are "green" jobs.** About half of the jobs can be classified as "green jobs" because they are associated with cleaning up and restoring the natural environment, such as construction, dredging, and environmental consulting jobs. Many of these jobs already exist in the King County economy and the proposed activities (e.g., monitoring or planting native species) are similar to activities done at other Superfund sites.
- **Some activities will result in more economic activity and jobs in King County than other activities.** On a dollar-for-dollar basis, additional spending on dredging will generate fewer regional jobs and less regional economic activity than additional spending on capping or confined aquatic disposal (CAD). The reasons for this are: (1) much of the cost of dredging is associated with hauling and disposal outside of the county and (2) firms in King County have more of the skilled labor and specialized equipment for some activities (e.g., capping or CAD) than for other activities.
- **The number of jobs resulting from spending on the LDW Area clean-up is slightly higher than the average for other non-residential construction projects.** For every $1 million spent on non-residential construction (e.g., road and bridge construction or office building construction) in King County, 5.9 jobs are created. The cost per job is $170,000, which includes costs for labor (e.g., wages), equipment, and materials. In comparison, the

[2] A "part-year" job is a job that is full time (e.g., 35 hours per week or more) but only lasts part of the year (e.g., during the October to February construction window).

amount spent on clean-up activities in King County averages about $140,000 per job (7.1 jobs per $1 million spent). One reason that spending per job is lower for clean-up of the LDW is that the materials used in the clean-up are less costly than for other non-residential construction. Typical non-residential construction uses a combination of low cost materials (e.g., gravel, sand, or dry wall) and higher cost materials (e.g., windows or carpets). The principal materials in the clean-up are largely low cost items, such as gravel or sand.

METHODOLOGY

Analytical methods

The primary analytical tool used in the evaluation of the economic and employment impacts of the Lower Duwamish Superfund site clean-up is an input-output model. Input-output models are static models that measure the flow of inputs and outputs in an economy at a point in time. With this information about inputs and outputs in an economy and the balanced accounting structure of an input-output model, an analyst can: (1) describe an economy at one time period, (2) introduce a change to the economy, and then (3) evaluate the economy after it has fully accommodated that change.[3] The analysis in this memorandum was developed using IMPLAN (IMpact analysis for PLANning), one of the most common software packages used to conduct input-output analyses.

The analysis of the impact of clean-up of the LDW Area considers three primary impacts of clean-up activities:

- **Economic output** is the broadest measure of economic activity and represents the value of finished goods. Economic output includes the costs of intermediated goods and other material inputs, as well as all value added activity as represented by the cost of labor, net business income (profits), and indirect business taxes.
- **Personal income** consists of compensation to employees and business owners (proprietor and corporate income).
- **Jobs** represent the number of additional jobs gained or lost as a result of clean-up of the Superfund site. Job impacts are the most popular measure of economic impacts because they are easy to understand.

The analysis considers different impacts from spending on clean-up of the LDW Area. The types of impacts considered in the analysis are:

- **Direct Impacts** are changes in economic activity associated with the cleanup activity itself; they are the initial effects on the local economy associated with the cleanup activities.
- **Indirect Impacts** are the secondary economic effects caused by the increased demand for inputs by the directly affected industries.
- **Induced Impacts** are the economic effects caused by changes in household spending that are the result of the additional employment generated by both the direct and indirect impacts.
- **Total Impacts** are the sum of direct, indirect, and induced impacts.

[3] This memorandum does not discuss details of the range of potential uses or limitations of input-output models.

The results presented in this memorandum are for the 11 clean-up alternatives with a construction phase, which does not include Alternative 1.[4] The results are based on cost estimate in Tables I-39 to I-49, as presented in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," dated August 20, 2010 and prepared by AECOM Environment.[5] AECOM has updated the cost estimates since August 2010. The updated cost estimates are in the "Appendix I Detailed Cost Estimates, Draft Final Feasibility Study" dated October 2010. The updated cost estimates were as much as 9% different from the cost estimates used in this report, with some scenarios increasing on cost and some decreasing in cost. The change in the estimates is largely the result of changes in assumptions about the amount of monitoring necessary for each scenario. While the final estimates would have a commensurate minor impact on the estimates in the report, they do not alter the report findings and implications.[6]

The Results Summary in this memorandum presents high-level results for all 11 clean-up scenarios and shows only total impacts. Appendix A presents all four types of impact for each clean-up scenario.

Study area

The economic impacts of an activity will differ depending on how the area being evaluated is defined. When measuring economic impacts, it is crucial that the analyst carefully select the relevant region or study area. This analysis focuses on three geographic areas: King County, Seattle, and the Lower Duwamish Waterway (LDW) Area. The geographic boundaries of King County and Seattle are well known. The boundaries of the LDW Area, however, are less clear. Figure 1 shows the Lower Duwamish Superfund Site, which is contained within a 5.5-mile stretch of the Lower Duwamish River before it flows into Elliott Bay.

The IMPLAN model produces estimates of the percentage of economic activity that may occur within each geographic area. ECONorthwest researched the availability of heavy construction and other industries that are necessary to the clean-up in King County and Seattle. Based on this research, we updated these assumptions, which generally resulted in increases in the assumption about the amount of clean-up activity that may be done by firms located in the three geographical areas.

The model assumes that all economic activity that occurs in the LDW Area also occurs in the City of Seattle and that all economic activity that occurs in the City of Seattle occurs in King County. For example, the model assumes that all barging activities will be done by firms in King County but that about 80% of barging will be done by firms located in the City of Seattle and about 30% will be done by firms located in the LDW Area. It is possible, even likely, that a

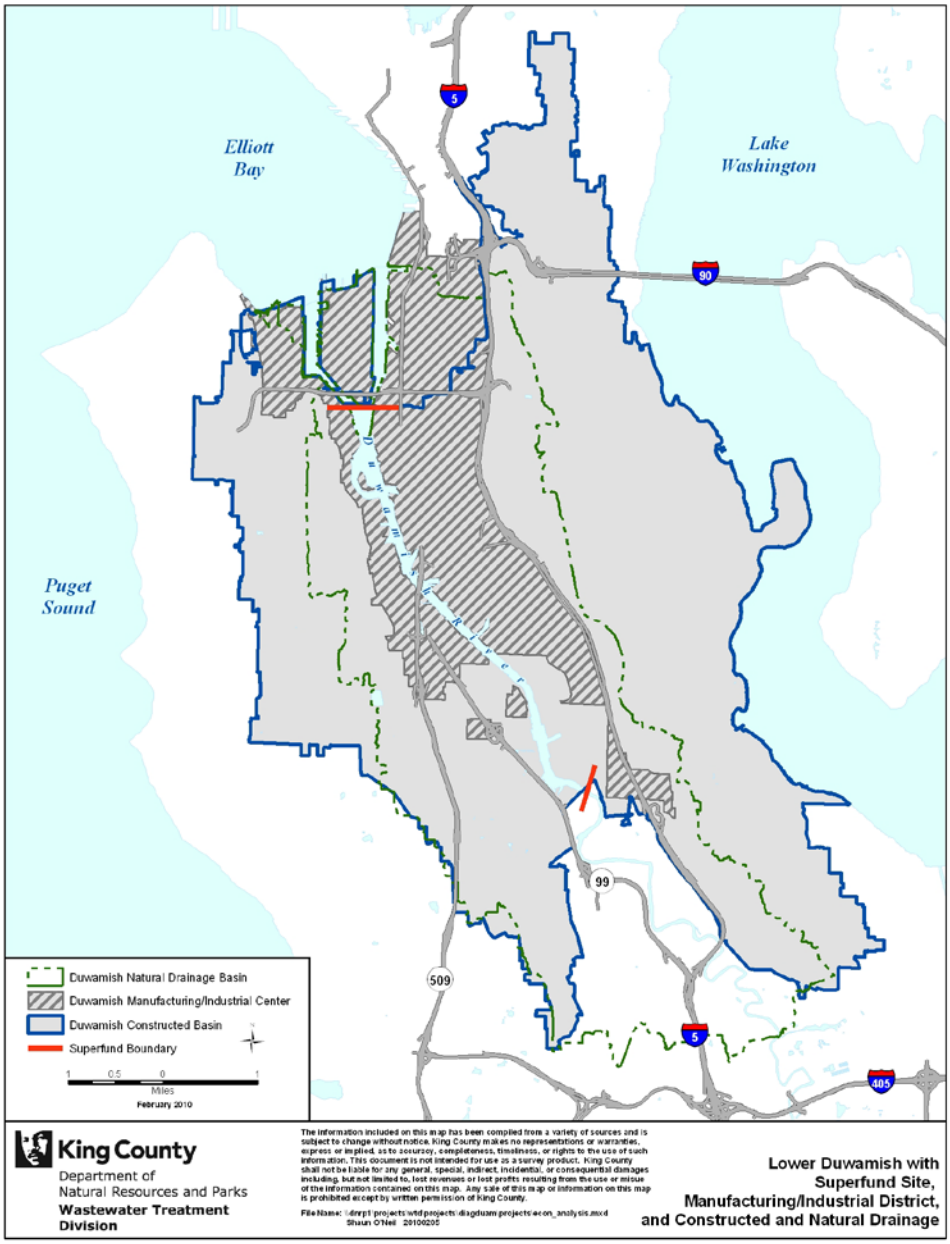
[4] Alterantive 1 is not included in this analysis because the participating agencies have already committed to fund the activities in this alternative. Alternative 1 cannot be compared with the other 11 alterantives because the activities in Alterantive 1 are different than the other alterantives.

[5] All dollar amounts are presented in 2010 dollars through this analysis. In the *Appendix I (v.2) Detailed Cost Estimates, Feasibility Study* document AECOM made different assumptions about future costs. For long-term costs (e.g., operations, maintenance, and long-term monitoring) AECOM used a discount rate of 3%. For shorter-term construction capital costs, which are spread out over several years, they presented amounts in 2010 dollars without using a discount rate because construction costs are increasing faster than the rate of return on money invested in the present day.

[6] It was not deemed necessary to redo the estimates because cost figures used here are generally within the error range of the costs of the alternatives presented in the October 2010 Draft Feasibility Study, and cost estimates could change again in the future as alternatives are refined.

