Appendix P
Socioeconomics Impact Analysis

September 2020

Chehalis River Basin Flood Damage Reduction Project

NEPA Environmental Impact Statement

US Army Corps of Engineers®

1 INTRODUCTION

This technical appendix presents data to support the impact findings presented in the section of the National Environmental Policy Act Environmental Impact Statement (NEPA EIS) analyzing impacts to socioeconomic resources (Section 5.10). It is organized in the following three parts:

- Socioeconomic Data: Provides more detailed data and interpretation to support the description of the study area in the NEPA EIS section.
- IMPLAN Technical Analysis: Describes the methods, assumptions, data sources, and detailed findings of the economic analysis of impacts from project-related spending.
- Timber Revenue Technical Analysis: Describes the methods, assumptions, data sources, and detailed findings of the economic analysis of timber harvest impacts.

2 SOCIOECONOMIC DATA

2.1 Population

Table 2.1-1 shows the populations of counties in the study area in 2018 and the change since 2010. The study area encompasses about 6% of Washington's population. Over 60% of the study area population is in Thurston County, which includes the state capital, Olympia. According to the 2010 U.S. Census, Lewis and Pacific counties both have a majority rural population (61% and 65%, respectively) compared with Grays Harbor (40%) and Thurston counties (21%) (U.S. Census Bureau 2020a).[1]

Since 2010, population growth in the study area has been slower than the statewide average (6% overall for the four counties compared to 8% statewide). The population of Grays Harbor County has declined, while Thurston County's population has grown slightly faster than the statewide population.

Table 2.1-1
Estimated Population and Growth Rates by County

GEOGRAPHIC AREA	2010	2018	PERCENTAGE CHANGE (2010 TO 2018)	AVERAGE ANNUAL GROWTH RATE (2010 TO 2018)
State of Washington	6,724,540	7,294,336	8%	1.0%
Grays Harbor County	72,797	71,967	-1%	-0.1%
Lewis County	75,455	76,947	2%	0.2%
Pacific County	20,920	21,281	2%	0.2%
Thurston County	252,264	274,684	9%	1.1%

Note:
Source: U.S. Census Bureau 2020a

Table 2.1-2 describes population forecasts from the Washington Office of Financial Management (OFM) from 2020 to 2040, which are then extrapolated to 2080. By 2080, populations are expected to increase in all four counties and statewide. However, growth in the later decades will slow compared with growth from 2020 to 2030. From 2020 to 2040, OFM estimates that Lewis County's population could grow at about half the pace of the statewide average, while Thurston County could exceed the statewide average growth rate, continuing the trend of the last decade. The population of Thurston County is expected to nearly double from 2020 to 2080. The forecasted population growth rates for Grays Harbor County and Pacific County are lower than for the other counties and are not expected to increase by more than 2.6% and 6.2%, respectively, in total from 2020 to 2080.

[1] The U.S. Census Bureau defines a rural area as any location not in an urban area (an area with a population of at least 2,500 people).

Table 2.1-2
Population Forecasts and Growth Rates (2020 to 2080)

GEOGRAPHIC AREA	PROJECTED POPULATION IN 2020	PROJECTED POPULATION IN 2040	PROJECTED POPULATION IN 2080	PERCENTAGE CHANGE (2020-2080)	AVERAGE ANNUAL GROWTH RATE (2020-2080)
State of Washington	7,638,415	9,242,022	12,967,027	69.8%	0.8%
Grays Harbor County	73,613	75,589	75,562	2.6%	0.0%
Lewis County	80,220	89,178	105,970	32.1%	0.4%
Pacific County	21,311	21,857	22,638	6.2%	0.1%
Thurston County	294,333	370,699	553,040	87.9%	1.0%

Notes:
Source: OFM 2017 and ECONorthwest Analysis
Projected population was calculated based on published estimated average annual growth rate for 2040 expanded to the year 2080. The demographic assumptions later than 2040 are not the official OFM population projections.

2.2 Housing

Within the study area, rental housing, hotels and motels, and campgrounds provide temporary accommodations for workers relocating to the study area from elsewhere. These workers may need housing for a few weeks to a few years, depending on their position.

The supply of rental housing is shown in Table 2.2-1. All of the counties in the study area have lower rates of renter-occupied housing than the statewide average. Of the four counties in the study area, Thurston County has the highest percentage of renter-occupied housing, slightly below the state average of 37%. Vacancy rates for rental properties are highest in Pacific County, at nearly double the Washington average of 4%, while Grays Harbor County has the lowest vacancy rate, at 3%.

Table 2.2-1
Housing Characteristics and Rental Housing Availability, 2018

GEOGRAPHIC AREA	TOTAL HOUSING UNITS	VACANT HOUSING UNITS	PERCENT RENTER-OCCUPIED	RENTAL VACANCY RATE
State of Washington	3,064,381	263,958	37.3%	3.7%
Grays Harbor County	36,005	7,742	33.8%	2.9%
Lewis County	34,952	4,690	30.3%	4.7%
Pacific County	16,119	7,032	22.2%	7.2%
Thurston County	115,193	7,123	36.3%	4.7%

Note:
Source: U.S. Census Bureau 2020b

Hotels and motels in the study area are concentrated in the Chehalis-Centralia area and in the Olympia-Tumwater area. There is limited availability of hotels and motels outside of these areas, and there are none within 20 miles of the proposed location of the flood retention facility. There are approximately

20 hotels and motels within about 30 miles of the flood retention facility. Hotels and motels in this region have a 50% to 70% occupancy rate in the winter season and a 80% to 100% occupancy rate in the summer (Marriott 2020; Centralia Square 2020; King Oscar Motel 2020).

There are a number of campgrounds and RV parks in a 20-mile radius around the Chehalis-Centralia Airport where workers could stay during the construction period. Table 2.2-2 shows a list of these facilities and their distances from the Airport Levee Improvements project area. Many of these facilities are open year-round. During summer months, many operate at capacity, especially during weekends and holidays.

Table 2.2-2
RV Parks and Campgrounds Within 20 Miles of the Chehalis-Centralia Airport

CAMPGROUND/RV PARK NAME	LOCATION	DRIVING DISTANCE FROM AIRPORT LEVEE IMPROVEMENTS PROJECT AREA
Riverside Golf Course RV Park	Chehalis, WA	1.5
Kresky Manor	Chehalis, WA	2.4
Stan Hedwall Park RV Park	Chehalis, WA	3.2
Mt View RV Park	Centralia, WA	4.8
Midway RV Park	Centralia, WA	5.6
Harrison RV/Mobile Home Park	Centralia, WA	6.8
Lewis County Campground	Bunker, WA	10.8
Oak RV Park	Chehalis, WA	11.2
Outback RV Park	Rochester, WA	11.9
Chehalis Camping Resort Cottage 5	Chehalis, WA	13.2
Chehalis RV Park & Camping Resort	Chehalis, WA	13.4
Chehalis Tribal Eagle RV Park	Oakville, WA	18.6
Rainbow Falls State Park	Dryad, WA	19.3

Note:
Source: Google 2020

There are fewer options for RV parks and campgrounds within a 20-mile radius of the proposed flood retention facility. There is one campground within 20 miles, at Rainbow Falls State Park, about 10.4 miles from the proposed flood retention facility project area. This campground has 40 standard campsites, eight partial-hookup sites, and several additional sites provided for non-motorized access. A group campsite provides accommodations for up to 60 people (Washington State Parks 2020a). Services available at the campground include restrooms with showers and a dump station. More detail on this facility is provided in Section 5.5, Recreation. Rates range from $27 to $45 per night during the peak season (May 15 through September 15), $20 to $40 during the shoulder season (April 1 through October 31), and $20 to $30 during the winter season (November through March) (Washington State Parks 2020b). Washington State Parks limits stays to 2 weeks. Therefore, this facility likely would not accommodate the needs of most workers.

Other camping options are located more than 20 miles from the proposed flood retention facility. These include Timberland RV Park (32.9 miles) and Raymond RV (33.2 miles), both located in Raymond, Washington, and Mt View RV Park (31.6 miles), Midway RV Park (31.7 miles), and Harrison RV/Mobile Home Park (32.2 miles), all of which are located in Centralia.

