February 2020
Proposed Chehalis River Basin Flood Damage Reduction Project
SEPA Draft Environmental Impact Statement

Appendix C
Environmental Health and Safety Discipline Report

Publication No.: 20-06-002

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About this Document

This discipline report has been prepared as part of the Washington Department of Ecology's (Ecology's) State Environmental Policy Act (SEPA) Environmental Impact Statement (EIS) to evaluate a proposal from the Chehalis River Basin Flood Control Zone District (Applicant).

Proposed Action

The Applicant seeks to construct a new flood retention facility and temporary reservoir near Pe Ell, Washington, and make changes to the Chehalis-Centralia Airport levee in Chehalis, Washington. The purpose of the Applicant's proposal is to reduce flooding originating in the Willapa Hills and improve levee integrity at the Chehalis-Centralia Airport to reduce flood damage in the Chehalis-Centralia area.

Time Frames for Evaluation

If permitted, the Applicant expects Flood Retention Expandable (FRE) facility construction would begin in 2025 and operations in 2030, and the Airport Levee Changes construction would occur over a 1-year period between 2025 and 2030. The EIS analyzes probable impacts from the Proposed Action and alternatives for construction during the years 2025 to 2030 and for operations from 2030 to 2080. For purposes of analysis, the term "mid-century" applies to the operational period from approximately 2030 to 2060. The term "late-century" applies to the operational period from approximately 2060 to 2080.

Scenarios Evaluated in the Discipline Report

This report analyzes probable significant environmental impacts from the Proposed Action, the Local Actions Alternative, and the No Action Alternative under the following three flooding scenarios (flow rate is measured at the Grand Mound gage):

- **Major flood:** Water flow rate of 38,800 cubic feet per second (cfs) or greater
- **Catastrophic flood:** Water flow rate of 75,100 cfs
- **Recurring flood:** A major flood or greater that occurs in each of 3 consecutive years

The general area of analysis includes the area in the vicinity of the FRE facility and temporary reservoir; the area in the vicinity of the Airport Levee Changes; and downstream areas of the Chehalis River to approximately river mile 9, just west of Montesano.

Local Actions Alternative

The Local Actions Alternative represents a local and nonstructural approach to reduce flood damage in the Chehalis-Centralia area. It considers a variety of local-scale actions that approximate the Applicant's purpose through improving floodplain function, land use management actions, buying out at-risk properties or structures, improving flood emergency response actions, and increasing water storage from Pe Ell to Centralia. No flood retention facility or Airport Levee Changes would be constructed.

No Action

Under the No Action Alternative, no flood retention facility or Airport Levee Changes would be constructed. Basin-wide large and small scale efforts would continue as part of the Chehalis Basin Strategy work, and local flood damage reduction efforts would continue based on local planning and regulatory actions.

SUMMARY

This discipline report describes the environmental health and safety considerations present in the study area. Environmental health and safety concerns include those associated with flood retention facility safety, structural or gate failure, potential contamination from hazardous material sites, and flood warning systems. Emergency response services are addressed in the *Public Services and Utilities Discipline Report* (ESA 2020a), and water quality is addressed in the *Water Discipline Report* (ESA 2020b). The *Earth Discipline Report* describes areas of seismic concern (Shannon & Wilson and Watershed GeoDynamics 2020).

This report also describes potential impacts to environmental health and safety from the Proposed Action, Local Actions Alternative, and No Action Alternative. These impacts are summarized in Tables C-1 and C-2.

Table C-1
Summary of Environmental Health and Safety Impacts from the Proposed Action

IMPACT	IMPACT FINDING	MITIGATION PROPOSED (SUMMARIZED, SEE SECTION 3.2.4)	SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACT
PROPOSED ACTION (FRE FACILITY AND AIRPORT LEVEE CHANGES) – CONSTRUCTION			
Potential for introducing high-pH discharges to surface waters during concrete production for construction.	Moderate to minor	**WATER-1:** Develop and implement a Surface Water Quality Mitigation Plan.	No
Increased traffic from Flood Retention Expandable (FRE) facility and levee construction; this increase would not likely create vehicle delays affecting emergency vehicles.	Minor	**EHS-1:** Coordinate activities with emergency service providers; notify public of any reduction in response times. **EHS-2:** Develop Construction Traffic Control Plans.	No
Potential for spills of oil or hazardous material during construction to affect people or the environment.	Minor	None	No
The likelihood of a catastrophic FRE facility failure from an earthquake on the Cascadia Subduction Zone is extremely low. During construction, no water would be stored in the temporary reservoir.	No impact	None	No

IMPACT	IMPACT FINDING	MITIGATION PROPOSED (SUMMARIZED, SEE SECTION 3.2.4)	SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACT
PROPOSED ACTION (FRE FACILITY AND AIRPORT LEVEE CHANGES) – OPERATIONS			
The likelihood of a catastrophic FRE facility failure from an earthquake on the Cascadia Subduction Zone during a time when the reservoir is storing water is extremely low, but consequences to people, buildings, infrastructure, and the environment would be significant.	**Significant**	**EHS-3:** Develop and implement a breach flood warning system for Pe Ell, Centralia, and Chehalis. **EHS-4:** Provide training to local emergency response officials for dam breach scenarios. **EJ-1:** To target outreach efforts for the Proposed Action, mitigation is proposed for the Applicant to develop an inclusive public involvement strategy tailored to the communities who may be affected from a catastrophic event causing the FRE facility to breach or fail while the temporary reservoir is holding water.	**Yes**
Flooding causing contamination from three hazardous materials sites would be either reduced or not changed.	No impact	None	No
Increased traffic from FRE facility and levee operations would not likely affect emergency services by causing vehicle delays or additional closure of the airport.	No impact	None	No

Table C-2

Summary of Environmental Health and Safety Impacts from Alternatives

IMPACT	IMPACT FINDING
LOCAL ACTIONS ALTERNATIVE	
Potential impacts from construction include workers' exposure to potential legacy contaminants, solvents, and petroleum products used to power construction-related equipment.	Moderate to minor
Inundation of facilities that use and store hazardous materials, resulting in potentially more frequent contamination of floodwaters. Public roadways and critical facilities would likely continue to remain vulnerable to flooding. Potential road closures during floods would affect emergency response time. Wells and surface waters would continue to remain vulnerable to contamination from flooding.	**Continuing substantial flood risk**
NO ACTION ALTERNATIVE	
Inundation of facilities that use and store hazardous materials, resulting in potentially more frequent contamination of floodwaters, potential for the contamination of wells and surface waters, and public roadways and critical facilities would remain vulnerable to flooding. Potential road closures during floods would affect emergency response time.	**Continuing substantial flood risk**

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1 INTRODUCTION

1.1 Resource Description

This report addresses impacts on environmental health and safety from the Chehalis River Basin Flood Control Zone District's (Applicant's) Proposed Action as well as for the No Action Alternative and Local Actions Alternative. Environmental health and safety concerns include those associated with Flood Retention Expandable (FRE) facility safety, structural or gate failure, potential contamination from hazardous material sites, and flood warning systems. Emergency response is addressed in the *Public Services and Utilities Discipline Report* (ESA 2020a), and water quality is addressed in the *Water Discipline Report* (ESA 2020b). The *Earth Discipline Report* describes areas of seismic concern (Shannon & Wilson and Watershed GeoDynamics 2020).

1.2 Regulatory Context

Laws, regulations, and plans used for determining potential impacts on environmental health and safety are listed and described in Table C-3. Each of these regulations or plans was reviewed for relevant information.

