

CLEAR CREEK AGRICULTURAL RESILIENCE ACTION PLAN

Prepared for

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Floodplains for the Future

Prepared by

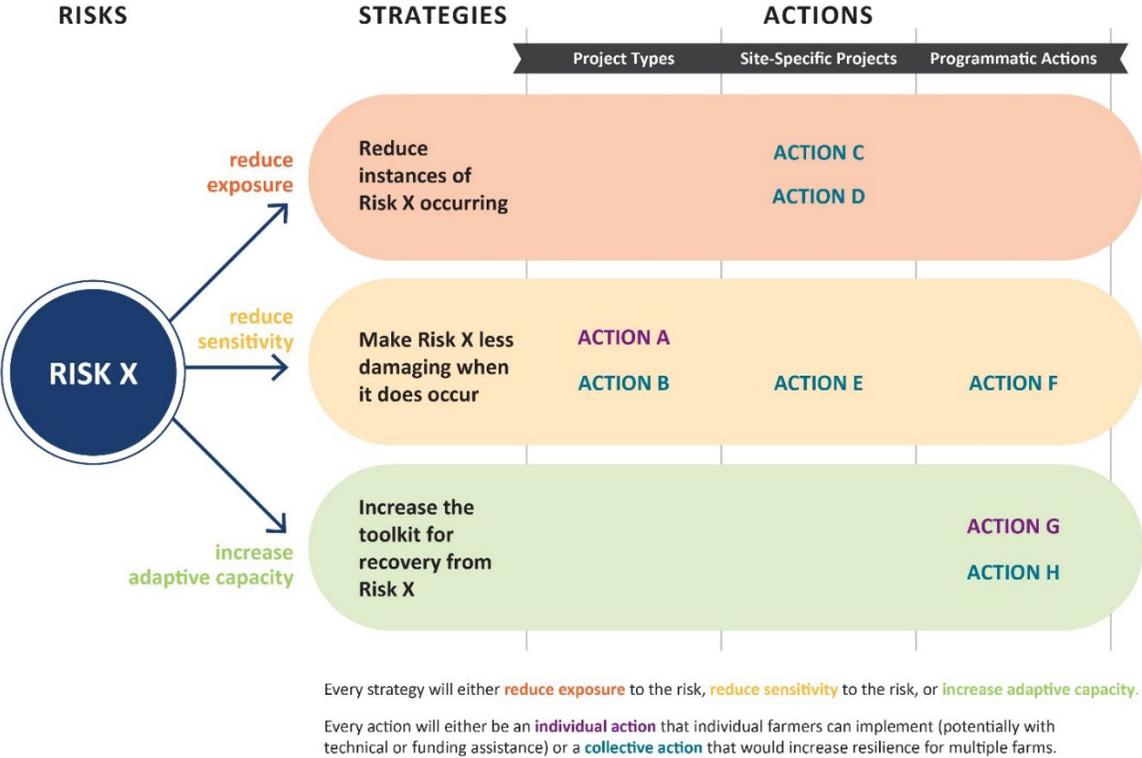
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EXECUTIVE SUMMARY

Background

The Clear Creek area is a highly productive agricultural region along the Puyallup River near Tacoma, Washington. Roughly a dozen farmers and landowners farm 575 acres of land on a mixture of small, local market-driven farms and large wholesale farms. The area is known for its high quality soils and proximity to markets, making the Clear Creek area an attractive location for farmers in the South Puget Sound region. Over the years, farmers in the Clear Creek area have faced increasing risks from flooding, development pressure, weather and climate change, and regulatory barriers, with each threatening the long-term viability of agriculture in the area. The purpose of the Clear Creek Agricultural Resilience Action Plan (ARAP) is to define risks facing farmers in the area and identify a suite of actions to reduce exposure and sensitivity to those risks and increase the adaptive capacity of farmers and the larger agricultural community. If pursued, the suite of actions will address physical conditions and increase agricultural viability to enhance the resilience of the agricultural community as conditions change.



The Clear Creek ARAP defines five major risks to agricultural resiliency in the Clear Creek area:

- Flooding
- Poor drainage
- Uncertainty about groundwater

- Development pressure
- Incompatible infrastructure

The plan outlines strategies to reduce exposure, reduce sensitivity, and increase adaptive capacity for each of the five risks. These strategies are then used to identify a suite of actions to address each risk through general project types, site-specific projects, or programmatic actions. The risks, strategies, and actions identified in this plan were selected based on extensive outreach with and feedback from Clear Creek farmers and other stakeholders in the area.

The Clear Creek ARAP is built upon years of outreach, engagement, and planning efforts in the area through programs like Floodplains for the Future (FFTF), the Farming in the Floodplain Project, and the Clear Creek Strategy Plan. These programs have convened stakeholders and partners representing the agricultural community as well as flood risk reduction and salmon recovery partners to identify challenges and generate multi-benefit solutions in the Clear Creek area. These projects built strong relationships between resource managers and at the agricultural community that formed the basis for the outreach and engagement efforts behind the ARAP.

The Clear Creek ARAP is a roadmap for use by Clear Creek farmers, Drainage District 10, the Pierce Conservation District, Pierce County, Floodplains for the Future, and other people and agencies interested in increasing agricultural resilience in the Clear Creek area. Full achievement of agricultural resilience will require collaboration and creativity. This ARAP will also require adaptive management, as described in Chapter 3. Some actions in the ARAP are already in progress, while others could take 50 years to complete. However, an update to the ARAP should be considered in 5 or 10 years, depending on the need.

Risks to Clear Creek Agriculture

Flooding

Puyallup River flooding is a significant physical risk and the most substantial long-term threat facing agriculture in the Clear Creek area. Flood impacts stem from a complex interaction of flows in the Puyallup River and Clear Creek and its tributaries. The flood control system in the area consists of levees, an upstream dam (Mud Mountain Dam), tide gates, and stormwater detention ponds on Swan, Squally, and Canyon creeks. In particular, the River Road levee presents threats from overtopping during high flow events that could lead to the destruction of farms, homes, and businesses in the area. Additionally, current regulations limit the extent to which areas can be rebuilt after floods of this type, which presents uncertainty for the long-term viability of agriculture in the Clear Creek area.

Poor Drainage

Agricultural drainage is the biggest current risk to agricultural viability in the Clear Creek area. All drainage in the area flows into Clear Creek before eventually draining to the Puyallup River. Clear Creek is a salmon-bearing stream, and the reliance on the creek for drainage results in regulatory barriers and enhanced permitting requirements for drainage maintenance. Clear Creek presents other challenges to farmers. The creek receives substantial amounts of sediment inputs and stormwater from its tributaries, reducing the capacity of the stream to support agricultural drainage. Invasive vegetation, slope, and flow also restrict the drainage capacity of the creek.

Uncertainty about Groundwater

Groundwater in the Clear Creek area is important to agricultural viability because it affects both water supply and drainage. Some farmers in the Clear Creek area rely on groundwater for irrigation. Despite the importance of groundwater, not much is known about groundwater levels, trends, or its interaction with surface water in the Clear Creek area. In particular, potential future groundwater levels with climate change and sea level rise are unknown. Groundwater in the area is relatively shallow, and rising groundwater levels in the future could further impede agricultural drainage and increase the frequency of groundwater ponding on the ground surface in some areas. The potential for saltwater intrusion into groundwater with sea level rise should also be considered. The uncertainty about current and future groundwater conditions in the area represents a risk to agricultural viability and resilience simply because we lack the base of information needed to understand what impacts could occur.

Development Pressure

The location of the Clear Creek area near the urban centers of Tacoma and Puyallup makes the area well suited to local, market-based agriculture, but also presents significant risks from development pressure to farmers and the agricultural land base in the area. Many farms in Pierce County and the Puyallup Watershed have been converted into residential and industrial uses; from 2013 to 2019, 5 percent of actively farmed land was lost to development. The Clear Creek area is within a designated floodway, which has reduced development pressures, but if that designation was to change, the area's proximity to urban centers would significantly increase development threats.

Incompatible Infrastructure

Infrastructure projects, including habitat projects, transportation projects, and other public development projects, pose risks to agricultural viability through the conversion of farmland and through changes to conditions (such as rural character, transportation networks, and drainage conditions, among many others) that could affect the viability of adjacent farms. Recently, the Clear Creek Floodplain Reconnection Project and the Canyon Road Regional Connection Project have raised questions within the Clear Creek agricultural community about the impacts of these projects on agricultural viability. The Clear Creek Floodplain Reconnection Project is a large-scale flood risk reduction and habitat restoration project that would restore connectivity between Clear Creek and the Puyallup River. The project presents several threats to agriculture in the area that have the potential to be mitigated through site design. The Canyon Road Regional Connection Project is a \$160 million infrastructure project being pursued by Pierce County to create a more direct north-south corridor from the Frederickson Industrial Area to the Port of Tacoma. The project footprint runs through the Clear Creek area, and several farmers have expressed concerns about impacts on their operations and businesses.

Actions to Address Risks

The Clear Creek ARAP includes 23 actions to increase agricultural viability in the Clear Creek Area. The table below lists the actions and where they can be found in the plan. The colors are linked to the strategy concepts in the figure above: reduce exposure, reduce sensitivity, and increase adaptive capacity.

#	NAME OF PROJECT OR ACTION	RISK	TIMEFRAME	STRATEGY
1	Community Training on Emergency Response During an Overtopping/Breaching Event	Flooding	Short term	Increase adaptive capacity
2	Develop Plan for Recovery After Overtopping Event	Flooding	Short term	Increase adaptive capacity
3	Build Shared Elevated Platforms for Equipment and Livestock	Flooding	Short term	Reduce sensitivity
4	Elevate and Protect Infrastructure	Flooding	Medium term	Reduce sensitivity
5	Increase Freeboard on River Road Levee	Flooding	Long term	Reduce exposure
6	Participate in Large-Scale Multi-Benefit Projects to Address Clear Creek Flooding	Flooding	Long term	Reduce exposure
7	Replace Undersized Culverts	Poor Drainage	Short term	Reduce exposure
8	Vegetation Management	Poor Drainage	Short term	Reduce exposure
9	Research Soil Compaction and Drainage	Poor Drainage	Short term	Increase information
10	Develop an Approach to Beaver Management	Poor Drainage	Short term	Increase adaptive capacity
11	Remove Roads and Other Infrastructure in Low-Lying Areas	Poor Drainage	Medium term	Reduce exposure
12	Support Upstream Projects to Reduce Sediment Inputs	Poor Drainage	Medium term	Reduce exposure
13	Separate Agricultural Drainage from Habitat	Poor Drainage	Long term	Reduce exposure
14	Explore Opportunities to Leverage Groundwater Information Gathered by FFTF	Uncertainty About Groundwater	Short term	Increase information
15	Begin Monitoring Groundwater for Agriculture to Develop Record of Conditions	Uncertainty About Groundwater	Short term	Increase information
16	Predict Groundwater Conditions into the Future with Climate Change	Uncertainty About Groundwater	Medium term	Increase information

#	NAME OF PROJECT OR ACTION	RISK	TIMEFRAME	STRATEGY
17	Provide Succession Planning Tools for Farmers	Development Pressure	Short term	Increase adaptive capacity
18	Support the Viability of the Agricultural Industry in the Watershed/County through the Pierce County Agricultural Roundtable (PCAR)	Development Pressure	Short term	Increase adaptive capacity
19	Explore Opportunities to Permanently Protect Farmland with Easements or Zoning if Floodway was Removed	Development Pressure	Medium term	Reduce exposure
20	Protect Farmland with Voluntary Conservation Easements	Development Pressure	Long term	Reduce exposure
21	Participate in FTF and in Conversations around Canyon Road; Explore Project Options that Protect Agriculture	Incompatible Infrastructure Investments	Short term	Increase adaptive capacity
22	Proactively Identify Potential Infrastructure Projects in the Area and Participate in Planning Conversations	Incompatible Infrastructure Investments	Medium term	Increase adaptive capacity
23	Advocate for Clear Creek Area as an Agricultural Corridor for the County with Long-Term Protections	Incompatible Infrastructure Investments	Long term	Reduce exposure

Priority Near-Term Projects

In addition to the 23 actions listed above, Clear Creek farmers have identified five Priority Projects that should be implemented in the near term. In particular, these projects should be considered for funding from Floodplains for the Future and Floodplains by Design.

Priority Project 1: Participating in the Clear Creek Integrated Design Process

The Clear Creek Integrated Design process will assess the feasibility and design of a large-scale multi-benefit project encompassing up to 250–300 acres of floodplain in the Clear Creek area. The long-term goals of this project are to reduce flood risk while creating a landscape where farms and fish can be productive.

Priority Project 2: Replace Nancy’s Ditch Culverts

Removal of the existing culverts could improve drainage through Nancy’s Ditch by removing obstructions to flow and could increase the exchange of water and passage of aquatic organisms between Clear Creek and Nancy’s Ditch.

Priority Project 3: Replace 50th Avenue East and 44th Street East Connecting Culvert

Replacement of the existing culvert could improve drainage along 50th Avenue East by removing obstructions to flow.

Priority Project 4: Vegetation Management in 50th Avenue East and 44th Street East Roadside Ditches

Ditch maintenance could improve drainage along 50th Avenue East and 44th Street East by removing obstructions to flow.

Priority Project 5: Reed Canarygrass Management in Nancy's Ditch

Removal of reed canarygrass would increase flow in Nancy's Ditch, allowing for more efficient drainage of the Clear Creek area.

Implementation

The Clear Creek ARAP will be jointly implemented by a variety of organizations involved in the Clear Creek area, including individual farmers, Drainage District 10, Pierce Conservation District, Pierce County, and the Strategic Conservation Partnership. Implementation actions should be coordinated by a Clear Creek ARAP Project Manager responsible for tracking and advocating for the plan, as well as promoting engagement and collaboration between entities and interests as actions in the plan are implemented.

Funding actions identified in the plan will be essential to ensuring successful implementation of the Clear Creek ARAP. There are currently no dedicated funding sources for agricultural resilience in the Clear Creek area. The development of the Clear Creek ARAP was funded with a Floodplains by Design grant and informed by work generated through the Floodplains for the Future initiative. Apart from these funding sources, Pierce County Flood Control Zone District, Drainage District 10, the Federal Emergency Management Agency (FEMA), and the Natural Resources Conservation Service (NRCS) may be additional sources of funding for actions in this plan.

Adaptive management will also be necessary for the implementation of this plan. The ARAP recommends that implementers of this plan and the ARAP Project Manager report on the status of actions through a report or memo each year. Every 2 years, ARAP implementers should meet with farmers and other partners in the region, including the Floodplains for the Future initiative, to review progress and identify new actions and priorities.

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ACRONYMS AND ABBREVIATIONS

ARAP	Agricultural Resilience Action Plan
ARL	Agricultural Resource Lands
BC	British Columbia
BIOAg	Biologically Intensive Agriculture & Organic Farming
BMPs	Best Management Practices
cfs	cubic feet per second
CSA	Community Supported Agriculture
DTG	Disappearing Task Group
Ecology	Washington Department of Ecology
EMD	Emergency Management Division
EQIP	Environmental Quality Incentives Program
EWPP	Emergency Watershed Protection Program
FCAAP	Flood Control Assistance Account Program
FEMA	Federal Emergency Management Agency
FFP	Farming in the Floodplain Project
FFTF	Floodplains for the Future—Puyallup, White & Carbon Rivers
GMA	Growth Management Act
HPA	Hydraulic Project Approval
M&O	Maintenance and Operations
NAVD	North American Vertical Datum
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
OCE	Office of the County Engineer
PALS	Planning and Land Services
PCAAC	Pierce County Agriculture Advisory Committee
PCAR	Pierce County Agricultural Roundtable
PPW	Pierce County Planning and Public Works
RCPP	Regional Conservation Partnership Program
RCW	Revised Code of Washington
SCP	Strategic Conservation Partnership
SPSSEG	South Puget Sound Salmon Enhancement Group
SWM	Surface Water Management
TAG	Technical Advisory Group
UGA	Urban Growth Area
USACE	U.S. Army Corps of Engineers
WDFW	Washington Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WSU	Washington State University

CHAPTER 1: INTRODUCTION

1.1 Introduction and Plan Purpose

This Agricultural Resilience Action Plan (ARAP) is a comprehensive planning document that identifies a range of actions that could be undertaken to increase agricultural resilience in the Clear Creek area. The ARAP focuses on the physical conditions that affect agricultural viability (such as flooding and drainage).

Farmers in the Clear Creek area are no stranger to risks and have continually faced challenges from flooding, development pressure, weather and climate change, and regulatory barriers. Over time, each of these risks and challenges threatens the long-term viability of agriculture in the Clear Creek area. The Clear Creek agricultural community has worked with partners from Pierce County and other organizations to reveal shared values, identify risks facing farmers, and develop a suite of actions to improve agricultural viability by reducing exposure to risks, reducing sensitivity to risks, and improving the capacity to adapt.

The purpose of the ARAP is to identify risks facing agriculture in the Clear Creek area and a suite of actions to reduce the exposure and sensitivity to those risks and increase the adaptive capacity of farmers and the larger agricultural community. The plan also identifies several Priority Projects that are ready for funding and advancement in the short term and includes a funding and implementation strategy to guide the long-term use of the plan. Several of the actions in the plan are already underway in some form, and many others have been discussed among stakeholders over the past 5 years. This plan focuses on documenting these actions, knitting them together into a comprehensive strategy, and identifying recommendations for funding and implementation.

The plan is rooted in engagement with Clear Creek farmers, who played a critical role in its development. This document is designed to help interested parties be strategic in their use of the limited resources available to enhance agricultural viability in the Clear Creek area. In addition to farmers in the Clear Creek area, staff from the Pierce Conservation District and Pierce County have been active and engaged participants in the planning and development process and will be instrumental in its execution. Development of this plan was funded by the Puyallup Watershed Floodplains for the Future program with a Floodplains by Design grant from the Washington Department of Ecology (Ecology). The plan was developed by Environmental Science Associates, initially through a contract with Washington State University (WSU) Puyallup and later with Pierce County Surface Water Management (SWM).

1.2 Study Area

The study area for the plan is the Clear Creek area, part of the Clear Creek Subbasin of the Puyallup Watershed (Figure 1). The Clear Creek area is the low-lying area of the Clear Creek Subbasin directly adjacent to the Puyallup River. For the purposes of this ARAP, the Clear Creek area has been defined as the unincorporated area of Pierce County located between the City of Tacoma and the City of Puyallup, between the Puyallup River to the north and Pioneer Way East to the south, excluding areas within the Urban Growth Area (UGA) of either city. The study area includes the farmland and farm businesses that are the focus of agricultural resilience actions in this plan; however, actions could occur outside of the

study area (for example, sediment control actions upstream on Clear Creek tributaries) or at the watershed or county scale (for example, programmatic actions taken by Pierce County to enhance agricultural viability). Figure 2 shows features in the Clear Creek area that are particularly relevant to the actions in this ARAP, including Clear Creek, Nancy’s Ditch, the BNSF Railway, 50th Avenue East, and 44th Street East.

1.3 Background

The Clear Creek ARAP is built from years of engagement, outreach, research, and planning actions conducted by partners in the Clear Creek area and throughout the Puyallup Watershed. Programs like Floodplains for the Future, the Farming in the Floodplain Project, and the Clear Creek Strategy Plan have convened stakeholders representing agricultural resiliency, flood risk reduction, and habitat recovery to identify risks facing the Clear Creek area and Puyallup Watershed and to develop actions to improve the resilience of all interests.

1.3.1 Floodplains for the Future

Floodplains for the Future—Puyallup, White & Carbon Rivers (FFTF) is a cross-sector and inter-organizational program hosted by Pierce County with a vision to recover floodplain functions and to protect the health and safety of communities around them. FFTF works to balance farm, fish, and flood management values across the Puyallup Watershed; to provide a safe place to voice varied opinions and needs; and to advance solutions for integrated floodplain management in the Puyallup, White, and Carbon rivers.