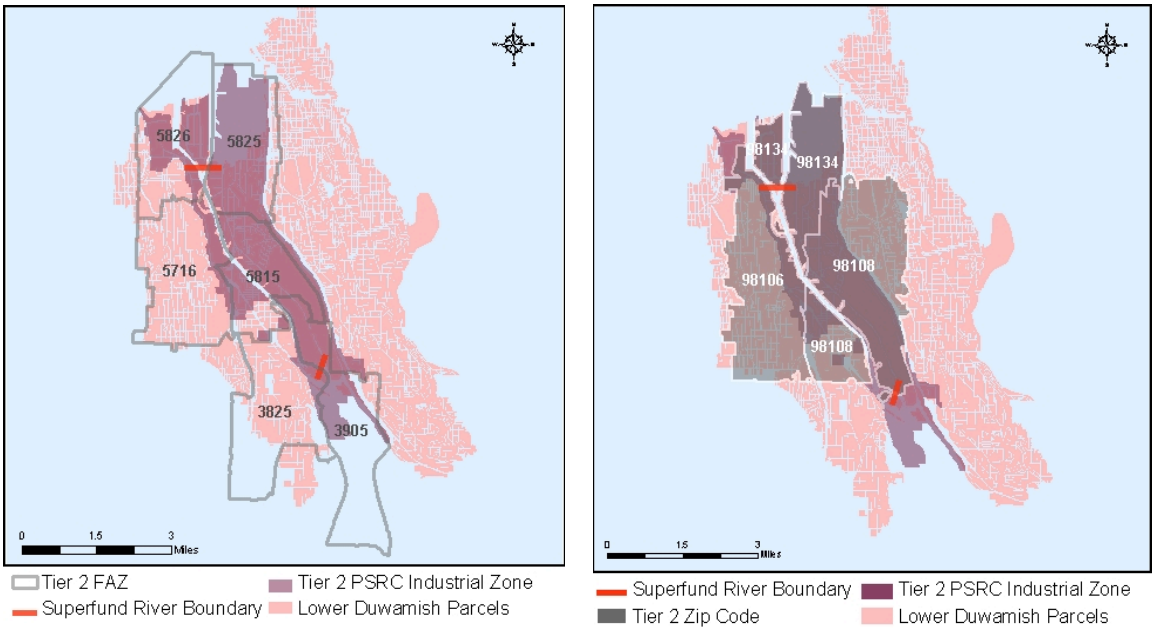
different share of barging will happen in the three geographic areas, depending on which businesses are awarded contracts for the clean-up process.

Figure 1: Lower Duwamish Waterway Superfund Site



The Lower Duwamish Area is the area described in the ECONorthwest "Lower Duwamish Economic Analysis" (dated March 2010) as the Tier 2 Study Area. Figure 2 shows the LDW Area, which includes the boundaries of the PSRC-identified Duwamish Manufacturing/Industrial Center (MIC) and includes some of the natural watershed directly draining to the Superfund site. The zip codes used to characterize the LDW Area covers a 16 square mile area and includes the following zip codes: 98106, 98108, 98134. The area is also identified by forecast analysis zones (FAZ), developed by the PSRC. The FAZs used to characterize the LDW Area are: 3825, 3905, 5716, 5815, 5825, 5826. The FAZ boundaries cover a 24.6 square mile area. Because of land use patterns and zoning, most of the economic activity is located closer to the Waterway.

Figure 2: Lower Duwamish Area (Tier 2) Designated Study Area—The Duwamish Manufacturing/Industrial Center; Figure on Left Overlaid with FAZs; Figure on Right Overlaid with Zip Codes



RESULTS SUMMARY

Table 1 shows a summary of the estimated costs (millions of dollars), total economic outputs, personal income, and jobs for the entire duration of the project for each of the alternative clean-up scenarios for the Lower Duwamish Superfund Site at three geographic levels: King County, Seattle, and the Lower Duwamish Waterway (LDW) Area.

The magnitude of the economic impacts of the clean-up vary depending on the geographic area and the clean-up alternative. Table 1 shows:

- **King County.** The economic outputs of the alternatives associated with clean-up activities are estimated to range from: $251 million to $1,593 million in King County, depending on the clean-up scenario.[7] The clean-up may generate personal income of between $99 million to $616 million over the entire length of the clean-up effort.
- **City of Seattle.** About 80% of the economic outputs in King County are estimated to occur in the City of Seattle, ranging from $202 million to $1,241. The clean-up is estimated to generate personal income of between $83 million to $505 million over the entire length of the clean-up effort.
- **LDW Area.** About one-quarter of the economic output generated in King County is estimated to occur within the LDW Area, ranging from $60 to $403 million. The clean-up is estimated to generate personal income of between $23 million to $151 million over the entire length of the clean-up effort.

[7] The October 2010 "Draft Final Feasibility Study" presents revised cost estimates for each scenario. The largest increase was for Alternative 3 Combined (a 9% increase to $18.5 million) and the largest decrease was Alternative 6 Removal (a 1% decrease of $14.0 million).

Table 1: Cost and Total Economic Outputs of Clean-up Activities Associated with the Lower Duwamish Superfund Site over the Entire Construction and Restoration Periods, King County, Seattle, and the LDW Area

Scenario	Cost* (millions of dollars)	Total Economic Outputs (millions of dollars)			Total Personal Income (millions of dollars)		
		King County	Seattle	LDW Area	King County	Seattle	LDW Area
Alt. 2 Removal with CAD	$213.2	$251	$202	$64	$99	$83	$24
Alt. 2 Removal	$196.6	$266	$208	$62	$104	$86	$24
Alt. 3 Combined	$202.9	$254	$200	$60	$100	$83	$23
Alt. 3 Removal	$276.1	$344	$269	$83	$134	$110	$31
Alt. 4 Combined	$280.5	$352	$277	$87	$138	$114	$33
Alt. 4 Removal	$441.7	$550	$430	$138	$214	$176	$52
Alt. 5 Combined	$299.3	$377	$297	$93	$148	$122	$36
Alt. 5 Removal	$560.2	$697	$545	$176	$270	$222	$66
Alt. 5 Removal Treatment	$614.6	$817	$626	$270	$312	$252	$97
Alt. 6 Combined	$620.9	$777	$611	$195	$303	$250	$74
Alt. 6 Removal	$1,284.2	$1,593	$1,241	$403	$616	$505	$151

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
*Note: Approximate costs does not include the cost of an $80,000 barge liner.
*Note: The October 2010 "Draft Final Feasibility Study" presents revised cost estimates for each scenario. The largest increase was for Alternative 3 Combined (a 9% increase to $18.5 million) and the largest decrease was Alternative 6 Removal (a 1% decrease of $14.0 million).
Note: Amounts are presented in 2010 dollars.

Table 2 shows the time period of each scenario and the annual economic output and annual personal income resulting from each scenario. The annual economic output and personal income was calculated based on the construction period for the alternative because about nearly all spending will occur during construction. Table 2 shows that, in general, alternatives with shorter construction time periods (e.g., Alternative 2) have larger annual economic output and personal income impacts than scenarios with longer construction periods (e.g., Alternative 6).

Table 2 shows:

- **King County.** The annual economic outputs of the clean-up activities range from: $35 million to $66 million annually in King County, accounting for less than 1% of King County's annual economic output. The clean-up may generate personal income of between $14 million to $25 million annually, accounting for less than 1% of personal income in King County each year. While the absolute spending on the clean-up is very large, the impact of the clean-up activity on an annual basis relative to King County's entire economy is relatively small.

  The primary reasons for cleaning up the Superfund site are improving environmental quality and providing certainty to businesses that may make investments in the LDW Area. The LDW Area plays an important role in the regional economy, with about one-quarter of Manufacturing and Transportation and Warehousing employment located in the LDW Area. Continued growth in the regional economy depends, in part, on continued investment by business in the LDW Area.

- **City of Seattle.** The annual economic outputs of the clean-up activities range from: $28 million to $52 million annually in Seattle, accounting for 1% of Seattle's annual economic output. The clean-up may generate personal income of between $11 million to $21 million annually, accounting for less than 1% of personal income in Seattle each year.
- **LDW Area.** The annual economic outputs of the clean-up activities range from: $9 million to $16 million annually in the LDW Area, accounting for less that 1% of the Area's annual economic output. The clean-up may generate personal income of between $3 million to $6 million annually, accounting for less than 1% of personal income in the Area each year.

Table 2: Annual Economic Output and Annual Personal Income from Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area

	Time (Years)		Annual Economic Output (millions of dollars)			Annual Personal Income (millions of dollars)		
Scenario	Constr-uction	Rest-oration	King County	Seattle	LDW Area	King County	Seattle	LDW Area
Alt. 2 Removal with CAD	3.9	25	$63	$50	$16	$25	$21	$6
Alt. 2 Removal	3.9	25	$66	$52	$16	$26	$21	$6
Alt. 3 Combined	3.7	25	$64	$50	$15	$25	$21	$6
Alt. 3 Removal	6.5	25	$49	$38	$12	$19	$16	$4
Alt. 4 Combined	7.1	20	$50	$40	$12	$20	$16	$5
Alt. 4 Removal	13	20	$42	$33	$11	$16	$14	$4
Alt. 5 Combined	7.7	20	$47	$37	$12	$18	$15	$4
Alt. 5 Removal	19	20	$37	$29	$9	$14	$12	$3
Alt. 5 Removal Treatment	19	20	$43	$33	$14	$16	$13	$5
Alt. 6 Combined	22	20	$35	$28	$9	$14	$11	$3
Alt. 6 Removal	45	20	$35	$28	$9	$14	$11	$3

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

In most studies, jobs are described as full-time equivalent (FTE) or a combination of full-time and part-time jobs. Jobs are typically classified as:

- **Full-time jobs** are equal to 260 working days per year (or 2080 hours per year), averaging a 40 hour work week. A full-time job is often referred to as an FTE.
- **Part-time jobs** are less than 8 hours per day or 40 hours per week. A part-time job could be last for a full year or part of a year.

The seasonal nature of this project creates some ambiguity about how to describe jobs. This analysis describes jobs in the following ways:

- **Full-year jobs** are jobs with 260 working days per year, averaging a 40 hour work week.

- **Part-year jobs** are jobs with fewer than 260 working days per year, averaging a 40 hour work week.