2.3 Income and Employment

Income in the four-county study area is measured in two different ways. Total labor income represents all employee compensation and proprietor (i.e., owner) income. Total output represents the total economic activity in a region. Table 2.3-1 shows that the total output for the four-county study area was about $33 billion dollars as of 2018. This value represented approximately 3.5% of Washington's statewide total output.

Table 2.3-1
Labor Income and Output in the Study Area, 2018

GEOGRAPHIC AREA	TOTAL LABOR INCOME	TOTAL OUTPUT
State of Washington	$326,760,028,882	$941,441,402,893
Four-County Study Area	$12,422,858,187	$33,177,123,352

Note:
Source: IMPLAN 2018

In 2018, approximately 201,592 people age 16 years and older were employed either full-time or part-time in the study area (BEA 2018). This represented about 5% of total employment in Washington. Employment in Thurston County (about 128,661 in 2018) represented about 63.8% of the total employment in the study area. Table 2.3-2 shows the employment and change in number of jobs in each of the counties from 2010 to 2018. Employment opportunities have grown throughout the region since 2010. However, employment in Thurston County and Lewis County has experienced the highest rate of growth among the four counties.

Table 2.3-2
Total Employment, 2010 through 2018

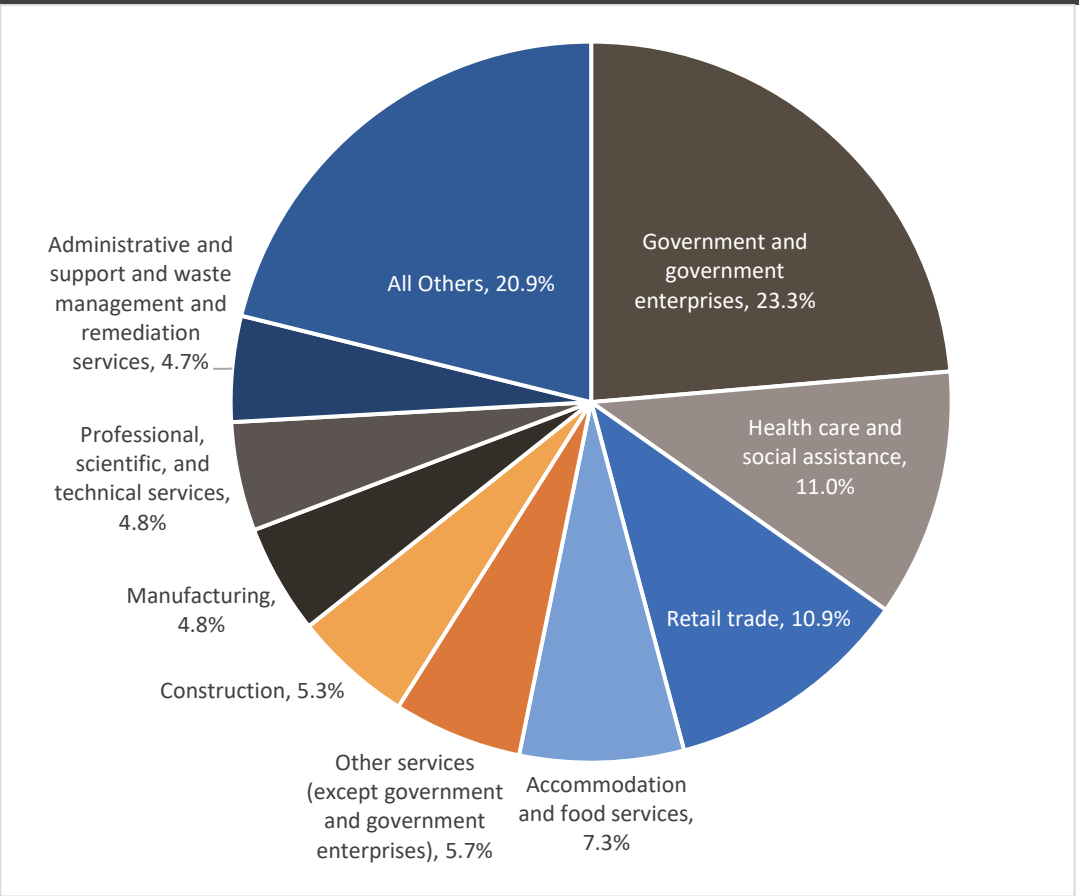
GEOGRAPHIC AREA	TOTAL EMPLOYMENT 2010	TOTAL EMPLOYMENT 2018	PERCENT CHANGE
State of Washington	3,771,444	4,560,332	20.9%
Grays Harbor County	30,588	31,465	2.9%
Lewis County	33,026	36,934	11.8%
Pacific County	9,317	10,125	8.7%
Thurston County	128,661	154,519	20.1%

Note:
Source: BEA 2020

Unemployment rates in the study area have declined since 2010 when they reached highs during the 2008 recession. In 2018, Thurston County's unemployment rate was similar to the statewide average of about 4.5%. Unemployment rates in Pacific, Lewis, and Grays Harbor counties have been consistently higher than the statewide average. They remain higher than what would be expected if all workers who wanted a job had access to one, at between 6% and 7% in 2018 (BLS 2020).

Figure 2.3-1 shows how employment was distributed across different sectors of the economy in 2018 for the study area. The three sectors that employed the most people are government (23%), health care (11%), and retail trade (11%). Olympia, the state capitol, is located in Thurston County. A large percent of employment in Thurston County came from government and government enterprises. The majority of the construction employment (67%) in the study area was located in Thurston County. About 20% of total employment was distributed across a variety of sectors that derive from or depend on natural resources, including farming, forestry and fishing, recreation, and mining (shown as "All Others" in Figure 2.3-1).

Figure 2.3-1
Percent of Total Employment by Sector, Study Area, 2018



Notes:
Source: BEA 2020b
All Others includes (in order of employment) real estate, rentals, and leasing; transportation and warehousing; finance and insurance; farm; arts, education, and recreation; education; wholesale trade; forestry, fishing, and related activities; information; management of companies and enterprises; mining, quarrying, and oil and gas extraction; and utilities.

2.4 Government Revenue

State, county, and local governments rely on a variety of taxes and revenue sources to fund public services and programs. For the state and county jurisdictions in Washington, a large share of tax revenue derives from retail sales and use taxes. The sales tax is paid for goods and services purchased within Washington. The use tax is paid when goods and services are purchased outside of Washington, but used within the state. The statewide sales tax rate is 6.5%. Local jurisdictions can also assess a local retail sales and use tax. In Washington, timberland owners pay a 5% excise tax on the stumpage value (the price paid for standing trees intended for harvest) when timber is harvested. The revenue is split, with 4% going to the county where the harvest occurs and 1% going to the state.

Table 2.4-1 provides information about revenues and tax sources for the state of Washington. In Fiscal Year (FY) 2019, 33% of total state revenue came from the retail sales and use tax. Timber excise taxes contributed 0.1% to the state tax revenue total in FY2019.

Table 2.4-1
Washington Fiscal Budget, FY2019

FISCAL BUDGET SOURCE	REVENUE (THOUSANDS OF DOLLARS)	PERCENT OF TOTAL REVENUES	STATE TAX RATE
Total Revenue	$36,063,213	100%	N/A
Total Tax Revenue	$18,314,744	51%	N/A
Property Tax Revenue	$2,339,469	6%	1.1%
Retail Sales and Use Tax	$11,952,070	33%	6.5%
Excise Tax	$1,146,348	3%	N/A
Timber Excise Tax Revenue	$2,450	0.1%	1.0%

Notes:
Source: OFM 2019, LEAP 2020
Timber excise tax revenue is calculated based on the $4.9 million estimate for the 2017-2019 biennium to the state general fund from LEAP 2020

Table 2.4-2 shows the revenues and tax revenue sources for the four counties in the study area. Compared to the state, property tax revenue is a more important component of county revenue than other taxes. Retail sales and use tax revenues represent approximately one-third of county tax revenue sources. The timber excise tax is a smaller portion of revenues than retail sales and use taxes and property taxes for the counties. Lewis and Grays Harbor counties draw more of their revenues from timber excise taxes than Pacific and Thurston counties. Timber excise taxes contributed 2.5% to Lewis County's total revenues and 5.5% to its total tax revenues.

