

APPENDIX A

COMMUNITY MEETING SUMMARIES



Timberworks: Restoration and Resiliency Master Plan
Stakeholder Interview Summary
March 2016

Stakeholder interviews were conducted with a variety of city staff, local organizations, and businesses to obtain information about flooding locations and flooding causes and to identify data resources for review. Interviews were useful for “Defining the Problem” and provided an understanding of local knowledge regarding flooding.

Advisory Committee:

- City of Aberdeen, Public Works Department, Rick Sangder, Lisa Scott
- City of Hoquiam, Public Works Department, Brian Shay
- Grays Harbor Council of Governments, Theresa Julius
- Port of Grays Harbor, Randy Lewis
- Grays Harbor County, Chuck Wallace or Frank Gordon

Additional Stakeholders Interviewed:

- City of Hoquiam Public Works Staff
- Greater Grays Harbor
- Pacific Care
- Dave Anderson, former City of Hoquiam Engineer
- Kathi Hoder, Aberdeen City Councilwoman
- City of Aberdeen Public Works Staff
- Port of Grays Harbor

Additional Stakeholders Identified for Future Engagement:

1. Quinault Indian Nation (Scott Reynnvan, President Fawn Sharp, John Kimball with Building Communities)
2. Grays Harbor County public works, planning, and natural resource staff
3. Chehalis Land Trust
4. Key community leaders and property owners (Don Root, Kim Malacoff, Anne Marie, Lori Call, Dave Warn)
5. Department of Natural Resources, Gloria Rodgers
6. Department of Fish and Wildlife
7. Other Hoquiam businesses impacted by flooding: Lams Grays Harbor, Wool Strapping, Hum Dinger, Howard Mo—on Queen—Boat Shop, chiropractor on 2100 block on Sumner on corner before going on Riverside (been flooded out three or four times), Breakwater Seafood
8. Geneseo Wyoming Railroad
9. WSDOT

Key Themes:

- Flooding in Hoquiam and Aberdeen is mostly a combination of storms and tides.
- Flood rates are a huge concern for residents and businesses, preventing community investment.
- Biggest flooding issues on Cherry Street, K Street, South Aberdeen.
- Drainages and culverts are old and dilapidated.
- Pump stations are not adequately performing.
- Need to plan for rebuilding systems.
- Open space to address flooding is of interest to the community.

Identified Flooding Locations:

- Adams Street, Hoquiam, from undersized culvert that hasn't been dug out recently.
- Cast Street, two undersized culverts near outflow, dilapidated.
- Fry Creek not as severe an issue as used to be unless very extreme weather. When Fry Creek comes under the road and takes a hard right, sediment in that area.
- Cherry Street one of the worst areas, from Fry Creek and Aberdeen issues.
- Simpson to West 5th Street, usually Fry Creek-related.
- North End by Hoquiam River experiencing erosion by mobile homes (tide gate was stolen).
- Moon Island Road, persistently flooded.
- Fifth Street Extension by Adams Street, sidewalks all being undermined (beginning to get fixed).
- Hills behind Pacific Care have water coming down and causing flooding.
- Twenty-Eighth on the west side of the map. Sweeping curve follows the track. Affluent pond is there. Treatment plant for paper mill was there, but completely demolished. Outfall. Tide gate issues, a lot take water in when they shouldn't. Might be best to get pumps to just blast the water out.
- Olympic Stadium.
- Beacon Hill and Queets Hill had landslides in January 2015.
- Canyon Court (Duffy through Thornton St) Aberdeen.
- Franklin Field (Aberdeen converted baseball field to stormwater storage, but still has flooding there).
- Dike Endresen on north end of Hoquiam that must have gaps in it because has bad riverine flooding.
- West End, Aberdeen has chronic flooding.
- Myrtle Street to Division Street (north of Simpson).
- Anne Maries Café and the alley behind 1st St. gets flooded anytime there is rain and high tide.

- F St unique is a pinch point, all water comes off the hill and can't get out—manhole on F between 1st and 2nd has pipe running backwards; every time it rains the manhole blows off.
- Wilson Creek by the bluff area coming into Aberdeen on Highway 12 by the bridge.
- North Aberdeen.
- East Aberdeen, D,C,B, Randall (no pump, any tide there will be standing water).
- Bad flooding just north of town on the Wishkah.
- Wilson Creek.
- South Aberdeen—levee has benefits but also causes fishbowl problems and chronic flooding of Charley Creek, Alder Creek—Filmore, Taft, Huntley (not riverine flooding, but can't pump out).
- Duffy Creek—removing many loads of debris from manholes.
- Port industrial area has internalized localized flooding; has internal stormwater system but with Frye Creek issues backs up at times.
- Interior drainage issues—Charley Creek, Alder Creek, Dawes Creek, Miller Slough.
- Wilson Creek conveyance issues.
- K Street is 18-inch corrugated metal, at river is rotted off and backed up against wood headwall that fills with sediment.