In this analysis, jobs are generally shown as full-year jobs (i.e., typically working 260 days per year or 2080 hours per year), as they are in Table 3. Since the construction period for the project is from October 1 through February 15, many, if not all, of the clean-up related jobs will be part-year jobs (i.e., be for less than 2080 hours per year) averaging a 40 hour work week. The actual number of part-year jobs generated per year is likely to be about two to three times the number of full-year jobs shown in Table 3 (because there are only 88 working days in the construction period), as shown in Table 4.

Table 3 shows the total and annual number of jobs associated with clean-up of the Superfund Site. The average annual number of jobs was calculated based on the construction period for each scenario. Alternatives with a shorter construction period will, generally speaking, produce more jobs annually than alternatives with a longer construction period. As a result, some of the higher cost alternatives (with a longer construction period) may produce a smaller annualized impact, but over a longer period. Also, note that the construction phase of the project will not begin, and few jobs will be created, until five years after the "Record of Decision" is signed by the Environmental Protection Agency (EPA).

Table 3 shows an estimate of full-year jobs, both for the entire project period and on an annual basis during the construction period:

- **King County.** The estimated number of full-year jobs over the entire project ranges from an average of 200 to 380 jobs per year. The number of jobs associated with clean-up of the LDW is a small fraction of the approximately 1 million jobs in King County.[8]
- **City of Seattle.** The estimated number of full-year jobs in Seattle over the entire length of the project is estimated to range from an average of 160 to 310 full-year jobs per year. The number of jobs associated with clean-up of the LDW is a small fraction of the approximately 600,000 jobs in the City of Seattle.[9]
- **LDW Area.** The estimated number of jobs in the LDW Area over the length of the entire project is estimated to range from 50 to 95 full-year jobs per year, depending on the alternative. The number of jobs associated with clean-up of the LDW is a small fraction of the approximately 106,000 jobs in the LDW Area.[10]
- **Total jobs for the entire project.** The total number of full-year jobs over the length of the entire project varies from about 1,450 full-year jobs to nearly 9,000 full-year jobs in King County.

[8] The number of jobs in King County is based on jobs reported by the Washington State Employment Security Department.

[9] The number of jobs in the LDW Area is based on Puget Sound Regional Council data about jobs by forecast analysis zones that were used to define the LDW area.

[10] The number of jobs in the LDW Area is based on Puget Sound Regional Council data about jobs by forecast analysis zone.

Table 3: Total Full-Year Jobs and Annual Full-Year Jobs from Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area

	Time (Years)		Estimated Total Full-Year Jobs (Entire Project)			Average Annual Full Year Jobs (During Construction)		
Scenario	Constr-uction	Rest-oration	King County	Seattle	LDW Area	King County	Seattle	LDW Area
Alt. 2 Removal with CAD	3.9	25	1,446	1,208	375	362	302	94
Alt. 2 Removal	3.9	25	1,516	1,242	364	379	311	91
Alt. 3 Combined	3.7	25	1,458	1,198	352	364	300	88
Alt. 3 Removal	6.5	25	1,956	1,600	484	279	229	69
Alt. 4 Combined	7.1	20	2,017	1,657	511	288	237	73
Alt. 4 Removal	13	20	3,119	2,548	804	240	196	62
Alt. 5 Combined	7.7	20	2,157	1,775	551	270	222	69
Alt. 5 Removal	19	20	3,946	3,221	1,028	208	170	54
Alt. 5 Removal Treatment	19	20	4,551	3,640	1,471	240	192	77
Alt. 6 Combined	22	20	4,429	3,632	1,149	201	165	52
Alt. 6 Removal	45	20	8,984	7,314	2,350	200	163	52

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

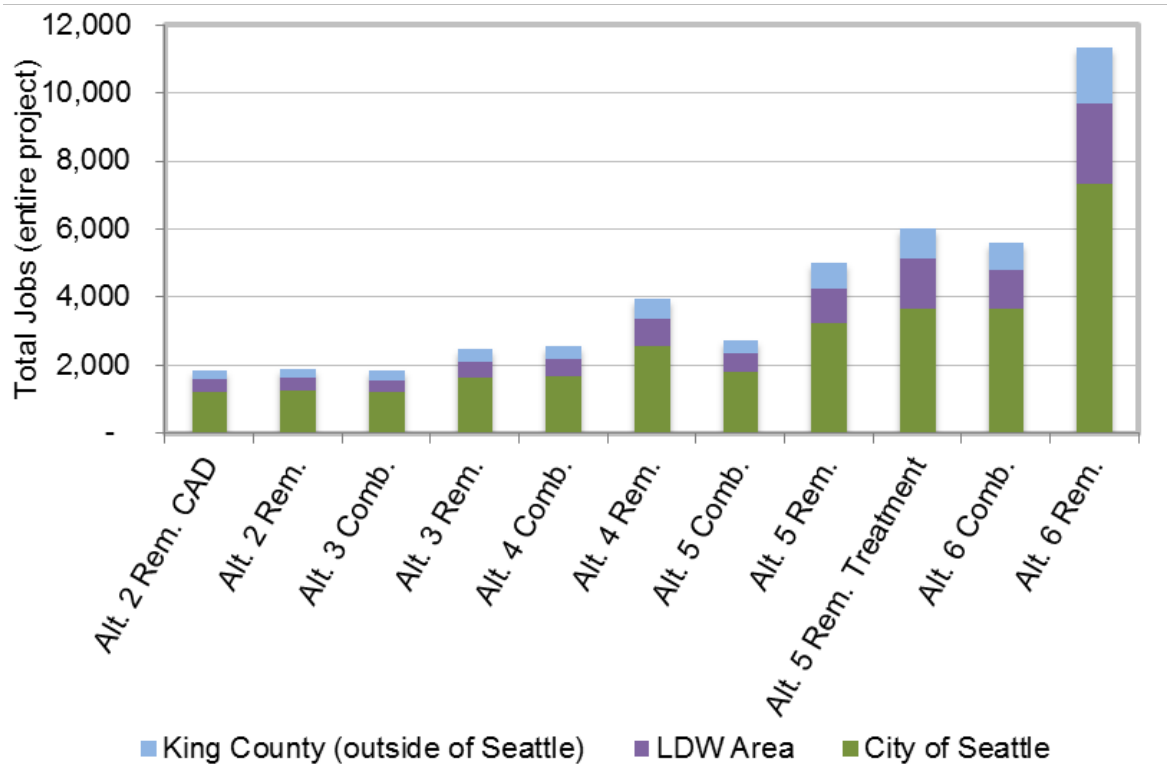
Note: The October 2010 "Draft Final Feasibility Study" presents revised cost estimates for each scenario. The largest increase was for Alternative 3 Combined (a 9% increase to $18.5 million) and the largest decrease was Alternative 6 Removal (a 1% decrease of $14.0 million). This change results in a slight change to the numbers presented in Table 3. For King County, it resulted an increase 148 total full-year jobs or 37 annual full-year jobs for Alternative 3 Combined. For Alternative 6 Removal, this change resulted in a decrease of 112 full-year jobs or 2 annual full-year jobs.

Figure 3 shows the estimated number of full-year jobs for the entire project in each scenario for the City of Seattle, LDW Area, and areas of King County that are outside of the City of Seattle. Figure 4 shows the estimated number of full-year jobs on an annual basis in each scenario for the same three geographic areas.

- **Total jobs, entire construction period**. Figure 3 shows that the total number of jobs is lowest in scenarios with the lowest overall spending (e.g., Alternatives 2 and 3). The total number of jobs created is highest for scenarios with higher spending (e.g., Alternative 6 Removal).

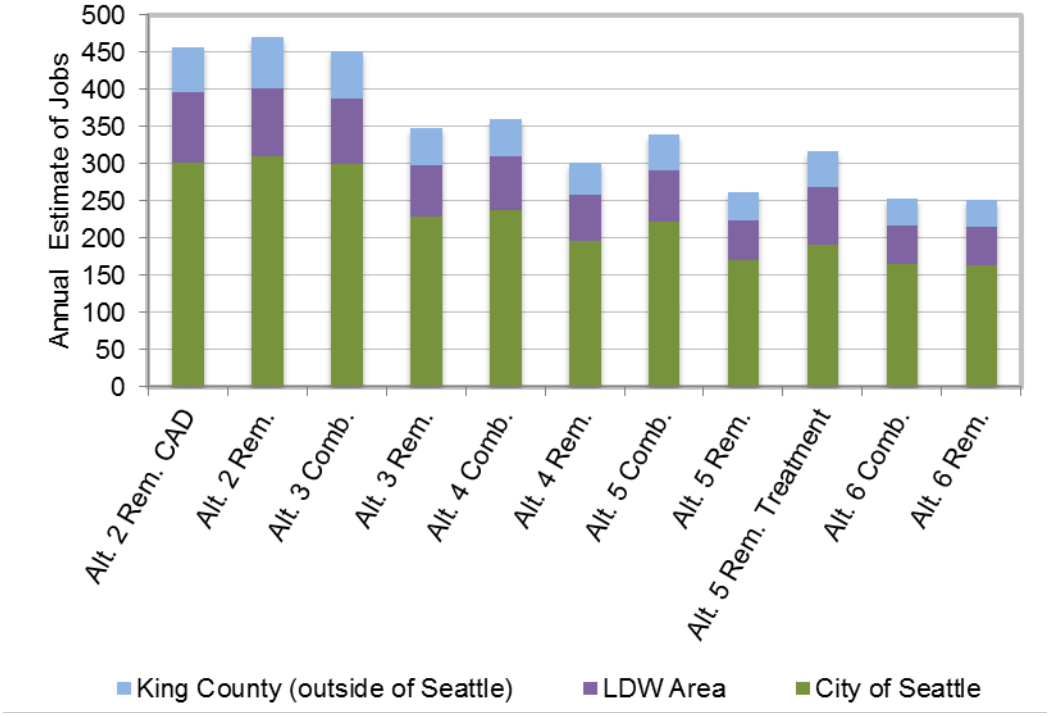
- **Annual jobs.** Figure 4 shows that scenarios with a shorter construction periods (e.g., Alternatives 2 and 3) result in the largest number of jobs on an annual basis. Scenarios with longer construction periods (e.g., Alternative 6 Removal) result in smaller number of jobs on an annual basis.