Table 2.4-2
County Tax Revenue Sources, FY2017

COUNTY REVENUE SOURCES	GRAYS HARBOR	LEWIS	PACIFIC	THURSTON
Total Revenue	$70,168,063	$89,628,520	$25,705,164	$225,744,161
Total Tax Revenue	$30,186,577	$40,328,885	$12,363,210	$116,492,310
Property Tax Revenue	$16,583,851	$24,072,185	$7,049,326	$72,054,048
Retail Sales and Use Tax Revenue	$11,228,020	$12,327,242	$4,200,637	$37,981,081
Timber Excise Tax Revenue	$1,822,458	$2,200,500	$664,124	$522,958

Note:
Source: Washington State Auditor's Office 2020

In Washington, landowners can qualify for property tax exemptions if the primary use is either timber or agricultural production, as follows:

- Farm and agriculture lands qualify for the current use exemption if the parcel is 20 or more acres and is devoted primarily to the production of livestock or agricultural commodities for commercial purposes; is enrolled in the USDA Conservation Reserve Program; or qualifies under other agriculture activities as outlined in the Washington code (WAC 458-30) (WDOR 2017a).
- Designated Forest Land must be primarily used for growing timber and incidental uses compatible with growing and harvesting timber (WDOR 2017b).

Table 2.4-3 shows the amount of land in each of these categories by county. Land under the Designated Forest Land classification for tax purposes constitute between 26% and 54% of the total land area in the counties in the study area. Farm and agriculture land enrolled in the current use tax exemption program ranges from 1.3% in Grays Harbor County to 7% in Thurston County.

Table 2.4-3
Designated Forest Land and Farm and Agriculture Current Use Land by County, 2015

ACRES IN TIMBER AND AGRICULTURAL PRODUCTION	GRAYS HARBOR	LEWIS	PACIFIC	THURSTON
Total Land Area	1,423,000	1,559,000	783,000	495,000
Designated Forest Land (Acres/%)	618,541/43%	709,263/45%	419,350/54%	127,930/26%
Farm and Agriculture Current Use (Acres/%)	19,276/1.3%	66,457/4.2%	34,743/4.4%	34,209/7%

Note:
Source: WDNR 2015

As discussed above, timber owners pay a timber excise tax on the value of harvested timber. Agricultural producers pay business and occupation tax on the value of retail products sold, and collect sales tax on products that are not exempt from sales tax (WDOR 2020a, 2020b).

Other taxes potentially relevant to the action alternatives in Washington include lodging taxes, fuel taxes, license taxes, and real estate excise taxes. Washington does not tax personal income. Local governments levy a tax on transient rentals (less than 30 consecutive days). The state of Washington does not collect revenues from a lodging tax.

2.5 Timber and Agricultural Production

Timber and agricultural production contribute to the economy of the study area by generating income and tax revenues. Tax revenues from timber and agricultural production are discussed in more detail in the previous subsections. The value of agriculture products sold in the study area in 2017 was about $384 million (Table 2.5-1). The value of livestock was greater in all counties except Grays Harbor, where the value of crops and livestock production were about equal in 2017. The top crops in the study area

were forage for livestock, followed by Christmas trees and berries. Cattle and chickens were the primary livestock products (USDA 2019).

Table 2.5-1
Agriculture Production by County, 2017

AGRICULTURE PRODUCTION	GRAYS HARBOR	LEWIS	PACIFIC	THURSTON
Market Value of Agricultural Products Sold (Thousands of Dollars)	$33,598	$136,345	$38,877	$176,090
Number of Farms	469	1,723	346	1,200
Average Market Value of Agricultural Products Sold per Farm (Dollars)	$71,637	$79,132	$112,360	$146,741
Percent of Value Crops/Livestock	52%/48%	26%/74%	19%/81%	32%/68%

Note:
Source: USDA 2019

Lewis County produced the highest volume of timber in 2017 within the study area, followed by Grays Harbor County. The majority of timber produced in each county in 2017 came from private land (Table 2.5-2).

Table 2.5-2
Timber Production by County, 2017

TIMBER PRODUCTION	GRAYS HARBOR	LEWIS	PACIFIC	THURSTON
Total Amount Harvested, 2017 (Thousand Board Feet)	311,600	370,977	176,167	78,510
Private/Public Ownership (% Volume Harvested in 2017)	86%/14%	87%/13%	86%/14%	75%/25%

Note:
Source: WDNR 2018

2.6 Ecosystem Services

Ecosystem services are the benefits people obtain from ecosystems (Millennium Ecosystem Assessment 2003). The ecosystem services that the proposed action alternatives are likely to affect include recreation, flood risk reduction, habitat for species, and cultural and spiritual importance. Ecosystem services are challenging to measure in economic terms because people don't usually pay for them directly. While their economic value can be more difficult to measure, they are important to people and the economy in the study area.

2.6.1 Flood Risk and Flooding Damages

A catastrophic flood in the Chehalis River Basin has approximately a 1% chance of occurring each year (Section 2, Purpose and Need). The added costs of time, vehicle mileage, and abandoned travel associated with detours due to a catastrophic flood could costs between $10 million to $20 million for at least 5 days of road closures (Hallenbeck et al. 2014). Over $95 million has been distributed in National Flood Insurance Program relief funds to the four counties in the study area since 1978 (NFIP 2018). Lewis County Public Works tracked damages to public road infrastructure during the 2007 and 2009 floods. The estimated nominal cost of damage to public road infrastructure in Lewis County from the December 2007 flood was $19,420,628, and the estimated cost from the January 2009 flood was $2,531,847 (Lewis County no date).

2.6.2 Habitats and Species

The economic value associated with salmon fisheries in the study area was documented in the Chehalis Basin Strategy Economic Study (EES 2016). The commercial value of a fish (the price a fisherman can sell their catch at) ranged from $5 to $48, depending on the species. The value of a fish caught by a sport fisherman (which reflects both the value of the fish and the experience of fishing) ranged from $32 to $165, depending on the location (river sport fishing is higher than ocean sport fishing; Table 2.6-1). Passive use values represent how much people value fish even if they do not consume them or enjoy the fishing experience. They are estimated based on how much people in Washington are willing to pay for self-sustaining wild salmon populations (EES 2016). The importance of salmon to the development and ongoing practice of cultural and spiritual traditions is a separate value, discussed below.

Table 2.6-1
Economic Value Per Fish, 2016 Dollars

SPECIES	OCEAN COMMERCIAL	OCEAN SPORT	GRAYS HARBOR COMMERCIAL	GRAYS HARBOR SPORT	RIVER SPORT	TRIBAL COMMERCIAL	PASSIVE USE VALUE
Chinook salmon	$48	$86	$51	$104	$165	$26	$2,232
Coho salmon	$10	$53	$10	$65	$147	$10	$2,232
Chum salmon	$5	N/A	N/A	$32	$73	N/A	$2,232
Steelhead	N/A	N/A	N/A	N/A	$94	N/A	$2,232

Note:
Source: EES 2016

3 IMPLAN TECHNICAL ANALYSIS

The IMPLAN software traces how spending circulates through a region's economy based on existing information about supply-chain and consumption relationships in the study region. To estimate the action alternatives' potential impact on regional economic activity, ECONorthwest used IMPLAN (Washington Statewide and County Model for 2018) to estimate jobs, income, and output associated with spending to construct and operate the action alternatives.