Table C-3

Regulations, Statutes, and Guidelines for Environmental Health and Safety

REGULATION, STATUTE, GUIDELINE	DESCRIPTION
FEDERAL	
33 U.S. Code 467f, National Dam Safety Program	Establishes and maintains a coordinated national dam safety program that is administered by the Federal Emergency Management Agency (FEMA).
Federal Guidelines for Dam Safety Risk Management (FEMA P-1025)	Provides guidance for dam safety and operation.
42 U.S. Code 6901 Resource Conservation and Recovery Act (RCRA)	Creates the framework for the proper management of hazardous and non-hazardous solid waste.
40 Code of Federal Regulations 112	Under the Clean Water Act, establishes procedures, methods, equipment, and other requirements to prevent the discharge of oil to water for facilities with aboveground storage of over 1,320 gallons.
STATE	
Washington Administrative Code (WAC) 173-175, Dam Safety	Provides comprehensive regulation and supervision of dams in order to reasonably secure safety of life and property. Includes oversight on the design, construction, operation, maintenance, and supervision of dams. Requires all dam designs to meet earthquake and hydrologic/hydraulic design criteria outlined in the Washington Department of Ecology (Ecology) Dam Safety Office (DSO) Guidelines. Rules are administered by Ecology's DSO.

REGULATION, STATUTE, GUIDELINE	DESCRIPTION
Water Resources Program Policy (DSO) POL 5102	Requires that construction of any new dam or reservoir cannot proceed until written approval of plans and specifications has been obtained from the DSO.
Water Resources Program Policy (DSO) POL 5201	Requires owners of new dams to develop an Operation and Maintenance Manual and an Emergency Action Plan (EAP).
Water Resources Program Policy (DSO) POL 5701	Requires a Dam Safety EAP to be formulated and maintained, identifying appropriate procedures and agency protocols to be followed in response to emergency situations on dams where there is a potential for loss of life.
Spills and Discharges into the Environment (WAC 173-303-145)	Establishes requirements for spill or discharge of dangerous waste or hazardous substances into the environment.
Discharge of Polluting Matter in Waters Prohibited (Revised Code of Washington [RCW] 90.48.080)	Establishes it is unlawful to discharge pollutants into waters of the state.
RCW 43.21A.732, Chehalis Basin Strategy	Establishes the Office of Chehalis Basin; primary purpose is to aggressively pursue implementation of an integrated strategy and administer funding for long-term flood damage reduction and aquatic species restoration in the Chehalis Basin.
RCW 86.16, Floodplain Management	Ecology is the state agency responsible for coordinating the floodplain management regulation elements of the National Flood Insurance Program.
RCW 90.03, Water Code	Promotes the use of public waters in a fashion that provides for obtaining maximum net benefits from both diversionary uses and the retention of waters within streams and lakes in sufficient quantity and quality to protect instream and natural values and rights.
Washington Hazardous Waste Management Act (RCW 70.105 and WAC 173-303)	Requires designation of dangerous and extremely hazardous waste, and proper handling, storage, transport, and disposal of such wastes.
LOCAL	
Lewis County Code 15.35, Flood Damage Prevention	Establishes regulations to promote public health and safety, to minimize public and private losses due to flood conditions in specific areas, to minimize the need for rescue and relief efforts associated with flooding, and to minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges in areas of special flood hazard.
Chehalis Municipal Code, Chapter 17.22, Frequently Flooded Areas – Flood Hazard Zone	Establishes regulations to promote public health and safety, to minimize public and private losses due to flood conditions in specific areas.
Centralia Municipal Code, Chapter 16.21, Floodplain Management	Establishes regulations to promote public health and safety, to minimize public and private losses due to flood conditions in specific areas.
Grays Harbor County Municipal Code, Chapter 18.06, Provisions for Flood Hazard Reduction	Establishes regulations to promote public health and safety, to minimize public and private losses due to flood conditions in specific areas.

2 METHODOLOGY

2.1 Study Area

The study area for environmental health and safety encompasses areas that could be directly or indirectly affected by construction or operation of the Proposed Action. This includes the area associated with the FRE facility site and construction activities, the area of maximum inundation extent for the temporary reservoir, the area associated with construction and resulting changes to the airport levee, and the area downstream of the FRE facility on the mainstem Chehalis River. The downstream study area extends to river mile 9, where the modeled water level from a catastrophic flood is no longer distinguishable from normal river water levels (Figure C-1).

2.2 Affected Environment

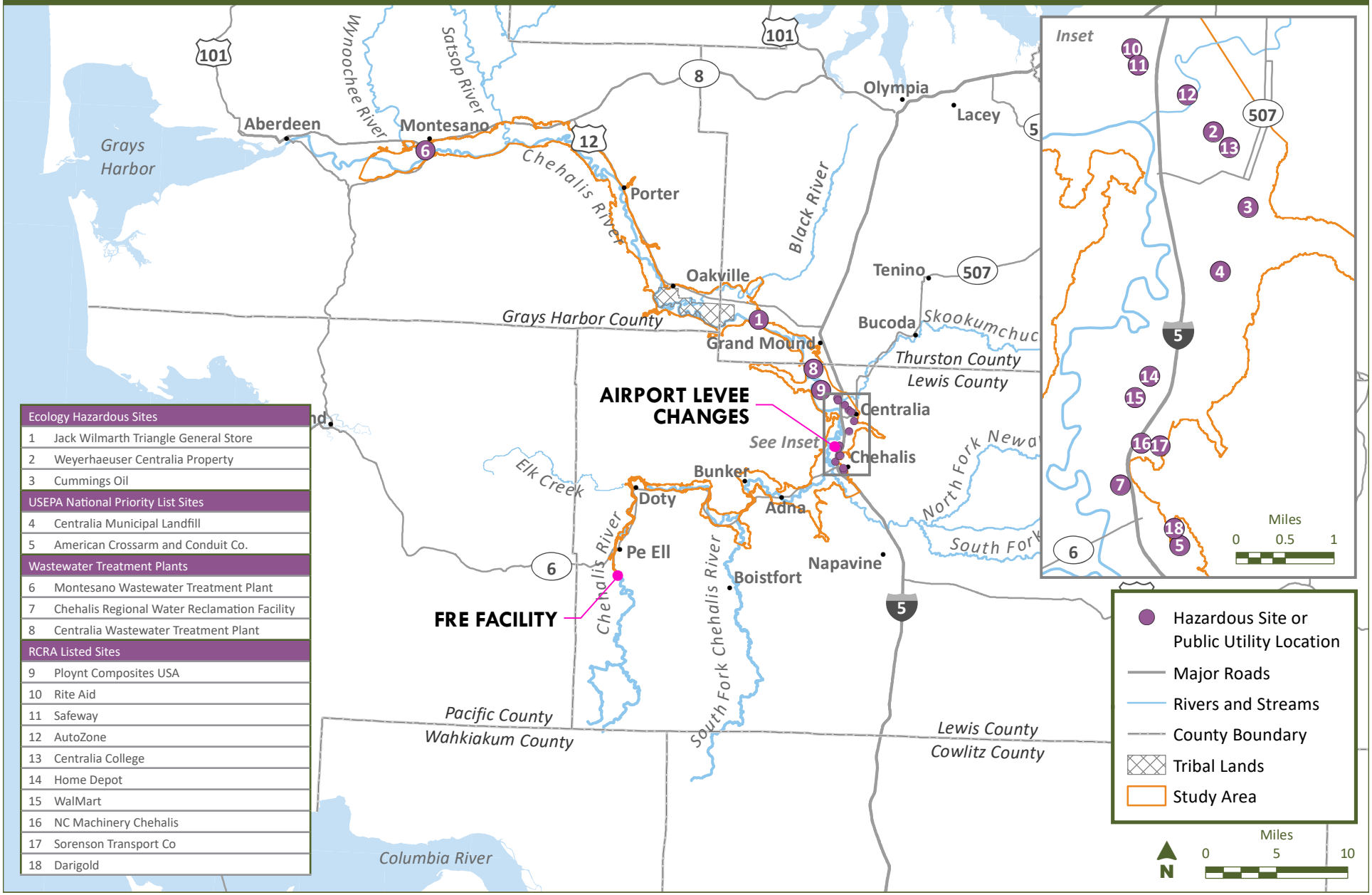
This section describes the two major environmental health and safety matters associated with flooding in the study area: hazardous materials and contaminates in floodwaters and existing flood warning systems. Information about sites with known contamination was obtained from published databases by the U.S. Environmental Protection Agency (EPA) and Washington Department of Ecology (Ecology). Relative to environmental health and safety, this section focuses on the areas within the study area that are subject to flooding from major and catastrophic floods based on flood modeling conducted for the Proposed Action, Local Actions Alternative, and No Action Alternative (Figure C-1). Critical emergency facilities, such as hospitals and police and fire stations, and emergency response are described in the *Public Services and Utilities Discipline Report* (ESA 2020a).