Figure 3: Total Full-Year Jobs from Clean-up Activities Associated with the Lower Duwamish Superfund Site, City of Seattle, the LDW Area, and King County outside of Seattle



Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Figure 4: Estimated Annual Full-Year Jobs from Clean-up Activities Associated with the Lower Duwamish Superfund Site, City of Seattle, the LDW Area, and King County outside of Seattle



Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Table 4 shows an estimate of the average annual estimate of the number of full-year and part-year jobs during the construction window for each area and clean-up alternative. The number of part-year jobs is estimated by multiply the full-year jobs by 2.5, which converts from full-year to part-year jobs. The number of part-year jobs gives a sense of the number of people who may be employed annually to work on the clean-up project.

Table 4: Estimated Annual Full-Year and Part-Year Jobs from Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area

	Time (Years)		Average Annual Full-Year Jobs (During Construction)			Approximate Part-Year Jobs During the Construction Window		
Scenario	Constr-uction	Rest-oration	King County	City of Seattle	LDW Area	King County	City of Seattle	LDW Area
Alt. 2 Removal with CAD	3.9	25	362	302	94	910	760	240
Alt. 2 Removal	3.9	25	379	311	91	950	780	230
Alt. 3 Combined	3.7	25	364	300	88	910	750	220
Alt. 3 Removal	6.5	25	279	229	69	700	570	170
Alt. 4 Combined	7.1	20	288	237	73	720	590	180
Alt. 4 Removal	13	20	240	196	62	600	490	160
Alt. 5 Combined	7.7	20	270	222	69	680	560	170
Alt. 5 Removal	19	20	208	170	54	520	430	140
Alt. 5 Removal Treatment	19	20	240	192	77	600	480	190
Alt. 6 Combined	22	20	201	165	52	500	410	130
Alt. 6 Removal	45	20	200	163	52	500	410	130

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The approximate number of jobs during the construction window was calculated by multiplying the average annual jobs by 2.5 and rounded to the nearest 10. For example, the average number of jobs per year from Alternative 2 Removal with CAD is 362, which was multiplied by 2.5 and rounded to result in about 910 jobs per year.

The types of jobs resulting from clean-up spending varies somewhat among the clean-up scenarios and among the three areas. In King County, the jobs are in the following industries: 50% in services (e.g., environmental consulting, surveying, or food services and accommodations); 25% in construction; 10% in transportation, 8% in government, and 7% in other industries. Figure A-1 in Appendix A shows a breakdown of jobs by industry for all three geographic areas.

One way to evaluate the impact of spending on job creation is to evaluate the amount spent per job created. The clean-up of the LDW Area is an example of non-residential construction. [11] In King County, every $1 million spent on non-residential construction (e.g., road and bridge construction or office building construction) creates 5.9 jobs. The cost per job is $170,000, including costs for labor (e.g., wages), equipment, and materials.

Table 5 shows clean-up spending per job created from clean-up activities. The amount spent on clean-up activities in King County averages about $140,000 per job (7.1 jobs per $1 million spent). One reason that spending per job is lower for clean-up of the LDW is that the materials used in the clean-up are less costly than for other non-residential construction. Typical non-residential construction uses a combination of low cost materials (e.g., gravel, sand, or dry wall)

[11] Note: most of the activities associated with the clean-up of the Lower Duwamish Superfund site would be conducted by firms within the non-residential construction sector.

and higher cost materials (e.g., windows or carpets). The principal materials in the clean-up are largely low cost items, such as gravel or sand.

The average spending for non-residential construction in King County is about $170,000 per job. In the LDW Area the spending per job is around $550,000 for most alternatives, except for Alternative 5 Removal Treatment, which includes more waste remediation that would occur in the LDW Area.

Table 5: Spending per Job Created from Clean-up Activities Associated with the Lower Duwamish Superfund Site over the 4 to 45 year construction period, King County, Seattle, and the LDW Area

	Total Jobs over the construction period			Spending per Full-Year Job Created		
Scenario	King County	Seattle	LDW Area	King County	Seattle	LDW Area
Alt. 2 Removal with CAD	1,446	1,208	375	$136,000	$163,000	$525,000
Alt. 2 Removal	1,516	1,242	364	$141,000	$172,000	$585,000
Alt. 3 Combined	1,458	1,198	352	$139,000	$169,000	$576,000
Alt. 3 Removal	1,956	1,600	484	$141,000	$172,000	$570,000
Alt. 4 Combined	2,017	1,657	511	$139,000	$169,000	$549,000
Alt. 4 Removal	3,119	2,548	804	$142,000	$173,000	$549,000
Alt. 5 Combined	2,157	1,775	551	$139,000	$169,000	$543,000
Alt. 5 Removal	3,946	3,221	1,028	$142,000	$174,000	$545,000
Alt. 5 Removal Treatment	4,551	3,640	1,471	$135,000	$169,000	$418,000
Alt. 6 Combined	4,429	3,632	1,149	$140,000	$171,000	$540,000
Alt. 6 Removal	8,984	7,314	2,350	$143,000	$176,000	$547,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

One of the questions that this analysis seeks to answer is how many of the jobs created by clean-up of the Superfund site are "green jobs?" There is no standard definition or tracking of green jobs. The State of Oregon defines green jobs as a job that increases environmental quality through increasing energy efficiency, producing renewable energy, preventing or mitigating environmental degradation, or cleaning up and restoring the natural environment.

About half of the jobs shown in Table 5 can be classified as "green jobs" because they are associated with cleaning up and restoring the natural environment, such as construction, dredging, and environmental consulting jobs. Many of these jobs already exist in the King County economy and the proposed activities (e.g., monitoring or planting native species) are similar to activities done at other Superfund sites.

APPENDIX A: DETAILED RESULTS FOR EACH ALTERNATIVE

Appendix A presents detailed results for each of the eleven alternatives described in the body of the report. The appendix is organized by alternative, beginning with Alternative 2 Removal. Some background information (e.g., about occupations or green jobs) is presented with Alternative 2 that is not repeated in each section.

Alternative 2 Removal

Table A-1 shows spending assumptions by industry sector for "Alternative 2 Removal" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 2 Removal is approximately four years.

Table A-1: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 2 Removal

		Regional Spending		
Industry Sector and Description	Total Direct Spending	King County	City of Seattle	LDW Area
Construction	$62,000,000	$56,000,000	$50,000,000	$20,000,000
Rail transportation	$17,000,000	$13,000,000	$8,000,000	$0
Water transportation	$12,000,000	$8,000,000	$7,000,000	$3,000,000
Motor transportation	$11,000,000	$11,000,000	$11,000,000	$3,000,000
Architectural and engineering services	$12,000,000	$12,000,000	$9,000,000	$1,000,000
Environmental services	$50,000,000	$28,000,000	$28,000,000	$5,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$34,000,000	$20,000,000	$3,000,000	$3,000,000
State and local govt (noneducation)	$11,000,000	$11,000,000	$11,000,000	$0
Total	**$213,000,000**	**$162,000,000**	**$130,000,000**	**$35,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $231 million, an increase of $18 million or 8%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Spending and employment for clean-up activities are reported by industry sector but people often think of employment by occupation. The list below provides examples of occupations within the industry sector. This list is intended to be illustrative, not comprehensive.

- Construction: dredge operators, demolition experts, operators of heavy machinery, and construction managers and administrators
- Rail transportation: operators of machinery transload machinery or train operators
- Water transportation: barge and tug boat operators and crew, operators of barge and tug machinery, or operators of transload machinery
- Motor transportation: truck drivers or operators of transload machinery
- Architectural and engineering services: engineers, laboratory technicians, mapping and survey technicians, or engineering managers and administrators

- Environmental services: scientists, engineers, project managers, planners, managers, and administrators
- Public relations: public relations consultants
- Waste management and remediation services: hazardous waste technicians or landfill operators
- State and local government: scientists, technicians, planners, project managers, managers, and administrators

Table A-2 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 2 Removal clean-up activities. Major clean-up activities are assumed to occur over the four-year construction period.

Table A-2: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 2 Removal

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$166,000,000	$46,000,000	$53,000,000	$265,000,000
Personal Income	$68,000,000	$18,000,000	$17,000,000	$103,000,000
Total Full-Year Jobs (entire construction period)	937	269	310	1,516
Spending Per Job Created				$141,000
City of Seattle				
Output	$130,000,000	$34,000,000	$43,000,000	$207,000,000
Personal Income	$57,000,000	$14,000,000	$15,000,000	$86,000,000
Total Full-Year Jobs (entire construction period)	775	207	260	1,242
Spending Per Job Created				$172,000
LDW Area				
Output	$39,000,000	$11,000,000	$12,000,000	$62,000,000
Personal Income	$15,000,000	$4,000,000	$4,000,000	$23,000,000
Total Full-Year Jobs (entire construction period)	229	65	70	364
Spending Per Job Created				$585,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $231 million, an increase of $18 million or 9%. This results in an increase in the number of total jobs in King County of about 144 full-year jobs over the entire construction period.

Table A-3 shows the distribution of total full-year jobs resulting from clean-up activities associated with Alternative 2 Removal.