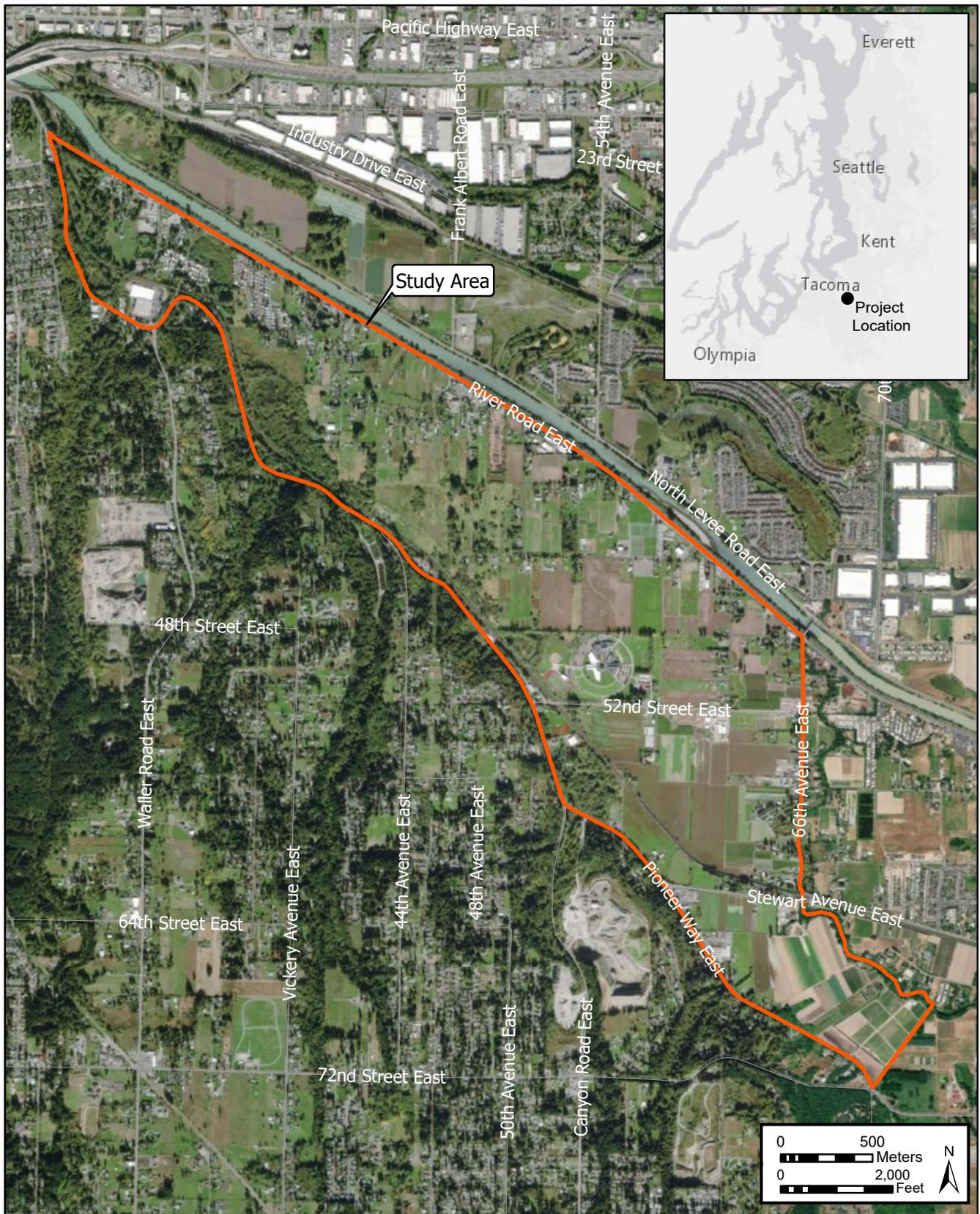
FFTF participants have developed a long-term vision that includes floodplain reconnection and habitat restoration efforts, agricultural land preservation, outreach, and monitoring. FFTF partners work together to advance and improve these important projects and to ensure that farm, fish, and flood values are equally represented through all stages of implementation, including planning, construction, and monitoring.

Since it began in 2013, FFTF has invested \$70 million in the Puyallup Watershed. Nearly \$24 million of those investments have been funded by Floodplains by Design grants issued to Pierce County (on behalf of the FFTF partnership) by Ecology. Along with currently in-progress and awarded Floodplains by Design grants, the total will reach \$46 million. The Floodplains by Design grants have funded agricultural viability components of the FFTF work plan, including the Farming in the Floodplain Project and the development of this ARAP. Other funding sources for work that meets the vision and goals of FFTF include the Salmon Recovery Funding Board, Real Estate Excise Tax funding, Pierce County, the Puyallup Tribe, and cities in the Puyallup Watershed. Additional information on the actions and achievements of FFTF can be found at www.floodplainsforthefuture.org.

Floodplains by Design is a statewide initiative and an Ecology grant program promoting integrated floodplain management.

Floodplains for the Future (FFTF) is a collaborative integrated floodplain management program for the Puyallup Watershed. FFTF actions are funded by various funding sources, including a series of Floodplains by Design grants issued to Pierce County.

The *Farming in the Floodplain Project* was a component of FFTF that was funded by the Floodplains by Design grants.

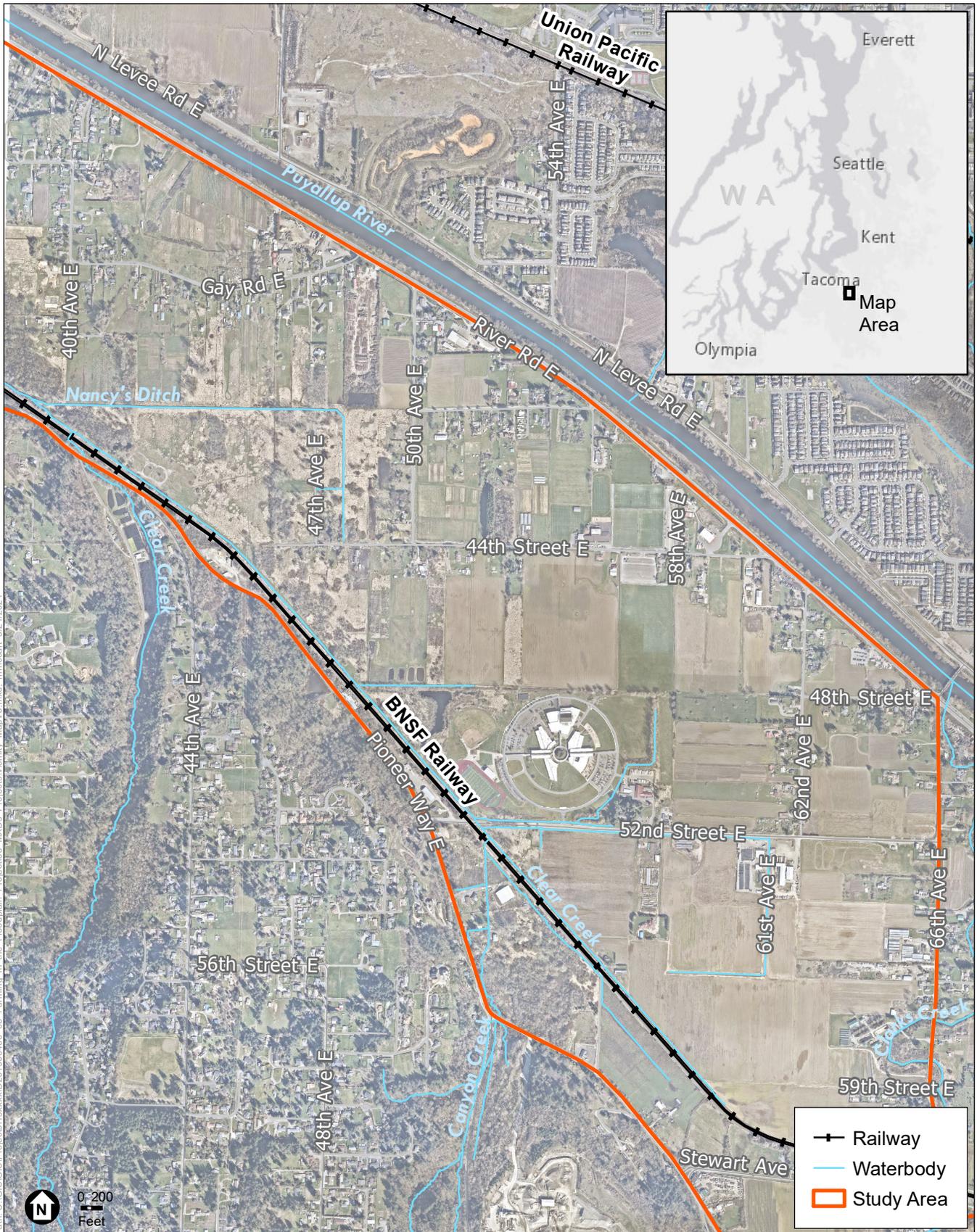


Source: DigitalGlobe 2018, ESA 2019

D181179.00 WSU Farming in the Floodplain

Figure 1
Study Area





SOURCE: ESRI, 2020, Pierce County, 2019, WSDOT, 2019

Farming in the Floodplain Project

Figure 2
Clear Creek Area Features



1.3.2 Farming in the Floodplain Project

The Farming in the Floodplain Project (FFP), which was active from 2016 through 2020, was a component of FFTF focused on agricultural viability in the Clear Creek area and the Puyallup Watershed. Over the course of the project, FFP was initially led by PCC Farmland Trust (now Washington Farmland Trust) and later by WSU Puyallup. When initiated in 2016, the purpose of the FFP was to advance progress toward a collectively agreed-upon plan for the Clear Creek area that improves agricultural viability while also meeting the goals of flood risk reduction and salmon habitat enhancement. The FFP was intended to clarify the needs and interests of the agricultural community in the Clear Creek area. Eventually, the focus of the FFP broadened to include the Puyallup Watershed as a whole. The work of the FFP will be carried forward in multiple forums, including:

- Implementation of this plan.
- The Pierce County Agricultural Roundtable (PCAR).
- Floodplains for the Future.
- Continued agriculture-focused work with Floodplains by Design funding, to be implemented by the Pierce Conservation District and Pierce County Planning and Public Works (PPW).

This ARAP builds upon on findings and information included in the following documents about the Clear Creek area developed by (or for) the FFP:

- The **Existing Conditions Report** (2016), which summarizes existing information about the physical conditions and trends in the Clear Creek area, identifies information needs, and describes the relationship between physical conditions and the viability of agriculture in the area.
- The **Sediment Conditions in the Puyallup River and Clear Creek Technical Memorandum** (2016), which summarizes information about sediment conditions in the Puyallup River, Clear Creek, and Clear Creek's tributaries.
- The **Existing Flood Risk Conditions for Agriculture in the Clear Creek Area Technical Memorandum** (2017), which describes the relationship of flood risk to agricultural viability, flood risk to organic certification and crops, vulnerabilities in the Clear Creek area flood system, ongoing and planned actions to reduce vulnerabilities in the Clear Creek area, and findings.
- The **Drainage Inventory Memorandum** (2017), which provides a map and qualitative information on the agricultural drainage system in the Clear Creek area.
- The **Farmland Impacts Memorandum** (2017), which identifies the general types of impacts that could occur to farmlands from a levee constructed as part of the proposed Clear Creek Floodplain Reconnection Project.
- The **Effect of Upstream Development on the Clear Creek Area Technical Memorandum** (2017), which evaluates the impacts from upstream development on runoff delivered to the Clear

Creek area. The evaluation also includes a summary of the change in stormwater regulations over time.

- The **Findings and Recommendations Report** (2017), which summarizes the key findings from the first phase of FFP work (2016–2017).
- The **Literature Review** (2020), which synthesizes existing information about agricultural resilience, the expected future climate conditions in the South Puget Sound region, and the interaction between agriculture, development, and a changing climate. Findings of the Literature Review are summarized in Section 2.8 of this ARAP.

More information on the FFP is available at www.farminginthefloodplain.org. Links to the documents listed above are available at www.farminginthefloodplain.org/resources.

1.3.3 Clear Creek Strategy Plan

The Clear Creek Strategy Plan, completed in 2020, is a plan to improve conditions related to flooding and drainage in the Clear Creek area by addressing flood risk reduction, agricultural viability, community support, and fish habitat functions. The plan is a community-driven process guided by input received from residents and stakeholders in the Clear Creek area to meet shared challenges.

Pierce County led a facilitated process to connect community members and identify shared values across competing interests. Additionally, interviews were held with stakeholders to better understand motivations, values, and concerns. The plan was developed using a pathways approach to identify both immediate and long-term decisions. This approach allows stakeholders to envision long-term planning actions in the Clear Creek area while simultaneously prioritizing more immediate needs. The plan is comprised of four pathways: (1) the Pierce County pathway, to reduce flood risk; (2) the habitat pathway, to improve salmon recovery; (3) the agriculture pathway, to enhance agricultural viability; and (4) County partner elements. Together, these pathways show stakeholders how their values and desired outcomes intersect and identify ways in which partners can work together to achieve multi-benefit solutions in the Clear Creek area. The Clear Creek Strategy Plan is available online at <https://www.co.pierce.wa.us/4574/Clear-Creek-Strategy-Plan>.

Both the Clear Creek Strategy Plan and this ARAP consider actions that could be taken to address both current issues and potential future issues associated with climate change and other developments. This ARAP focuses on agricultural needs, while agriculture was considered as one pathway in the Clear Creek Strategy Plan. There are many shared and related actions between the two plans, and implementation of the plans should be coordinated. More discussion of coordinated implementation of the two plans is found in Section 3.9.

1.4 What is an Agricultural Resilience Action Plan?

An Agricultural Resilience Action Plan is a document that identifies a suite of agreed-upon strategies and actions that, if pursued, address physical conditions and increase agricultural viability to enhance the resilience of the agricultural community as conditions change.

Agricultural Resilience Actions Plans are a relatively new concept, although similar plans have been developed elsewhere in the Puget Sound region and the Pacific Northwest. In 2019, the Snohomish Conservation District developed the *Agriculture Resilience Plan for Snohomish County*. The plan was developed with local input and is intended to help farmers in Snohomish County build a more resilient agricultural landscape to withstand challenges including development, population growth, flooding, and climate change. The goals of the *Agriculture Resilience Plan* are to provide information and funding to farms to manage on-farm risks, develop landscape-scale projects, and protect agricultural lands from development pressures. Since development of the *Agriculture Resilience Plan* in 2019, a full-time staff person has been hired to manage agricultural resilience projects. The *Agriculture Resilience Plan* is available online at <https://snohomishcd.org/ag-resilience>.

In 2013, the Climate & Agriculture Initiative BC, a partnership between the British Columbia Agriculture Council and the Investment Agriculture Foundation of British Columbia, developed a regional adaptation strategy series to develop agricultural resilience plans for farm communities in Southwest British Columbia. This process brought together farmers and agricultural stakeholders in a process that generated 11 strategies and 26 actions for agriculture in the region to adapt to increasing coastal flood risk, effects on water supply, variable precipitation rates, and extreme weather and climate conditions.

1.5 Outreach and Engagement

The Clear Creek ARAP was informed by outreach and engagement efforts with farmers and members of the Clear Creek agricultural community. In spring 2019, members of the Farming in the Floodplain team had conversations with Clear Creek farmers to establish their interest in the development of an Agricultural Resilience Action Plan. In January 2020, the FFP team conducted site visits and had additional conversations with farmers to discuss issues to address in the plan and potential opportunities and actions. In response to the COVID-19 pandemic, the FFP team shifted outreach actions to a virtual setting and distributed a survey and made calls to farmers to establish Priority Projects to include in the plan in May 2020. In December 2020, the FFP team held a virtual meeting of the FFP Technical Advisory Group (TAG) to review individual plan components and brainstorm partners, funding sources, and potential barriers for each of the actions listed in the plan. A draft of the ARAP was shared with farmers and other stakeholders in the Clear Creek area to solicit input on actions in the plan in April and May 2021. During the comment period on the draft ARAP, another virtual meeting of the TAG was held to discuss the plan. Input from the TAG meeting has been incorporated into this final ARAP.

1.6 Summary of Actions

This plan includes five Priority Projects (described in Chapter 4) and 23 actions (described in Chapters 5 through 9) that would increase agricultural viability in the Clear Creek area. The table below lists the actions and where they can be found in the plan. The colors are linked to the strategy concepts in Figure 3.

#	NAME OF PROJECT OR ACTION	RISK	TIMEFRAME	STRATEGY
P1	Participate in the Clear Creek Integrated Design Process	Multiple	Short term	Multiple
P2	Replace Nancy's Ditch Culverts	Poor Drainage	Short term	Reduce exposure
P3	Replace 50 th Avenue East and 44 th Street East Connecting Culvert	Poor Drainage	Short term	Reduce exposure
P4	Vegetation Management in 50 th Avenue East and 44 th Street East Roadside Drainage Ditches	Poor Drainage	Short term	Reduce exposure
P5	Reed Canarygrass Management in Nancy's Ditch	Poor Drainage	Short term	Reduce exposure
1	Community Training on Emergency Response During an Overtopping/Breaching Event	Flooding	Short term	Increase adaptive capacity
2	Develop Plan for Recovery After Overtopping Event	Flooding	Short term	Increase adaptive capacity
3	Build Shared Elevated Platforms for Equipment and Livestock	Flooding	Short term	Reduce sensitivity
4	Elevate and Protect Infrastructure	Flooding	Medium term	Reduce sensitivity
5	Increase Freeboard on River Road Levee	Flooding	Long term	Reduce exposure
6	Participate in Large-Scale Multi-Benefit Projects to Address Clear Creek Flooding	Flooding	Long term	Reduce exposure
7	Replace Undersized Culverts	Poor Drainage	Short term	Reduce exposure
8	Vegetation Management	Poor Drainage	Short term	Reduce exposure
9	Research Soil Compaction and Drainage	Poor Drainage	Short term	Increase information

#	NAME OF PROJECT OR ACTION	RISK	TIMEFRAME	STRATEGY
10	Develop an Approach to Beaver Management	Poor Drainage	Short term	Increase adaptive capacity
11	Remove Roads and Other Infrastructure in Low-Lying Areas	Poor Drainage	Medium term	Reduce exposure
12	Support Upstream Projects to Reduce Sediment Inputs	Poor Drainage	Medium term	Reduce exposure
13	Separate Agricultural Drainage from Habitat	Poor Drainage	Long term	Reduce exposure
14	Explore Opportunities to Leverage Groundwater Information Gathered by FFTF	Uncertainty About Groundwater	Short term	Increase information
15	Begin Monitoring Groundwater for Agriculture to Develop Record of Conditions	Uncertainty About Groundwater	Short term	Increase information
16	Predict Groundwater Conditions into the Future with Climate Change	Uncertainty About Groundwater	Medium term	Increase information
17	Provide Succession Planning Tools for Farmers	Development Pressure	Short term	Increase adaptive capacity
18	Support the Viability of the Agricultural Industry in the Watershed/County through the Pierce County Agricultural Roundtable (PCAR)	Development Pressure	Short term	Increase adaptive capacity
19	Explore Opportunities to Permanently Protect Farmland with Easements or Zoning if Floodway was Removed	Development Pressure	Medium term	Reduce exposure
20	Protect Farmland with Voluntary Conservation Easements	Development Pressure	Long term	Reduce exposure
21	Participate in FFTF and in Conversations around Canyon Road; Explore Project Options that Protect Agriculture	Incompatible Infrastructure Investments	Short term	Increase adaptive capacity
22	Proactively Identify Potential Infrastructure Projects in the Area and Participate in Planning Conversations	Incompatible Infrastructure Investments	Medium term	Increase adaptive capacity

#	NAME OF PROJECT OR ACTION	RISK	TIMEFRAME	STRATEGY
23	Advocate for Clear Creek Area as an Agricultural Corridor for the County with Long-Term Protections	Incompatible Infrastructure Investments	Long term	Reduce exposure

1.7 Plan Contents

This ARAP includes the following chapters:

- **Chapter 1 – Introduction** includes a description of the plan purpose, study area, background, and information about agricultural resilience plans.
- **Chapter 2 – Agriculture and Resilience** includes a summary of agriculture in Puget Sound, Pierce County, the Puyallup Watershed, and the Clear Creek area; a description of agricultural viability and resilience; and a summary of a literature review conducted as part of the development of this ARAP.
- **Chapter 3 – Plan Implementation** includes a discussion of funding, describes the roles of various organizations in implementing the plan, and adaptive management.
- **Chapter 4 – Priority Near-Term Projects** includes a description of Priority Projects that are ready for investment and funding in the short term.
- **Chapter 5 – Flooding** includes a description of flood risks facing agriculture in the Clear Creek area as well as identified strategies, actions, and funding recommendations to address the risk.
- **Chapter 6 – Poor Drainage** includes a description of drainage risks facing agriculture in the Clear Creek area as well as identified strategies, actions, and funding recommendations to address the risk.
- **Chapter 7 – Uncertainty About Groundwater** includes a description of groundwater risks facing agriculture in the Clear Creek area as well as identified strategies, actions, and funding recommendations to address the risk.
- **Chapter 8 – Development Pressure** includes a description of development pressure risks facing agriculture in the Clear Creek area as well as identified strategies, actions, and funding recommendations to address the risk.
- **Chapter 9 – Incompatible Infrastructure** includes a description of risks associated with proposed and planned infrastructure in the Clear Creek area as well as identified strategies, actions, and funding recommendations to address the risk.
- **Chapter 10 – References** lists full citations for the documents and other sources cited in the plan.