2.2.1 Hazardous Materials and Contaminants in Floodwater

Floodwater can become contaminated in a variety of ways. Water can come in contact with agricultural chemicals or hazardous materials at contaminated sites, or it can dislodge chemicals stored above ground. Floods can also inundate livestock areas and septic and wastewater treatment systems and can be contaminated with untreated sewage and decomposing bodies of drowned livestock. Wastewater treatment plants (WWTPs) can become flooded, or malfunction, and release untreated sewage to nearby waterbodies or cause backflow of sewage into homes. Drinking water can be contaminated when wells or water treatment systems are flooded. Contaminated floodwater can also seep into groundwater.

These contaminated waters are health hazards if the public comes in contact with them through direct physical contact, ingestion, or open wounds (OSHA 2019). Household items that have been flooded pose a health concern if they come into close contact with people. Floodwater often contains infectious organisms such as *E. coli* and *Salmonella*, which can cause intestinal illnesses. Agricultural or industrial chemicals can cause chemical poisoning. Many materials used in home construction, including wood, fiberglass, and insulation, can absorb floodwater and the contaminants it carries, leaving flooded homes contaminated even after they dry out.

Figure C-1
Environmental Health and Safety Study Area and Facilities



Ecology Hazardous Sites	
1	Jack Wilmarth Triangle General Store
2	Weyerhaeuser Centralia Property
3	Cummings Oil
USEPA National Priority List Sites	
4	Centralia Municipal Landfill
5	American Crossarm and Conduit Co.
Wastewater Treatment Plants	
6	Montesano Wastewater Treatment Plant
7	Chehalis Regional Water Reclamation Facility
8	Centralia Wastewater Treatment Plant
RCRA Listed Sites	
9	Ployint Composites USA
10	Rite Aid
11	Safeway
12	AutoZone
13	Centralia College
14	Home Depot
15	WalMart
16	NC Machinery Chehalis
17	Sorenson Transport Co
18	Darigold

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Ecology's Hazardous Sites List includes multiple hazardous material sites in the study area (Ecology 2019). Most of these sites are associated with gas stations or other vehicle facilities, and most of the contaminants are petroleum or related products. The sites are generally clustered around cities and towns in the study area and along major arterials. Ecology ranks three sites in the study area as hazard ranking 1 or 2, indicating a higher priority for cleanup: Jack Wilmarth Triangle General Store, Weyerhaeuser Centralia Property, and Cummings Oil (Ecology 2019). The Weyerhaeuser Centralia Property and Cummings Oil sites are in Lewis County, and the Jack Wilmarth Triangle General Store is in Thurston County (Figure C-1). These sites contain contaminated soil and groundwater. Ecology has ranked one other site in the study area, Trailer Village in Centralia, with a hazard ranking of 2; however, this site has been cleaned up and is being continually monitored.

The EPA lists two National Priorities List (i.e., Superfund) sites in the study area: Centralia Municipal Landfill and American Crossarm and Conduit (EPA 2019a; Figure C-1). The Centralia Municipal Landfill is south of Centralia. The American Crossarm and Conduit Co. site is near Chehalis (Figure C-1). Both sites have undergone some level of cleanup and are being monitored by Ecology or EPA. If inundated, the Ecology- and EPA-listed sites have the potential to contaminate floodwater by mobilizing contaminated soil or groundwater.

Many other sites that store hazardous materials, such as dry cleaners, gas stations, industrial facilities, and farms, are located throughout the study area. Any facility that stores hazardous materials and chemicals has the potential to contaminate floodwaters if the materials are inundated and mobilized by floodwaters. No known contaminated or hazardous materials storage sites are present in the areas associated with construction of the Proposed Action (i.e., the FRE facility, temporary reservoir location, and at the airport levee).

In the study area, 10 businesses (Table C-4) submitted a Dangerous Waste Annual Report in 2018 as a dangerous waste generator under the Resource Conservation and Recovery Act (RCRA; EPA 2019b). Small- and medium-quantity generators accumulate less than 2,200 pounds of dangerous waste at any time. Large-quantity generators accumulate more than 2,200 pounds of dangerous waste at any time.

Table C-4

Dangerous Waste Generators Within Study Area

RCRA ID	HANDLER NAME	GENERATOR STATUS	NAICS	LOCATION	CITY	LATITUDE	LONGITUDE
WAH000028550	Home Depot 4740	MQG	444110	1701 NW Louisiana Avenue	Chehalis	46.6757	-122.978
WAH000044264	Polynt Composites USA Inc.	MQG	325510	3712 Northpark Drive	Centralia	46.73794	-123.004
WAR000002147	Wal Mart 2249	MQG	452311	1601 NW Louisiana Avenue	Chehalis	46.66311	-122.982
WAH000047811	AutoZone 4184	SQG	441310	614 Harrison Avenue	Centralia	46.72338	-122.972
WAD981764608	Centralia College	SQG	611210	301 S King Street	Centralia	46.71635	-122.963
WAD988476917	Darigold Inc.	SQG	311514	67 SW Chehalis Avenue	Chehalis	46.65924	-122.97
WAD076654219	NC Machinery Chehalis	SQG	811310	1178 Ne Maryland Avenue	Chehalis	46.67001	-122.982
WAH000040014	Rite Aid #5284	SQG	446110	1200 Harrison Avenue	Centralia	46.72944	-122.982
WAH000044761	Safeway Store 1495	SQG	445110	1129 Harrison Avenue	Centralia	46.71493	-122.957
WA0000001412	Sorenson Transport Co. Inc.	SQG	484121	632 California Way	Chehalis	46.67118	-122.974

Source: EPA 2019b
Notes:
MQG: medium quantity generator
NAICS: North American Industry Classification System
SQG: small quantity generator

The Centralia WWTP, the Chehalis Regional Water Reclamation Facility, and the Montesano WWTP are located within the study area. Septic tanks are located throughout the rural areas of the study area and have contaminated floodwater during prior floods.

The 2007 flood caused the death of thousands of livestock and flooded livestock areas, contaminating floodwater. A 10-month cleanup, conducted by Ecology's Southwest Regional Office Spill Response Unit, was conducted after this flood. The cleanup area for the flood included Pe Ell, Doty, Adna, Littell, and the area between Chehalis and Centralia. A temporary hazardous waste storage site was located at the Meskill Solid Waste Transfer Station (Holcomb 2008).

Flooding of the Chehalis-Centralia Airport in 2007 contaminated floodwater with jet fuel and other fuel. Household propane tanks were also flooded and were retrieved and disposed of by Ecology in coordination with Lewis County and commercial propane companies. Overall, spill responders and crew members disposed of 4,000 gallons of oil, gasoline, paint pesticides, anti-freeze, flammable liquids, and corrosive substances, as well as 17,500 pounds of hazardous solid substances, oil-contaminated debris, and empty drums and containers (Holcomb 2008).

2.2.2 Flood Warning Systems

Many places in the study area are rural and remote. This results in intermittent availability of cell phone and internet services within some parts of the study area.

The counties in the study area (Lewis, Thurston, and Grays Harbor) manage flood warning systems through their emergency management departments. The county emergency management departments provide flood warning services for all jurisdictions in the counties, with the exception of Centralia in Lewis County. Centralia has its own emergency management department. In emergencies, each emergency management department activates its emergency operations center.