The IMPLAN analysis results were used for two purposes in evaluating Alternatives 1 and 2:

- First, to estimate the economic impacts of the project in terms of additional jobs, labor income, and economic activity that the project supports within the socioeconomic study region
- Second, to estimate the amount of labor required for construction and operation, which informs the analysis of impacts to population and impacts on demand for housing

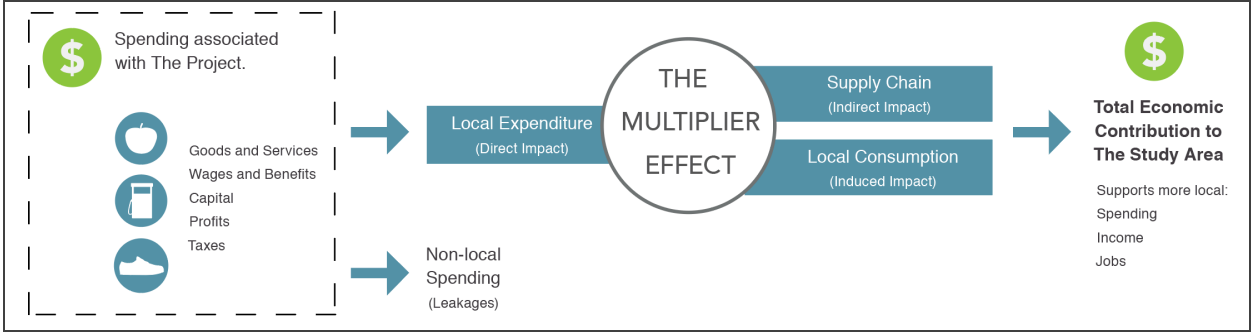
This technical appendix outlines the methodology, data, assumptions, and results of the IMPLAN analysis.

3.1 Methodology

3.1.1 Methods

The IMPLAN model works by tracing how spending circulates through an economy or study area. Figure 3.1-1 shows how spending leads to total economic impacts. Changes in one sector or multiple sectors of the economy trigger changes in demand and supply throughout the economy. Initial changes in the model propagate through the economy through links in the supply and demand chain. This changes equilibrium quantities of inputs and outputs and associated jobs, income, and value-added components. These multiplier effects continue until the initial change in final demand leaks out of the local economy in the form of savings, taxes, and imports.

Figure 3.1-1
Pathway of Economic Impacts



3.1.2 Definition of Terms

Economic impact analysis employs specific terminology to identify the different types of economic impacts. Economic impacts are classified by their relationship to the activity in question. The four terms of interest are as follows:

- ***Direct impacts or primary impacts*** are the output, jobs, and income associated with the immediate effects of final demand changes created for the project. For purposes of this analysis, the direct impacts are the spending involved with construction and operation of the action alternatives.
- ***Indirect impacts*** are production changes in backward-linked industries caused by the changing input needs of directly affected industries. Suppliers to the directly involved industry will also purchase additional goods and services, and spending leads to additional rounds of indirect impacts. Because they represent interactions among businesses, these indirect effects are often referred to as supply-chain impacts.
- ***Induced impacts*** are the changes in regional household spending patterns caused by changes in household income. The direct and indirect increases in employment and income enhance the overall purchasing power in the economy, thereby inducing further spending by households. Employees in these industries, for example, will use their income to purchase groceries or take their children to the doctor. These induced effects are often referred to as consumption-driven impacts.
- ***Secondary impacts*** are the sum of indirect and induced impacts or, simply, the economic effects on sectors outside of direct work on the project.

Total economic effects are based on the sum of the direct, indirect, and induced impacts. These three types of economic impacts are measured in terms of output, labor income, and employment resulting from spending in the study area. The IMPLAN model reports the following measures of economic impacts:

- ***Jobs***, according to IMPLAN's methodology, are measured in terms of full-year-equivalents (FYE). One FYE job equals work over 12 months in a given industry (this is the same definition used by the Bureau of Labor Statistics [BLS]). For example, two jobs that last 6 months each in 2019 count as one FYE job in 2019. A job can be full-time or part-time, seasonal, or permanent. IMPLAN counts jobs based on the duration of employment, not the number of hours per week worked. Job impacts associated with operations are for 1 year of normal operations.
- ***Labor income*** consists of employee compensation and proprietor's income, and is a subset of output.
  - *Employee compensation* includes workers' wages and salaries, as well as other benefits such as health, disability, and life insurance, retirement payments, and non-cash compensation.
  - *Proprietor's income* (business owner's income) represents the payments received by small-business owners or self-employed workers—in this case, drivers. Business income would

include, for example, income received by private business owners, doctors, accountants, and lawyers.

- ***Total value added*** is equivalent to Gross State Product and is a subset of output. It represents the value of goods and services produced minus the cost of intermediate inputs.
- ***Output*** represents the value of goods and services produced, and is the broadest measure of economic activity.

3.1.3 Study Area Designation

Economic impacts reported by IMPLAN vary based upon the study area selected. IMPLAN creates study area databases corresponding to these areas that represent the behavior of the study area economies. These databases do not contain any information about the specific action alternatives under study. Ideally, the study area boundaries should be defined such that most of the project's suppliers and workers come from within the defined region. For projects with both a construction and operating phase, it is possible to define the study areas for each type of expenditure differently.

The construction activities associated with a specific economic action will draw mostly from construction labor within a local area. However, for large industrial projects requiring specialized labor, the labor market and specialized construction materials may come from an entire state or larger area. This analysis uses information about specialized requirements of the construction process to make a suitable judgment about the geography chosen for the construction impact analysis.

The economic geography of operations for a business or a project may be different. Operating supplies, such as utilities and maintenance services, will most likely be locally sourced. The same is true for labor, especially in the case of long-term operations. Census data can be used to determine the degree of long-distance labor commuting that might be associated with the local labor market. The economic impact analysis of operations can often be measured for a single county or metropolitan region, but generally not an entire state.

For purposes of this analysis the study area is defined as the four counties that are likely to supply labor, goods, or services to the project. These counties, Grays Harbor, Lewis, Pacific, and Thurston, are the same throughout the socioeconomic analysis.

3.1.4 Limitations of Economic Impact Analysis

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 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 accommodated that change.

This type of "partial equilibrium" analysis permits comparison of the economy in two separate states. However, it does not describe how the economy moves from one equilibrium to the next. In partial

equilibrium analysis, the researcher assumes that all other relationships in the economy remain the same (other than the initial economic stimulus).

Contrary to dynamic models, static models assume that there are no changes in wage rates, input prices, and property values. In addition, underlying economic relationships in input-output models are assumed constant. That is, there are no changes in the productivity of labor and capital, and no changes in population migration or business location patterns.

IMPLAN results are based upon a single year. Because IMPLAN uses retrospective data, it is not meant to be used for dynamic long-term modelling of an economy because it cannot account for structural changes in the relationship between industries.

3.1.5 Data Sources

This analysis used IMPLAN's 2018 Washington State model to perform the input-output calculations. Action alternative-related spending on construction and operation, which represents the "direct impacts" of the action alternatives, were used as the primary inputs to the model. Because more recent estimates of construction and operation costs for the action alternatives were not available, ECONorthwest derived these inputs from prior estimates of construction and operation spending from HDR (2018) and EES (2016).

The cost estimates are based on the information provided in the *Supplemental Design Report* (HDR 2018). They do not include costs for roads, land and land rights, transmission lines and substations equipment, sales tax, engineering and construction management assistance, permitting costs, property tax, insurance, Environmental Impact Statement or Endangered Species Act-related studies and agreements, or mitigation design and construction costs.

Similarly, these resources were also used to estimate the number of jobs supported for each phase of the project. The construction timeline is for the analysis is five years, based upon the alternatives and assumptions for the project. For the flood retention facility, the construction timeline is based upon the construction schedule from Figure 1 of Chehalis River Basin Flood Control Zone District (2019).

3.1.6 Assumptions

Various assumptions were made to complete the IMPLAN analysis, including the following:

- IMPLAN reports annual values. Therefore, construction spending was annualized from the 5-year spending estimate to represent the amount of spending that would occur each year. This allocation of spending was done by combining the construction schedule from HDR (2018) and construction budget to estimate the amount of budget per year based on phase-level spending and estimated months of activity. The number of months per year of activity were converted into percentages for the project to yield an estimate of phase level spending for each year.