Table A-3: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 2 Removal

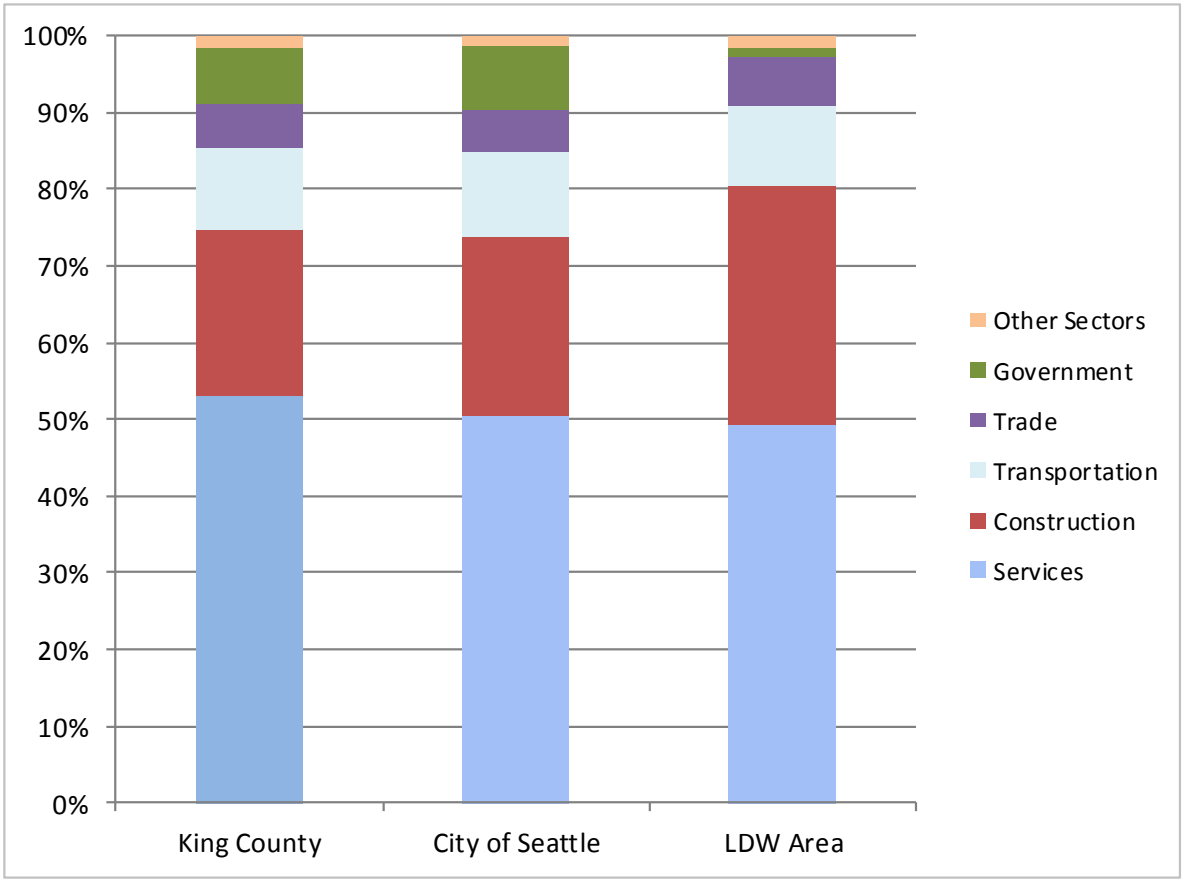
	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	2	0	1	0	0
Utilities	0	1	0	0	0	0
Construction	324	332	285	292	113	114
Manufacturing	0	18	0	13	0	5
Trade	1	91	1	68	0	23
Transportation	117	159	107	137	28	38
Services	405	803	293	626	88	179
Government	89	110	89	105	0	5
Total	**937**	**1,516**	**775**	**1,242**	**229**	**364**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Figure A-1 shows the relative share of total full-year jobs (Table A-3) by industry sector for King County, Seattle, and the LDW Area.

Figure A-1: Estimated Distribution of Total Jobs by Industry Sector, King County, Seattle, and the LDW Area for Alternative 2 Removal



Source: ECONorthwest analysis of BLM and outfitter survey data

Table A-4 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 2 Removal, over the entire project period. Green jobs are defined by the Oregon House Bill 3300 as a job that provides a service or produces a product that:

1. Increases energy efficiency;
2. Produces renewable energy;
3. Prevents, reduces or mitigates environmental degradation;
4. Cleans up and restores the natural environment; or
5. Provides education, consultation, policy promotion, accreditation, trading and offsets, or similar supporting services for any of the activities in categories 1 through 4.

Table A-4: Estimated Green Jobs (Full-Year) by Industry for the Alternative 2 Removal over the entire construction period, King County, Seattle, and the LDW Area for Alternative 2 Removal

Green jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	324	285	113
Transportation	117	107	28
Engineering services	85	75	9
Environmental services	181	188	32
Waste management and remediation services	86	14	14
Total	**793**	**670**	**195**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 2 Removal with CAD

Table A-5 shows spending assumptions by industry sector for "Alternative 2 Removal with CAD" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 2 removal is approximately four years.

Table A-5: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 2 Removal with CAD

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$69,000,000	$63,000,000	$56,000,000	$22,000,000
Rail transportation	$10,000,000	$8,000,000	$5,000,000	$0
Water transportation	$14,000,000	$8,000,000	$7,000,000	$3,000,000
Motor transportation	$7,000,000	$7,000,000	$7,000,000	$2,000,000
Architectural and engineering services	$12,000,000	$12,000,000	$9,000,000	$1,000,000
Environmental services	$46,000,000	$26,000,000	$26,000,000	$5,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$24,000,000	$15,000,000	$4,000,000	$4,000,000
State and local govt (noneducation)	$10,000,000	$10,000,000	$10,000,000	$0
Total	**$197,000,000**	**$152,000,000**	**$126,000,000**	**$36,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $206 million, an increase of $9 million or 5%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-6 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 2 Removal with CAD clean-up activities. Major clean-up activities are assumed to occur over the four-year construction period.

Table A-6: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 2 Removal with CAD

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$156,000,000	$44,000,000	$51,000,000	$251,000,000
Personal Income	$65,000,000	$17,000,000	$16,000,000	$98,000,000
Total Full-Year Jobs (entire construction period)	897	253	296	1,446
Spending Per Job Created				$136,000
City of Seattle				
Output	$126,000,000	$33,000,000	$42,000,000	$201,000,000
Personal Income	$56,000,000	$14,000,000	$14,000,000	$84,000,000
Total Full-Year Jobs (entire construction period)	754	201	253	1,208
Spending Per Job Created				$163,000
LDW Area				
Output	$40,000,000	$12,000,000	$12,000,000	$64,000,000
Personal Income	$16,000,000	$5,000,000	$4,000,000	$25,000,000
Total Full-Year Jobs (entire construction period)	236	66	73	375
Spending Per Job Created				$525,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $206 million, an increase of $9 million or 5%. This results in an increase in the number of total jobs in King County of about 73 full-year jobs over the entire construction period.

Table A-7 shows the distribution of jobs resulting from clean-up activities associated with Alternative 2 Removal with CAD.

Table A-7: Estimated Distribution of Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 2 Removal with CAD

Aggregate Industry Sector	King County		City of Seattle		LDW Area	
	Direct	Total	Direct	Total	Direct	Total
Natural resources	0	2	0	1	0	0
Utilities	0	1	0	0	0	0
Construction	361	368	318	323	125	126
Manufacturing	0	18	0	13	0	5
Trade	1	88	1	67	1	24
Transportation	76	112	68	95	18	28
Services	379	757	286	612	92	186
Government	81	100	81	96	0	5
Total	**897**	**1,446**	**754**	**1,208**	**236**	**375**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-8 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 2 Removal with CAD, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-8: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 2 Removal with CAD

Green jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	361	318	125
Transportation	76	68	18
Engineering services	85	75	9
Environmental services	168	175	30
Waste management and remediation services	67	19	16
Total	**757**	**655**	**198**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 3 Combined

Table A-9 shows spending assumptions by industry sector for "Alternative 3 Combined" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 3 Combined is approximately four years.

Table A-9: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 3 Combined

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$62,000,000	$56,000,000	$50,000,000	$19,000,000
Rail transportation	$15,000,000	$12,000,000	$8,000,000	$0
Water transportation	$11,000,000	$7,000,000	$6,000,000	$2,000,000
Motor transportation	$10,000,000	$10,000,000	$10,000,000	$3,000,000
Architectural and engineering services	$12,000,000	$11,000,000	$9,000,000	$1,000,000
Environmental services	$47,000,000	$27,000,000	$27,000,000	$5,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$30,000,000	$18,000,000	$3,000,000	$3,000,000
State and local govt (noneducation)	$10,000,000	$10,000,000	$10,000,000	$0
Total	**$203,000,000**	**$155,000,000**	**$125,000,000**	**$33,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $221 million, an increase of $18 million or 9%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-10 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 3 Combined clean-up activities. Major clean-up activities are assumed to occur over the four-year construction period.

Table A-10: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 3 Combined

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$159,000,000	$44,000,000	$51,000,000	$254,000,000
Personal Income	$66,000,000	$17,000,000	$17,000,000	$100,000,000
Total Full-Year Jobs (entire construction period)	903	257	298	1,458
Spending Per Job Created				$139,000
City of Seattle				
Output	$125,000,000	$33,000,000	$42,000,000	$200,000,000
Personal Income	$55,000,000	$13,000,000	$14,000,000	$82,000,000
Total Full-Year Jobs (entire construction period)	749	199	251	1,198
Spending Per Job Created				$169,000
LDW Area				
Output	$37,000,000	$11,000,000	$12,000,000	$60,000,000
Personal Income	$15,000,000	$4,000,000	$4,000,000	$23,000,000
Total Full-Year Jobs (entire construction period)	222	62	68	352
Spending Per Job Created				$576,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $221 million, an increase of $18 million or 9%. This results in an increase in the number of total jobs in King County of about 148 full-year jobs over the entire construction period.

Table A-11 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 3 Combined.

Table A-11: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 3 Combined

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	2	0	1	0	0
Utilities	0	1	0	0	0	0
Construction	322	330	284	290	112	113
Manufacturing	0	18	0	12	0	4
Trade	1	88	1	66	0	22
Transportation	107	145	98	126	25	35
Services	388	770	282	604	85	173
Government	84	104	84	100	0	5
Total	**903**	**1,458**	**749**	**1,198**	**222**	**352**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-12 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 3 Combined, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-12: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 3 Combined

Green jobs (over the entire project)	King County	Seattle	Tier 2
Construction	322	284	112
Transportation	107	98	25
Engineering services	84	74	9
Environmental services	173	180	31
Waste management and remediation services	77	12	12
Total	**763**	**648**	**188**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 3 Removal

Table A-13 shows spending assumptions by industry sector for "Alternative 3 Removal" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 3 Removal is approximately six and one-half years.

Table A-13: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 3 Removal

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$84,000,000	$76,000,000	$68,000,000	$27,000,000
Rail transportation	$22,000,000	$16,000,000	$11,000,000	$0
Water transportation	$16,000,000	$11,000,000	$9,000,000	$3,000,000
Motor transportation	$15,000,000	$15,000,000	$15,000,000	$4,000,000
Architectural and engineering services	$12,000,000	$12,000,000	$10,000,000	$1,000,000
Environmental services	$63,000,000	$35,000,000	$35,000,000	$6,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$44,000,000	$26,000,000	$4,000,000	$4,000,000
State and local govt (noneducation)	$14,000,000	$14,000,000	$14,000,000	$0
Total	**$276,000,000**	**$210,000,000**	**$169,000,000**	**$46,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $292 million, an increase of $16 million or 6%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-14 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 3 Removal clean-up activities. Major clean-up activities are assumed to occur over the six-and-one-half-year construction period.