All emergency management departments have a notification system that allows residents to sign up for automated notifications of emergencies (e.g., floods) through emails or phone calls. The departments have websites with links to river gages and weather reports. During flood emergencies, these websites provide specific warning information about floods, including road closures. The counties also provide emergency preparedness education, including for storms and floods, as well as brochures with information on what to do before, during, and after a flood.

Following the 2007 flood, many Chehalis Basin residents said the flood forecasting and warning system was inadequate for predicting flooding on their property. In response, the Chehalis River Basin Flood Authority funded a study of the existing system and implemented a plan to improve it. New rainfall, temperature, and river monitoring stations were installed.

The Flood Authority also established the Chehalis River Basin Flood Warning System, a web-based early warning system that includes links to weather and river forecasts. The website is updated during floods

to include emergency alerts and additional information on the flood. This system also allows residents to sign up for automated notifications of emergencies.

During floods, local fire departments typically assist with rescue operations, emergency medical service, and the warning process as described in the *Public Services and Utilities Discipline Report*. Sheriffs for Grays Harbor County and Lewis County direct the emergency management programs for their jurisdictions. The Grays Harbor County Sheriff also acts as the director of emergency management, and the Lewis County Sheriff's Office sends out warnings to the community in the event of a disaster or critical emergency via a mass notification system called Everbridge. Lewis County recently upgraded to the Everbridge notification system because it is more configurable and robust than the previous system, Code Red (Lewis County 2019). The Grays Harbor County Division of Emergency Management is responsible for emergency preparedness; disaster, emergency response/recovery, and hazardous materials response planning; running the emergency operations center; conducting responder training; providing public education, outreach, and exercises for disaster and emergency response; and operating the StormReady program (Grays Harbor County 2019).

Thurston County also has an emergency management department, which provides flood information and assistance, public education and outreach, and natural hazard planning documents (Thurston County 2019). Thurston County Emergency Management sends out mass notification via the Thurston County Alert system to inform the public about emergency and non-emergency issues such as evacuation notices and weather-related hazards (Thurston County 2018).

2.3 Studies and Reports Referenced/Used

Studies and reports used for the Environmental Health and Safety analysis include the following:

- *Chehalis Basin Strategy Programmatic Environmental Impact Statement* (Ecology 2017)
- Hazardous Sites List (Ecology 2019)
- *2007-08 Chehalis River Flood Oil and Hazardous Material Recovery Project Final Report* (Holcomb 2008)
- "Fact Sheets on Natural Disaster Recovery, Flood Cleanup" (OSHA 2019)
- *Superfund: National Priorities List* (EPA 2019a)
- Everbridge Overview and FAQs (Lewis County 2019)
- *Emergency Management* (Thurston County 2019)
- *Thurston Community Alert* (Thurston County 2018)
- *Emergency Management* (Grays Harbor County 2019)
- *Comprehensive Flood Management and Natural Hazards Mitigation Plan* (City of Centralia 2008)
- *Lewis County Multi-Jurisdictional Hazard Mitigation Plan* (Lewis County Emergency Management 2016)
- *Washington State Enhanced Hazard Mitigation Plan* (Washington Emergency Management Division 2018)

2.4 Technical Approach

To examine the potential effects on environmental health and safety, public databases were reviewed for sites within the study area with known contamination, including the FRE facility and temporary reservoir, the airport levee, and areas of likely inundation during a flood. Information was obtained from mapped sources and public websites and added to a study area map. Factors considered for the analysis of construction effects included the likelihood for construction activities to come into contact with contaminated soil or groundwater.

To identify the potential impacts from flood inundation, a geographic information system (GIS) map of inundation levels under the Proposed Action, alternatives, and flood scenarios was reviewed. Other discipline reports prepared for this project were also reviewed to identify impacts on seismic potential, transportation, and FRE facility safety as they relate to impacts on environmental health and safety. Information on the potential for a gate failure was provided by project team engineers, as well as the modeling results for a hypothetical FRE facility breach.

3 TECHNICAL ANALYSIS AND RESULTS

3.1 Overview

This section describes the probable impacts to environmental health and safety from the Proposed Action (Section 3.2), Local Actions Alternative (Section 3.3), and No Action Alternative (Section 3.4). The section also evaluates required permit conditions and planning document requirements that could address the impacts identified (Section 3.2.3). When probable significant adverse environmental impacts remain after considering these, the analysis identifies mitigation measures that could avoid, minimize, or reduce the identified impact below the level of significance (Section 3.2.4).

3.2 Proposed Action

3.2.1 Impacts from Construction

3.2.1.1 Direct

3.2.1.1.1 Flood Retention Expandable Facility

Similar to most construction projects, the potential short-term impacts on environmental health and safety from the construction of the FRE facility include the potential risk that construction workers could come into contact with construction solvents and petroleum products such as diesel and gasoline or that spills could occur. Petroleum products used to fuel equipment and a diesel generator would be located in the construction area in aboveground tanks which would contain more than 1,320 gallons of oil. Therefore, a Spill Control and Countermeasure Plan would be required for the facility. Safety measures required under state and federal laws would be implemented to control the routine transport, use, and disposal of oil and hazardous materials during construction. In the event of an oil or hazardous material spill, emergency actions would be required under federal and state law to contain and clean up the spill. Adverse impacts from spills of oil or hazardous material affecting people or the environment from construction of the FRE facility are anticipated to be **minor.**

As described in the *Water Discipline Report* (ESA 2020b), stormwater and wastewater that have had contact with cement used in concrete production present a potential for introducing high-pH discharges to surface waters, thereby elevating instream pH levels. Construction activities would be done under the regulation of an Ecology National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit and local land use and development permits issued by Lewis County. The NPDES Construction Stormwater Permit includes conditions requiring the permittee to control flow rates to protect waterways downstream, as required by the local plan approval authority. With appropriate control measures and monitoring programs in place and as required by permits, construction-related discharges must meet water quality standards and are expected to be within anthropogenic allowance, and therefore, these discharges would represent **moderate to minor** adverse impacts on environmental health.

Construction of the FRE facility would occur over a 5-year period. Water would not be stored in the temporary reservoir during construction, but would flow through the bypass tunnel. If the facility site were damaged from landslides or an earthquake during construction, it would not occur while the reservoir is holding water; therefore, there would be **no adverse impact** to environmental health and safety. In addition, the probability of the design seismic event occurring during construction is extremely low.

As described in the *Transportation Discipline Report* (ESA 2020c), the daily traffic along South 3rd Street/Muller Street in Pe Ell is anticipated to increase by less than 20% during the active construction period. However, traffic volumes on these roads are low, and given the already low volumes of traffic, the increased traffic volume during construction would not likely affect vehicle delays and safety. Adverse impacts on environmental health and safety from the construction of the FRE facility are anticipated to be **minor.** Mitigation is proposed for the Applicant to coordinate construction activities with emergency service providers, schedule construction to minimize impacts, and notify the public of construction that will reduce service response delays related to traffic and activities. In addition, to reduce impacts on emergency services and response, the Applicant will develop Construction Traffic Control Plans for the FRE facility and levee construction work.

3.2.1.1.2 Airport Levee Changes

The potential short-term impacts on environmental health and safety from the construction of the Airport Levee Changes include the small possibility that construction workers would come into contact with construction solvents and petroleum products such as diesel and gasoline. Safety measures required under state and federal laws would be implemented to control the routine transport, use, and disposal of hazardous materials during construction. In the event of an oil or hazardous material spill, emergency actions would be required under state law to contain and clean up the spill. Adverse impacts on environmental health and safety from the construction of the Airport Levee Changes are anticipated to be **minor.**

3.2.1.2 Indirect

3.2.1.2.1 Flood Retention Expandable Facility

No indirect adverse impacts on environmental health and safety from the construction of the FRE facility are anticipated.

3.2.1.2.2 Airport Levee Changes

No indirect adverse impacts on environmental health and safety from the construction of the Airport Levee Changes are anticipated.