CHAPTER 2: AGRICULTURE AND RESILIENCE

2.1 Agriculture in Puget Sound

Since the 1800s, agriculture has been a major land use in the Puget Sound region, as well as a major part of the regional economy, a source of locally grown food, and a significant block of open space providing habitat, water management, and other ecological benefits. However, agriculture is under significant threat of conversion across the region. According to the Regional Open Space Conservation Plan, 55,000 acres of the region’s farmland has been lost over the last 40 years (25 percent of the total farmland acreage). The plan states that another 104,000 acres of farmland are at risk, and points out that “[l]oss of farmland in one county affects the viability of the farming economy in neighboring counties.” The plan states:

A range of factors is threatening the economic viability of farmland, including increased land values, farm costs exceeding revenues, lack of supporting infrastructure, a lack of new farmers to replace retiring farmers, and farming lands that lack protection through zoning or other regulatory designations. Only 64 percent of farmland in the open space network has a protective agricultural zoning designation and many of these designations provide limited protection due to small allowable lot sizes.

One of the key strategies in the plan is to “Keep Working Lands Working,” including using Purchase of Development Rights, Transfer of Development Rights, zoning designations, technical assistance, and economic development to support the agricultural economy and protect farmland (Puget Sound Regional Council, 2018).

2.2 Agriculture in Pierce County

According to the 2012 USDA Census of Agriculture, Pierce County is home to almost 1,500 local farms that produce \$91 million worth of products, including vegetables, livestock, poultry, eggs, flowers and bulbs, and aquaculture (Pierce County, 2016). Farmland throughout the county has historically been converted into residential and other uses, and that trend is continuing. Remaining agricultural lands are often adjacent to residential or industrial structures. In 2004, American Farmland Trust published a report titled: *The Suitability, Viability, Needs, and Economic Future of Pierce County Agriculture*, which found that agriculture in the county had shifted from industrial, wholesale agriculture to value-added, direct market “urban edge” farming. This shift was caused by the urbanization and fragmentation of the agricultural land base, but was made possible by the favorable climate and soil conditions to support agriculture in the county (American Farmland Trust, 2004). More recent reports suggest that the trends identified in the 2004 report have continued throughout the Puyallup Watershed (WSU et al., 2015).

In 2012, there were 1,478 farms in Pierce County and 49,483 acres in farming. The market value of products sold in 2012 was \$90,933,000, with approximately \$24 million of that total coming from crop sales and \$67 million from livestock sales. The overall market value of products sold was up 9 percent from 2007. However, 1,214 of the farms (82 percent) made less than \$10,000 in sales in 2012, and only 45 (3 percent) made more than \$100,000 in sales. Over half of the principal operators of farms in the

county did not list farming as their primary occupation, and the average age of principal operators was 59.6 years old (USDA, 2012).

Since that time, agriculture in Pierce County has experienced changes. In 2017, Pierce County saw an increase in the total number of farms to 1,607 farms with a decrease in the total acreage of farmland to 45,766. The market value of products sold also fell to just below \$65 million with nearly \$30 million from crops and over \$35 million from livestock. 1,345 farms (84 percent of total) made less than \$10,000 in sales in 2017, a 10 percent increase from 2012. In 2017, 49 farms reported sales in excess of \$100,000 (USDA, 2017).

The Pierce County Agriculture Advisory Committee (PCAAC) is an advisory committee to the Pierce County Council. The PCAAC “*provides recommendations on issues that impact agriculture in Pierce County and acts as a forum for those interested in enhancing and promoting the long-term success of agriculture in the County*” (Pierce County, 2021).

2.3 Agriculture in the Puyallup Watershed

The Puyallup Valley has experienced a more rapid increase in development as compared to the rest of the Puget Sound region. As of the writing of the 2006 Pierce County Agriculture Strategic Plan, 25 percent of agricultural land in the Puyallup Valley was located within incorporated areas or urban growth boundaries (Pierce County, 2006). These areas presented heightened risks for the conversion of farmland by development.

Between 2013 and 2019, 804 acres of actively farmed land were lost in the watershed, representing 5 percent of total farmland. Farmland conservation programs have protected farms in the watershed, but long-term farmland efforts in Pierce County lag far behind those in the King County portion of the watershed. Pierce County has conserved 563 acres of farmland in the watershed compared to 2,323 acres conserved by King County. Zoning designations have the potential to conserve agricultural lands, but significant portions of actively farmed land fall outside of those designations and face pressures from development, including urbanization, development of warehouses, conversion to rural residential, and new roads.

Apart from development pressures, habitat projects do not pose a threat to farmland conversion in the watershed. A recent analysis showed that only one 40-acre habitat project resulted in a loss of farmland between 2013 and 2019, while numerous other restoration projects were completed that had no impacts on agricultural lands (Environmental Science Associates, 2021). On the other hand, many farms in the watershed are at risk due to proposed infrastructure and transportation projects.

The threats facing agriculture in the Puyallup Watershed have underscored the importance of proactive engagement and communication among the agricultural community and other interests in the watershed to avoid or minimize impacts on farmland.

2.4 Agriculture in the Clear Creek Area

There are 575 acres of actively farmed land in the Clear Creek area (out of 1,440 acres total in the study area, as defined in Figure 1 in Chapter 1). These acres represent about a dozen farmers and farm landowners. The Clear Creek area reflects the trend in Pierce County of a transition to smaller, local market-driven urban edge farming. The area also has several large wholesale farms that have been in the same families for generations. The area's proximity to consumers and highly productive soils also attracts new farmers to Pierce County, with new farmers starting farms or becoming owners of existing smaller farms. Farmers in the Clear Creek area note the value of their prime farmland soils, as defined by the Natural Resources Conservation Service (NRCS). Soils in the Clear Creek area produce high-value crops and support small farms (Clear Creek Farmers, 2016).



Early Bird Farm, an 11-acre farm that grows crops and produces eggs for farmers markets and CSA subscriptions

As a Puyallup Valley lowland agricultural area not located within a UGA, the Clear Creek area is important for agriculture in Pierce County as a whole. Farms in the Clear Creek area are close to consumers and local markets in the urban centers of Tacoma and Puyallup. Smaller acreage farms in the Clear Creek area, many of which are certified organic, sell vegetables, berries, eggs, meats, and other farm products direct to consumers on farm or through Community Supported Agriculture (CSA) subscriptions, as well as through outlets such as the Tacoma and Proctor Farmers Markets and Marlene's

Market (a local grocery store chain) (Johnson et al., 2016). Larger scale farms also sell fresh produce direct to local consumers through their own on-farm stands, as well as to regional grocery retailers and food distributors. Many Clear Creek farms offer agritourism activities such as community potlucks, on-farm events, summer camps, pumpkin patches, and U-pick berries (Clear Creek Farmers, 2016).

With a total of 575 acres of farmland, the Clear Creek area is not a large agricultural area when compared to other agricultural areas in the region. However, it is an important area with farms that serve many customers in the local area and beyond. Throughout the course of the FFP and development of the Clear Creek Strategy Plan, Clear Creek farmers and other residents have made it clear that they consider agriculture to be part of the future of the area. In addition, the Clear Creek area has been the focus of conversations about agricultural viability and resilience in the Puget Sound watershed and in the Puget Sound region because it is the site of major investments in flood risk reduction, salmon habitat, and transportation. Despite its relatively small size, the Clear Creek area is an important area for conversations about agricultural resilience for several reasons:

- There are only 3,905 acres of actively farmed land in the Puyallup Watershed floodplains. Over 20 percent of that land (803 acres) is within city or UGA boundaries, and only 2,166 acres have a zoning designation that protects agriculture. Within this context, the 575 acres of actively farmed land in the Clear Creek area is a significant portion of the Puyallup Watershed’s floodplain agriculture.
- With its location and soils, the Clear Creek area offers many benefits to the small, direct consumer approach to farming, which is the trend throughout Pierce County and many other areas of the Puget Sound region. Agriculture in areas like Clear Creek needs to find a way to remain resilient and viable for the agricultural industry as a whole to remain viable in many parts of the region, or many farms (and the associated open space in floodplain areas) will be lost.
- In addition to being a high priority agricultural area, Clear Creek is a part of the reservation of the Puyallup Tribe of Indians, an important estuary and intertidal habitat area for salmon, and an area at extreme risk of flooding. The complexity, interdependency, and importance of the Clear Creek area for each interest drive the need for collaboration to achieve meaningful project implementation. Clear Creek represents an opportunity to demonstrate how agriculture can remain resilient in an area that is a high priority for other interests. If this plan is successfully implemented, Clear Creek can serve as an example of how multi-benefit projects and integrated approaches can enhance agriculture while achieving other goals.

2.4.1 Challenges

Farmers in the Clear Creek area have noted that farmers constantly deal with risks, including weather, flooding and drainage problems, and market conditions. In any given year, some crops are successful and others are not. Farmers individually determine what an acceptable level of risk is and adjust their farming practices accordingly. Current conditions in the Clear Creek area present a range of risks to agriculture each year, and future conditions are anticipated to increase some existing risks, present new risks, or in some cases reduce risks.

This action plan addresses a variety of physical risks facing farmers in the Clear Creek area that present near-term and long-term challenges. These risks include:

- Flooding (from both the Puyallup River and Clear Creek)
- Poor Drainage
- Uncertainty About Groundwater (including the potential impacts of groundwater levels on drainage and irrigation needs and the potential for saltwater intrusion).
- Development Pressure
- Incompatible Infrastructure Investments

Other risks that are not covered include market conditions and regulations, both of which are outside the scope of this plan.

2.4.2 Assets that Contribute to Agricultural Viability

Although the Clear Creek area faces numerous challenges and risks to agricultural viability, a variety of assets in the Clear Creek contribute to agricultural viability:

- **Prime Soils:** The Clear Creek area is known for its highly productive soils that support a variety of forms of agriculture and diverse crop production.
- **Mix of Farm Business Types:** From wholesale farms that supply produce to regional markets, to small farms that operate robust CSA programs, the diversity of farm businesses in the Clear Creek area makes the region economically resilient and contributes significantly to agricultural viability.
- **Proximity to Markets:** The location of the Clear Creek area to large cities like Tacoma and Seattle, as well as rapidly expanding mid-size cities provides farmers with easy access to a variety of markets and consumers.
- **Floodway Designation and Development:** As a Pierce County-designated floodway, development is severely limited in the Clear Creek area. This designation removes significant development pressure from farms in the Clear Creek area and contributes to the long-term viability of agriculture.
- **Exemptions for Agriculture:** Pierce County Code 18E.70.040 B includes some allowances for agricultural activities in the floodway, including: repair, reconstruction, replacement, and improvement of farmhouses and non-residential agricultural structures if design considerations to minimize flood damage are followed; building of new agricultural accessory structures such as barns and storage buildings if design considerations to minimize flood damage are followed; and import, storage, or application of compost, with some conditions. Individual property owners should contact Pierce County for specific review of the restrictions on their parcel.

- **Engaged Farmers:** Farmers in the Clear Creek area have been committed partners in large-scale planning efforts in the region, including the Farming in the Floodplain Project, the Clear Creek Strategy Plan, and the Floodplains for the Future program. This engagement has made significant contributions to agricultural viability.

2.5 Foundational Assumption of the Plan

The foundational assumption of the plan that will guide work to improve agricultural resiliency in the Clear Creek area is:

Agriculture is part of the future of the Clear Creek area, and community members want it to be resilient into that future.

The foundational question behind this plan is:

What actions related to physical conditions would help sustain agriculture in the Clear Creek area into the future?

2.6 Agricultural Viability

The FFP focuses on agricultural viability, which can be defined as the ability of a farmer or group of farmers to:

- Productively farm on a given piece of land or in a specific area.
- Maintain an economically viable farm business.
- Keep the land in agriculture over the long term.
- Steward the land so it will remain productive into the future.

2.7 Agricultural Resilience

The Food and Agriculture Organization states that agricultural resilience can be enhanced by:

- **Reducing Exposure to Risks.** By removing, reducing, or limiting exposure to events like flooding, farmers in the Clear Creek area are protected from negative effects of risks facing the area.
- **Reducing Sensitivity to Risks.** Farmers in the Clear Creek area will always face risks, and detrimental events are bound to happen eventually. By preparing for these events, farmers and others reduce their sensitivity to risks and are able to recover more quickly.
- **Increasing Adaptive Capacity.** Agricultural adaptation increases resilience and can be considered a form of risk management that is best implemented by diverse stakeholder groups who provide local knowledge (Šūmane et al., 2018).



Duris Farmstand, Clear Creek area

The strategies and actions described in this ARAP are based on the following concepts, which are also shown in the flowchart below (Figure 3):

- **Strategies and actions** to improve resilience should address **risks** to agricultural viability.
- **Strategies** to improve resilience can **reduce exposure to risks, reduce sensitivity to risks, or increase adaptive capacity**. Some actions in this plan also **increase information** available to Clear Creek farmers, which should be considered a subset of increasing adaptive capacity.
- **Actions** within each strategy can be **project types** (such as elevating structures), which could be done in multiple areas or on multiple properties depending on farmer interest; **site-specific projects** (such as addressing freeboard issues on River Road Levee), which would need to occur in one location; or **programmatic actions** (such as providing succession tools for farmers), which do not involve on-the-ground construction or implementation but that still contribute to agricultural resilience.
- Every action will be an **individual action** or a **collective action**.

Throughout this plan, strategies and actions are described as **short term**, **medium term**, or **long term**. These designations do not refer to specific timeframes, but instead to strategic sequencing within each chapter.

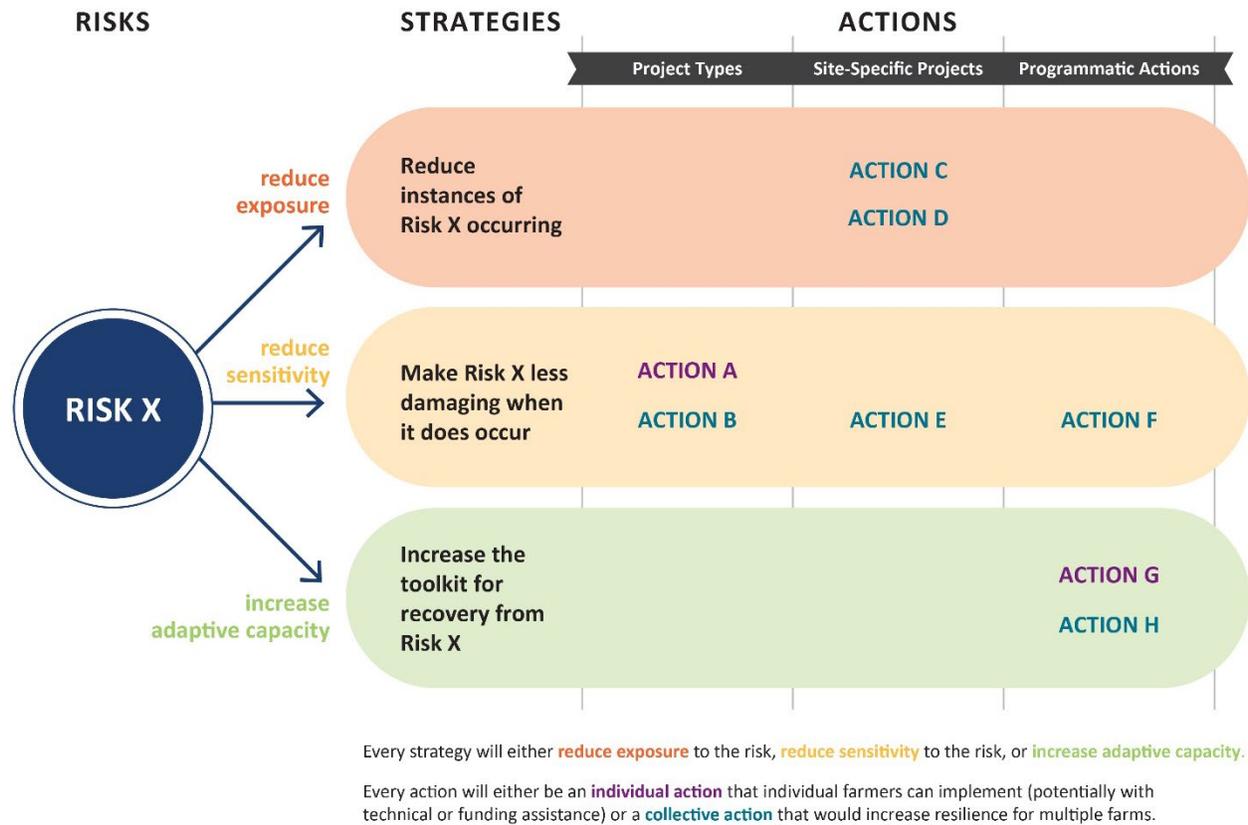


Figure 3. Conceptual Framework for Agricultural Resilience

2.8 Summary of Literature Review Findings

In 2020, a literature review was developed for the Farming in the Floodplain Project to compile existing information about agricultural resilience, the expected future climate conditions in the South Puget Sound region, and the interaction between agriculture, development, and a changing climate. Thirty-four sources were used in this literature review, including academic and government research articles, reports, and summaries related to these topics. The literature review has informed the development of this plan and generated nine key recommendations:

1. Literature on the impacts of development on agriculture describe the importance of avoiding regulations that place an unnecessary or unfair burden on agriculture.

2. Agricultural resilience actions should not be focused entirely on climate change. They should consider a broader picture of agricultural resilience, including resilience to economic conditions, politics, development, and other factors that can affect agricultural viability.
3. Resilience actions should focus on adaptation to climate change, not mitigation. Agriculture is well-suited to adaptation, and adaptation is more resonant for farmers than mitigation.
4. Individual and collective on-the-ground actions can increase agricultural resilience, but the policy context is also a critical aspect of resilience. Resilience actions should also consider policy recommendations and collaborative partnerships to support agriculture, not just on-the ground actions.
5. Agricultural resilience is dependent on ecosystem processes that provide services to agriculture. Therefore, an integrated approach that considers ecosystem processes is a benefit to resilience. Resilience actions should consider multiple-benefit and integrated approaches and continue to be linked to the Puyallup Watershed Floodplains for the Future program.
6. While incremental, long-term changes in climate conditions will affect agriculture, the largest vulnerabilities are associated with extreme events (such as large floods or major droughts). Also, other adaptation efforts have found that farmers are more interested in planning that addresses extreme events than planning that addresses incremental changes.
7. Resilience planning should prioritize actions that promote sustainable adaptations (such as those that maintain natural and social capital and promote social self-organization).
8. Resilience actions should include funding strategies, since the ability to fund adaptations is a major barrier to agricultural resilience.
9. Resilience planning should consider actions that support collaborative partnerships and organizations that can support agricultural viability and resilience.

The projects and actions described in Chapters 4 through 9 of this plan have been developed with consideration of these recommendations in mind.

CHAPTER 3: PLAN IMPLEMENTATION

3.1 Funding

The funding needed for actions in this plan varies from actions that could be done with already-funded staff to one action that could cost over \$500 million. The Priority Projects described in Chapter 4 would cost approximately \$450,000 to \$500,000 total.

Finding funding sources for actions in this plan will be critical to implementation of the plan. Currently, there are no dedicated sources of funding for agricultural resilience in the Clear Creek area. Floodplains by Design grants have covered the development of this ARAP and the past Farming in the Floodplain Project research and outreach that informed it. Existing funding sources that could be accessed to fund actions in this plan are described for each risk throughout Chapters 5 through 9 and are listed in the table below.