Table A-14: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 3 Removal

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$215,000,000	$60,000,000	$68,000,000	$343,000,000
Personal Income	$88,000,000	$23,000,000	$22,000,000	$133,000,000
Total Full-Year Jobs (entire construction period)	1,209	347	400	1,956
Spending Per Job Created				$141,000
City of Seattle				
Output	$168,000,000	$44,000,000	$56,000,000	$268,000,000
Personal Income	$74,000,000	$18,000,000	$19,000,000	$111,000,000
Total Full-Year Jobs (entire construction period)	998	266	336	1,600
Spending Per Job Created				$172,000
LDW Area				
Output	$52,000,000	$15,000,000	$16,000,000	$83,000,000
Personal Income	$20,000,000	$6,000,000	$5,000,000	$31,000,000
Total Full-Year Jobs (entire construction period)	305	86	93	484
Spending Per Job Created				$570,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $292 million, an increase of $16 million or 6% This results in an increase in the number of total jobs in King County of about 129 full-year jobs over the entire construction period.

Table A-15 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 3 Removal.

Table A-15: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 3 Removal

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	2	0	1	0	1
Utilities	0	1	0	0	0	0
Construction	440	451	388	396	154	156
Manufacturing	0	24	0	16	0	6
Trade	1	119	1	89	1	30
Transportation	154	208	141	180	36	50
Services	494	1,006	351	779	114	234
Government	119	146	118	139	0	7
Total	**1,209**	**1,956**	**998**	**1,600**	**305**	**484**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-16 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 3 Removal, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-16: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 3 Removal

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	440	388	154
Transportation	154	141	36
Engineering services	87	77	9
Environmental services	230	240	41
Waste management and remediation services	113	19	18
Total	**1,024**	**863**	**259**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 4 Combined

Table A-17 shows spending assumptions by industry sector for "Alternative 4 Combined" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 4 Combined is approximately seven years.

Table A-17: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 4 Combined

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$94,000,000	$85,000,000	$76,000,000	$30,000,000
Rail transportation	$21,000,000	$16,000,000	$11,000,000	$0
Water transportation	$14,000,000	$10,000,000	$8,000,000	$3,000,000
Motor transportation	$14,000,000	$14,000,000	$14,000,000	$4,000,000
Architectural and engineering services	$12,000,000	$11,000,000	$9,000,000	$1,000,000
Environmental services	$64,000,000	$36,000,000	$36,000,000	$6,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$42,000,000	$24,000,000	$4,000,000	$4,000,000
State and local govt (noneducation)	$15,000,000	$15,000,000	$15,000,000	$0
Total	**$280,000,000**	**$214,000,000**	**$174,000,000**	**$48,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $293 million, an increase of $13 million or 4%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-18 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 4 Combined clean-up activities. Major clean-up activities are assumed to occur over the seven-year construction period.

Table A-18: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 4 Combined

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$221,000,000	$61,000,000	$70,000,000	$352,000,000
Personal Income	$91,000,000	$24,000,000	$23,000,000	$138,000,000
Total Full-Year Jobs (entire construction period)	1,251	354	412	2,017
Spending Per Job Created				$139,000
City of Seattle				
Output	$174,000,000	$45,000,000	$58,000,000	$277,000,000
Personal Income	$76,000,000	$18,000,000	$20,000,000	$114,000,000
Total Full-Year Jobs (entire construction period)	1,037	273	348	1,657
Spending Per Job Created				$169,000
LDW Area				
Output	$54,000,000	$16,000,000	$17,000,000	$87,000,000
Personal Income	$21,000,000	$6,000,000	$5,000,000	$32,000,000
Total Full-Year Jobs (entire construction period)	323	90	99	511
Spending Per Job Created				$549,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $293 million, an increase of $13 million or 4% This results in an increase in the number of total jobs in King County of about 101 full-year jobs over the entire construction period.

Table A-19 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 4 Combined.

Table A-19: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 4 Combined

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	2	0	1	0	1
Utilities	0	1	0	0	0	0
Construction	488	499	430	438	170	172
Manufacturing	0	25	0	17	0	7
Trade	1	124	1	93	1	32
Transportation	146	199	134	172	35	48
Services	493	1,018	351	792	117	244
Government	122	149	121	142	0	7
Total	**1,251**	**2,017**	**1,037**	**1,657**	**323**	**511**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-20 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 4 Combined, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-20: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 4 Combined

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	488	430	170
Transportation	146	134	35
Engineering services	83	73	9
Environmental services	234	244	42
Waste management and remediation services	106	17	16
Total	**1,057**	**897**	**271**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 4 Removal

Table A-21 shows spending assumptions by industry sector for "Alternative 4 Removal" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 4 Removal is approximately thirteen years.

Table A-21: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 4 Removal

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$144,000,000	$130,000,000	$116,000,000	$46,000,000
Rail transportation	$35,000,000	$27,000,000	$18,000,000	$0
Water transportation	$27,000,000	$18,000,000	$15,000,000	$5,000,000
Motor transportation	$24,000,000	$24,000,000	$24,000,000	$7,000,000
Architectural and engineering services	$12,000,000	$12,000,000	$10,000,000	$1,000,000
Environmental services	$99,000,000	$55,000,000	$55,000,000	$10,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$71,000,000	$42,000,000	$7,000,000	$7,000,000
State and local govt (noneducation)	$24,000,000	$24,000,000	$24,000,000	$0
Total	**$442,000,000**	**$336,000,000**	**$271,000,000**	**$77,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $444 million, an increase of $2 million or less than 1%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-22 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 4 Removal clean-up activities. Major clean-up activities are assumed to occur over the 13-year construction period.

Table A-22: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 4 Removal

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$346,000,000	$95,000,000	$109,000,000	$550,000,000
Personal Income	$141,000,000	$37,000,000	$36,000,000	$214,000,000
Total Full-Year Jobs (entire construction period)	1,929	552	638	3,119
Spending Per Job Created				$142,000
City of Seattle				
Output	$270,000,000	$70,000,000	$90,000,000	$430,000,000
Personal Income	$117,000,000	$28,000,000	$30,000,000	$175,000,000
Total Full-Year Jobs (entire construction period)	1,590	421	537	2,548
Spending Per Job Created				$173,000
LDW Area				
Output	$86,000,000	$25,000,000	$27,000,000	$138,000,000
Personal Income	$33,000,000	$10,000,000	$9,000,000	$52,000,000
Total Full-Year Jobs (entire construction period)	506	143	155	804
Spending Per Job Created				$549,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $444 million, an increase of $2 million or less than 1%.This results in an increase in the number of total jobs in King County of about 17 full-year jobs over the entire construction period.

Table A-23 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 4 Removal.

Table A-23: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 4 Removal

Aggregate Industry Sector	King County		City of Seattle		LDW Area	
	Direct	Total	Direct	Total	Direct	Total
Natural resources	0	4	0	2	0	1
Utilities	0	2	0	1	0	1
Construction	752	770	663	676	265	268
Manufacturing	1	39	0	27	0	10
Trade	2	192	1	144	1	50
Transportation	249	336	227	291	59	82
Services	727	1,538	502	1,179	182	382
Government	198	240	197	230	0	11
Total	**1,929**	**3,119**	**1,590**	**2,548**	**506**	**804**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-24 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 4 Removal, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-24: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 4 Removal

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	752	663	265
Transportation	249	227	59
Engineering services	89	79	9
Environmental services	360	374	64
Waste management and remediation services	184	31	30
Total	**1,633**	**1,374**	**427**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 5 Combined

Table A-25 shows spending assumptions by industry sector for "Alternative 5 Combined" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 5 Combined is approximately eight years.

Table A-25: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 5 Combined

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$102,000,000	$92,000,000	$82,000,000	$32,000,000
Rail transportation	$22,000,000	$17,000,000	$11,000,000	$0
Water transportation	$15,000,000	$10,000,000	$8,000,000	$3,000,000
Motor transportation	$15,000,000	$15,000,000	$15,000,000	$4,000,000
Architectural and engineering services	$12,000,000	$12,000,000	$9,000,000	$1,000,000
Environmental services	$68,000,000	$38,000,000	$38,000,000	$7,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$44, 000,000	$25,000,000	$4,000,000	$4,000,000
State and local govt (noneducation)	$16,000,000	$16,000,000	$16,000,000	$0
Total	**$299,000,000**	**$229,000,000**	**$187,000,000**	**$52,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $314 million, an increase of $14 million or 5%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-26 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 5 Combined clean-up activities. Major clean-up activities are assumed to occur over the eight-year construction period.

Table A-26: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 5 Combined

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$236,000,000	$65,000,000	$75,000,000	$376,000,000
Personal Income	$98,000,000	$25,000,000	$25,000,000	$148,000,000
Total Full-Year Jobs (entire construction period)	1,339	377	441	2,157
Spending Per Job Created				$139,000
City of Seattle				
Output	$186,000,000	$49,000,000	$62,000,000	$297,000,000
Personal Income	$82,000,000	$20,000,000	$21,000,000	$123,000,000
Total Full-Year Jobs (entire construction period)	1,111	291	373	1,775
Spending Per Job Created				$169,000
LDW Area				
Output	$58,000,000	$17,000,000	$18,000,000	$93,000,000
Personal Income	$23,000,000	$7,000,000	$6,000,000	$36,000,000
Total Full-Year Jobs (entire construction period)	349	96	106	551
Spending Per Job Created				$543,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $314 million, an increase of $14 million or 5%..This results in an increase in the number of total jobs in King County of about 115 full-year jobs over the entire construction period.

Table A-27 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 5 Combined.

Table A-27: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 5 Combined

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	2	0	1	0	1
Utilities	0	1	0	0	0	0
Construction	532	544	469	478	186	188
Manufacturing	1	27	0	19	0	7
Trade	1	132	1	100	1	35
Transportation	154	210	141	182	36	51
Services	520	1,081	370	842	126	263
Government	130	159	130	153	0	7
Total	**1,339**	**2,157**	**1,111**	**1,775**	**349**	**551**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-28 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 5 Combined, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-28: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 5 Combined

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	532	469	186
Transportation	154	141	36
Engineering services	85	75	9
Environmental services	249	259	44
Waste management and remediation services	112	17	17
Total	**1,132**	**962**	**292**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 5 Removal

Table A-29 shows spending assumptions by industry sector for "Alternative 5 Removal" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 5 Removal is approximately 19 years.