3.2.2 Impacts from Operation

3.2.2.1 Direct

3.2.2.1.1 Flood Retention Expandable Facility

The design of the FRE facility will incorporate stringent state dam safety standards, design guidelines, and precautions for safe operation. Design criteria reports include information on the seismic events evaluated as part of the initial design process (HDR and Shannon & Wilson 2015, 2017). The evaluation includes looking at downstream hazard potential, populations at risk and potential for loss of life, potential economic loss, and potential environmental damages.

The dam safety guidelines provide guidance in the selection of appropriate design and performance goals for critical project elements (Ecology 1992). Design and performance goals for critical project elements are selected based on a design step format with eight design steps where the goals become increasingly more stringent in progressing from Design Step 1 through Design Step 8. For example, Design Step 1 has an annual exceedance probability (AEP) of 1 in 500 and is applicable when the downstream consequences of a failure would be minimal and there would be no potential for loss of life. At Design Step 3, there is an AEP of 1 in 3,333 with the potential for the loss of one to three lives. The AEP increases (Design Step 4 at 1 in 10,000 through Design Step 8 at 1 in 1,000,000) with increasing loss of life, critical infrastructure at risk, and potential environmental consequences. The scheme terminates in theoretical maximum events.

An initial assessment of the design step for a dam can be generally related to the downstream hazard classification. For example, using Ecology's Dam Safety Office (DSO) guidelines, an initial Design Step of 3 or 4 would be recommended for a significant, hazard class 2D dam (economic loss appreciable, 1 or 2 inhabited structures, population at risk of 1 to 6 people); or a Design Step 8 would be recommended for a high, hazard class 1A dam (economic loss extreme, more than 100 inhabited structures, population at risk of more than 300 people).

Given the downstream hazard, it is expected the FRE facility would be required to meet Design Step 8 requirements. For seismic design of the FRE facility, an AEP of 1% in 100 years is expected to be used, which approximately corresponds to a return period of 10,000 years for the ground motions considered in the design of the facility (Ecology 1992).

Flood retention facility failures can occur and have typically been associated with three general categories of project components: spillways, outlet conduits, and the impounding barrier and foundation (Ecology 1993). Special emphasis is provided in the Dam Safety Guidelines to provide consistent design levels and balanced protection of the critical elements in the three general categories (Ecology 1993).

As an example of a type of failure, despite the stringent design requirements, there is a very small potential for a gate to fail while the reservoir is holding water. The FRE facility would contain five openings with gates. If a gate failure occurred and the outlet was closed, there would be no impact and water would be retained in the reservoir. If a gate failure occurred and the largest outlet remained 75% open, water would flow through the outlet at a rate of up to 14,200 cubic feet per second (cfs), which could reduce the amount of water stored in the reservoir by a small amount (HDR 2018). It would not be expected to significantly affect people or structures downstream because this flow volume is within the range of FRE facility operational flows.

Over the life of the FRE facility, an earthquake on the Cascadia Subduction Zone (CSZ) could damage the facility (refer to the *Earth Discipline Report* for further discussion of the CSZ in more detail [Shannon & Wilson and Watershed GeoDynamics 2020]). To provide seismic parameters for the preliminary design of the FRE facility, geotechnical studies were completed (HDR and Shannon & Wilson 2015). The primary seismic hazards for the FRE facility are ground motion and fault rupture. A seismic hazard analysis was performed to identify the potentially active faults near the site and the seismogenic effects on the structure. The conclusion was that several faults in Western Washington could potentially have an effect on the FRE facility, namely the CSZ plate interface, the CSZ intraslab, the Olympia Fault, and the Doty Fault. The study concluded that the controlling maximum credible earthquake is a CSZ interface event.

Design earthquake time histories were provided for probabilistic ground motions with a 2,475-year return period as well as other return periods ranging from 500 to 10,000 years. Deterministic maximum credible earthquake ground motions were estimated for a magnitude 8.9 CSZ interface earthquake, a magnitude 7.5 CSZ intraslab earthquake, a magnitude 7.1 Olympia Fault earthquake, and a magnitude 6.9 Doty Fault earthquake (HDR and Shannon & Wilson 2015).

If the FRE facility sustained major damage while storing water, water from the temporary reservoir could be released, causing catastrophic downstream flooding and endangering public safety. The worst-case assumption also considers that the development of a breach for a roller-compacted concrete dam could occur relatively quickly and release the entire contents of the reservoir. The probability of a seismic event with a 500-year return period occurring while there is also a full or mostly full reservoir is 0.0000000018 (calculation: 5.48E-06 * 3.33E-04 = 1.8E-09). The probability of a seismic event with a 2,475-year return period occurring while there is also a full or mostly full reservoir is 0.00000000037 (calculation: 1.11E-06 * 3.33E-04 = 3.7E-10). This corresponds to a probability of a 1 in 2,500,000,000 chance of occurrence.

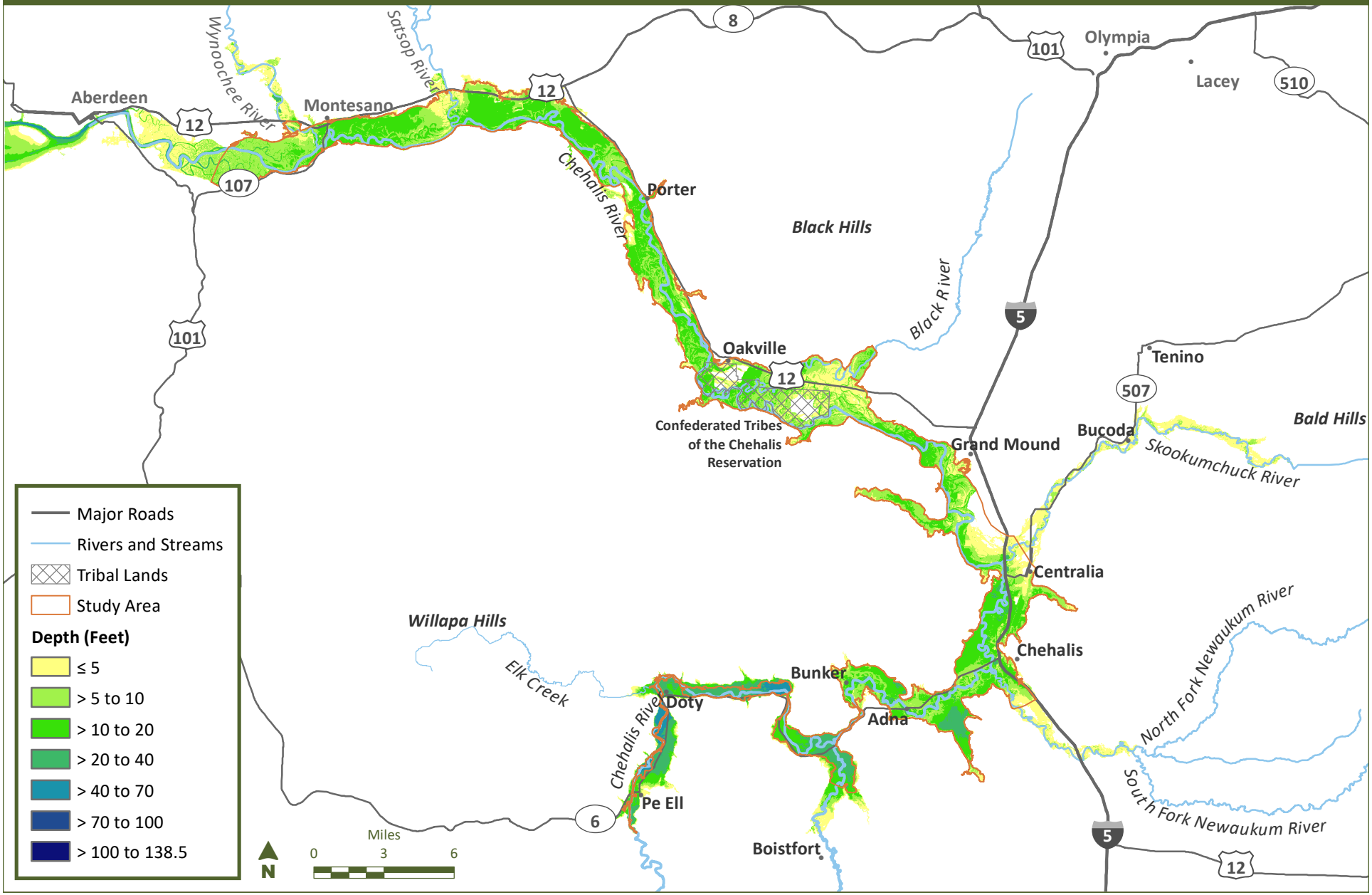
The proposed FRE facility would be designed to a high standard of safety, with Design Step 8 used for an emergency spillway design, with the capacity to maintain the design freeboard. The probability of a failure for a modern dam is extremely low, given modern design methods and construction techniques. The FRE facility would be required to meet stringent DSO design guidelines, covering a variety of possible conditions that could affect the dam, such as earthquakes and floods, as part of the Dam Safety