FUNDING PROGRAM	SOURCE (AGENCY)	RELEVANT RISK(S)
Aquatic Invasive Plants Management Grants	Ecology	Poor Drainage
Biologically Intensive Agriculture & Organic Farming Grants	WSU Extension	Poor Drainage
Conservation Futures Program	Pierce County	Development Pressure
Conservation Innovation Grants	NRCS	Poor Drainage
Disaster Assistance Program	Washington Emergency Management Division	Flooding
District Funds	Drainage District 10	Poor Drainage
Emergency Conservation Program	Farm Service Agency	Flooding
Emergency Watershed Protection Program	NRCS	Flooding
Environmental Quality Incentives Program	NRCS	Flooding Poor Drainage
Floodplains by Design	Ecology	Flooding, Poor Drainage Uncertainty About Groundwater Development Pressure Incompatible Infrastructure

FUNDING PROGRAM	SOURCE (AGENCY)	RELEVANT RISK(S)
Habitat Strategic Initiative	National Oceanic and Atmospheric Administration (NOAA)	Uncertainty About Groundwater
Hazard Mitigation Grant Program	FEMA	Flooding
National Estuary Program – Local Integrating Organization	U.S. Environmental Protection Agency	Uncertainty About Groundwater
Natural Resource Investments	Washington Conservation Commission (Pierce Conservation District)	Poor Drainage
Pierce County Flood Control Zone District	Pierce County Taxing District	Flooding
Pierce County Noxious Weed Control Board	Pierce County Noxious Weed Control Board	Poor Drainage
Preparedness Grants	FEMA and Washington Emergency Management Division	Flooding
Regional Conservation Partnership Program	NRCS	Flooding
Transfer of Development Rights Program	Pierce County and City of Tacoma	Development Pressure
Washington Wildlife and Recreation Program – Farmland	Washington State Recreation and Conservation Office	Development Pressure

In addition to those existing sources, new or increased funding sources could contribute to implementation of this plan:

- Ecology’s Flood Control Assistance Account Program (FCAAP) funds the development of Comprehensive Flood Control Management Plans, flood control maintenance projects, and emergency flood control projects. FCAAP has been funded at \$4 million in the 2021–2023 biennium. FCAAP could potentially fund actions that do not have many other available funding sources (such as Actions 3 and 7).
- Funding for farmland protection through easements and acquisitions (Action 20) is being worked on by many organizations focused on farmland and open space protection locally and across Puget Sound. The Strategic Conservation Partnership identifies several future funding opportunities, including a regional Transfer of Development Rights program, a Pierce County voter-approved bond funded by a property tax levy, and a one percent real estate excise tax. In addition, an increase to the Conservation Futures tax, impact investment opportunities, private foundations, and other local and regional efforts can lead to additional funding and expedite protection efforts.

- Federal stimulus programs focused on green jobs and carbon sequestration may provide creative opportunities to develop multi-benefit projects and succeed in accessing new funding streams.

3.2 Actions that Are Already Underway

Some of the actions described in this plan are already underway. However, they are included in the plan for several reasons:

- They are part of the overall strategy for agricultural resilience in the Clear Creek area.
- They should be part of tracking efforts related to this plan.
- The role for ARAP implementers in the completion of these actions should be articulated.

The table below lists those actions that are already underway and the role of ARAP implementers in the actions. The colors associated with each action reflect the coding in the conceptual framework in Figure 3 in Section 2.7.

#	NAME OF PROJECT OR ACTION	STATUS	ROLE OF ARAP IMPLEMENTERS
P1	Participate in the Clear Creek Integrated Design Process	FFTF partners are currently launching the Clear Creek Integrated Design process.	Continue participating in the Integrated Design and the Clear Creek Dialogue Group to represent agricultural interests and advocate for inclusion of ARAP actions.
P5	Reed Canarygrass Management in Nancy's Ditch	Drainage District 10 is planning to implement this action in summer 2021.	Support Drainage District 10 in implementing this action in summer 2021 and as needed in the future.
6	Participate in Large-Scale Multi-Benefit Projects to Address Clear Creek Flooding	Farmers and agricultural stakeholders have been part of conversations about potential multi-benefit floodplain projects for the past 5 years.	The actions described in this plan should be folded into multi-benefit projects where possible through the Clear Creek Integrated Design process.
9	Research Soil Compaction and Drainage	This action is planned for implementation with Floodplains by Design 2019–2021 funding.	Findings of the research should be used to identify new actions through adaptive management of this plan (Section 3.10).
14	Explore Opportunities to Leverage Groundwater Information Gathered by FFTF	The South Puget Sound Salmon Enhancement Group (SPSSEG) is currently implementing a study plan for monitoring groundwater in the Clear Creek area as part of the FFTF program.	Groundwater information gathered by SPSSEG needs to be synthesized for agricultural viability and resilience needs.

#	NAME OF PROJECT OR ACTION	STATUS	ROLE OF ARAP IMPLEMENTERS
18	Support the Viability of the Agricultural Industry in the Watershed/County through the Pierce County Agriculture Roundtable (PCAR)	PCAR has started to form and is currently developing its structure.	PCAR is a new organization that is not fully established and that would benefit from additional support. ARAP implementers can coordinate with PCAR to highlight issues and needs in the Clear Creek area specifically.
21	Participate in FFTF and in Conversations around Canyon Road; Explore Project Options that Protect Agriculture	These conversations have been ongoing for several years.	A staff role that includes participating in these conversations will ensure that Clear Creek agricultural needs continue to be considered.

3.3 Staff Support and Leadership for ARAP Implementation

Successful implementation of this ARAP will require dedicated staff time to track and advocate for actions in the plan, seek funding, coordinate, and adaptively manage the plan. There should be a staff person with a portion of their time dedicated to serving as the **Clear Creek ARAP Project Manager**. This role could be housed at the Pierce Conservation District as part of the Farm Team. It could also be housed at Pierce County Planning and Land Services (PALS). The Project Manager’s staff time could be funded by the Floodplains by Design 2019–2021 grant and future Floodplains by Design grants.

Throughout this plan, action descriptions include references to **ARAP implementers**. This primarily refers to the Project Manager, but implementers could also be Clear Creek farmers, Drainage District 10, or other agricultural stakeholders (such as the Pierce County PALS agriculture program or the Pierce Conservation District). While one Project Manager should be responsible for tracking and advocating for the plan, successful implementation of this plan will require collaboration with other interests in the Clear Creek area related to flood risk reduction, salmon health, and other agricultural considerations.

The role of the Project Manager is described in the table below.

ROLE OF THE CLEAR CREEK ARAP PROJECT MANAGER

	Participating in the Clear Creek Integrated Design and Dialogue Group to advocate for alternatives that increase agricultural resilience and to look for opportunities to incorporate other actions in this plan into the Integrated Design.
Promoting	Participating in FFTF conversations about the scope of work for the Floodplains by Design 2021–2023 grant and future Floodplains by Design grant applications to advocate for funding of actions in this plan as part of the ag-related tasks under the grant, starting with Priority Projects identified in Chapter 4.

ROLE OF THE CLEAR CREEK ARAP PROJECT MANAGER

	Participating in FFTF conversations about the application for the Floodplains by Design 2023–2025 grant program (and future grant rounds) to identify actions in the ARAP that could be part of the funding package.
	Identify and apply for other funding sources for actions in the plan, as identified in Section 3.1 and throughout Chapters 5 through 9.
Tracking	Track the status of actions described in the plan and provide an annual update to FFTF and to Clear Creek farmers. Participate in the annual Results Cycle of the FFTF Monitoring Plan, which tracks progress toward FFTF goals.
Adapting	See Section 3.10.
	Coordinate with the Clear Creek Strategy Plan Project Manager.
	Conduct outreach to Clear Creek farmers.
Coordinating	Help farmers access programs described in this plan, such as succession tools (Action 17) and elevation programs (Action 4). Participate in FFTF meetings and Disappearing Task Groups (DTGs) where appropriate.
Acting	Lead specific actions in the plan, or identify and coordinate with appropriate leads, that primarily require staff support (e.g., Actions 6, 10, 14, and 21).

3.4 Individual Farmer Role in Implementation

The purpose of this ARAP is to support farmers and farm businesses in the Clear Creek area by increasing agricultural resilience. Participation of individual farmers in the implementation of the plan will be necessary to keep the plan on track and to ensure that it meets farmer needs. It will be the role of ARAP implementers to reach out to Clear Creek farmers regularly for input, and farmers can support that by being responsive and by sharing their opinions and preferences. In some cases, ARAP implementers can represent farmers in collaborative discussions (such as the Clear Creek Integrated Design process), but in many cases direct engagement from farmers will be more effective.

Some actions in the plan would require work on private land and require interest, buy-in, and championship from landowners. One example is Action 4 (Elevate and Protect Infrastructure). Some actions that would primarily benefit individual farmers (such as Action 4) may require cost-share from the landowner.

3.5 Drainage District 10 Role in Implementation

Drainage District 10 is a special purpose drainage district incorporated under Revised Code of Washington (RCW) 85.06, which gives the District commissions “*the exclusive charge of the*

construction and maintenance of all drainage systems which may be constructed by said district.” In addition to playing a leading role in managing drainage issues in the Clear Creek area, Drainage District 10 can also support implementation of this ARAP by representing the interests of the agricultural community in conversations and negotiations about infrastructure and multi-benefit projects in the area.

Drainage District 10 should play a lead role in Action 8 (Vegetation Maintenance) and in the Priority Projects described in Chapter 4. The Drainage District can also support implementation of other projects that would be led by other stakeholders but which could improve drainage conditions, such as upstream projects that would reduce sediment inputs (Action 12), potentially the Clear Creek Integrated Design (Priority Project 1), or applications for Floodplains by Design grants, by writing letters of support for grant applications.

3.6 Pierce Conservation District Role in Implementation

The Pierce Conservation District could best support implementation of this ARAP by housing the Clear Creek ARAP Project Manager. The Conservation District can also support implementation of the ARAP as a project sponsor for cost-sharing, technical assistance, and grant applications, and by working with landowners on voluntary adoption of best management practices (for example, as part of Action 12 – Support Upstream Projects to Reduce Sediment Impacts). As a member of the Strategic Conservation Partnership (SCP), the Pierce Conservation District could help connect the work of the SCP (which is particularly relevant to Actions 17, 19, and 20) to implementation of the ARAP. The Pierce Conservation District manages the Regional Conservation Partnership Program (RCP) for the Puyallup Watershed, which provides a different pathway to access NRCS funds for conservation easement projects (Action 20).

3.7 County Role in Implementation

Pierce County will be an important partner in implementing this ARAP. Two divisions of Pierce County Planning and Public Works should be involved: Surface Water Management (SWM) and the agriculture program within Planning and Land Services (PALS).

Because the two greatest risks to agricultural resilience in the Clear Creek area (flooding and drainage) relate to surface water, SWM will be a key partner in actions to address the risks. As the lead for the Floodplains for the Future program, SWM is responsible for managing the Floodplains by Design grants from Ecology, which are a key funding source for many of the actions in this plan. SWM can help build agricultural resilience in the Clear Creek area by collaborating openly and thoughtfully with farmers and other agricultural stakeholders on the Clear Creek Integrated Design and other multi-benefit projects in the area.

The agriculture program in the PALS division will also have a role in many actions, including Action 18 (Pierce County Agriculture Roundtable) and Action 23 (Advocate for Clear Creek Area as an Agricultural Corridor). PALS is also responsible for permitting many on-farm actions as well as actions in this ARAP.

PALS should consider the value of implementing this ARAP when permitting actions in the Clear Creek area.

Other County divisions should be engaged in specific actions. The Office of the County Engineer (OCE) is responsible for road engineering and design for the County, and the Maintenance and Operations (M&O) division is responsible for road maintenance. OCE would need to be engaged in Actions 21 and 22, and the M&O division would need to be engaged in Priority Project 3. SWM and PALS should help connect Clear Creek farmers and agriculture stakeholders to these divisions where appropriate and helpful for implementing this plan.

3.8 Strategic Conservation Partnership Role in Implementation

The Strategic Conservation Partnership (SCP) is a collaborative group formed by the Pierce County Agricultural Program, Washington Farmland Trust, Forterra, and the Pierce Conservation District. The purpose of the SCP is to collaborate on projects that accelerate and improve the pace, quality, and durability of resource land conservation activities in Pierce County, with a focus on agricultural lands. In recent years, facilitation of the SCP has been funded by Floodplains for the Future’s Floodplains by Design grants.

The SCP’s Shared Conservation Strategy Document states:

The founding principle of the SCP is that, in order to dramatically accelerate the rate of farmland protection, strategic partnerships are needed. SCP members acknowledge that no one organization or agency has the resources or capacity to protect the amount of farmland or form the strategic partnerships necessary for long-term viability of agriculture in Pierce County and the Puyallup Watershed. Therefore, collaboration between SCP members will allow for the greatest use of existing funding sources. When collaborating, SCP members can work together to meet the needs of farmers who are interested in conservation. Collaboration also allows SCP members to maximize funding sources, such as Pierce County Conservation Futures, for agricultural conservation instead of competing with each other for limited resources.

The SCP should have a role in implementation of actions to address the risk of development pressure. SCP members have knowledge of and access to a range of succession planning tools (including but not limited to agricultural conservation easements) that could help with implementation of Action 17. The SCP is working to increase the pace and magnitude of farmland conservation in Pierce County, which would support Actions 19 and 20. SCP members should be key participants in the strategic conversations required for Action 19.

3.9 Relationship to Clear Creek Strategy Plan Implementation

As described in Section 1.3.3, the Clear Creek Strategy Plan and this ARAP have overlapping geographic areas. There are also some overlapping projects between the plans (see table below). Implementation of

the two plans should be coordinated. The ARAP Project Manager should coordinate regularly with the Clear Creek Strategy Plan Project Manager at Pierce County SWM to discuss the status of projects and to identify opportunities to leverage funding sources to support both plans.

The table below cross-walks actions in the Clear Creek Strategy Plan with actions in this ARAP. Many actions are the same between the two plans, overlap, or are related. Implementation of all of the actions listed in the table below will be more effective if coordinated across the two plans. The color coding for Clear Creek Strategy Plan elements matches the benefit categories in the Strategy Plan (purple for fish habitat benefits, green for agricultural viability benefits, blue for flood risk reduction benefits, and red for community support benefits). The color coding for Clear Creek ARAP actions are linked to the strategy concepts in Figure 3.

#	CLEAR CREEK STRATEGY PLAN ELEMENT	#	RELATED CLEAR CREEK ARAP ACTION
PIERCE COUNTY PATHWAY			
2	Clear Creek Habitat Restoration	P1	Participate in Clear Creek Integrated Design Process
4	Network Drainage Analysis	7	Replace Undersized Culverts
		8	Vegetation Management
8	Puyallup River Levee Safe Fail Planning	1	Community Training on Emergency Response During an Overtopping/Breaching Event
		2	Develop Plan for Recovery After Overtopping Event
9	Incubator Farm with Flood-Safe Shared Structures	3	Build Shared Elevated Platforms for Equipment and Livestock
10	Community Recovery Fund	2	Develop Plan for Recovery After Overtopping Event
15	Invasive Vegetation Management	P4	Vegetation Management in 50 th Avenue East and 44 th Street East Roadside Drainage Ditches
		P5	Reed Canarygrass Management in Nancy's Ditch
		8	Vegetation Management
20	New Multi-Benefit Infrastructure	P1	Participate in Clear Creek Integrated Design Process
21	Upgraded Levee on River Road	5	Increase Freeboard on River Road Levee
HABITAT PATHWAY			

#	CLEAR CREEK STRATEGY PLAN ELEMENT	#	RELATED CLEAR CREEK ARAP ACTION
H-4	Groundwater Study	14	Explore Opportunities to Leverage Groundwater Information Gathered by FFTF
H-5	Invasive Vegetation Management	P4	Vegetation Management in 50 th Avenue East and 44 th Street East Roadside Drainage Ditches
		P5	Reed Canarygrass Management in Nancy's Ditch
		8	Vegetation Management
AGRICULTURE PATHWAY			
A-1	Pierce County Agriculture Roundtable (PCAR)	18	Support the Viability of the Agricultural Industry in the Watershed/County through PCAR
A-2	Agriculture Resilience Plan		All actions
A-3	Farm Pads	3	Build Shared Elevated Platforms for Equipment and Livestock
A-5	Separate Agricultural Drainage from Habitat	13	Separate Agricultural Drainage from Habitat
A-6	Flood Safe Shared Structures	3	Build Shared Elevated Platforms for Equipment and Livestock
COUNTY PARTNER ELEMENTS			
C-1	Climate Change Study		All actions
C-3	Farmland Conservation	20	Protect Farmland with Voluntary Conservation Easements
C-4	Permitted Flood Safe Structures for Non-agricultural uses	4	Elevate and Protect Infrastructure

3.10 Adaptive Management

Adaptive management refers to the process of reviewing and updating strategies and actions over time based on tracking implementation of the plan and the results of initial actions. Adaptive management of this ARAP will be critical for achieving agricultural resilience in the Clear Creek area.

Every year, ARAP implementers should report on the status of the plan to Clear Creek farmers and to Floodplains for the Future to allow a broad group of stakeholders to track the plan and respond to the outcomes of actions. The report could be in the format of a memo or a presentation. The report should include a description of which projects have been advanced, barriers that have prevented advancement on

the plan, and results of actions that are underway or have been completed. Farmers and FFTF stakeholders should be encouraged to provide input on the status of the plan.

Every 2 years, a more extensive collaborative conversation should occur through a Disappearing Task Group (DTG) meeting with Clear Creek farmers and FFTF members. The DTG should review plan progress, identify new actions based on changes in conditions and outcomes of completed work, identify priorities for available funding, and adjust strategies when needed. The DTG meetings should be held in the winter of even-numbered years (i.e., 2022, 2024, etc.) so that outcomes of the meetings can inform applications for Floodplains by Design grants.

Adaptive management of the plan should also include development of project cost estimates and regular refining and updating of those estimates. ARAP implementers could track the gap between needed and funded work over time. The overall cost estimate for the plan could change over time because it may not be necessary to complete all actions to address risks. If near-term actions are more effective than expected at addressing risks or if conditions change, it may not be necessary to complete long-term, more expensive actions. Therefore, cost estimating should focus on near-term and medium-term tasks.

Some actions in this plan (particularly those that increase existing information) should inform the development of new actions as part of the adaptive management process. Specific actions that will likely lead to new actions that should be discussed and collaboratively agreed-upon as part of adaptive management of this plan include:

- **Priority Project 1:** Participate in the Clear Creek Integrated Design Process
- **Action 2:** Develop Plan for Recovery After Overtopping Event
- **Action 9:** Research Soil Compaction and Drainage
- **Action 14:** Explore Opportunities to Leverage Groundwater Information Gathered by FFTF
- **Action 15:** Begin Monitoring Groundwater for Agriculture to Develop Record of Conditions
- **Action 16:** Predict Groundwater Conditions into the Future with Climate Change
- **Action 19:** Explore Opportunities to Permanently Protect Farmland with Easements or Zoning if Floodway Designation were Removed
- **Action 21:** Participate in FFTF and in Conversations around Canyon Road; Explore Project Options that Protect Agriculture
- **Action 22:** Proactively Identify Potential Infrastructure Projects in the Area and Participate in Planning Conversations

CHAPTER 4: PRIORITY NEAR-TERM PROJECTS

4.1 Introduction

This chapter describes five Priority Projects that should be funded and carried out in the near term. These actions were developed based on input from Clear Creek farmers solicited in May 2020. These actions should be considered a high priority for funding from Floodplains for the Future through Floodplains by Design grants. Priority Project 1 is a programmatic action that relates to many of the other actions throughout this plan, and Floodplains by Design funding should be used to ensure that farmer interests are represented in the work. Priority Projects 2 through 5 are capital improvement projects that would improve drainage conditions in the Clear Creek area.

The Priority Projects in this section could be funded by a variety of funding sources, but they should be considered high priority for use of Floodplains by Design funding. Some projects are already being advanced by Drainage District 10 with District funding. Other potential funding sources include the Pierce County Flood Control Zone District or NRCS.

It is possible that the Clear Creek Integrated Design process could recommend near term changes to the area (such as re-meandering Clear Creek), which would change the feasibility or priority of some of the other Priority Projects in this section. Implementation of Priority Projects should be coordinated through the Integrated Design process and be adjusted as needed.

4.2 Priority Project 1: Participate in the Clear Creek Integrated Design Process

STRATEGY	TIMEFRAME	ACTION TYPE
Multiple	Short term	Programmatic  Collective

Floodplains for the Future is currently launching a Clear Creek Integrated Design process, which will include the formation of a Clear Creek Dialogue Group. The Clear Creek Integrated Design process will assess the feasibility and design of a large-scale multi-benefit project encompassing up to 250–300 acres of floodplain in the Clear Creek area. The long-term goals of this project are to reduce flood risk while creating a landscape where farms and fish can be productive. This work would generate multi-benefit projects to improve the interests of farm, fish, and flood stakeholders. Over the past 6 years, partners in the Floodplains for the Future program have made investments toward better understanding the physical, biological, and social complexities of the area to inform actions to reduce flood risk, support agriculture, and continue salmon recovery. Potential actions to improve drainage in the Clear Creek area through this project include designing projects to separate agricultural drainage from fish habitat, removing barriers to agricultural drainage, re-meandering Clear Creek, and promoting and maintaining drainage infrastructure and maintenance.