Table A-29: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 5 Removal

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$185,000,000	$167,000,000	$150,000,000	$59,000,000
Rail transportation	$46,000,000	$34,000,000	$23,000,000	$0
Water transportation	$34,000,000	$23,000,000	$19,000,000	$7,000,000
Motor transportation	$30,000,000	$30,000,000	$30,000,000	$9,000,000
Architectural and engineering services	$13,000,000	$13,000,000	$10,000,000	$1,000,000
Environmental services	$124,000,000	$70,000,000	$70,000,000	$12,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$92,000,000	$54,000,000	$9,000,000	$9,000,000
State and local govt (noneducation)	$31,000,000	$31,000,000	$31,000,000	$0
Total	**$560,000,000**	**$426,000,000**	**$344,000,000**	**$98,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending decreased to $554 million, a decrease of $6 million or 1%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-30 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 5 Removal clean-up activities. Major clean-up activities are assumed to occur over the 19-year construction period.

Table A-30: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 5 Removal

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$438,000,000	$121,000,000	$138,000,000	$697,000,000
Personal Income	$178,000,000	$47,000,000	$45,000,000	$270,000,000
Total Full-Year Jobs (entire construction period)s	2,441	698	807	3,946
Spending Per Job Created				$142,000
City of Seattle				
Output	$343,000,000	$89,000,000	$113,000,000	$545,000,000
Personal Income	$148,000,000	$36,000,000	$38,000,000	$222,000,000
Total Full-Year Jobs (entire construction period)	2,011	531	679	3,221
Spending Per Job Created				$174,000
LDW Area				
Output	$110,000,000	$32,000,000	$34,000,000	$176,000,000
Personal Income	$43,000,000	$12,000,000	$11,000,000	$66,000,000
Total Full-Year Jobs (entire construction period)	647	182	198	1,028
Spending Per Job Created				$545,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending decreased to $554 million, a decrease of $6 million or 1%.This results in a decrease in the number of total jobs in King County of about 46 full-year jobs over the entire construction period.

Table A-31 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 5 Removal.

Table A-31: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 5 Removal

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	5	0	2	0	1
Utilities	0	2	0	1	0	1
Construction	967	989	852	868	341	345
Manufacturing	1	49	0	34	0	13
Trade	3	243	2	182	1	64
Transportation	320	430	292	372	76	105
Services	897	1,921	613	1,466	229	484
Government	254	308	253	295	0	14
Total	**2,441**	**3,946**	**2,011**	**3,221**	**647**	**1,028**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-32 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 5 Removal, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-32: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 5 Removal

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	967	852	341
Transportation	320	292	76
Engineering services	94	83	10
Environmental services	453	471	81
Waste management and remediation services	235	39	38
Total	**2,068**	**1,737**	**546**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 5 Removal Treatment

Table A-33 shows spending assumptions by industry sector for "Alternative 5 Removal Treatment" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 5 Removal Treatment is approximately 19 years.

Table A-33: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 5 Removal Treatment

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$195,000,000	$177,000,000	$158,000,000	$62,000,000
Rail transportation	$23,000,000	$17,000,000	$11,000,000	$0
Water transportation	$34,000,000	$23,000,000	$19,000,000	$7,000,000
Motor transportation	$15,000,000	$15,000,000	$15,000,000	$5,000,000
Architectural and engineering services	$13,000,000	$13,000,000	$10,000,000	$1,000,000
Environmental services	$136,000,000	$76,000,000	$76,000,000	$14,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$159,000,000	$140,000,000	$68,000,000	$68,000,000
State and local govt (noneducation)	$34,000,000	$34,000,000	$34,000,000	$0
Total	**$615,000,000**	**$499,000,000**	**$394,000,000**	**$157,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending decreased to $605 million, a decrease of $10 million or 2%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-34 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 5 Removal Treatment clean-up activities. Major clean-up activities are assumed to occur over the 19-year construction period.

Table A-34: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 5 Removal Treatment

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$512,000,000	$146,000,000	$159,000,000	$817,000,000
Personal Income	$204,000,000	$56,000,000	$52,000,000	$312,000,000
Total Full-Year Jobs (entire construction period)	2,792	829	930	4,551
Spending Per Job Created				$135,000
City of Seattle				
Output	$393,000,000	$105,000,000	$128,000,000	$626,000,000
Personal Income	$167,000,000	$42,000,000	$43,000,000	$252,000,000
Total Full-Year Jobs (entire construction period)	2,252	620	768	3,640
Spending Per Job Created				$169,000
LDW Area				
Output	$169,000,000	$51,000,000	$49,000,000	$269,000,000
Personal Income	$61,000,000	$19,000,000	$16,000,000	$96,000,000
Total Full-Year Jobs (entire construction period)	896	287	289	1,471
Spending Per Job Created				$418,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending decreased to $605 million, a decrease of $10 million or 2%. This results in a decrease in the number of total jobs in King County of about 80 full-year jobs over the entire construction period.

Table A-35 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 5 Removal Treatment.

Table A-35: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 5 Removal Treatment

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	5	0	2	0	2
Utilities	0	3	0	1	0	1
Construction	1,020	1,041	898	914	359	365
Manufacturing	1	57	0	40	0	19
Trade	3	276	2	203	1	89
Transportation	179	297	161	243	43	83
Services	1,310	2,531	913	1,910	492	891
Government	279	342	278	326	0	21
Total	**2,792**	**4,551**	**2,252**	**3,640**	**896**	**1,471**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-36 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 5 Removal Treatment, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-36: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 5 Removal Treatment

Green Jobs (over the entire project)	**King County**	**City of Seattle**	**LDW Area**
Construction	1,020	898	359
Transportation	179	161	43
Engineering services	94	83	10
Environmental services	496	516	88
Waste management and remediation services	613	304	297
Total	**2,402**	**1,963**	**797**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 6 Combined

Table A-36 shows spending assumptions by industry sector for "Alternative 6 Combined" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 6 Combined is approximately 22 years.

Table A-37: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 6 Combined

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$212,000,000	$192,000,000	$171,000,000	$67,000,000
Rail transportation	$49,000,000	$36,000,000	$24,000,000	$0
Water transportation	$33,000,000	$22,000,000	$18,000,000	$7,000,000
Motor transportation	$32,000,000	$32,000,000	$32,000,000	$10,000,000
Architectural and engineering services	$20,000,000	$19,000,000	$15,000,000	$2,000,000
Environmental services	$140,000,000	$78,000,000	$78,000,000	$14,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$96,000,000	$56,000,000	$9,000,000	$9,000,000
State and local govt (noneducation)	$34,000,000	$34,000,000	$34,000,000	$0
Total	**$621,000,000**	**$474,000,000**	**$385,000,000**	**$108,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $647 million, an increase of $26 million or 4%.

Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-38 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 6 Combined clean-up activities. Major clean-up activities are assumed to occur over the 22-year construction period.

Table A-38: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 6 Combined

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$488,000,000	$134,000,000	$155,000,000	$777,000,000
Personal Income	$200,000,000	$52,000,000	$51,000,000	$303,000,000
Total Full-Year Jobs (entire construction period)	2,746	777	906	4,429
Spending Per Job Created				$140,000
City of Seattle				
Output	$384,000,000	$99,000,000	$128,000,000	$611,000,000
Personal Income	$167,000,000	$40,000,000	$43,000,000	$250,000,000
Total Full-Year Jobs (entire construction period)	2,271	595	765	3,632
Spending Per Job Created				$171,000
LDW Area				
Output	$122,000,000	$35,000,000	$38,000,000	$195,000,000
Personal Income	$48,000,000	$14,000,000	$12,000,000	$74,000,000
Total Full-Year Jobs (entire construction period)	726	201	221	1,149
Spending Per Job Created				$540,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending increased to $647 million, an increase of $26 million or 4%. This results in an increase in the number of total jobs in King County of about 211 full-year jobs over the entire construction period.

Table A-39 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 6 Combined.

Table A-39: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 6 Combined

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	5	0	2	0	1
Utilities	0	3	0	1	0	1
Construction	1,106	1,131	974	993	387	391
Manufacturing	1	55	0	38	0	15
Trade	3	273	2	205	2	72
Transportation	338	457	309	395	80	111
Services	1,020	2,169	710	1,673	258	543
Government	278	337	277	324	0	15
Total	**2,746**	**4,429**	**2,271**	**3,632**	**726**	**1,149**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-40 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 6 Combined, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-40: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 6 Combined

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	1,106	974	387
Transportation	338	309	80
Engineering services	140	123	14
Environmental services	509	530	91
Waste management and remediation services	245	38	37
Total	**2,337**	**1,974**	**609**

Source: ECONorthwest analysis of BLM and outfitter survey data

Alternative 6 Removal

Table A-41 shows spending assumptions by industry sector for "Alternative 6 Removal" for three geographic areas: King County, the City of Seattle, and the LDW Area. The construction period for Alternative 6 Removal is approximately 45 years.

Table A-41: Estimated Spending by Industry Sector for Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 6 Removal

		Regional Spending		
Industry Sector and Description	**Total Direct Spending**	**King County**	**City of Seattle**	**LDW Area**
Construction	$424,000,000	$383,000,000	$342,000,000	$134,000,000
Rail transportation	$107,000,000	$80,000,000	$54,000,000	$0
Water transportation	$83,000,000	$56,000,000	$45,000,000	$17,000,000
Motor transportation	$71,000,000	$71,000,000	$71,000,000	$21,000,000
Architectural and engineering services	$23,000,000	$23,000,000	$19,000,000	$2,000,000
Environmental services	$282,000,000	$158,000,000	$158,000,000	$28,000,000
Public relations	$5,000,000	$4,000,000	$3,000,000	$0
Waste management and remediation services	$217,000,000	$127,000,000	$21,000,000	$21,000,000
State and local govt (noneducation)	$72,000,000	$72,000,000	$72,000,000	$0
Total	**$1,284,000,000**	**$975,000,000**	**$784,000,000**	**$224,000,000**

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment
Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending decreased to $1,270 million, a decrease of $14 million or 1%.
Note: Rounding errors may cause the "Total" to be slightly higher or lower than sum of the spending.