- The same construction schedule was used for the FRE facility in Alternative 1 as the FRO facility in Alternative 2. The Collection, Handling, Transport, and Release (CHTR) facility was assumed to have the same construction schedule as the total budget for the flood retention facility.
- Costs were escalated using a 3.5% annual escalation rate based on the rate used by HDR (2018) to estimate the cost increase for construction starting in 2025. Costs were escalated from 2017 to 2025 and then also from 2025 through 2029 for the construction period. Operation costs were escalated to 2030, the first full year of operations spending. To provide conservative estimates, the escalation rate also accounted for inflation. Therefore, the estimated dollar amounts should be considered real estimates of construction for the year they occur.
- "56: Construction of new non-residential structures" was the IMPLAN sector used to estimate construction activities. All construction costs are assumed to be sourced from within the four-county study area, which is the default IMPLAN local purchase percentage for sector 56 in this geography.
- "60: Maintenance and repair construction of non-residential structures" was the IMPLAN sector used to estimate operation activities. Local supplies account for 62% of construction costs which are sourced from within the four-county study area, which is the default IMPLAN local purchase percentage for sector 60 in this geography.

3.2 Results

3.2.1 Construction

3.2.1.1 Alternative 1 (Proposed Project)

3.2.1.1.1 Flood Retention Expandable (FRE) Facility

As detailed in Table 3.2-1, the total construction budget for the FRE facility is $358 million over a 5-year construction period (2017 dollars; HDR 2018). Additionally, $43 million would be spent on the CHTR facility (HDR 2018).

Table 3.2-1
Distribution of Estimated Construction Costs of the FRE Facility over Construction Period (2017 Dollars)

CONSTRUCTION PHASE	TOTAL PHASE COST	COST YEAR 1	COST YEAR 2	COST YEAR 3	COST YEAR 4	COST YEAR 5
Phase 1: Site Preparation	$38,410,400	$22,085,980	$16,324,420			
Percent Allocation		*58%*	*43%*			
Phase 2: Construction	$192,571,260	$11,004,072	$63,273,414	$63,273,414	$27,510,180	$27,510,180
Percent Allocation		*6%*	*33%*	*33%*	*14%*	*14%*

CONSTRUCTION PHASE	TOTAL PHASE COST	COST YEAR 1	COST YEAR 2	COST YEAR 3	COST YEAR 4	COST YEAR 5
No Phase: Composite, Contingencies, Non-Contract Costs	$127,415,487	$31,274,710	$46,332,904	$26,641,420	$11,583,226	$11,583,226
Percent Allocation		*25%*	*36%*	*21%*	*9%*	*9%*
CHTR Facility	$43,000,000	$7,298,242	$14,778,902	$10,921,496	$4,914,673	$5,086,687
Percent Allocation		*17%*	*34%*	*25%*	*11%*	*12%*
Total Cost	**$401,397,147**	**$71,663,004**	**$140,709,640**	**$100,836,330**	**$44,008,079**	**$44,180,093**
Percent Allocation		*18%*	*35%*	*25%*	*11%*	*11%*

Note:
Source: HDR 2018

Escalated using the 3.5% rate from HDR (2018), these annual costs combined total $559 million over the 5-year construction period (Table 3.2-2).

Table 3.2-2
Estimated Yearly Cost of Construction Activities for FRE Facility (Escalated, 2025 Dollars)

CAPITAL CATEGORY	COST YEAR 1	COST YEAR 2	COST YEAR 3	COST YEAR 4	COST YEAR 5	TOTAL COST
FRE Facility (Escalated)	$84,756,101	$171,630,670	$126,833,753	$57,075,189	$59,072,820	$499,368,533
CHTR Facility (Escalated)	$9,610,391	$20,142,127	$15,405,849	$7,175,274	$7,686,333	$60,019,973
Total Cost (Escalated)	**$94,366,491**	**$191,772,796**	**$142,239,602**	**$64,250,463**	**$66,759,153**	**$559,388,506**

Note:
Source: HDR 2018; ECONorthwest analysis

3.2.1.1.2 Airport Levee Improvements

The Airport Levee Improvements are estimated to cost $4.6 million (2017 dollars) with construction occurring in 1 year (2025; EES 2016). Escalating this cost to 2025 dollars using a 3.5% rate yields an estimate of $6.2 million for the Airport Levee Improvements.

3.2.1.1.3 Total Direct Spending, Alternative 1

Combining the escalated FRE facility, CHTR facility, and Airport Levee Improvement construction costs yields a total cost of $565 million in construction costs over the 5-year period (Table 3.2-3).

Table 3.2-3
Estimated Direct Spending on Construction for Alternative 1

CAPITAL CATEGORY	COST YEAR 1	COST YEAR 2	COST YEAR 3	COST YEAR 4	COST YEAR 5	TOTAL COST
FRE Facility	$84,756,101	$171,630,670	$126,833,753	$57,075,189	$59,072,820	$499,368,533
CHTR Facility	$9,610,391	$20,142,127	$15,405,849	$7,175,274	$7,686,333	$60,019,973
Airport Levee Improvements	$6,150,815	N/A	N/A	N/A	N/A	$6,150,815
Total Cost	**$100,517,306**	**$191,772,796**	**$142,239,602**	**$64,250,463**	**$66,759,153**	**$565,539,321**

Note:
Source: HDR 2018

3.2.1.1.4 Total Economic Impacts, Alternative 1

The IMPLAN model was used to estimate the gross economic contribution of project-related spending on construction of Alternative 1. The analysis measured the economic impacts in terms of employment, labor income, total value added, and output. These outputs are defined in Section 2, Socioeconomic Data. The total output supported by Alternative 1 within the four- county study area is approximately $896 million over the 5-year construction period. That output value includes $502 million in labor income and $463 million in total value added supported by the project. Table 3.2-4 presents the results of this analysis.

Table 3.2-4
Economic Impact of Spending Associated with Alternative 1 Construction

ECONOMIC IMPACT CATEGORY	EMPLOYMENT	LABOR INCOME	TOTAL VALUE ADDED	OUTPUT
Direct Effect	5,568	$379,569,454	$229,527,357	$497,231,559
Indirect Effect	715	$39,430,872	$69,111,072	$125,484,686
Induced Effect	1,791	$83,414,881	$164,701,853	$273,165,811
Total Effect	8,075	$502,415,207	$463,340,282	$895,882,057

Note:
Source: ECONorthwest analysis performed using IMPLAN (2018)

The jobs estimate reported by IMPLAN is in terms of FYE positions. Therefore, it represents positions per year over the 5 years. However, one person could have the same position for all 5 years. Because of

this definition, it is more useful to consider peak employment during the construction period for a more accurate representation of jobs. Year 2 (2026) is when the largest amount of construction spending occurs. It is also when the highest number of positions (1,910) would be supported by the project (Table 3.2-5).

Table 3.2-5
Estimated Direct Employment by Year

CAPITAL CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL EMPLOYMENT
FRE Facility	860	1,709	1,239	547	559	4,916
CHTR Facility	98	201	151	69	73	590
Airport Levee Improvements	62	N/A	N/A	N/A	N/A	62
Total Direct Labor	**1,021**	**1,910**	**1,390**	**616**	**632**	**5,568**

Note:
Source: ECONorthwest analysis performed using IMPLAN (2018)

3.2.1.2 Alternative 2 (FRO Facility and Airport Levee Improvements)

The FRO facility in Alternative 2 would have a lower construction cost than the FRE facility in Alternative 1. The FRO facility would cost an estimated $298 million (2017 dollars; HDR 2018), which is $392 million when escalated to 2025 dollars. The construction schedule for the FRO facility would be the same as for the FRE facility described in Alternative 1. There would also be the same costs for the CHTR facility and the Airport Levee Improvements. The escalated costs by year and component are described in Table 3.1-6. These values are in 2020 dollars and are escalated to account for increased costs.

3.2.1.2.1 Total Direct Spending, Alternative 2

Combining the escalated costs of the FRO facility, the CHTR facility, and the Airport Levee Improvements yields a total cost of $497 million in construction costs over the 5-year period (Table 3.2-6).