Many of the risks to agricultural resilience in the Clear Creek area, particularly flood risk and risks from poor drainage, will require significant investments to address. Drainage District 10 resources and agriculture-focused grant sources are very unlikely to be enough to address these risks, particularly the long-term strategies and actions needed. Collaboration with other stakeholders to incorporate agricultural needs into multi-benefit project packages will be critical for achieving the purpose of this ARAP. Therefore, participation in the Clear Creek Integrated Design process is a high priority for implementation of this ARAP.

In recent years, there have been conversations with the BNSF Railway about their potential interest in expanding the Railway to include a third rail as it passes through the Clear Creek area. If pursued, this project could have substantial implications for Clear Creek itself and for multi-benefit project plans in the area. Coordination with BNSF, if required, would be conducted through the Clear Creek Integrated Design process and the Dialogue Group.

Ideally, multiple agriculture-focused stakeholders will participate in the Integrated Design process, including individual Clear Creek farmers, Drainage District 10 representatives, the Pierce County agriculture program, and the Pierce Conservation District. All of the actions in this plan should be considered in the Integrated Design process; however, actions that are particularly relevant to the Integrated Design and may rely on that process include:

- **Action 6:** Participate in Large-Scale Multi-Benefit Projects to Address Clear Creek Flooding
- **Action 11:** Remove Roads and Other Infrastructure in Low-Lying Areas
- **Action 13:** Separate Agricultural Drainage from Habitat
- **Action 21:** Participate in FFTF and Conversations Around Canyon Road; Explore Options that Protect Agriculture

4.3 **Priority Project 2: Replace Nancy’s Ditch Culverts**

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Short term	Project	 Collective

Location: Intersection of Nancy’s Ditch and Clear Creek

Description of Issue: Nancy’s Ditch drains into Clear Creek through four concrete culverts set in a dirt road embankment. The road is used for maintenance access and must be maintained. The inverts of the culverts are several feet above the channel bed in this location, and the limited conveyance capacity has the potential to obstruct flows, particularly during high runoff events.

Recommended Solution: Replace the existing culverts and road embankment with a prefabricated bridge that spans the ditch width. Geotechnical studies would be required to determine the bearing capacity of the local soils to inform bridge foundation design, and a hydraulic assessment is recommended to confirm the appropriate bridge span and the local scour risk.

Project Benefits: Removal of the existing culverts could improve drainage through Nancy's Ditch by removing obstructions to flow and could increase the exchange of water and passage of aquatic organisms between Clear Creek and Nancy's Ditch.

Coordination Needs: Drainage District 10, Port of Tacoma, U.S. Army Corps of Engineers (USACE), Washington Department of Fish and Wildlife (WDFW), Pierce County Planning and Public Works

Environmental Considerations: Removal of the existing culverts and embankment would require work within the ordinary high water mark of Nancy's Ditch. Temporary stream bypass and / or turbidity control devices would need to be in place.



Nancy's Ditch culverts

4.4 Priority Project 3: Replace 50th Avenue East & 44th Street East Connecting Culvert

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Short term	Project	 Collective

Location: Intersection of 50th Avenue East and 44th Street East

Description of Issue: The ditch along the east side of 50th Avenue East does not drain effectively because the culvert inlet at the south end of the 50th Avenue East ditch is at a lower elevation than the invert of the ditch along 44th Street East that it is draining into. The culvert is also small diameter and may be insufficiently sized to carry to full flow of the ditch.

Recommended Solution: Open cut replacement of the existing culvert with a large diameter culvert set at a slope more conducive to drainage. Repair of paved surfaces following installation.

Project Benefits: Replacement of the existing culvert could improve drainage along 50th Avenue East by removing obstructions to flow.

Coordination Needs: Drainage District 10, Pierce County Planning and Public Works Maintenance & Operations

Environmental Considerations: The project is entirely in within a man-made maintained drainage ditch in the public right-of-way. A wetland delineation would need to be performed along the existing ditch to confirm that there are no wetland impacts.



44th Street East roadside ditch

4.5 **Priority Project 4: Vegetation Management in 50th Avenue East and 44th Street East Roadside Ditches**

STRATEGY	TIMEFRAME	ACTION TYPE
Reduce exposure	Short term	Project  Collective

Location: 50th Avenue East and 44th Street East

Description of Issue: The portions of the ditches along the east side of 50th Avenue East and the south side of 44th Street East are clogged with sediment and weeds, potentially reducing the ditch slope and impeding drainage. The affected area is the full length of the 50th Avenue East ditch and the portion of the 44th Street East ditch that is west of 50th Avenue East.

Recommended Solution: Maintain the existing ditch, including removal of weeds and sediment to return the ditch invert to the design grade.

Project Benefits: Ditch maintenance could improve drainage along 50th Avenue East and 44th Street East by removing obstructions to flow.

Coordination Needs: Drainage District 10, Pierce County Planning and Public Works Maintenance and Operations

Environmental Considerations: The project is entirely in within a man-made maintained drainage ditch in the public right-of-way. A wetland delineation would need to be performed along the existing ditch to confirm that there are no wetland impacts.



44th Street East drainage ditch



50th Avenue East drainage ditch

4.6 **Priority Project 5: Reed Canarygrass Management in Nancy’s Ditch**

STRATEGY	TIMEFRAME	ACTION TYPE
Reduce exposure	Short term	Project  Collective

Location: Nancy’s Ditch

Description of Issue: Nancy’s Ditch is a constructed watercourse that originates at 44th Street East approximately 250 feet east of 47th Avenue East, continues north for a quarter mile, then turns west and

continues for approximately a half-mile before draining into Clear Creek via four small culverts. Most agricultural drainage in the Clear Creek area eventually flows through Nancy's Ditch before reaching Clear Creek. Reed canarygrass is very dense along both banks for the entire length of Nancy's Ditch. Reed canarygrass is growing within the channel in many areas, impeding water flow and potentially increasing water levels upstream.

Recommended Solution: Establish and carry out a management approach for reed canarygrass in Nancy's Ditch. Remove reed canarygrass on 3,400 feet of Nancy Ditch, including:

- 2,200 feet of the east-west portion of Nancy's Ditch from the east border of the Dimond property to the confluence with Clear Creek.
- 1,200 feet of the north-south portion of Nancy's ditch from 44th Street East to the 90-degree bend at the south end of Inch Acres.

The portion of the east-west stretch of Nancy's Ditch from Inch Acres to the Dimond Property is not included because it is inaccessible and due to riparian vegetation, which adequately shades the ditch and therefore prevents drainage issues due to reed canarygrass.

Methods would include mowing an access path along the south side of the ditch on the east-west portion and also an access path along the north-south portion. Ditch cleaning would be conducted with a rake-like bucket attachment for floating reed canarygrass. Depending on permitting and permissions, maintenance would also include removal of grass anchored to muck in the bottom of the ditch. Material would be scattered 15 feet away from the ditch evenly, then mowed a few weeks later when it dries out to disperse it. A regular annual herbicide spraying would be established to keep canarygrass in check until a long-term solution is achieved.

Project Benefits: Removal of reed canarygrass could increase flow in Nancy's Ditch, allowing for more efficient drainage of the Clear Creek area.

Coordination Needs: Pierce County SWM

Environmental Considerations: None. The project is entirely in within a man-made maintained drainage ditch in the public right-of-way.



Reed canarygrass in Nancy's Ditch

CHAPTER 5: FLOODING

5.1 Description of Flooding Risk

Flooding in the Clear Creek area is caused by a complex interaction of flows in the Puyallup River and Clear Creek and its tributaries. The flood control system in the area consists of levees, an upstream dam (Mud Mountain Dam), tide gates, and stormwater detention ponds on Swan, Squally, and Canyon creeks. The flood system includes vulnerabilities from both the Puyallup River and Clear Creek, both of which are described in this section.

5.1.1 Puyallup River Flooding

Puyallup River flooding is a significant physical risk and the most substantial long-term threat facing agriculture in the Clear Creek area. In particular, the River Road Levee poses risks from overtopping events or breaching, which would cause significant flood damage to Clear Creek Farms. Climate change is also anticipated to significantly increase flood levels on the Puyallup River, and current regulations, in many cases, prevent the rebuilding of structures that are substantially damaged by flood events of this type.

The levees on the Puyallup River upstream of River Mile 2.8 are owned and operated by Pierce County, including the River Road Levee (Pierce County, 2013). River Road Levee reduces flood risk to the Clear Creek area from the Puyallup River. The levee was constructed before there were federal standards for levees. Current standards adopted by FEMA require 3 feet of freeboard (height of levee above the 100-year flood elevation) for accredited levees. During flood modeling conducted in 2004, it was determined that the River Road Levee does not provide adequate freeboard, and FEMA subsequently de-accredited the levee.

No information is available on the probability of River Road Levee overtopping. In 2006 and 2009, however, flood levels were projected to overtop the River Road Levee, and Pierce County called for an evacuation of the Clear Creek area (Pierce County, 2016; Hunger and Schmidt, 2016). Fortunately, in both events, precipitation patterns changed and the levee was not overtopped. In recent events, such as the 2009 flood, floodwaters have reached the edge of the Highway 167 road surface (Hunger and Schmidt, 2016).

The potential exists for River Road Levee to overtop or breach. This represents the biggest flood-related threat to farms in the Clear Creek area. Overtopping of the levee could significantly affect farms (as well as human health and safety) in the Clear Creek area. An overtopping event would also result in high flood velocities and present dangers to the area. Homes, barns, fields, and equipment throughout the Clear Creek area could be inundated. People in the area could be physically at risk, and Pierce County could call for evacuations based on flood forecasts. Livestock would also be threatened by an overtopping flood event.

Flood risk throughout Puget Sound is projected to increase with climate change. Heavy rainfall events are projected to become heavier, increasing peak flows. Sea levels are projected to rise. At the same time,

sediment loads are projected to increase and the Puyallup River is predicted to aggrade, reducing channel capacity to handle the increased peak flows.

The Puyallup Watershed is a “mixed rain and snow” watershed, meaning that about 30 percent of the total volume of precipitation in the basin falls as snow while the rest falls as rain (Mauger et al., 2015). The percentage of precipitation that falls as snow is relatively high because the headwaters of the rivers include high elevation areas on Mount Rainier. Accumulated snowpack within a watershed effectively stores water through the winter until it starts to melt in the spring, shifting a portion of streamflow to later in the year. The Puget Sound region as a whole is projected to see a decrease in snowpack and an associated increase in the percentage of precipitation falling as rain. Mixed rain and snow watersheds are projected to see the largest changes in flooding as they transition to a greater balance of rain relative to snow (Mauger et al., 2015).

Flood risk is projected to increase in the Puyallup Watershed and across Puget Sound. Peak daily river flows are projected to increase between 18 and 55 percent by the 2080s, and peak daily rainfall events are projected to become 5 to 34 percent more intense (Mauger et al., 2015). Under a climate change projection based on a moderate greenhouse gas emissions scenario, the volume of the 10-year flood in the Puyallup River is projected to increase 12 to 85 percent by the 2080s (Climate Impacts Group, 2016). Increased flooding would increase the cost of flood protection and stormwater management. Highways and other roads adjacent to rivers would flood more frequently. Existing flood control infrastructure, such as levees and tide gates, could be stressed by more frequent floods and from floods that exceed the magnitude of events the infrastructure was designed for (Mauger et al., 2015).

As flood water levels on the Puyallup River increase with climate change, the probability of the River Road Levee overtopping and inundating farms in the Clear Creek area will also increase. Increased water levels from sea level rise and river flooding will also delay drainage from the Clear Creek tide gates, increasing backwater flooding of Clear Creek area.

For more information, you can access the *Farming in the Floodplain Project Findings and Recommendations Report* and the *Existing Flood Risk Conditions for Agriculture in the Clear Creek Area Technical Memorandum* at <https://farminginthefloodplain.org/resources/>.

5.1.2 Clear Creek Flooding

Large portions of the Clear Creek area are mapped as being within the 100-year floodplain. Mapped flood elevations within the floodplain are at about 18 feet NAVD in a 100-year flood (Pierce County, 2013). In addition, each of the four tributaries to Clear Creek (Swan Creek, Squally Creek, upper Clear Creek, and Canyon Creek) has a mapped floodplain going upstream through its respective canyon.

The 100-year flood flows in Clear Creek are over 700 cubic feet per second (cfs) (Schmidt, 2016), as compared to a mean December flow of 15.4 cfs. The 2013 Pierce County Flood Plan shows over 20 repetitive loss properties (i.e., properties with more than one flood insurance claim within a 10-year period) in the Clear Creek area (Pierce County, 2013). Other properties without flood insurance also have had repetitive flooding (Dixon, 2017). Floodwaters reached an elevation of 18 feet above sea level in the Clear Creek area in the 2009 flood, and more than 10 people had to be rescued (Pierce County, 2013).

Flooding of this elevation in the Clear Creek area inundates approximately 400 acres of land (Pierce County, 2013).

All four tributaries of Clear Creek will likely adjust as climate change and development alter streamflow and sediment dynamics. Unlike the Puyallup River, Clear Creek and its tributaries do not have glacial headwaters, so the impacts of climate change on flooding are likely to be less dramatic than on the Puyallup. However, heavy precipitation events are projected to become more intense, meaning that climate change will likely increase the frequency, volume, and duration of flood events on Clear Creek. Increased sediment due to climate change could also increase aggradation and reduce channel capacity in Clear Creek. Climate change could make inundation of farmlands in the Clear Creek area more likely in the future.



Flooded fields in the Clear Creek area

5.2 Strategy to Address Flooding

The strategy to address the risk of flooding directly from the Puyallup River via a levee overtopping event or a levee breach is:

- In the **short term**, increase adaptive capacity through community training on emergency response (Action 1) and developing a recovery plan (Action 2). Increasing the adaptive capacity of the

farming community in the Clear Creek area has the potential to protect human life in a flood event and to allow farm businesses to recover more quickly.

- In the **medium term**, reduce sensitivity to flooding by building shared elevated platforms and equipment for livestock (Action 3) and elevating and protecting infrastructure (such as farmhouses and barns) (Action 4). Reducing sensitivity will minimize the damage to farm business operations in a flood event.
- In the **long term**, reduce exposure to flooding by increasing the freeboard on the River Road Levee (Action 5) and by participating in large-scale multi-benefit projects to address flooding (Action 6). While these actions are unlikely to occur for many years and would be expensive, they are the only approaches that could reduce the potential for an overtopping or breaching event (Action 5) or structurally protect farmland in the area from Clear Creek flooding (Action 6).

5.3 **Action 1: Community Training on Emergency Response During an Overtopping/Breaching Event**

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase adaptive capacity	Short term	Programmatic	 Collective

Because overtopping of the River Road Levee would be a significant risk to public safety and to agricultural operations, community training on emergency response would increase the capacity of the community to respond in a flood event. There are already substantial resources for emergency response, including Pierce County SWM and Emergency Management and the Riverside Fire & Rescue District. Organizations already responsible for emergency response could collaborate to document procedures and develop training for the community.

In addition to the extensive knowledge and expertise from local and regional groups that could be leveraged (including the Riverside Fire & Rescue District and Pierce County SWM and Emergency Management), many resources could help inform emergency response plans and training. For example, in 2018, FEMA published *Emergency Preparedness Guidelines for Levees: A Guide for Owners and Operators*, which includes a chapter on trainings and exercises (FEMA, 2018). The American Society of Civil Engineers has published a brochure titled *So, You Live Behind a Levee!* which could be distributed or adapted to the Clear Creek community (American Society of Civil Engineers, 2010).

Benefits:

- Emergency response training would increase the education and understanding of flood risk in the Clear Creek community.

- Emergency response training could reduce the risk to human life and safety in the event of an overtopping or breaching event.
- Emergency response training could also reduce the damage to farm operations in a flood event.

Coordination Needs and other Considerations:

- The Riverside Fire & Rescue District, Pierce County SWM, and Pierce County Emergency Management should be tapped to inform or lead emergency planning and community training.
- The Puyallup Tribe should also be involved in this action.
- Resources and information from federal agencies, including FEMA and the National Weather Service, should be explored and leveraged.

5.4 Action 2: Develop Plan for Recovery After Overtopping Event

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase adaptive capacity	Short term	Programmatic	 Collective

As described above, the overtopping of the River Road Levee is a significant risk to farm operations in the Clear Creek area. An overtopping event would require a robust recovery effort to help affected individuals, farm businesses, and infrastructure. Developing a community plan for recovery in advance of an event will help farm operations get back up and running faster. The recovery plan could describe a list of steps to take, a description of regulations related to rebuilding efforts, and links to resources. Development of the plan should be collaborative and involve as many community members as possible. The planning could be coordinated with the emergency response training described above in Action 1.

Benefits:

- The development of a recovery plan would provide Clear Creek farmers with an immediately actionable list of steps to take if such an event occurred.
- The plan would enable farmers to respond quickly and efficiently to an overtopping event, limiting the duration of impacts felt after the event.
- A plan would provide farmers with a comprehensive guide to regulations in the Clear Creek area related to recovery and rebuilding efforts.

Coordination Needs and Other Considerations:

- The recovery plan should be coordinated with Pierce County SWM, Pierce County Roads, Pierce County Department of Emergency Management, the Puyallup Tribe, and Riverside Fire & Rescue District.
- Rebuilding after a severe flooding event can be challenging and is not always advised. From a flood risk perspective, it is important to consider that any flood event can happen again (and potentially worse the next time), so rebuilding a structure as it was previously may not make sense.
- From a regulatory perspective, the National Flood Insurance Program (NFIP) requires that a substantially damaged building be rebuilt to current flood regulation standards. The Clear Creek area is situated in a regulatory floodway, which would prevent most structures from being rebuilt if they are substantially damaged in a flood event.

5.5 Action 3: Build Shared Elevated Platforms for Equipment and Livestock

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce sensitivity	Medium term	Project Type	 Collective

Flooding poses a variety of risks to farmers in the Clear Creek area, particularly for large machinery and livestock that cannot be quickly moved to different areas during flood events. Shared elevated platforms and farm pads in the vicinity of Clear Creek farms are one way to overcome this challenge by providing farmers with elevated areas to store farm equipment and livestock. Because the Clear Creek area is within a designated floodway, anything constructed in the area is required to have flow-through capabilities, meaning that these types of structures would need to be elevated platforms and not areas of compacted fill.

In lieu of constructing elevated structures, areas within the Clear Creek area that are slightly higher than the mean elevation could be designated as areas for farm equipment and livestock during flood events.

Benefits:

- Elevated farm pads reduce the overall cost of flood damage by protecting valuable infrastructure and livestock during flood events.

Coordination Needs and Other Considerations:

- Pierce County PALS and SWM would need to be involved in determining which types of structures would be permissible in the area.

5.6 Action 4: Elevate and Protect Infrastructure (farmhouses, barns, etc.)

STRATEGY	TIMEFRAME	ACTION TYPE
Reduce sensitivity	Medium term	Project Type  Individual

Many farms are able to withstand flooding without major damage to agricultural operations. Fields used for seasonal crops can flood in the winter without ruining crops. However, where farm buildings (such as barns and farmhouses) are located within the floodplain, they are vulnerable to flood damage that can affect agricultural operations. Elevating farmhouses and barns is an effective method of reducing sensitivity to flooding; floodwaters would still reach the building, but damage would be avoided. FEMA has programs that can fund elevation projects.

For a less intensive project, farmers could also consider adding storage (such as shelves) within existing barns or other buildings above the 100-year flood elevation (with extra added height to account for future flood levels) that could be used to store equipment and tools to reduce flood damages.

Benefits:

- Elevating farmhouses, barns, and other farm buildings in the Clear Creek area would lower the costs of flood damages, protect infrastructure, and potentially reduce the number of repetitive loss properties.

Coordination Needs and Other Considerations:

- Federal funding programs for elevations typically are run through local jurisdictions, so projects would need to be coordinated with Pierce County. Pierce County SWM could provide information to inform decisions about how high structures should be elevated.
- Pierce County Code 18E.70.040.B.8 Flood Hazard Area Standards ([LINK](#)) provides information on requirements related to the repairs, reconstruction, replacement, or improvements to existing non-residential agricultural structures.
- Because the Clear Creek area is a floodway, elevated structures would need to have flow-through capabilities. Structures would not be able to be elevated on fill.