Permit. The emergency spillway is designed so that the reservoir will not rise above the design freeboard elevation. This is the DSO standard for preventing overtopping and undue stress on the embankment, which might lead to a potential failure. The FRE facility would be required to be designed to withstand shaking associated with an earthquake on the CSZ as described previously.

Breach modeling of the extreme case for a hypothetical breach predicted the breach peak outflow at the FRE facility to be 1,236,000 cfs (WSE 2019). The consequences of a simulated catastrophic breach at the FRE facility were assessed based on a comparison of the downstream flood zones and the simulated zones for a breach under the Proposed Action (Figure C-2). The downstream breach flood and the subsequent hazard will be assessed in more detail as the design is refined as part of the permitting process. The downstream flood inundation analysis identified various impacts, including geomorphological impacts such as erosion and turbidity, overbank flooding and sediment transport, channel fluctuations, and landslides into the floodplain, as well as direct breach flood impacts to property, buildings, transportation corridors, and other infrastructure.

An FRE facility break or failure could develop within a relatively short time frame with a pronounced peak release of the water stored in the temporary reservoir behind the embankment. Peak volumes and flow velocities, especially near the failing structure, could be extremely high because of the high hydraulic head or elevation of the water behind the structure and the possibility of a rapid failure of a large section of the FRE facility structure. The peak flood hydrograph may be highly compressed (on the temporal axis) due to the rapid release of impounded water. This peak release of water from the flood retention facility break would travel as an impulse wave downstream, followed by gradually waning flood depths.

Figure C-2
Modeled Downstream Extent of Catastrophic FRE Facility Failure



Source: WSE 2019

Forces on structures impacted by the peak flood would be dependent on flow velocity and depth, but because most traditional structures are not designed or constructed to withstand the large dynamic forces generated by such an intense flood, the extent of damage to people, structures, properties, livestock, infrastructure, and the environment from a facility breach would be **significant**. Considering the quantity of water released from the FRE facility if it failed, and the relatively short time period over which the release could occur, the consequences of a flood retention facility breach, due to these dynamic forces exerted by the rapidly traveling flood wave, would cause extensive physical damage and pose a significant hazard to persons in the breach flood zone. The consequences of this type of flooding include potential loss of human life, loss of and damage to public infrastructure, and extensive damage to private properties and the environment.

Emergency Response Plans would be required to be developed by the Applicant in conjunction with the Town of Pe Ell, Lewis County, and other stakeholders in potentially affected areas. The plans would be developed and executed in accordance with an Emergency Action Plan (EAP), as required by Ecology's DSO. EAPs provide guidance for detecting the event, determining the emergency level, notifying the community, addressing the event, and reporting it (Ecology 2013). At a minimum, EAPs include the specifics related to notification procedures, a notification list including names and telephone numbers of all potentially affected downstream residents and local emergency officials, and procedures to follow for emergency situations that would not necessarily lead to FRE facility failure but could represent a hazard for downstream residents. EAPs should be reviewed and updated at least once per year.

To improve emergency response, mitigation is included in Section 3.2.4 to develop and implement a breach flood warning system for Pe Ell, Centralia, and Chehalis. The breach flood warning system would be a staged system, with alerts and responses becoming more urgent as the potential for a breach becomes more severe. The initial stage may begin with notifications to local officials, eventually proceeding to full-scale evacuations. For a fast-developing breach scenario, with little warning time, alert sirens may be an option. This system will be reviewed by Ecology's DSO and Lewis County emergency response agencies.

Mitigation is also included for the Applicant to provide training to local emergency response officials for breach scenarios as part of the EAP. Mitigation also includes providing educational outreach for downstream residents, schools, and critical facilities on how to respond in the case where a breach releases water.

Although the likelihood of a catastrophic FRE facility failure occurring while the temporary reservoir is holding water is extremely low, there are no mitigation measures that could completely eliminate the possibility of an incident or the resulting impacts. Therefore, the results of such an event would be considered a **significant and unavoidable adverse impact**.

3.2.2.1.2 Airport Levee Changes

The Airport Levee Changes include raising the existing levee around the Chehalis-Centralia Airport and a portion of NW Louisiana Road. The purpose of these changes is to provide protection from catastrophic floods for the Chehalis-Centralia Airport, local businesses, and a portion of Interstate 5 (I-5). As described in the *Transportation Discipline Report*, modeling shows the Airport Levee Changes would reduce inundation levels and duration of closure at the Chehalis-Centralia Airport in a catastrophic flood, allowing the airport to function and provide emergency response for longer periods during flooding. The Airport Levee Changes would also provide some protection to a portion of I-5 during a catastrophic flood, possibly maintaining I-5 as an emergency response route for longer periods during flooding. There would be **no adverse impacts** as a result of the Airport Levee Changes, but the overall area would experience impacts from flooding and the Chehalis-Centralia Airport would continue to be closed during certain floods.

3.2.2.1.3 Changes in Inundation

The FRE facility would reduce the severity of flooding in portions of the study area during a major or catastrophic flood, which would likely reduce the need for emergency response services in those areas. The FRE facility would also reduce the inundation depth and number of local roadways flooded during a major or catastrophic flood, which would have positive impacts on emergency response and public safety within those road corridors. By reducing the depth of inundation, it could also reduce the contamination of surface water by floodwaters and the release of hazardous materials, thereby reducing the potential for public exposure to hazardous materials and any health and safety effects.

The FRE facility would not substantially reduce the contamination of drinking water wells because most areas using wells would continue to be inundated during mid- and late-century major or catastrophic flood. Reducing the depth or duration of inundation would not prevent groundwater contamination as contamination could occur with any amount of inundation. Overall, the FRE facility would reduce threats to public health and safety for a major or catastrophic flood in the study area. For floods larger than a catastrophic flood, the FRE facility would contain up to 65,810 acre-feet of water in the reservoir but any additional water would spill over the FRE facility via the spillway. For example, in a 500-year flood similar to the 2007 flood, flows exceeding the reservoir's capacity to store and pass through the outlet structure would discharge through an emergency spillway at the top of the structure. The spillway is expected to be used very rarely and for events of very short duration. Flood levels downstream would be reduced, because the flow over the spillway would occur after the peak of the flood occurs (Anchor QEA 2017).

Based on modeling, the following three hazardous facilities sites with known contamination could be potentially affected by flooding in the study area under the modeled flood scenarios for the alternatives.