Table A-42 shows draft average annual economic impacts for King County, Seattle, and the LDW Area associated with Alternative 6 Removal clean-up activities. Major clean-up activities are assumed to occur over the 45-year construction period.

Table A-42: Spending of Clean-up Activities Associated with the Lower Duwamish Superfund Site, King County, Seattle, and the LDW Area for Alternative 6 Removal

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$1,003,000,000	$276,000,000	$314,000,000	$1,593,000,000
Personal Income	$406,000,000	$108,000,000	$103,000,000	$617,000,000
Total Full-Year Jobs (entire construction period)	5,551	1,594	1,839	8,984
Spending Per Job Created				$143,000
City of Seattle				
Output	$782,000,000	$201,000,000	$258,000,000	$1,241,000,000
Personal Income	$336,000,000	$82,000,000	$87,000,000	$505,000,000
Total Full-Year Jobs (entire construction period)	4,562	1,207	1,546	7,314
Spending Per Job Created				$176,000
LDW Area				
Output	$252,000,000	$73,000,000	$77,000,000	$402,000,000
Personal Income	$98,000,000	$28,000,000	$25,000,000	$151,000,000
Total Full-Year Jobs (entire construction period)	1,479	418	453	2,350
Spending Per Job Created				$547,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system and Tables I-39 to I-49, as described in "Appendix I (v.2) Detailed Cost Estimates, Feasibility Study," August 20, 2010, prepared by AECOM Environment

Note: The October 2010 "Draft Feasibility Study" estimate of total direct spending decreased to $1,270 million, a decrease of $14 million or 1%. This results in a decrease in the number of total jobs in King County of about 112 full-year jobs over the entire construction period.

Table A-43 shows the distribution of full-year jobs resulting from clean-up activities associated with Alternative 6 Removal.

Table A-43: Estimated Distribution of Total Full-Year Jobs over the Entire Construction Period by Industry Sector, King County, Seattle, and the LDW Area for Alternative 6 Removal

	King County		City of Seattle		LDW Area	
Aggregate Industry Sector	**Direct**	**Total**	**Direct**	**Total**	**Direct**	**Total**
Natural resources	0	11	0	5	0	3
Utilities	0	5	0	2	0	1
Construction	2,212	2,263	1,947	1,985	773	782
Manufacturing	2	112	0	77	0	30
Trade	6	555	4	415	3	147
Transportation	754	1,011	689	876	179	246
Services	1,985	4,314	1,335	3,270	524	1,108
Government	590	714	588	685	0	32
Total	**5,551**	**8,984**	**4,562**	**7,314**	**1,479**	**2,350**

Source: ECONorthwest analysis of BLM and outfitter survey data

Note: Services include environmental and other consulting services, engineering, laboratory services, surveying and mapping, other professional services, and accommodations and food services.

Table A-44 shows estimated "green" jobs (full-year) by industry resulting from clean-up activities associated with Alternative 6 Removal, over the entire project period. We defined green jobs using the definition of green jobs from Oregon House Bill 3300, which defines a as described earlier in Appendix A.

Table A-44: Estimated Green Jobs (Full-Year) by Industry for the Entire Project, King County, Seattle, and the LDW Area for Alternative 6 Removal

Green Jobs (over the entire project)	King County	City of Seattle	LDW Area
Construction	2,212	1,947	773
Transportation	754	689	179
Engineering services	169	148	17
Environmental services	1,028	1,070	183
Waste management and remediation services	558	95	93
Total	**4,721**	**3,949**	**1,245**

Source: ECONorthwest analysis of BLM and outfitter survey data

APPENDIX B: ESTIMATED IMPACTS OF MARGINAL INCREASE IN SPENDING ON SELECTED ACTIVITIES

This appendix presents rough estimates of the impact of spending on selected clean-up activities. The purpose of the analysis is to identify the activities that generate more or less spending and jobs in King County, the City of Seattle, and the LDW Area. This analysis uses the same methodology and assumptions used in the rest of the study, with the exception of the amount spent. In each of the five activities shown in this appendix, we modeled the effect of spending $1 million on the specified activity. The activities modeled are:

- **Dredging and disposal** is a combination of dredging, transporting dredge spoils (by barge, truck, and rail), and disposing of the spoils in a landfill.
- **Capping** is capping (backfill of a dredged area).
- **CAD** is placing dredge spoils into a CAD.
- **Monitoring** is a combination of environmental consulting services, laboratory analysis, surveying and mapping, and government services.
- **Source control** is a combination of environmental consulting services, laboratory analysis, and government services.

Although the five activities are not, strictly speaking, substitutes, the tables illustrate that the economic impacts accruing to King County (or any sub-region of the King County) are not equal for each activity associated with the Lower Duwamish cleanup. In particular, because much of the cost of dredging is associated with dumping dredged materials in landfills in eastern Washington or Oregon, much of the direct spending on the dredging activities occurs outside of the County.

If the economy of any of the three areas changes significantly, the estimates of spending for any of these activities could change. For example, if a laboratory specializing in analysis of hazardous waste located in the LDW Area, the spending in the LDW Area on activities involving laboratory analysis (e.g., monitoring or source control) could increase.

The tables shows estimates the following types of impacts:

- **Direct Impacts** are estimates of changes in economic activity associated with the cleanup activity itself; they are the initial effects on the local economy associated with the cleanup activities.
- **Indirect Impacts** are estimates of the secondary economic effects caused by the increased demand for inputs by the directly affected industries.
- **Induced Impacts** are estimates of the economic effects caused by changes in household spending that are the result of the additional employment generated by both the direct and indirect impacts.
- **Total Impacts** are the sum of direct, indirect, and induced impacts.

Table B-1: Draft Sensitivity Analysis—Average County Level Impact of an Additional Million Dollars Spent on Dredging & Disposal Activities, King County, Seattle, and the LDW Area

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$826,000	$235,000	$234,000	$1,295,000
Personal Income	$290,000	$93,000	$76,000	$459,000
Total Full-Year Jobs	4	1	1	7
Spending Per Job Created				$147,662
Seattle				
Output	$587,000	$156,000	$159,000	$902,000
Personal Income	$214,000	$64,000	$54,000	$332,000
Total Full-Year Jobs	3	1	1	5
Spending Per Job Created				$205,000
LDW Area				
Output	$211,000	$59,000	$63,000	$333,000
Personal Income	$80,000	$23,000	$21,000	$124,000
Total Full-Year Jobs	1	0	0	2
Spending Per Job Created				$509,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system

Table B-2: Draft Sensitivity Analysis—Average County Level Impact of an Additional Million Dollars Spent on Capping* Activities, King County, Seattle, and the LDW Area

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$967,000	$265,000	$311,000	$1,543,000
Personal Income	$403,000	$103,000	$101,000	$607,000
Total Full-Year Jobs	6	1	2	9
Spending Per Job Created				$110,207
Seattle				
Output	$819,000	$210,000	$244,000	$1,273,000
Personal Income	$342,000	$84,000	$82,000	$508,000
Total Full-Year Jobs	5	1	1	7
Spending Per Job Created				$135,000
LDW Area				
Output	$367,000	$100,000	$116,000	$583,000
Personal Income	$150,000	$39,000	$38,000	$227,000
Total Full-Year Jobs	2	1	1	4
Spending Per Job Created				$281,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system

*"Capping" involves the backfilling of dredged materials.

Table B-3: Draft Sensitivity Analysis—Average County Level Impact of an Additional Million Dollars Spent on Confined Aquatic Disposal (CAD)Activities, King County, Seattle, and the LDW Area

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$1,000,000	$331,000	$259,000	$1,590,000
Personal Income	$308,000	$119,000	$85,000	$512,000
Total Full-Year Jobs	4	2	2	8
Spending Per Job Created				$133,125
Seattle				
Output	$800,000	$259,000	$197,000	$1,256,000
Personal Income	$253,000	$96,000	$66,000	$415,000
Total Full-Year Jobs	3	1	1	6
Spending Per Job Created				$165,000
LDW Area				
Output	$300,000	$99,000	$78,000	$477,000
Personal Income	$92,000	$36,000	$25,000	$153,000
Total Full-Year Jobs	1	1	0	2
Spending Per Job Created				$444,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system

"CAD" is method of disposing of the contaminated sediment on-site, rather than in a landfill.

Table B-4: Draft Sensitivity Analysis—Average County Level Impact of an Additional Million Dollars Spent on Source Control Activities, King County, Seattle, and the LDW Area

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$856,000	$162,000	$358,000	$1,376,000
Personal Income	$526,000	$62,000	$117,000	$705,000
Total Full-Year Jobs	7	1	2	10
Spending Per Job Created				$102,689
Seattle				
Output	$747,000	$131,000	$410,000	$1,288,000
Personal Income	$490,000	$53,000	$138,000	$681,000
Total Full-Year Jobs	6	1	2	9
Spending Per Job Created				$106,000
LDW Area				
Output	$60,000	$19,000	$23,000	$102,000
Personal Income	$30,000	$7,000	$7,000	$44,000
Total Full-Year Jobs	0	0	0	1
Spending Per Job Created				$1,550,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system

"Source control" is the process of identifying and eliminating sources of upland contamination

Table B-5: Draft Sensitivity Analysis—Average County Level Impact of an Additional Million Dollars Spent on Monitoring Activities, King County, Seattle, and the LDW Area

Impact Area / Impact Measure	Direct	Indirect	Induced	Total
King County				
Output	$770,000	$206,000	$306,000	$1,282,000
Personal Income	$420,000	$79,000	$100,000	$599,000
Total Full-Year Jobs	5	1	2	8
Spending Per Job Created				$117,775
Seattle				
Output	$686,000	$179,000	$306,000	$1,171,000
Personal Income	$395,000	$72,000	$103,000	$570,000
Total Full-Year Jobs	5	1	2	8
Spending Per Job Created				$124,000
LDW Area				
Output	$85,000	$27,000	$32,000	$144,000
Personal Income	$42,000	$11,000	$10,000	$63,000
Total Full-Year Jobs	1	0	0	1
Spending Per Job Created				$1,103,000

Source: ECONorthwest analysis of data from the IMPLAN modeling system