5.7 Action 5: Increase Freeboard on River Road Levee

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Long term	Site-Specific	 Collective

Increasing the freeboard along the River Road Levee would provide increased protection against overtopping flood events. In 2016, the USACE completed a draft feasibility report as part of its Flood Risk Management General Investigation for the Puyallup River basin (U.S. Army Corps of Engineers, 2016). The General Investigation examined flood risk throughout the basin and proposed alternative solutions, including levee modifications and sediment management. One proposal in the report was the construction of a new 4.3-mile flood wall along the left bank of the lower Puyallup River on the existing River Road Levee. This proposed flood wall would run from River Mile 2.9 to 7.2, encompassing the entire Clear Creek area and would range from 4 to 8 feet in height, with an average height of 6 feet. In 2018, the USACE notified Pierce County that the General Investigation report was moved to inactive status. However, the County continues to examine the issue. While the project does not currently have momentum, it represents the best opportunity to address the flood risk from the River Road Levee. Adding freeboard on the River Road Levee would be expensive and take a long time to design, permit, and construct. This suggests that the short- and medium-term strategies described in Actions 1 through 4 are important to pursue in the meantime.

Benefits:

- Reducing the risk of an overtopping event on the River Road Levee is the only way to reduce exposure to the flood risk from the Puyallup River. Addressing this vulnerability in the flood management system would greatly increase the resilience of farms in the Clear Creek area.

Coordination Needs and Other Considerations:

- As the owner of the River Road Levee, Pierce County would be the lead (or at least the local sponsor) of any action to address the levee.
- River Road is a state highway, so the Washington State Department of Transportation (WSDOT) would need to be involved, as would Pierce County Roads.
- Federal agencies would be involved in both funding and permitting of any project to address the River Road Levee, including the USACE, U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration (NOAA).
- State agencies like the WDFW and Ecology would be involved in permitting.
- The Puyallup Tribe would need to be closely involved from the outset of the project.

- As noted above, a project of this type and scale would be expensive and would take a long time to design and construct, so other actions to improve agricultural resilience to flooding need to be undertaken in the meantime.
- Adding freeboard to the River Road Levee could have many environmental impacts that would need to be evaluated and mitigated. Permitting and Section 7 consultation under the Endangered Species Act could be complex.
- Although additional freeboard would enhance flood protection for the Clear Creek area, increasing the freeboard of the River Road Levee could result in a change to the floodway designation of the area. However, such a change would not be automatic. Pierce County could choose to not have the new floodwall be certified by FEMA, or the County could continue to regulate the area as a floodway. If the floodway designation were removed, the potential for development in the Clear Creek area would greatly increase given its close proximity to urban centers. Development pressure is described in more detail in Chapter 8.
- Completion of this project would also require the levee on the other side of the Puyallup River to be set back and built to the same elevation as the River Road levee.

5.8 Action 6: Participate in Large-Scale Multi-Benefit Projects to Address Clear Creek Flooding

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Long term	Project	 Collective

While Actions 1 and 2 would increase the adaptive capacity of the Clear Creek agricultural community, and Actions 3 and 4 would protect infrastructure, buildings, and livestock from flood damage, the only way to reduce exposure to flooding and keep Clear Creek farms dry would be a large-scale structural flood management project, such as a ring levee. Any such project would be expensive and would take a long time to design, permit, and construct. This suggests two things:

- The short- and medium-term strategies described in Actions 1 through 4 are important to pursue in the meantime. Increasing adaptive capacity and reducing sensitivity could be enough to support agricultural resilience for many years to come, or changing conditions could increase the risk that Clear Creek flooding presents to farms in the area and make a large-scale structural solution more compelling.
- The political coalition and funding portfolio required to move such a project forward would require the project to provide multiple benefits, such as a combination of flood risk reduction, habitat restoration, and agricultural resilience benefits. Multi-benefit projects are able to access more funding sources, including Floodplains by Design, and can gain broader support.

One example of a multi-benefit project that has been proposed for the area is the Clear Creek Floodplain Reconnection Project, included in the 2013 Pierce County Rivers Flood Hazard Management Plan as Action 5.1.10.2, Clear Creek Acquisition and Levee (Pierce County, 2013). The proposed project would remove the tide gates at the mouth of Clear Creek to allow water from the Puyallup River to flow into the Clear Creek area, reconnecting the river to a portion of its historic floodplain. The reconnected floodplain would establish a more natural connection with the Puyallup River and allow free passage for fish in and out of Clear Creek. To reduce property damage, Pierce County would acquire property from willing sellers and construct a ring levee around the reconnected floodplain to protect property on the dry side of the levee. Farmers in the Clear Creek area raised concerns about how the project could affect agriculture in the area, and these concerns were explored in the *Farmland Impacts Evaluation Technical Memorandum* developed for the FFP in 2017. The project was also discussed in the *Findings and Recommendations Report* for the FFP in 2017, which determined that, while the project did present potential negative impacts, many of these potential impacts could be avoided or minimized through project design, and that the project also represented an opportunity to pursue large-scale actions that could improve conditions for agricultural viability as part of a multi-benefit project.

Based on conversations about the Clear Creek Floodplain Reconnection Project, including concerns from farmers, Pierce County is pursuing a more open-ended process to determine the best multi-benefit project design for the Clear Creek area. The Clear Creek Integrated Design process, with an associated Clear Creek Dialogue Group, is expected to begin in 2021. ARAP implementers should participate in the Integrated Design process (Priority Project 1).

The ability of potential alternative designs for a multi-benefit project to reduce exposure of farm operations to flooding from Clear Creek should be evaluated based on the following indicators:

- Acreage of farmland inundated in a 10-year flood.
- Acreage of farmland inundated in a 100-year flood.
- Flood elevation in a 10-year flood.
- Flood elevation in a 100-year flood.
- Time required to drain agricultural areas after an overtopping event on the River Road Levee.
- Acreage of farmland inundated in a 10-year flood in future condition scenarios (2050s and 2080s).
- Acreage of farmland inundated in a 100-year flood in future condition scenarios (2050s and 2080s).
- Flood elevation in a 10-year flood in future condition scenarios (2050s and 2080s).
- Flood elevation in a 100-year flood in future condition scenarios (2050s and 2080s).

Benefits:

- This action could keep farm operations from being inundated by floodwaters in a much broader range of flood events than under current conditions.
- A large multi-benefit project has the potential to address other agricultural resilience needs, such as drainage (see Chapter 6).

Coordination Needs and Other Considerations:

- Pierce County SWM would likely be the lead on any multi-benefit flood risk reduction project in the Clear Creek area.
- The Clear Creek Integrated Design process is part of the Floodplains for the Future initiative.
- Any project would need to be coordinated with Drainage District 10, the Puyallup Tribe, salmon recovery stakeholders, and many others.
- As noted above, a multi-benefit project of this type and scale would be expensive and would take a long time to design and construct, so other actions to improve agricultural resilience to flooding need to be undertaken in the meantime. Permitting and Section 7 consultation under the Endangered Species Act could be complex.
- A large-scale multi-benefit project could potentially have many environmental impacts that would need to be evaluated and mitigated, even if the overall purpose of the project is to improve environmental conditions.
- As described above, a multi-benefit project has great potential upside for agricultural resilience if agricultural impacts are minimized and mitigated, if flood risks are addressed, and if agricultural benefits can be provided. Potential agricultural impacts to be considered in conversation and design include the increased difficulty in draining the area if the River Road Levee were to overtop, changes in groundwater-surface water interactions, changes in the drainage regime, acquisition of farmland for inclusion in the project footprint, and potential impacts on special districts (Drainage District 10 and the Riverside Fire & Rescue District).

5.9 Funding Recommendations to Address Flooding

The actions identified to address flood risk range from planning to capital improvement projects. It may be beneficial to package actions together to provide potential funders a full understanding of the approach to addressing a larger issue as opposed to evaluating standalone actions.

The most promising funding sources to address flood risk are federal, state, and local grant programs. Floodplains by Design is a flexible, multi-benefit program that should be considered when other funding options do not exist or do not seem feasible. Packages developed for future Floodplains by Design grant

awards can include actions from this ARAP as well as advancement of multi-benefit projects that support agricultural resilience among other benefits (such as habitat).

The best funding sources to pursue to implement the short-term planning actions (1 and 2) are FEMA's Preparedness Grants distributed in Washington through the Emergency Management Division (EMD) of Washington. Clear Creek is in Region 5 and should work directly with the EMD liaison in seeking funding through its Preparedness Grants Program to implement Actions 1 and 2. EMD's Hazard Mitigation Assistance Grants generally require a disaster declaration, but Pre-Disaster Mitigation grants may be available annually through a national, competitive process.

To implement Action 3 (Building Shared Elevated Platforms for Equipment and Livestock), the Pierce County Flood Control Zone District and NRCS Environmental Quality Incentives Program (EQIP) are the most promising funding sources. Floodplains by Design may be appropriate for implementing collective actions (Action 3) or as a match to EQIP for individual actions (Action 4).

Funding for individual structure elevation (Action 4) is available from a variety of sources, including FEMA and the Hazard Mitigation Grant Program. A subset of the program, the Flood Mitigation Assistance Grant Program, makes funding available to states, counties, and other jurisdictions with a FEMA-approved Hazard Mitigation Plan to reduce or eliminate the risks of repetitive flood damage to buildings and structures enrolled in the NFIP, including raising structures above the base flood elevation. Additional grant opportunities may exist for individual landowners to implement Action 4 if they meet certain criteria for federal programs. Socially disadvantaged farmers are eligible for higher EQIP grants. Department of Housing and Urban Development programs should be explored for eligibility, such as the Veterans Housing Rehabilitation and Modification Pilot Program (for low-income or disabled veterans).

If a flooding event occurs, the EMD's Disaster Assistance Program and NRCS's Emergency Watershed Protection Program (EWPP) Recovery Program should be considered. The NRCS EWPP program is for both public and private landowners but requires a government (such as County or Tribe) or Conservation Districts sponsor. The sponsoring authority should be identified as part of the recovery plan developed in Action 2. The Farm Service Agency's Emergency Conservation Program provides technical assistance and funding to restore damaged farmland if the event qualifies as a disaster unusual to the area. Ecology's Flood Control Assistance Account Program, previously available for floodplain management planning and implementation of actions to control flooding, is now available for emergency projects only due to budget reductions in the 2019–2021 biennium, but may be funded at a higher level in the 2021–2023 biennium.

Implementing Action 5, which is longer term and high cost, will likely require multiple funding sources and the careful development of associated land use policies. A stand-alone funding strategy is recommended for this action, with USACE, FEMA, EMD of Washington, Pierce County, Pierce County Flood Control Zone District, and Floodplains by Design considered as both funders and partners in the development of a strategy and its implementation.

The funding for participating in the planning and design of a multi-benefit floodplain project in the Clear Creek area (Action 6) is most likely to be with Floodplains by Design. As representative organizations or individual farmers identify project elements that benefit farms or reduce flood risk, funding sources to consider may include EQIP or the NRCS Regional Conservation Partnership Program. The funding

sources for elements of capital work in the Clear Creek area to this point have been the Pierce County Flood Control Zone District and Floodplains by Design; additional funding will be needed to complete the project.

CHAPTER 6: POOR DRAINAGE

6.1 Description of Drainage Risk

Agricultural drainage in the Clear Creek area is the biggest current risk to agricultural viability. Currently, all agricultural drainage from the Clear Creek area flows into Clear Creek before eventually draining to the Puyallup River. Relying on Clear Creek to drain agricultural fields creates several problems for agriculture in the Clear Creek area. Clear Creek is a salmon-bearing stream, which leads to higher regulatory barriers and permitting requirements for drainage maintenance.



Clear Creek

Clear Creek receives substantial sediment and stormwater inputs from its four major tributaries (Swan Creek, Squally Creek, upper Clear Creek, and Canyon Creek). During wet-season conditions, stormwater volumes from the tributaries raise the water level in Clear Creek, reducing the capacity of the channel to drain agricultural ditches. Current drainage conditions in the Clear Creek area are poor. There are thick growths of reed canarygrass and other vegetation in the ditches, and there is evidence of sediment deposition in most ditches. Both the vegetation growth and sediment deposits restrict drainage in the area.

Ditches generally have stable banks, but there are some small areas of localized erosion. A general lack of native trees and shrubs on the banks of ditches limits shading, which is a factor in vegetation growth in the channels. The lack of bank vegetation may also increase sediment runoff into ditches. The presence of beavers and beaver dams has also had an impact on drainage in recent years. Additionally, slope and elevation in the Clear Creek area present significant challenges to drainage. Replacing culverts would lead to drainage improvements, but would not ultimately solve all drainage challenges.

6.2 Strategy to Address Poor Drainage

The strategy to address the risks presented by drainage is:

- In the **short term**, reduce exposure to poor drainage through the replacement of identified key culverts (Action 7) and vegetation management (Action 8), increase information by researching whether soil compaction contributes to drainage issues (Action 9), and develop an effective approach to beaver management (Action 10). Reducing exposure will limit the number of drainage issues for farms in the Clear Creek area, and increasing information will help the agricultural community address new drainage challenges.
- In the **medium term**, reduce exposure to poor drainage through the removal of infrastructure (such as roads) in areas acquired by Pierce County (Action 11) and by providing support to upstream projects designed to reduce sediment inputs (Action 12). Reducing exposure will limit the number of drainage issues for farms in the Clear Creek area.
- In the **long term**, reduce exposure to poor drainage by separating agricultural drainage from habitat (Action 13). This would be a large undertaking but could improve long-term drainage maintenance in the area by removing fish from drainage channels, making it easier to permit and complete maintenance activities.

6.3 Action 7: Replace Undersized Culverts

STRATEGY	TIMEFRAME	ACTION TYPE
Reduce exposure	Short term	Project  Collective

Numerous culverts drain the Clear Creek area. Chapter 4 of this report identifies two specific culvert replacement projects to improve drainage: the replacement of culverts in Nancy’s Ditch (Priority Project 2) and the replacement of the 50th Avenue East and 44th Street East connecting culverts (Priority Project 3). In addition to the culverts described later in this report, other undersized or poorly functioning culverts in the Clear Creek area may need to be replaced. The Drainage Inventory Memorandum includes measurements and observations of culverts that appear to be undersized, choked with sediment or vegetation, or otherwise insufficient to meet drainage needs. Additional analysis may be needed to identify other priority culvert replacement projects. Residents in the Clear Creek area have noted that the culvert that conveys Clear Creek under Gay Road causes water to back up and affects drainage.

For example, a backwater analysis could be used to identify additional undersized culverts in the Clear Creek area. Backwater analyses are performed using additional information about culverts such as physical conditions like size, slope, and elevation as well as logging water elevations on both sides of the culvert, or rainfall data from USGS.

Pierce County is currently conducting a survey of the Clear Creek area that will inform drainage improvement options, to be discussed as part of the Clear Creek Integrated Design process (Priority Project 1).

Benefits:

- Replacing undersized culverts in the Clear Creek area would help move water through the system more efficiently, improving the drainage network and expediting the movement of water during flood and heavy rain events.

Coordination Needs and Other Considerations:

- Drainage District 10 should lead or be heavily engaged in any culvert replacement projects that include or interact with agricultural drainage in the area. Pierce County SWM is another key stakeholder, as well as Pierce County Maintenance and Operations for any replacement of roadside drainage ditch culverts (such as Priority Project 2).
- The Puyallup Tribe, WDFW, and the Salmon Recovery Lead Entity should also be engaged throughout the process of replacing culverts.
- While undersized culverts and drainage maintenance issues contribute to poor drainage, the elevation and gradient of the Clear Creek area are a major limiting factor. Replacing undersized culverts would improve drainage conditions but would not be the ultimate solution to drainage needs.
- Replacing culverts is expensive, and benefits should be considered relative to the costs.
- Priority Projects 2 and 3 have been prioritized in this plan based on agricultural needs. Ideally, culverts in the area will eventually be prioritized based on multiple benefits, incorporating needs for agriculture, flood risk reduction, fish passage, and habitat benefits. Identifying projects with benefits for multiple interests would expand funding opportunities.

6.4 Action 8: Vegetation Management

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Short term	Project	 Collective

Invasive plants, including reed canarygrass, elodea, duckweed, and Himalayan blackberry, are a maintenance issue for the agricultural drainage system in the Clear Creek area. Removal of reed

canarygrass, in particular, is a major unaddressed maintenance need in the drainage system. Reed canarygrass encroaches on ditch channels, traps sediment in the channel, and impedes water flow. Chapter 4 of this plan identifies two specific vegetation management actions: Vegetation Management in 50th Avenue East and 44th Street East Roadside Ditches (Priority Project 4), and Reed Canarygrass Management in Nancy's Ditch (Priority Project 5).

In addition to the Priority Projects in Chapter 4, ARAP implementers should develop a plan for controlling weeds in and along the drainage ditches. The Pierce County Noxious Weed Control Board offers information on appropriate weed control methods. Many of these methods will require permits, especially those that involve chemical applications. Water quality in ditches should be assessed to determine whether water quality issues, such as nutrient pollution, are contributing to the growth of noxious vegetation. If so, addressing water quality issues could help with weed control.

Planting desirable vegetation along drainage ditches could also help address invasive vegetation. Shade from shrubs and trees can effectively reduce some noxious weeds, including reed canarygrass and elodea. Vegetation strips can also reduce sediment and pollutants entering ditches from adjacent land. Some portions of Nancy's Ditch are shaded with mature vegetation (the portion of the east-west stretch of Nancy's Ditch from Inch Acres to the Dimond Property) and therefore do not have the same drainage issues due to reed canarygrass as other areas of the ditch. Other portions of Nancy's Ditch have been planted with vegetation within the past 5 years so that the vegetation, when mature, will shade the ditch and prevent growth of reed canarygrass and other invasive vegetation. Similar plantings could be done on other ditches in the area.

Some considerations for planting projects include:

- Select native vegetation species.
- Avoid planting any species on the Washington State or Pierce County noxious weed list (Washington State Noxious Weed Control Board, 2020; Pierce County Noxious Weed Control Board, 2021).
- Maintain access to the ditches for future maintenance activities.
- Design plantings so that they do not interfere with the stability of the ditches.
- Select plants with strong roots that add to bank stability.
- Do not select aggressive plants that would encroach on channels, such as Hooker's willow.
- Minimize the conversion of farmland adjacent to drainage channels.

Benefits:

- The removal of invasive vegetation could improve drainage efficiency.
- Shading out vegetation with plantings could improve drainage efficiency and have other benefits to water quality and habitat.



Nancy's Ditch

Coordination Needs and Other Considerations:

- Drainage District 10 should lead drainage maintenance projects.
- Pierce Conservation District would be a key partner in any planting projects.
- Vegetation management activities could conflict with salmon habitat restoration, depending on the methods used. ARAP implementers should coordinate with salmon recovery stakeholders, including the Puyallup Tribe and WDFW.

6.5 **Action 9: Research Soil Compaction and Drainage Issues**

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase information	Short term	Programmatic	 Collective

Soil compaction, which is sometimes referred to as a plow pan, occurs when agricultural soils compress over time as a result of traveling or working on fields that are too wet. Poor pasture and livestock management methods can also lead to severe, localized soil compaction. Soil compaction can lead to drainage issues and can negatively affect crops by inhibiting their ability to root into the subsoil. Although little information about soil compaction in the Puyallup Watershed exists, Pacific Northwest soils are more susceptible to extreme cases of soil compaction than other areas of the United States. Conversations with NRCS staff have indicated that soil compaction may be a cause of poor drainage in agricultural lands in the Puyallup Watershed. In addition to drainage problems, soil compaction can lead to sheet erosion, delays in planting, poor groundwater recharge, and poor soil fertility.

ARAP implementers should conduct a study of soil compaction in the Clear Creek area, potentially including conversations with farmers and field surveys to determine where soil compaction exists and how deep it is. The study could also explore the causes and indicators of compaction and prevention/treatment measures.

Benefits:

- An increased understanding of soil compaction issues can inform on-farm solutions and help focus future capital improvement project work in areas where soil compaction could be addressed to improve drainage.

Coordination Needs and other Considerations:

- Potential partners in this work include WSU Puyallup and NRCS. Drainage District 10, the Pierce Conservation District, Pierce County PALS, and Washington Farmland Trust should also be included in planning and implementing a study of soil compaction.