Table 3.2-6
Estimated Direct Spending on Construction for Alternative 2

CAPITAL CATEGORY	COST YEAR 1	COST YEAR 2	COST YEAR 3	COST YEAR 4	COST YEAR 5	TOTAL COST
FRO Facility	$70,484,952	$147,727,274	$109,169,327	$49,126,197	$50,845,614	$427,353,364
CHTR Facility	$9,610,391	$20,847,101	$16,503,130	$7,955,355	$8,820,244	$63,736,221
Airport Levee Improvements	$6,150,815	N/A	N/A	N/A	N/A	$6,150,815
Total Cost	**$86,246,158**	**$168,574,376**	**$125,672,457**	**$57,081,552**	**$59,665,858**	**$497,240,400**

Note:
Source: HDR 2018

The year with the highest number of FYE positions is Year 2 (2026), when an estimated 1,679 people would be employed across the project area (Table 3.2-7).

Table 3.2-7
Distribution of Employment over the Construction Period for Alternative 2

LABOR CATEGORY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Flood Retention Only	659	1,471	1,067	471	481	4,148
CHTR Facility	90	208	161	76	83	618
Airport Levee	57	N/A	N/A	N/A	N/A	57
Total Labor	**806**	**1,679**	**1,228**	**547**	**564**	**4,824**

Note:
Source: ECONorthwest analysis performed using IMPLAN (2018)

3.2.1.2.2 Total Economic Impacts, Alternative 2

For Alternative 2, the analysis measured the economic impacts in terms of employment, labor income, total value added, and output. These outputs are defined in Section 2, Socioeconomic Data. The total output supported by construction for Alternative 2 within the four-county study area is approximately $776 million over the 5-year construction period. That output value includes $435 million in labor income and $401 million in total value added supported by the project. Table 3.2-8 presents the results of this analysis.

Table 3.2-8
Economic Impact of Spending Associated with Alternative 2 Construction

ECONOMIC IMPACT CATEGORY	EMPLOYMENT	LABOR INCOME	TOTAL VALUE ADDED	OUTPUT
Direct Effect	4,824	$328,847,709	$198,855,689	$430,786,664
Indirect Effect	620	$34,161,737	$59,875,782	$108,716,208
Induced Effect	1,552	$72,268,177	$142,692,796	$236,662,751
Total Effect	6,996	$435,277,623	$401,424,267	$776,165,622

Note:
Source: ECONorthwest analysis performed using IMPLAN (2018)

Compared to Alternative 1, the difference in economic impacts for Alternative 2 is $118 million lower output, $67 million lower labor income, and $62 million lower in total value added (Table 3.2-9).

Table 3.2-9
Economic Impact Differences Between Alternative 1 and Alternative 2

ECONOMIC IMPACT CATEGORY	EMPLOYMENT	LABOR INCOME	TOTAL VALUE ADDED	OUTPUT
Direct Effect	-744	-$50,721,745	-$30,671,668	-$66,444,895
Indirect Effect	-96	-$5,269,135	-$9,235,290	-$16,768,478
Induced Effect	-239	-$11,146,704	-$22,009,057	-$36,503,060
Total Effect	-1,079	-$67,137,584	-$61,916,015	-$119,716,435

Note:
Source: ECONorthwest analysis performed using IMPLAN (2018)

3.2.2 Operations

3.2.2.1 Alternative 1

3.2.2.1.1 Total Direct Spending, Alternative 1

The total operation cost for all facilities, once they are in operation, is $636,000 per year (2017 dollars). The majority of these operation costs is for the FRE facility ($603,000 in 2017 dollars). Escalated to 2030, which would be the first full year of operations, the total annual operation costs would be $994,676 per year (Table 3.2-10).

Table 3.2-10
Estimated Operations Costs for the FRE Facility and Airport Levee Improvements (2017 Dollars)

CAPITAL CATEGORY	ANNUAL OPERATIONS COSTS (2017 DOLLARS)	ANNUAL OPERATIONS COSTS (2030 DOLLARS)
Flood Retention Expandable	$603,000	$943,066
CHTR Facility	$25,000	$39,099
Airport Levee Improvements	$8,000	$12,512
Total	**$636,000**	**$994,676**

Note:
Sources: HDR 2018; EES 2016

3.2.2.1.2 Total Economic Impacts, Alternative 1

Economic impacts for operation spending for Alternative 1 were estimated using IMPLAN. Based on that analysis, the total output supported by operations spending would be $949,514 per year. This level of output includes $287,734 in labor income and $464,146 in total value added supported by the project. This value is less than the escalated annual operating costs because of the local purchase percentage for the study area, that is, some services and goods are obtained from outside the four-county region. Approximately five jobs would be supported by this level of operation spending, the majority of which would be for the FRE facility, which would represent 95% of annual operations spending (Table 3.2-11).

Table 3.2-11

Economic Impacts from Spending During Operation

ECONOMIC IMPACT CATEGORY	EMPLOYMENT	LABOR INCOME	TOTAL VALUE ADDED	OUTPUT
Direct Effect	3	$184,939	$267,884	$612,624
Indirect Effect	1	$54,971	$101,838	$180,282
Induced Effect	1	$47,824	$94,423	$156,608
Total Effect	**5**	**$287,734**	**$464,146**	**$949,514**

Note:
Source: ECONorthwest analysis performed using IMPLAN (2018)

3.2.2.2 Alternative 2

Alternative 2 would have the same operations costs and economic impacts as reported for Alternative 1.

4 TIMBER REVENUE TECHNICAL ANALYSIS

4.1 Introduction

Forested land would be cleared of vegetation and permanently removed from timber production to construct and operate the flood retention facility. The harvest activities associated with the action alternatives would produce merchantable timber. Selling this timber would generate revenue, and the state of Washington and Lewis County would collect timber excise taxes on that revenue. Permanently removing the land from timber production during project operation would reduce revenue earned from timber harvest activities within the study area and would reduce the associated timber excise tax collected by the state of Washington and Lewis County.

This analysis estimates the value of timber harvest and associated timber excise taxes in the following two scenarios:

- Ongoing timber harvest activities that would occur in the project area under the No Action Alternative, but would not occur during operation of the project
- One-time timber harvest activities that would occur during construction

This technical appendix describes the methods, data, assumptions, and results of the analysis.

4.2 Methodology

4.2.1 Methods

Timber excise tax revenues were analyzed by evaluating how much merchantable timber would be permanently cleared for construction of the flood retention facility. The stumpage value (the price paid for standing trees intended for harvest) was estimated from the acreage and species on that land to determine the timber excise tax implications. In Washington, timberland owners pay a 5% excise tax on the stumpage value when timber is harvested. The revenue is split, with 4% going to the county where the harvest occurs and 1% going to the state. Estimating stumpage value requires converting from acres to board feet of merchantable timber per acre and then applying the stumpage price to that volume of harvest. Alternative 1 and Alternative 2 would have the same area of harvested timber for construction.

4.2.2 Data Sources

Table 4.6-8 of the EIS (Chapter 4.6, Terrestrial Species and Habitats) describes how many acres would be permanently cleared for construction of the flood retention facility and vegetation management in the temporary reservoir area. The total impact area is 480 acres, including both riparian and non-riparian acres. Of that area, approximately 306.03 acres are Douglas-fir or Western hemlock, 102.01 acres are non-managed red alder, and the remainder are non-managed acres of various vegetation types. This

acreage estimate does not account for the acres that may need to be cleared for construction of staging areas and roads. Therefore, it is likely an underestimate of total acres that would need to be harvested.

An age distribution for those specific acres of trees is not available. However, a prior survey from the Chehalis Basin Working Group (CBWG 2014) estimated the age distribution of Douglas-fir acres in the impact area of the project. There is no available age distribution estimate for red alder.

Converting from acres to board feet requires estimates of cubic feet per acre. The cubic feet per acre estimate is based on the average volume of timber per acre for private land in Washington of 3,861 cubic feet per acre (USFS 2017).