Table C-5 shows the projected flood levels under the No Action and Proposed Acton Alternatives during various flood scenarios at these sites (see also Figure C-3):

- **The American Crossarm and Conduit site** would be inundated during all modeled flood scenarios under both the No Action Alternative and the Proposed Action. Under the Proposed Action, the site would be inundated by 1.6 feet of water during a mid-century major flood and by 2.63 feet of water in a late-century major flood. The Proposed Action would reduce the inundation levels at the site by approximately 0.7 foot under both modeled flood scenarios. For the catastrophic flood scenarios under the Proposed Action, the site would be inundated by 5.29 feet during a mid-century flood and 6.02 feet under a late-century flood. The Proposed Action would reduce inundation levels by 1.15 and 0.91 feet, respectively. Any level of inundation could mobilize contaminants; therefore, the Proposed Action would not reduce the threat of environmental health and safety from contamination due to inundation of the American Crossarm and Conduit site.
- **The Jack Wilmarth Triangle General Store site** would not be inundated during the modeled mid-century major flood scenario under the No Action Alternative or the Proposed Action. During the modeled late-century major flood, the site would be inundated under the No Action Alternative (0.38 foot) but not the Proposed Action. Therefore, under this flood scenario, the Proposed Action would reduce the environmental health and safety impacts of contaminated floodwaters associated with inundation of the Jack Wilmarth Triangle General Store site. Under the modeled mid- and late-century catastrophic floods, the site would be inundated under the No Action Alternative by 1.86 and 2.95 feet of water, respectively. The Proposed Action would reduce modeled flood depths by 2.27 feet during the mid-century catastrophic flood and by 2.5 feet during the late-century catastrophic flood. Because the site would still be inundated, contaminants could still be mobilized by floodwaters.
- **The Weyerhaeuser Centralia Property site** would be inundated during the modeled mid- and late-century catastrophic floods under the No Action Alternative by an estimated 0.65 and 0.83 foot of water, respectively. There would be no reduction in inundation at the site under the Proposed Action; the Proposed Action would not change water levels at the site. Because the site would still be inundated under all modeled flood scenarios, contaminants could still be mobilized by floodwaters.

Many other sites throughout the study area use and store hazardous materials, such as dry cleaners, gas stations, industrial facilities, and farms. Any facility that stores hazardous materials and chemicals has the potential to contaminate floodwaters if the materials are inundated and mobilized by floodwaters. While floodwaters could mobilize contaminants, the FRE facility would either reduce water levels or cause no changes to water levels at the identified hazardous materials sites. Therefore, the operation of the FRE facility would **not cause adverse impacts** to hazardous material sites.

The other contaminated sites shown in Figure C-1 (Cummings Oil and Grange Supply) were not included in the analysis presented in Table C-5 because these facilities are not anticipated to be inundated in the modeled flood scenarios. The Centralia WWTP and the Chehalis Regional Water Reclamation Facility were also not included in the analysis because these facilities are not anticipated to be inundated during the modeled flood scenarios. While the modeling indicates the Montesano WWTP, or a portion of the WWTP, would be inundated during a mid- or late-century catastrophic flood under both the No Action Alternative and the Proposed Action, existing berms, or protections planned in the future, could protect the WWTP from some or all of these floods. The Montesano WWTP was threatened by flooding during the 2007 flood. Since that time, the Chehalis River Basin Flood Authority has helped to construct a new berm around the settling ponds to protect them from flooding. If the site were to be flooded, modeling indicates that flooding would be highly variable across the site. For one location selected for modeling, the site would be inundated under the modeled mid- and late-century catastrophic flood scenario by 2.58 feet and 3.89 feet, respectively (see Table I-4 in the *Public Services and Utilities Discipline Report*). The Proposed Action would reduce these inundation levels to zero during a mid-century catastrophic flood and by 1.02 feet during a late-century catastrophic flood. Therefore, the operation of the FRE facility would **not cause adverse impacts** to WWTP facilities.

3.2.2.2 Indirect

3.2.2.2.1 Flood Retention Expandable Facility

No indirect adverse impacts on environmental health and safety from the operation of the proposed FRE facility are anticipated.

3.2.2.2.2 Airport Levee Changes

No indirect adverse impacts on environmental health and safety from the operation of the proposed Airport Levee Changes are anticipated.

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Table C-5

Predicted Inundation Depths (in Feet) at Known Contaminated Sites During Major and Catastrophic Floods

	MAJOR FLOOD						CATASTROPHIC FLOOD					
	MID-CENTURY			LATE-CENTURY			MID-CENTURY			LATE-CENTURY		
FACILITY[1]	NO ACTION	PROPOSED ACTION	DIFFERENCE	NO ACTION	PROPOSED ACTION	DIFFERENCE	NO ACTION	PROPOSED ACTION	DIFFERENCE	NO ACTION	PROPOSED ACTION	DIFFERENCE
American Crossarm and Conduit Co.	2.34	1.6	-0.74	3.34	2.63	-0.71	6.44	5.29	-1.15	6.93	6.02	-0.91
Jack Wilmarth Triangle General Store	0	0	0	0.38	0	-0.38	4.13	1.86	-2.27	5.45	2.95	-2.5
Weyerhaeuser Centralia Property	0	0	0	0	0	0	0.65	0.65	0	0.83	0.83	0
Safeway Store 1495	0	0	0	0	0	0	1.34	1.31	-0.03	1.39	1.38	-0.01
AutoZone 4184	2.02	2.02	0	2.49	2.48	-0.01	4.17	3.70	-0.47	4.88	4.54	-0.34
Centralia Community College	0	0	0	0	0	0	0.04	0.04	0	0.77	0.23	-0.54
Home Depot 4740	0	0	0	0	0	0	0	0	0	0.96	0	-0.96
Wal Mart 2249	0	0	0	0	0	0	1.89	0	-1.89	3.27	0	-3.27
NC Machinery Chehalis	0	0	0	0	0	0	4.99	0	-4.99	6.49	2.47	-4.02
Sorenson Transport Co. Inc.	0	0	0	0	0	0	2.39	0	-2.39	3.90	0	-3.90
Darigold Inc.	0	0	0	0.20	0	-0.20	2.42	1.57	-0.85	2.78	2.11	-0.67

Note:
1. Inundation measurements are taken at one point at the facility location; inundation depths may vary at other locations on facility sites.

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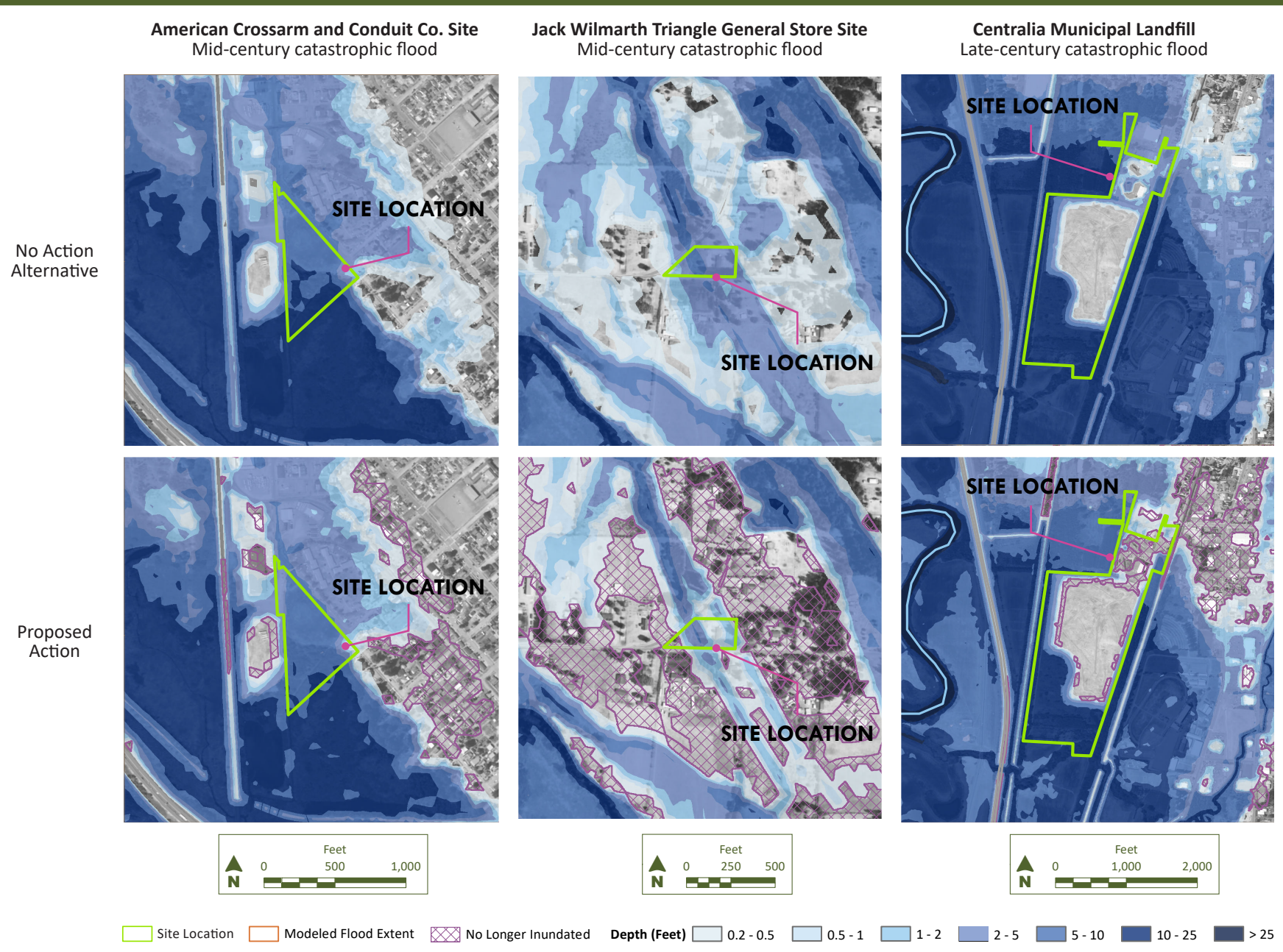
Figure C-3
Predicted Changes in Inundation Depths at Select Sites