6.6 Action 10: Develop an Approach to Beaver Management

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase adaptive capacity	Short term	Programmatic	 Collective

As noted above, beaver dams can be an impediment for agricultural drainage. Drainage District 10 has a Hydraulic Project Approval (HPA) from the WDFW to remove beaver dams in portions of Clear Creek that are restricted to a single watercourse without side channels. The HPA also includes beaver relocation. However, beaver dams on portions of Clear Creek or its side channels that are not managed by Drainage District 10 and that are not covered by the HPA also provide impediments to agricultural drainage.

ARAP implementers, led by Drainage District 10, should collaboratively develop an approach to beaver management that will help maintain agricultural drainage while be acceptable to landowners in the area who may prefer not to remove beaver dams on their property. Additional tools and approaches should be considered, such as beaver deceivers and other deterrent devices. Collaborative conversations should be

initiated with landowners such as the Port of Tacoma and the Puyallup Tribe. Regional experts like Beavers Northwest, South Sound Beaver Recovery, and Beaver Creek Environmental Services should be consulted for suggestions of innovative approaches. Agricultural groups in other Puget Sound areas (such as the Snoqualmie Valley Watershed Improvement District and Whatcom Family Farmers) may also have suggestions of approaches that have worked in their areas.

Benefits:

- Developing an approach to managing beaver dams on Clear Creek and its side channels would increase the toolkit for dealing with impediments to agricultural drainage.

Coordination Needs and Other Considerations:

- Collaborative brainstorming and action are needed to supplement the current approach available to Drainage District 10. As noted above, the Port of Tacoma and the Puyallup Tribe should be included in collaborative conversations.

6.7 Action 11: Remove Roads and Other Infrastructure in Low-Lying Areas

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Medium term	Project	 Collective

Over the past decade, Pierce County has been purchasing properties in low-lying portions of the Clear Creek area from willing sellers in order to reduce flood damage. In particular, the County has acquired many properties on 47th Avenue South and on 44th Street East west of 50th Avenue East. At some point in the future, as acquisitions continue, it may be possible to remove the roadways and associated infrastructure in these areas. Removing this infrastructure could open up opportunities for drainage. For example, the 44th Street East roadside drainage ditch flows into Nancy’s Ditch through an undersized culvert under the road. Removing the roadway would create a more open connection.

In addition, if the former Dimond property is turned into a wetland complex as part of restoration activities, it may be possible to have farms drain directly into the area without requiring constricting ditches. This action would need to be coordinated through the Clear Creek Integrated Design process and through FFTF. Allowing farms to drain directly into a restoration project would likely require adoption of new Best Management Practices (BMPs) on some farms, but the improved drainage would provide compensatory benefits. The cost of BMPs could be offset by funding programs such as EQIP.



44th Street East

Benefits:

- By participating in the Clear Creek Integrated Design process, farmers in the Clear Creek area would provide input on project design.

Coordination Needs and Other Considerations:

- This action would be led by Pierce County. Coordination and collaboration with Drainage District 10 and with individual farmers would be required.
- FFTF stakeholders interested in salmon habitat (including the South Puget Sound Salmon Enhancement Group [SPSSEG], the Puyallup Tribe, and the Water Resource Inventory Area [WRIA] 10 Salmon Lead Entity) should be included in conversations about this project.

6.8 Action 12: Support Upstream Projects to Reduce Sediment Inputs

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Medium term	Project Type	 Collective

Accumulated sediment has been observed in ditches throughout the Clear Creek area. For example, during a drainage inventory conducted in 2016, up to 2.5 feet of accumulated sediment was observed in Nancy’s Ditch. Sediment levels in Clear Creek varied, but were up to 3 feet deep in some locations. Accumulated sediment is an issue for agricultural drainage because it reduces the carrying capacity of ditches and stream channels. It also provides a growth medium for invasive vegetation. Addressing sediment accumulation would improve the agricultural drainage system. While it is sometimes possible to directly remove sediment from drainage ditches that are not fish-bearing streams, sediment removal is unlikely an option in Clear Creek itself. Therefore, addressing the sediment inputs from upstream sources (Swan Creek, Squally Creek, upper Clear Creek, and Canyon Creek) could reduce sediment accumulation in Clear Creek and therefore increase drainage capacity in the system.

The *2006 Clear/Clarks Creek Basin Plan* describes conditions on the upstream tributaries. During fieldwork for the Basin Plan, active streambank and channel bed erosion were observed in all of the tributaries to Clear Creek. Erosion was observed in the form of channel downcutting, channel sidecutting, and hillslope mass wasting caused largely by excessive peak flows coupled with the geologic conditions of large, unconsolidated glacial outwash deposits, which are fine-grained and easily erodible. The Basin Plan stated that urbanization has increased peak flows on these streams, which have in turn increased erosion (Pierce County, 2006).

All four streams draining into Clear Creek (Swan Creek, Squally Creek, upper Clear Creek, and Canyon Creek) are eroding naturally, especially given the erodible soils and steep topography. However, development has altered conditions and increased both the sediment loads and the flows that transport this sediment (Pierce County, 2006). In general, the sediment is deposited in the low-gradient, slow-moving, floodplain reach, which is the low-lying Clear Creek area where agricultural land uses are located. Stormwater or sediment facilities on all four streams provide some reduction in peak flows and/or capture and removal of sediment.

The *Swan Creek Watershed Characterization and Action Plan* (2015) includes a set of recommended capital improvement projects to address erosion and sediment loads, including headwaters preservation, regional detention, targeted detention, streambank stabilization, vegetation restoration, culvert outfall repair, and storm drain replacement (Pierce County, 2015). Completing these projects on Swan Creek would not be directly relevant to agricultural resilience in the Clear Creek area because Swan Creek enters Clear Creek downstream of the agricultural lands. In addition, the sediment pond on Swan Creek prevents excessive sediment from entering Clear Creek. However, completing similar projects on Squally Creek and especially upper Clear Creek and Canyon Creek could reduce sediment loads entering the low-

lying Clear Creek area. ARAP implementers should encourage planning efforts to identify projects for these tributaries.

Upstream sediment reduction projects would not be led by Clear Creek farmers or ARAP implementers. Planning (similar to the Swan Creek Action Plan but for other tributaries) and projects could be led by Pierce County SWM or the Puyallup Tribe. In addition, Pierce Conservation District could potentially work with landowners on voluntary projects that reduce sediment inputs into upstream tributaries. ARAP implementers should support upstream sediment reduction projects, participate in collaborative efforts related to these projects, and coordinate letters of support from Drainage District 10, individual farmers, and/or other agricultural stakeholders for grant applications that would fund these projects.

Benefits:

- Reduce sediment inputs into the low-lying portions of Clear Creek, thereby increasing drainage capacity and reducing growth mediums for invasive vegetation.
- Increasing collaboration and mutual support with stakeholders working on stream restoration, water quality, flood hazard management, and habitat restoration.

Coordination Needs and Other Considerations:

- Planning and projects to reduce upstream sediment would likely be led by Pierce County SWM or the Puyallup Tribe.
- Pierce Conservation District could pursue voluntary projects to reduce sediment inputs with landowners.
- Reducing upstream sediment inputs may not have an immediately noticeable and direct correlation to sediment levels in Clear Creek; over time, however, reducing sediment inputs upstream should improve drainage conditions in Clear Creek agricultural areas.
- Infrastructure on the tributaries (including detention facilities and the hatchery on Clear Creek) needs to be considered in any planned actions.

6.9 **Action 13: Separate Agricultural Drainage from Habitat**

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Long term	Project Type	 Collective

If the agricultural drainage system in the Clear Creek area had a separate outlet to the Puyallup River, with fish screens installed, it would be easier to permit maintenance activities because most (if not all) of the ditches would likely be considered non-fish-bearing. Drainage District 10 and individual farmers

would have more control over the drainage system. Agricultural drainage would no longer have to flow through Clear Creek, which also receives input flow from the four upstream tributaries. Separating the drainage system from Clear Creek would also allow options for restoring the stream to more natural conditions. Other options for separating agricultural drainage from habitat areas (other than a separate outlet to the Puyallup River) should be considered.

Separating the agricultural drainage system from Clear Creek would be a large capital improvement project requiring new infrastructure. It would also be a complex project to permit because it would require a new outlet to the Puyallup River and would have to meet water quality criteria. Because of topography, the new river outlet would ideally be located as far downstream as possible to maximize gravity drainage. The drainage channel leading to the new outlet would need to be excavated as far as feasible toward the outlet, but may need to be piped as the elevation of the ground rises.

A project of this scale would likely need to be included as part of a multi-benefit package of actions in the Clear Creek area. Therefore, ARAP implementers should advocate for separation of drainage as part of the Clear Creek Integrated Design process (Priority Project 1).

Benefits:

- Separating agricultural and habitat drainage would improve farm drainage and reduce the regulatory challenges of linking drainage with fish-bearing streams.

Coordination Needs and Other Considerations:

- This project would need to be coordinated with many stakeholders, including numerous landowners and representatives of fish and flood interests, for inclusion as part of a multi-benefit project package. Coordination should start with Floodplains for the Future and the Clear Creek Dialogue Group.
- Pierce County, the Puyallup Tribe, and various permitting agencies would need to be involved in conversations about this action.
- It could be difficult to reach agreement on and permit the creation of a new outlet to the Puyallup River.
- A new outlet to the Puyallup River would likely require fish screens to ensure that fish do not enter the drainage system.
- Water quality in the water newly draining directly to the Puyallup River may be a concern.

6.10 Funding Recommendations to Address Poor Drainage

Implementing the near-term actions to address poor drainage, particularly culvert replacement (Action 7) and vegetation management (Action 8), are action types that often have dedicated funded sources in Washington. However, because the priority culverts listed here are not also priority culverts for fish

passage concerns, these actions will not rank highly enough for funding through culvert replacement programs such as those administered by the Fish Passage Barrier Removal Board, WSDOT, or even County Roads. Other funding programs specific to flooding or farm improvements are more promising for implementing these actions, particularly Floodplains by Design. Other entities or funding programs with promise include:

- The Washington Conservation Commission’s Natural Resource Investments, accessed through the Pierce Conservation District.
- Drainage District 10.
- EQIP.
- Ecology’s Aquatic Invasive Plants Management Grants to address species listed on the state noxious weed list (Washington State Noxious Weed Control Board, 2020) and/or the Washington Department of Agriculture quarantine list (Washington State Department of Agriculture, 2021).
- The Pierce County Noxious Weed Control Board and the Washington Conservation Corps may be appropriate partners to implement and/or fund Action 8.

A soil compaction study (Action 9) is expected to be funded by the 2019–2021 Floodplains by Design grant to Floodplains for the Future. In addition to the Floodplains by Design grant, the most promising fund sources to implementing actions to address soil compaction are likely NRCS Conservation Innovation Grants and partnering with the WSU Extension to access their Biologically Intensive Agriculture & Organic Farming (BIOAg) grants.

Funding of upstream projects to reduce sediment input (Action 12) will likely come from a separate realm from other agricultural viability projects. Measures to address stormwater, for example, have numerous funding sources, permit obligations, and other mechanisms for managing both stormwater and associated sediment. Projects will likely be led by organizations such as Pierce County SWM, Pierce Conservation District, or the Puyallup Tribe, and they would likely use a mix of their own funding and grant sources. Support for these projects from Clear Creek farmers and from other agricultural stakeholders is unlikely to require dedicated funding. Support could be conducted as part of staff work by existing staff positions (potentially with funding support from Floodplains for the Future), by funded staff time for ARAP implementation (see Section 3.3), or by farmer participation that could be funded through honorariums provided by FFTF. If projects to reduce upstream sediment inputs occur on farms, EQIP or other sources previously mentioned may be appropriate. If voluntary measures occur on other private or public property, various Pierce Conservation District, Tribal, funding, and financing programs may be appropriate.

Similar to Action 12, Actions 11 and 13 would primarily require participation in FFTF-related activities, which is unlikely to require dedicated funded. Participation could be conducted as part of staff work by existing staff positions or by farmer participation that could be funded through honorariums provided by FFTF. Action 13 should be packaged with other multi-benefit projects (such as the Clear Creek Integrated Design process) when seeking capital funds from Floodplains by Design or other possible sources.

CHAPTER 7: UNCERTAINTY ABOUT GROUNDWATER

7.1 Description of Groundwater Risk

Groundwater in the Clear Creek area is important to agricultural viability because it affects both water supply and drainage. Some farmers in the Clear Creek area rely on groundwater for irrigation. Despite the importance of groundwater, not much is known about groundwater levels, trends, or interaction with surface water in the Clear Creek area. In particular, potential future groundwater levels with climate change and sea level rise are unknown. Groundwater in the area is relatively shallow, and rising groundwater levels in the future could further impede agricultural drainage and increase the frequency of groundwater ponding on the ground surface in some areas. The potential for saltwater intrusion into groundwater with sea level rise should also be considered. The uncertainty about current and future groundwater conditions in the area represents a risk to agricultural viability and resilience simply because we lack the base of information needed to understand what impacts could occur.

7.2 Strategy to Address Uncertainty About Groundwater

The strategy to address the risks presented by groundwater is:

- In the **short term**, increase information by exploring opportunities to leverage groundwater information gathered by FFTF (Action 14) and begin monitoring groundwater to develop a record of conditions (Action 15). Increasing information related to groundwater will help the agricultural community in the Clear Creek area make more informed decisions and fill a significant knowledge gap.
- In the **medium term**, increase information by projecting future groundwater conditions with climate change impacts (Action 16). Increasing information related to groundwater will help the agricultural community in the Clear Creek area make more informed decisions and fill a significant knowledge gap.
- In the **long term**, develop new actions based on information learned and future climate change studies.

7.3 Action 14: Explore Opportunities to Leverage Groundwater Information Gathered by FFTF

STRATEGY	TIMEFRAME	ACTION TYPE
Increase information	Short term	Programmatic  Collective

As part of FFTF-funded efforts to better understand habitat conditions in the Clear Creek area, SPSSEG is monitoring and observing groundwater in the Clear Creek area and collecting information on the relationship between groundwater and surface water. Although the purpose of this work is to better understand the dynamics between groundwater and thermal diversity for fish populations, data collected through this work has potential implications for understanding the relationship between groundwater and agriculture.

This project involves the installation of 14 groundwater wells in a grid pattern in the Lower Puyallup River reach, including the Clear Creek area. Data from these wells, in addition to data from existing groundwater wells in the area, will be used to inform the development of a groundwater model for the area. This model will be used to predict groundwater movements throughout the course of a year, how close water the water comes to the surface, when it rises above the surface, and which way the water moves through the system. This data will provide valuable information to farmers related to drainage, growing seasons, and landscape-scale organization of farms and infrastructure. Farmers in the Clear Creek area have expressed interest in this work, and SPSSEG has stated their intention to place some of the 14 new groundwater wells on farms in the Clear Creek area.

Benefits:

- Improved groundwater information and modeling will increase the understanding of how groundwater affects agriculture in the Clear Creek area, including whether high groundwater is contributing to drainage issues and whether groundwater changes in the future could negatively impact agricultural viability.

Coordination Needs and Other Considerations:

- ARAP implementers should coordinate closely with SPSSEG on the results of the groundwater modeling.
- The information and modeling from SPSSEG may need to be supplemented with additional monitoring with an agricultural focus (Action 15) and with climate change scenarios (Action 16).

7.4 Action 15: Begin Monitoring Groundwater for Agriculture to Develop Record of Conditions

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase information	Short term	Programmatic	 Collective

As described above in Section 7.1, not much is known about groundwater conditions in the Clear Creek area. SPSSEG is currently monitoring groundwater conditions in the area (see Action 14), but the monitoring locations and protocols were selected based on habitat needs. It may be necessary or helpful to

gather groundwater information specific to agricultural needs. Under this action, ARAP implementers should develop groundwater monitoring protocols and locations to inform decision-making about agriculture. This action should be done in sequence with Action 14 so that efforts can fill gaps in information after SPSSEG groundwater information is available.

The protocols and locations for groundwater modeling should be informed by:

- Conversations with Clear Creek farmers to establish areas where groundwater levels are an issue (for example, areas where there is ponding on fields that is not caused by soil compaction).
- Review of future condition groundwater studies conducted by the Snohomish Conservation District for the *Agriculture Resilience Plan for Snohomish County* to identify processes and lessons learned that could be leveraged for successful studies in the Clear Creek area.
- Collaboration with flood risk reduction and salmon recovery stakeholders to identify opportunities to gather information that would be useful for multiple interests.

Benefits:

- Developing more information about groundwater dynamics will enable Clear Creek farmers to better understand the role that groundwater plays in affecting agricultural operations.
- Information could inform modeling of future groundwater conditions (Action 16).

Coordination Needs and Other Considerations:

- ARAP implementers should coordinate with SPSSEG, Pierce County SWM, the Puyallup Tribe, and other FFTF stakeholders to identify opportunities to meet multiple needs with any data gathered. Creating multi-benefit protocols for groundwater monitoring can broaden the range of available funding sources.

7.5 Action 16: Predict Groundwater Conditions into the Future with Climate Change

STRATEGY	TIMEFRAME	ACTION TYPE
Increase information	Medium term	Programmatic  Collective

As described in Section 7.1, future conditions could lead to groundwater posing a greater risk to agricultural viability in the area. Sea level rise could raise groundwater levels, potentially increasing ponding on fields. Saltwater intrusion into groundwater is also possible. Predicting future groundwater conditions with climate change could help Clear Creek farmers plan and inform long-term actions that could be added to implementation of this plan.

For an example of climate change studies of groundwater specifically developed for agricultural purposes, review the *Agriculture Resilience Plan for Snohomish County* (<https://snohomishcd.org/ag-resilience>). The Snohomish County studies revealed that rising sea levels are expected to delay spring planting due to an increase in base groundwater levels. This study was able to project delays in spring cultivation by estimating how long it would take future elevated groundwater levels to fall to the current levels observed during spring. Conditions in the Clear Creek area are different than conditions in the Snohomish County agricultural areas considered in the *Agriculture Resilience Plan*, so the study results are not transferable and should only be considered an example.

Benefits:

- Predicting future groundwater conditions in the Clear Creek area will enable farmers to plan for the future and will inform potential actions to address groundwater risks.

Coordination Needs and Other Considerations:

- Future groundwater condition studies should be coordinated with Pierce County SWM, SPSSEG, the Puyallup Tribe, and other FFTF stakeholders so that they can be leveraged for multiple purposes.

7.6 Funding Recommendations to Address Groundwater Risks

The actions to address groundwater largely focus on monitoring and modeling, which are not often eligible for many funding sources, including most of those already described in this plan. Flexible funding sources to consider include Floodplains by Design, the U.S. Environmental Protection Agency’s National Estuary Program accessed through the Local Integrating Organization (Pierce Conservation District) or the Habitat Strategic Initiative Technical Team, NOAA’s Community-Based Restoration Program, or in partnership with the University of Washington’s Climate Impacts Group to identify other funding sources or researchers interested in these issues. Action 14 requires coordination and tracking, which would not necessarily require dedicated funding and could potentially be covered by Floodplains by Design -funded staff time for ARAP implementation.

CHAPTER 8: DEVELOPMENT PRESSURE

8.1 Description of Development Pressure Risk

Farmland throughout Pierce County has historically faced development pressure; many farms have been converted into residential and other uses, and that trend is continuing. Remaining agricultural lands are often adjacent to residential or commercial structures. The Puyallup Valley in particular has experienced a rapid increase in development. As of the writing of the 2006 Pierce County Agriculture Strategic Plan, 25 percent of agricultural land in the Puyallup Valley was located within incorporated areas or urban growth boundaries as of 2006 (Pierce County, 2006). In 2004, American Farmland Trust published a report titled: *The Suitability, Viability, Needs, and Economic Future of Pierce County Agriculture*, which found that agriculture in the county was shifting from industrial, wholesale agriculture to value-added, direct market “urban edge” farming. This shift was caused by the urbanization and fragmentation of the agricultural land base, but was made possible by the favorable climate and soil in the county (American Farmland Trust, 2004).

Development pressure has led to the conversion of farmland across the Puyallup Watershed (5 percent of actively farmed land was converted to development from 2013 to 2019). Development pressure has been lower in the Clear Creek area because of the floodway designation, but agricultural land in the area has still been lost in recent years. Additionally, if the floodway designation were to change, the proximity to urban areas would likely make development pressure very high.