Stumpage value per thousand board feet (MBF) is calculated from the prices reported to Washington Department of Revenue. The stumpage value for timber sold in 2019 is $577 per MBF for Douglas-fir, $655 for red alder, and $15 per ton for chipwood for Region 4, which includes the flood retention facility project area (WDOR 2020).

Weyerhaeuser, who currently manages the timber within the flood retention facility project area, has a harvest schedule of 40- to 50-year rotations (CBWG 2014).

Volumes by age class distribution are estimated from empirical yield functions developed by the U.S. Forest Service for use in the Resources Planning Act (RPA) planning efforts (Haynes et al. 2006).

4.2.3 Assumptions

The following assumptions were used to quantify the value of the potential impacts to the timber excise tax revenue from construction of the project:

- The amount of standing timber and age class of that timber would be the same at the time of harvest as the current information available for the area.
- The conversion from cubic feet to board feet is 5 board feet per cubic foot for age classes over 50 years and 4.6 board feet per cubic food for age classes between 20 and 50 years. For age classes below 20 years, a ratio of 52.6 cubic feet per ton is assumed, based on empirical data.
- Trees less than 20 years old are harvested for chipwood rather than as logs.
- Real stumpage value is a constant price in real terms over time, meaning there is no inflation rate applied. The same stumpage value for Douglas-fir is applied for Western hemlock.
- Harvests by Weyerhaeuser would have occurred only for Douglas-fir and Western hemlock. Harvests would have occurred every 10 years, based on the 40- to 50-year rotation schedule.
- All managed forestland over 60 years is either in the riparian area or otherwise protected by regulation. Therefore, it would not be harvested under the No Action Alternative.
- A 3% discount rate is applied to future years to calculate net present value (NPV).
- The acre values and age distribution are in the same proportion in 2025 as the inventory from Table 4 of CBWG (2014).

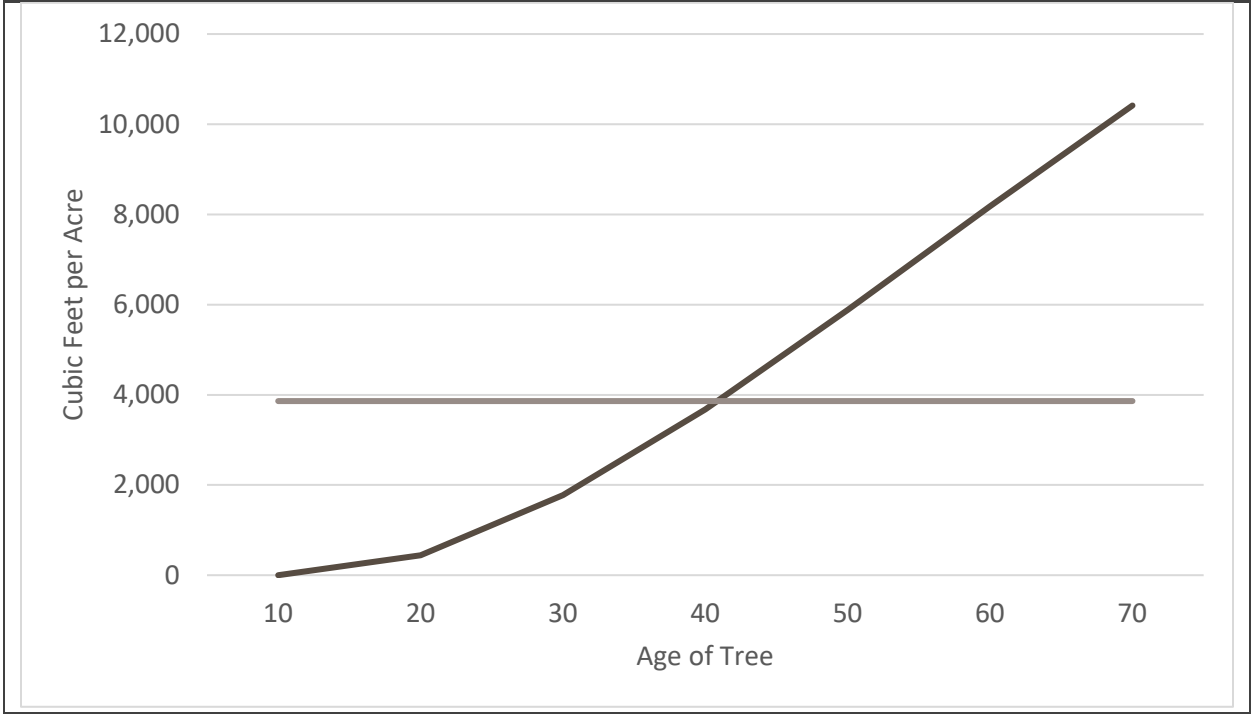
- Managed forest outside this 480 acres in the impact area would continue to be managed by Weyerhaeuser in accordance with their rotation schedules.
- The 306.03 acres of Douglas-fir or Western hemlock and 102.01 acres of red alder comprise all merchantable timber within the impact area.
- Because there is not an age distribution estimate for red alder, the average cubic feet per acre from USFS (2017) is used to estimate volume and is not adjusted by age class.
- For Douglas-fir and Western hemlock, the 3,861 average cubic feet per acre for private land varies based on age class (USFS 2017). The yield curve in Figure 4.2-1 shows the assumed cubic feet per acre based on the average cubic feet per acre. Table 4.2-1 shows the calculated cubic feet per acre by age class and resulting harvest assumption (RPA yield) based on the acres for each age class.

Table 4.2-1
Acreage of Douglas-fir and Western Hemlock in the Project Area by Age Class

MAXIMUM AGE	ACRES	DOUGLAS-FIR RPA YIELD (CUBIC FEET PER ACRE)	HARVESTED CUBIC FEET
10	30.1	0	0
20	38.8	443	17,199
30	41.2	1,777	73,219
40	41.2	3,677	151,506
50	41.2	5,884	242,442
60	41.2	8,186	337,293
70	72.3	10,415	753,218

Note:
Source: Haynes et al. (2007)

Figure 4.2-1
Yield Curve of Cubic Feet per Acre by Age Class



Note:
Source: Haynes et al. (2007)

4.3 Results

4.3.1 Alternatives 1 and 2

Under Alternatives 1 and 2, timber in the impact area would need to be harvested for construction of the flood retention facility. Weyerhaeuser would lose the opportunity to harvest on some of the acres they otherwise would have harvested. The total impact area would be 480 acres, including both riparian and non-riparian acres (Table 4.6-8 of the EIS). Of that, approximately 306.03 acres are Douglas-fir or Western hemlock, 102.01 acres are non-managed red alder, and the remainder are non-managed acres of various vegetation types. Applying the age classes from Table 4 of CBWG (2014) yields the age distribution estimates provided in Table 4.3-1.

Table 4.3-1
Acreage of Merchantable Timber in the Impact Area by Age Class

AGE CLASS	ACRES
10	30.1
20	38.8
30	41.2
40	41.2

AGE CLASS	ACRES
50	41.2
60	41.2
70	72.3
Unknown (Red Alder)	102.01
Total	**408.04**

Note:
Sources: EIS Table 4.6-8; CBWG (2014) Table 4

Applying the assumptions listed in Section 2.3 to obtain yields of volume by age class results in the tons and MBF of Douglas-fir/Western hemlock and red alder listed in Table 4.3-2. These volumes represent timber that would be harvested for construction of the flood retention facility and not allowed to mature to the standard harvest rotation age. The age class with the largest volume is for Douglas-fir/Western hemlock trees with a maximum age of 70. Because much of the area that would be impacted is riparian, those trees were likely not previously harvested because of regulatory restrictions.