3.2.3 Required Permits

The following permits would be required for the Proposed Action:

- **Dam Safety Construction Permit (Ecology):** A dam safety construction permit is required before constructing, modifying, or repairing any dam or controlling works for storage of 10 or more acre-feet of water, liquid waste, or mine tailings. Ecology reviews and administers all dam safety permits in Washington to ensure compliance with state and federal construction and operation requirements. The FRE facility would require a dam safety permit prior to the start of construction.
- **Floodplain Development Permit (Lewis County):** A floodplain development permit will be required.
- **Conditional Letter of Map Revision (Federal Emergency Management Agency [FEMA])**: Will be needed because the Proposed Action would alter flood depths and the extent of the Special Flood Hazard Area.
- **Letter of Map Revision (FEMA):** Will be required after construction, reflecting as-built conditions and subsequent changes to the Special Flood Hazard Area.

3.2.4 Proposed Mitigation Measures

This section describes the mitigation measures that would reduce and compensate for impacts related to water from construction and operation of the Proposed Action. These mitigation measures would be implemented with, or as part of, the required permits, plans, and approvals described in Section 3.2.2.

The Applicant will implement the following measures to mitigate impacts on environmental health and safety:

- **EHS-1:** To reduce impacts on emergency services and response, mitigation is proposed for the Applicant to coordinate construction activities with emergency service providers, schedule construction to minimize impacts, and notify the public of construction that will reduce service response delays related to traffic and activities.
- **EHS-2:** To reduce impacts on emergency services and response, mitigation is proposed for the Applicant to develop Construction Traffic Control Plans for the FRE facility and levee construction work.
- **EHS-3:** To improve emergency response, mitigation is proposed for the Applicant to develop and implement a breach flood warning system for Pe Ell, Centralia, and Chehalis. The breach flood warning system would be a staged system, with alerts and responses becoming more urgent as the potential for a breach becomes more severe. The initial stage may begin with notifications to local officials, eventually proceeding to full-scale evacuations. For a fast-developing breach scenario, with little warning time, alert sirens may be an option. This system will be reviewed by Ecology's DSO and Lewis County emergency response agencies.
- **EHS-4:** To improve emergency response, mitigation is proposed for the Applicant to provide training to local emergency response organizations on breach scenarios as part of the EAP. This

also includes providing educational outreach for downstream residents, schools, and critical facilities on how to respond to a rapidly developing breach.

3.2.5 Significant and Unavoidable Adverse Environmental Impacts

Compliance with laws and implementation of mitigation measures would reduce impacts related to environmental health and safety. Although the likelihood of a catastrophic FRE facility failure from an earthquake during a time when the reservoir is storing water is extremely low, there are no mitigation measures that could completely eliminate the possibility of an incident or the resulting impacts. Therefore, the potential for a catastrophic FRE facility failure in the event of an earthquake while the reservoir is full is considered a **significant and unavoidable adverse impact** to people, infrastructure, structures, and the environment downstream.

3.3 Local Actions Alternative

3.3.1 Impacts from Construction

3.3.1.1 Direct

Potential short-term impacts on environmental health and safety from construction of the Local Actions Alternative include construction workers' exposure to potential legacy contaminants, construction solvents, and petroleum products such as diesel and gasoline used to power construction-related equipment. Because construction would be temporary, this potential adverse impact would range from **moderate to minor**, depending on proximity to a contaminated site, type of hazardous material being used by workers, and duration.

3.3.1.2 Indirect

No indirect adverse impacts on environmental health and safety from the construction of the Local Actions Alternative are anticipated.

3.3.2 Impacts from Operation

This section analyzes the potential impacts from operation and implementation of local actions.

3.3.2.1 Direct

Under the Local Actions Alternative, environmental health and safety throughout the study area would continue to be vulnerable during a major or catastrophic flood. Inundation of facilities that use and store hazardous materials would continue, resulting in contamination of floodwaters. There is also the potential for the contamination of wells and surface waters from inundation of floodwaters, creating health and safety issues. Flooding along public roadways would likely not be reduced. Floods would likely continue to result in road closures during floods on I-5, State Route (SR 6), and U.S. Route (US 12), as well as other local roadways, continuing to affect emergency response time.

Floodproofing residences and commercial buildings could reduce floodwater contamination of hazardous materials stored at each location. These effects would be beneficial at the locations where they are applied.

New facilities could either be prohibited from being located within the 500-year floodplain or be protected from damage and loss of access during a 500-year flood through more stringent construction standards. Regulatory standards that minimize new development in the floodplain would reduce risks to public safety and potential impacts on emergency services. Therefore, beneficial effects on public health and safety could result from land use management improvements.

Implementing improvements to the flood warning system would improve flood forecasts and increase the lead time for flood warning and preparation. Floodplain storage improvements and channel

migration would reduce the extent and duration of floods. The implementation of these three local actions would result in some localized beneficial effects on environmental health and safety.

3.3.2.2 Indirect

No indirect adverse impacts on environmental health and safety from the operation of the Local Actions Alternative are anticipated.

3.3.3 Flood Conditions and Impacts

This discipline report analyzes probable impacts to environmental health and safety under the No Action Alternative, and similar impacts would likely occur for the Local Actions Alternative. Major and catastrophic floods would continue and areas would experience **substantial flood risk** under the Local Actions Alternative that would affect environmental health and safety.

3.4 No Action Alternative

Under the No Action Alternative, flooding would not be reduced. Inundation of facilities that use and store hazardous materials would result in contamination of floodwaters. There is also the potential for the contamination of wells and surface waters from inundation of floodwaters, creating health and safety issues.

Under the No Action Alternative, flooding along public roadways and at critical facilities would not be reduced. Floods would continue to result in road closures during floods on I-5, SR 6, and US 12, as well as other local roadways, continuing to affect emergency response time. Critical facilities could also continue to be sited in the floodplain, further affecting emergency response time. Major and catastrophic floods would continue and areas would experience **substantial flood risk** under the No Action Alternative that would affect environmental health and safety.

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