8.2 Strategy to Address Development Pressure

The strategy to address the risk of development pressure is:

- In the **short term**, increase adaptive capacity by providing succession planning tools for farmers (Action 17) and supporting the viability of the agricultural industry in the watershed and county through PCAR (Action 18). Increasing the adaptive capacity of the farming community in the Clear Creek area has the potential to protect agricultural interests in the face of rising development pressure.
- In the **medium term**, reduce exposure to development pressure by exploring opportunities to permanently protect farmland with easements or zoning if the floodway designation were ever removed (Action 19). Reducing exposure to development will help maintain farms in the Clear Creek area.
- In the **long term**, reduce exposure to development pressure by protecting farmland with voluntary conservation easements (Action 20). Although agricultural easements require significant work over long periods of time, they have protected many farms in the Puyallup Watershed.

8.3 Action 17: Provide Succession Planning Tools for Farmers

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase adaptive capacity	Short term	Programmatic	 Individual

Succession planning is an essential, yet often time-consuming and complex, component for the long-term conservation of agricultural lands. Succession planning helps farmers and their families plan the long-term goals and uses of agricultural lands. Often, a lack of a succession plan leads to the sale of a farm to developers and conversion to other land uses. Numerous resources are available to help farmers and their families navigate the succession planning process. The Washington State Conservation Commission has published a workbook titled *Planning the Future of Your Farm*. This report walks farmers through the succession planning process by helping them identify their values, assess risk tolerance, set goals and objectives, evaluate farm resources, identify farm transfer tools, and prepare for meetings with professional advisors. Additionally, Washington Farmland Trust has created the Farm to Farmer program (<https://farmtofarmer.org/>), which seeks to connect landowners looking to sell or lease their farmland with farmers seeking land. Farmland conservation easements are often a helpful tool in succession planning, ensuring that a property remains farmland while allowing the landowner to “cash in” on the development value of the property. Tools like these can help farmers in the Clear Creek area navigate the succession process and build long-term resilience for the agricultural community. ARAP implementers should help connect Clear Creek area farmers to these and other resources for succession planning.

Benefits:

- Succession planning tools will provide farmers with necessary resources to help them secure the long-term interests of their farms and support agricultural viability in the Clear Creek area. Successful succession planning for Clear Creek area farms can help keep farmland in farming and avoid conversion.

Coordination Needs and Other Considerations:

- The Strategic Conversation Partnership and its members, including Washington Farmland Trust, Forterra, and Pierce County PALS, have access to succession tools and should be included in any efforts on this action.
- Agriculture easements should be considered as one of the succession tools.
- Implementation of this action should focus on outreach to individual farmers to help connect them to existing tools.

8.4 **Action 18: Support the Viability of the Agricultural Industry in the Watershed/County Through the Pierce County Agriculture Roundtable (PCAR)**

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase adaptive capacity	Short term	Programmatic	 Collective

The Pierce County Agriculture Roundtable (PCAR) is a group comprised of representatives from Pierce County, the Pierce Conservation District, the King-Pierce Farm Bureau, the Pierce County Agricultural Advisory Committee, Pierce County Fresh (as part of the Agriculture Community of Interest), and Washington Farmland Trust whose purpose is to address issues facing farmers and the agricultural community in Pierce County. Recently, PCAR received a Green Partnership Fund Grant from the Pierce Conservation District to initiate a strategic planning process to more formally establish a well-defined structure and operating procedure for PCAR. This process is in its early stages, but PCAR members remain committed to engagement and coordination around issues facing Pierce County agriculture and will be a valuable resource to support resilience-building activities in the Clear Creek area.

This ARAP focuses on the physical conditions that affect agriculture in the Clear Creek area. However, overcoming development pressure will require that farm businesses remain viable and profitable. Farmland conservation is necessary but not sufficient if farms go out of business or relocate to other areas. Supporting farm businesses is outside the scope of this ARAP, but within the scope and expertise of PCAR. Therefore, supporting PCAR in ongoing, functioning collaboration will support the implementation of this ARAP.

Benefits:

- PCAR and its representatives have unique experience and expertise with agriculture in Pierce County and will serve as an effective resource for improving conditions in the Clear Creek area.
- PCAR has the potential to address issues affecting farm businesses that are outside the scope of this plan, including regulations and markets.

Coordination Needs and Other Considerations:

- PCAR is a new organization that is not fully established and that needs financial and political support to define its structure and operating procedure in order to become a long-term and effective organization that supports agriculture in Pierce County and the Clear Creek area.

8.5 Action 19: Explore Opportunities to Permanently Protect Farmland with Easements or Zoning if Floodway Designation were Removed

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Medium term	Programmatic	 Collective

As described above, development pressure in the Clear Creek area has been limited by the floodway designation. Action 5 in this plan would increase freeboard on the River Road Levee and address the deficiencies that initially led the levee to be decertified and, therefore, the Clear Creek area to be regulated as a floodway. While Action 5 would reduce exposure to flood risk, it could open the door to certification of the levee, which in turn could allow the area to no longer be limited as a floodway. It is important to note that portions of the Clear Creek area would continue to be regulated as a floodway due to the likelihood of deep and fast-flowing floodwaters in the area during a 100-year flood. It is also important to note that both certification of the levee and removal of the floodway designation would not happen automatically and would have to be actively pursued by Pierce County. That said, if those events were to occur, development pressure in the Clear Creek area would be very high due to its proximity to the cities of Tacoma and Puyallup. The floodway designation currently protects the area from development but also presents some obstacles to actions that would help farm businesses, such as building agricultural accessory structures or rebuilding damaged buildings.

In the medium term, ARAP implementers and other agriculture stakeholders should explore opportunities to permanently protect farmland in the area with easements or zoning. Easements would be the most effective long-term strategy for farmland protection – see Action 20. Agricultural Resource Lands (ARL) is the Pierce County zoning designation that is the most protective of agriculture. The Growth Management Act (GMA) requires that counties designate areas of significance for commercial agricultural production. In 2016, an independent team of experts convened to study agricultural resources in Pierce County under the name *Fresh Look at Pierce County Agriculture*. Through their work, this group found that Pierce County’s ARL designation meets the criteria established by the GMA, but that the ARL designation alone was not sufficient to protect the highest value farmland in the county. This report recommended that Pierce County pursue a comprehensive farmland conservation strategy and identify other methods to conserve farmland through the Purchase of Development Rights using revenue from a real estate excise tax.

If farmland in the Clear Creek area were conserved, it could allow flood regulations in the area to change in the event that deficiencies on the River Road Levee were addressed without increasing development pressure and without increasing the risk that more development would occur behind the levee, thereby increasing future flood risk.

Benefits:

- Zoning and agricultural conservation easements can provide lasting protections from development pressure for farmland in the Clear Creek area.
- Strategic conservation of farmland in the area could potentially open the door to changes in flood regulations in the event that deficiencies on the River Road Levee were addressed in the future.

Coordination Needs and Other Considerations:

- Conversations about long-term conservation strategies for the area should be coordinated with the Strategic Conservation Partnership.
- Conversations about zoning should be coordinated with Pierce County PALS.
- As noted above, zoning is not a foolproof method for protecting agricultural lands, and zoning can change.

8.6 **Action 20: Protect Farmland with Voluntary Conservation Easements**

STRATEGY	TIMEFRAME	ACTION TYPE
Reduce exposure	Long term	Project Type  Individual

Agricultural conservation easements are voluntary actions that compensate farmers for the development rights on their property, ensuring that the property can remain in agriculture over the long term. Landowners are compensated for the free market value of the property rights (as determined by an appraiser), the development rights are extinguished, and an entity such as a land trust owns the agricultural conservation easement for the property. In the long term, permanent agricultural conservation of farms in the Clear Creek area is the most effective way to avoid development pressure. Easements should be placed on all farms in the Clear Creek area that have willing and interested landowners.

Regional partners like the Strategic Conservation Partnership (SCP) are working to leverage strategic relationships to conserve agricultural lands in Pierce County. The SCP has set a 10-year voluntary conservation goal of conserving 6,000 acres of farmland. To work toward its goals, the SCP has emphasized collaboration, integration, and prioritization actions. Collaboration allows SCP members to work together and maximize funding sources for agricultural conservation instead of competing against one another. Integrating actions between the SCP and other partners and organizations has enabled SCP members to work with Pierce County and Tribal partners through the Floodplains for the Future program to generate additional funding opportunities for agricultural conservation. To maximize conservation efforts, the SCP has invested in prioritization studies to identify land and properties best suited for voluntary easements to promote long-term agricultural viability. The SCP is also heavily invested in identifying new funding sources to support its conservation work.

Benefits:

- Voluntary agricultural easements contribute toward protecting and preserving agricultural lands in the Clear Creek area and can ensure that farmland is available for the next generation of farmers.
- Easements are a helpful succession tool for farmers. Easements allow farmers to be compensated for the development value of their property without selling the property to developers. Future owners of the property can purchase it based on its value as farmland, not its value as a site for warehouses or residential development. Easements have already been successfully used as succession tools for farms in the Clear Creek area and elsewhere in Pierce County.

Coordination Needs and Other Considerations:

- Conservation easements should be coordinated by and through the Strategic Conservation Partnership.
- Because of the cost and length of time required to complete conservation easement projects, they are not sufficient to conserve agriculture in the short term. Zoning and other land use restrictions can be more effective in protecting large areas of land. However, zoning is not foolproof in preventing conversion and zoning can change, so easements are more effective in the long term.
- Existing funding sources are insufficient to meet farmland conservation needs in the region. New funding sources are needed.
- Currently, the value of development rights in the Clear Creek area is limited by the floodway designation, which may make conservation easements less appealing to landowners. The floodway designation and planned projects like the Canyon Road Regional Connection Project also add an element of uncertainty that makes the Clear Creek area a lower priority for land trusts and easement funding sources when compared to other areas of the Puyallup Valley.

8.7 Funding Recommendations to Address Development Pressure

The actions needed to address development pressure range from work that individual farmers and organizations must take on (potentially with funding support for staff time or participation) to farmland protection measures with existing funding sources.

Protecting farmland through voluntary conservation easements (Action 20) is currently being implemented by several entities in Pierce County (Washington Farmland Trust, Forterra, the Pierce Conservation District, and Pierce County PALS) who collaborate to increase the pace and magnitude of conservation through the SCP. The SCP has a Shared Conservation Strategy Document that describes current funding sources, which are reliable but insufficient to address the funding need. Funding sources include the Pierce County Conservation Futures Program, the NRCS Regional Conservation Partnership Program, the Washington Wildlife and Recreation Program, and Floodplains by Design.

The Pierce County and City of Tacoma Transfer of Development Rights programs can offer market-based exchanges whereby the development rights of properties can be permanently extinguished. At this time, the County has limited capacity to execute Transfer of Development Rights projects. While this approach may provide limited opportunity in the near term, it could be a key funding mechanism in the future, particularly if the floodway designation is removed (Action 19). Floodplains by Design has been a reliable funding source for ensuring both policy and protection efforts in the Clear Creek area, as well as for funding some of the actions that may be less competitive for other funding sources (such as Actions 17 and 18).

There are numerous ideas for increased current funding levels or developing new programs and tools that could particularly help fund easements. See Section 3.1 for more details.

CHAPTER 9: INCOMPATIBLE INFRASTRUCTURE

9.1 Description of Incompatible Infrastructure Risk

Infrastructure projects can affect agricultural viability in a variety of ways, including the direct conversion of farmland, increases in development pressure, and changes in drainage patterns. For the purposes of this ARAP, infrastructure projects include habitat projects, transportation projects, or any other developments or land use changes that are pursued by a public entity. Over the past 5 years, proposed infrastructure projects (including the Clear Creek Floodplain Reconnection Project and the Canyon Road Regional Connection Project) have raised many questions about the potential impacts of projects on agriculture.

Pierce County SWM proposed the Clear Creek Floodplain Reconnection Project, a large-scale flood risk reduction and habitat restoration project that would restore connectivity between Clear Creek and the Puyallup River and would provide greater flood protection from Clear Creek by constructing a ring levee. Farmers in the Clear Creek area raised concerns about how the project could affect agriculture in the area, and these concerns were explored in the *Farmland Impacts Evaluation Technical Memorandum* developed for the FFP in 2017. The project was also discussed in the *Findings and Recommendations Report* for the FFP in 2017, which determined that, while the project did present potential negative impacts, many of these potential impacts could be avoided or minimized through project design, and that the project also represented an opportunity to pursue large-scale actions that could improve conditions for agricultural viability as part of a multi-benefit project. Based on conversations about the Clear Creek Floodplain Reconnection Project, including concerns from farmers, Pierce County is pursuing a more open-ended process to determine the best multi-benefit project design for the Clear Creek area. The Clear Creek Integrated Design process, with an associated Clear Creek Dialogue Group, is expected to begin in 2021.

Roads are necessary infrastructure for farms to function for farm access, equipment moving, and access to markets. However, new transportation and roadway projects have the potential to impact agricultural resilience both directly (through land conversion or changes to access) and indirectly (through changing the character of an area and encouraging future development).

The Canyon Road Regional Connection Project is a transportation infrastructure project being pursued by Pierce County to create a more direct north-south corridor from the Frederickson Industrial Area to the Port of Tacoma. The project entails the construction of a new bridge over the BNSF Railway that runs along the southwest border of the Clear Creek area, as well as a new bridge crossing the Puyallup River and connecting with 70th Avenue East. The project footprint cuts through the Clear Creek area and could impact several farms through land conversion, changes to access, and changes to the rural character of the area. Several farmers in the proposed project footprint have expressed concerns about potential impacts from the project on their farm businesses and long-term plans. Pierce County plans to purchase 10.2 acres of land designated as ARL to complete the project (Pierce County, 2021).

Other infrastructure projects could be planned or proposed in the future. For example, there has been some discussion of BNSF Railway adding a third rail to its line adjacent to Pioneer Way, which would

affect Clear Creek. Also, WSDOT is currently advancing a project to connect Highway 167 in Puyallup to I-5 via Fife, which would change River Road from a state highway to a County road, potentially opening up opportunities for other infrastructure projects involving or related to that road.

9.2 Strategy to Address Incompatible Infrastructure

The strategy to address the risk of incompatible infrastructure is:

- In the **short term**, increase adaptive capacity through participation in Floodplains for the Future and in conversations related to the Canyon Road project (Action 21). Increasing the adaptive capacity of the farming community in the Clear Creek area has the potential to limit the impacts of infrastructure project on agricultural businesses and support increasing infrastructure needs in the region.
- In the **medium term**, increase adaptive capacity by proactively identifying other potential infrastructure projects in the area in order to participate in planning conversations (Action 22).
- In the **long term**, reduce exposure to flooding by advocating for the Clear Creek area to be designated as an agricultural corridor for the County with long-term protections (Action 23). Although this project would require significant planning and coordination, this approach would provide greater protection to the agricultural community in the Clear Creek area.

9.3 Action 21: Participate in FFTF and in Conversations around Canyon Road; Explore Project Options that Protect Agriculture

STRATEGY	TIMEFRAME	ACTION TYPE
Increase adaptive capacity	Short term	Programmatic  Collective

As described in Section 9.1, floodplain reconnection projects and the Canyon Road Regional Connection Project have the potential to impact agricultural viability in the Clear Creek area. Farmers and agriculture stakeholders have been participating in FFTF since its formation and should continue to do so. Participation and input in FFTF can help ensure that potential impacts on agriculture from floodplain reconnection projects can be minimized or avoided. More importantly, multi-benefit floodplain projects have the potential to provide benefits to agriculture that otherwise may never be funded and implemented. Many of these conversations will take place through the Clear Creek Integrated Design process (Priority Project 1).

Over the past 2 years, farmers have increasingly been engaged in conversations around the Canyon Road Regional Connection Project to help influence the project design to minimize impacts on farmland. The

OCE conducted meetings with farmers, provided information, solicited input, and worked to minimize impacts on agricultural land. As of spring 2021, the railroad crossing segment of the project, which is most likely to impact farms, is 90 percent designed, so major changes are unlikely to be made. The river crossing segment will undergo environmental review in the future, which will provide an opportunity to submit comments.

Benefits:

- Participating in conversations regarding the Canyon Road Regional Connection Project and other forums like Floodplains for the Future will enable farmers in the Clear Creek area to influence the design of projects to minimize or avoid impacts on agriculture and to find opportunities to provide benefits to agriculture.

Coordination Needs and Other Considerations:

- The Pierce County Office of the County Engineer is leading the Canyon Road Regional Connection Project.

9.4 **Action 22: Proactively Identify Potential Infrastructure Projects in the Area and Participate in Planning Conversations**

STRATEGY	TIMEFRAME	ACTION TYPE	
Increase adaptive capacity	Medium term	Programmatic	 Collective

In recent years, the Clear Creek Floodplain Reconnection Project and the Canyon Road Regional Connection Project have sparked extensive conversations about the potential impacts of infrastructure projects on agricultural viability and resilience in the Clear Creek area. In both cases, while early outreach and coordination did occur, farmers in the area have felt that project plans and designs were developed to a certain point before their input and needs were considered. In the future, more proactive coordination on infrastructure projects could help with integration of agricultural resilience into habitat, transportation, and other projects. ARAP implementers should coordinate with Pierce County to identify upcoming projects (not all of which would be led by Pierce County, but which Pierce County staff are likely to be aware of or involved with) and advocate for agriculture to have a seat at the table in early discussions about the projects. Potential infrastructure projects include multi-benefit actions coming out of the Clear Creek Integrated Design process, the potential addition of a third rail to the BNSF Railway that runs alongside Pioneer Way, and potential changes to River Road after the Highway 167 extension (through Fife) is completed.

Benefits:

- Farmers in the Clear Creek area will be well positioned to inform and influence project design for future infrastructure projects in the area.
- Participating in planning conversations with other partners in the region will strengthen relationships between Clear Creek farmers and Pierce County and result in more thoughtfully designed multi-benefit projects.

Coordination Needs and Other Considerations:

- Pierce County Planning and Public Works (including SWM, PALS, and the Office of the County Engineer) would be the best starting point for conversations about future infrastructure projects.
- Early and active engagement in the Clear Creek Integrated Design process will help ensure that agricultural needs are considered in multi-benefit project planning.
- The Pierce County Agricultural Roundtable and Pierce County Agricultural Advisory Committee are two potential venues for collaborative conversations about upcoming infrastructure projects.

9.5 **Action 23: Advocate for Long-Term Protections for Agriculture in the Clear Creek Area**

STRATEGY	TIMEFRAME	ACTION TYPE	
Reduce exposure	Long term	Programmatic	 Collective

Portions of the Clear Creek area are zoned Agricultural Resource Land (ARL), which is intended to provide long-term protection. The Clear Creek area is also included in the Puyallup/Orting Valley Agricultural Production District in the Pierce County Comprehensive Plan (Pierce County, 2020). However, these designations have not prevented Pierce County departments from developing capital projects for the Clear Creek area that convert or otherwise might impact agriculture, as described above in Section 9.1. In addition, ARL zoning has not prevented conversion of ARL-zoned farmland in Pierce County to residential and commercial development.

Clear Creek farmers and ARAP implementers should advocate for long-term protections for agriculture in the Clear Creek area. Protections could be incorporated into the Agricultural Production District concept in the Comprehensive Plan. Protections could include:

- A determination that Pierce County capital projects will not convert ARL-zoned land in the Clear Creek area and/or that capital projects will mitigate any impacts on agricultural operations.

- Stricter permitting requirements for residential or commercial development on ARL-zoned parcels.
- Allocation of funding (or County support of new funding sources) for farmland conservation easements.
- Adoption of a Roadway Design Standard specific to agricultural areas.

Benefits:

- Long-term protections for Clear Creek area as an agricultural corridor would help maintain the viability of farm business in the area and provide a justification to advocate for infrastructure projects that support agriculture.

Coordination Needs and Other Considerations:

- The Pierce County Agricultural Advisory Committee and PALS would need to be involved in this action.

9.6 Funding Recommendations to Address Incompatible Infrastructure Investments

The actions described above are related to active participation by the farming community or agriculture service providers in currently proposed projects (Action 21), future projects (Action 22), and advocacy (Action 23). This work would best be conducted by existing staff positions (such as an Agricultural Planner at Pierce County) or by funded staff time for ARAP implementation (see Section 3.3). That staff time could be funded by FFTF through current and future Floodplains by Design grants. Participation by farmers could be funded through honorariums provided by FFTF or as part of the project budget for specific projects (such as transportation projects) that would benefit from farmer engagement. FFTF should also consider allocating resources (whether staff resources or funding for facilitation by grant subrecipients or contractors) to advance these conversations through Disappearing Task Groups (DTGs) or other collaborative activities.

CHAPTER 10: REFERENCES AND SOURCE MATERIAL

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