Table 4.3-2
Current Acreage in the Project Area by Age Class

MAXIMUM AGE	CUBIC FEET/ACRE	BOARD FEET/CUBIC FEET	CUBIC FEET/TON	BOARD FEET	MBF	TONS
10	0		0			0
20	443		52.6			428
30	1,777	4.6		441,031	441	
40	3,677	4.6		912,589	913	
50	5,884	4.6		1,460,340	1,460	
60	8,186	5		2,208,337	2,208	
70	10,415	5		3,766,091	3,766	
Unknown (Red Alder)	3,861	4.6		1,811,759	1,812	

Applying the volumes to the stumpage values of $577 per MBF for Douglas-fir/Western hemlock, $655 per MBF for red alder, and $15 per ton for chipwood for Region 4 from the Washington State Office of Financial Management (OFM 2020) yields the total value of merchantable timber that would be harvested during construction under Alternatives 1 or 2. The total stumpage value of merchantable timber that would be harvested under Alternatives 1 or 2 is approximately $5.6 million. Table 4.3-3 provides the stumpage values by age class.

Table 4.3-3
Stumpage Value of Harvest by Age Class for Douglas-fir and Western Hemlock

AGE CLASS	STUMPAGE VALUE
10	$0
20	$4,905
30	$194,338
40	$402,127
50	$643,491
60	$973,091
70	$2,173,035
Unknown (Red Alder)	$1,186,702
Total	**$5,577,687**

Applying the state and county tax rates of 1% and 4%, respectively, yields a total tax value if harvested today of $278,884, which consists of $55,777 in state tax and $223,107 in Lewis County tax revenue (Table 4.3-4).

Table 4.3-4
Timber Excise Tax Under Alternatives 1 or 2

TAXING JURISDICTION	TAX RATE ON STUMPAGE VALUE	VALUE OF TIMBER EXCISE TAX REVENUE
State Tax	0.01	$55,777
County Tax	0.04	$223,107
Total Tax	**0.05**	**$278,884**

4.3.2 No Action Alternative

Under the No Action Alternative, 232.51 acres of non-riparian Douglas-fir and Western hemlock in the impact area would be harvested by Weyerhaeuser in accordance with their harvest schedule of 40- to 50-year rotations (CBWG 2014). Red alder would not be harvested because it is not actively managed by Weyerhaeuser.

All managed forestland over 60 years old is either in the riparian area or otherwise protected by regulation, and thus would not be harvested. This assumption results in an adjusted age category classification without the acres over 60 years old. Table 4.3-5 provides the distribution of acres by age class for the No Action Alternative, assuming that harvest would not occur on acres with trees over 60 years old.

Table 4.3-5
Current Acres of Merchantable Timber by Age Class Without Acres with Trees over 60 Years Old

HABITAT CATEGORY	ADJUSTED ACRES
Managed Forest, 0-10 Year	30.1
Managed Forest, 10-20 Year	38.8
Managed Forest, 20-60 Year	164.8
Total	**232.51**

Note:
Sources: EIS Table 4.6-8; CBWG (2014) Table 4

As indicated in the assumptions, the analysis assumes Weyerhaeuser would harvest mature trees every 10 years. The 20- to 60-year age class of acres was divided by four to distribute for the first four decades. Although this assumption is a simplification, there was not sufficient information to distinguish the distribution of age classes between 20 and 60 years. The 10- to 20-year age class is harvested within 40 years, and the 0- to 10-year age class is harvested within 50 years. Acres were converted to cubic feet by assuming that 4,781 cubic feet per acre of merchantable timber are in each harvested acre (based upon the average 40- to 50-year value from the yield curve). Under these assumptions, the NPV of future harvests of the 232.51 acres of non-riparian Douglas-fir and Western hemlock is equal to $1.6 million (Table 4.3-6).

Table 4.3-6
Project Harvest and Value Over the Study Period

YEAR	ACRES AVAILABLE FOR HARVEST	NOMINAL VALUE	NET PRESENT VALUE
0	40.99	$520,125	$520,125
10	40.99	$520,125	$387,022
20	40.99	$520,125	$287,981
30	40.99	$520,125	$214,285
40	38.63	$490,095	$150,242
50	29.92	$379,583	$86,586
Total	**232.51**	**$2,950,181**	**$1,646,241**

Applying the 5% total tax rate, which includes the 1% state and 4% county tax, to the NPV estimates results in a total tax revenue of $82,312, including $16,462 in state tax revenues and $65,850 in county tax revenues (Table 4.3-7).

Table 4.3-7
Timber Excise Tax Revenue Over the Study Period

YEAR	TOTAL TIMBER EXCISE TAX	STATE TAX (1%)	COUNTY TAX (4%)
2025	$26,006	$5,201.25	$20,805.02
2035	$19,351	$3,870.22	$15,480.89
2045	$14,399	$2,879.81	$11,519.23
2055	$10,714	$2,142.85	$8,571.39
2065	$7,512	$1,502.42	$6,009.68
2075	$4,329	$865.86	$3,463.43
Total	**$82,312**	**$16,462**	**$65,850**

4.3.3 Difference in Alternatives

Alternatives 1 and 2 yield higher results compared to the No Action Alternative because those action alternatives include harvest of riparian acres, which are in the oldest age class, as well as red alder harvest. Neither of these harvests would occur under the No Action Alternative. The total difference in timber excise tax revenues between the No Action Alternative and Alternatives 1 and 2 is $196,572, with the majority (80%) as tax revenues for Lewis County (Table 4.3-8).

Table 4.3-8
Difference in Timber Excise Tax Revenue Collected Between No Action Alternative and Alternatives 1 and 2

TAX TYPE	NO ACTION ALTERNATIVE	ALTERNATIVES 1 AND 2	DIFFERENCE
State Tax	$16,462	$55,777	$39,314
County Tax	$65,850	$223,107	$157,258
Total Tax	**$82,312**	**$278,884**	**$196,572**

5 REFERENCES

CBWG (Chehalis Basin Working Group, Habitat Mapping and Wildlife Surveys Technical Sub-committee), 2014. *Habitat Mapping and Wildlife Studies: Final Technical Memorandum*. September 3, 2014.

Centralia Square Grand Ballroom and Hotel, 2020. Personal communication between Sarah Reich (ECONorthwest) and Centralia Square Grand Ballroom and Hotel representative. April 13, 2020.

Chehalis River Basin Flood Control Zone District, 2019. *Proposed Flood Retention Dam Construction Schedule Supplemental Information*. Submitted to the Washington Department of Ecology and U.S. Army Corps of Engineers. August 2019.

EES (EES Consulting, LLC), 2016. *Chehalis Basin Strategy Draft Economics Study Update*. September 28, 2016.

Haynes, R.W., D.M. Adams, R.J. Alig, P.J. Ince, J.R. Mills, and X. Shou, 2007. *The 2005 RPA timber assessment update.* General Technical Report PNW-GTR-699. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

HDR, 2018. *Chehalis River Basin Flood Control: Combined Dam and Fish Passage Supplemental Design Report FRE Dam Alternative*.

IMPLAN, 2018. *Washington State Model, 2018*. Accessed at: www.IMPLAN.com.

King Oscar Motel, 2020. Personal communication between Sarah Reich (ECONorthwest) and King Oscar Motel representative. April 13, 2020.

Marriott (Fairfield Inn & Suites by Marriott Grand Mount Centralia), 2020. Personal communication between Sarah Reich (ECONorthwest) and Marriott representative. April 13, 2020.

Millennium Ecosystem Assessment, 2003. *Ecosystems and Human Well-Being: A Framework for Assessment*. Washington, D.C.: Island Press.

OFM (Washington State Office of Financial Management), 2020. "County Distribution Statistics, Quarter 4 2018, Summary of County Distribution." Accessed March 13, 2020. Accessed at: https://dor.wa.gov/find-taxes-rates/other-taxes/county-distribution-statistics.

USFS (U.S. Forest Service), 2016. Forests of Washington. Accessed March 13, 2020. Accessed at: https://usfs.maps.arcgis.com/apps/MapJournal/index.html?appid=92de15e3bef24e5bb2189de7a20472c0.

WDOR (Washington Department of Revenue), 2020. *Tax Reporting Instructions and Stumpage Value Determination Tables, July 1 through December 31, 2019*. Special Programs Division Forest Tax Section. Accessed at: https://dor.wa.gov/sites/default/files/legacy/Docs/Pubs/ForestTax/sh2019/InstrSVtables2019_2ndHalf.pdf.