Recommendations for Improvements from Stakeholders:

- Property owners raising homes on stilts.
- Cities keeping on top of maintenance with drains and pumps to prevent blockages with debris and sedimentation.
- Building a wall.
- Retaining dike wall on Frye Creek (dikes on Myrtle prevent water from Frye Creek flooding into Hoquiam, but then it floods Aberdeen).
- Build levee around Grays Harbor Historical Seaport property.
- See if Hoquiam dikes are still certified from the 1930s–1940s.
- Hoquiam will have \$20 million over the next ten years from logging revenue to spend on storm management infrastructure.
- Housing near Canyon Court is dilapidated—perhaps relocate residents?
- Need to get water through or over dike. If put in a larger pump station to regional location in South Aberdeen, let's not fight Chehalis River and discharge higher up. Going over the dike would help.
- South Aberdeen—ditch rerouting on the inside of the dike, more water to one or more regional facilities on the dike and pump free of head loss on the river, massive improvement in flooding and I and I reduction.
- More pumping stations would be a solution for Aberdeen.

Open Space Recommendations from Stakeholders:

- Finch Park, Aberdeen.
- West End Park, Aberdeen.
- Bishop Ballfield—remove dike and restore ponds on waterfront from field along to south Aberdeen.
- Green space on Sumner and Simpson, Aberdeen.
- Downtown Aberdeen open space for meeting.
- Anything to slow water coming off hill behind Canyon Court.
- Pioneer Park, city owned baseball facility used from Oct. – March pretty minimal compared to March – Oct.
- Piece of property owned by the port near Frye Creek, site that filled with dredged wells, sank, and is now over 50 percent wetlands. Could be mitigation area? Thirty percent for wetland, 20 percent for development? Mitigation or flood control site?
- ITT—Rayonier pulp and paper site—pulp mill got shut down, all gone, paper mill ran into late 90s and now defunct and completely razed. Worry about a lot of water and rain on that site and where it's going. Stormwater control and prevention?
- Port acquired property in South Aberdeen—could be used for enhancements.
- Stewart Park.
- Wilson Creek large-scale pond retention, fish habitat, remediation, stormwater retention.
- Seaport site, city thinking of buying area next to it.
- Housing authority site near PUD would make great retention.

**TimberWorks: Restoration and Resiliency Master Plan
Report Back—Community Meeting #1: Walking Tours
March 31, 2016**

On March 31, community meetings with walking tours were held in Aberdeen and Hoquiam. The morning meeting was held at the Grays Harbor PUD and walking tours visited Fry Creek. At least 29 attendees joined this meeting and walking tour. The afternoon meetings were held at the Aberdeen Log Pavilion and walking tours visited Wilson Creek. At least 14 attendees attended the afternoon session. Objectives of this outreach were to provide an overview of the project, see on-the-ground examples of areas experiencing flooding, and obtain feedback about flooding experiences and potential solutions.

Walking Tour Notes:

- Question posed regarding the Canyon Court drainage. Rick Sangder indicated that they refer to the drainage from Canyon Court as “Division Creek.” From the Canyon Court area, drainage flows down Division Street to the Division Street pumping station.
- The (former) Electric Park was located on the west side of Cherry Street and Oak Street. There used to be a swimming pool, etc., and the park was well loved by the community. The park has been missed, and this came up numerous times as we discussed the idea of providing additional green space/parks.
- Kathi Hoder is receptive to an easement or similar arrangement that would allow the Fry Creek floodplain bench to expand toward her garage.
- Potential detention storage area behind Pacific Care and PUD.
- The Thornton Creek project in Seattle was referenced as a great example of what can be done with Fry Creek. Completed around 2009–2011. We can research this for precedent project concepts and images.
- Diplomacy in action might be useful when it comes to negotiating with WSDOT for the Fry Creek culvert crossings under Hwy 101.
- The “Swale on Yale” project may be another useful precedent project concept. It’s more of a standard LID application but it may have some application or relevance to TimberWorks.
- There was reference to a stormwater vault up above Fry Creek, upslope, under an old tennis court area. Street name possibly Basich Blvd.

Ideas for Stormwater Retention:

- Sherwood Forest.
- Parking lot between Olympic Stadium and school.
- Combine stormwater improvements with bike lanes.
- Grassy field between school and Pacific Care center is owned by school district.

Attendee Concerns:

- Homeowners don't want view blocked by dike.
- Some residents don't feel heard by city.
- Homeowners concerned about being excluded from levee, concern about where lines are drawn on maps.
- Concern from residents about homes with isolated flooding due to low areas, but aren't included in the areas of focus.
- Meeting during daytime doesn't work for everyone.

**TimberWorks: Restoration and Resiliency Master Plan
Report Back—Community Meeting #2: Open House
April 28, 2016**

On April 28, 2016, the cities of Aberdeen and Hoquiam held an open house for members of the community to learn about the TimberWorks Master Plan and Northshore Levee project, understand existing flooding conditions, discuss typologies of improvements, and identify potential locations for different improvement projects. Forty attendees signed in at the event, including several council members, the Mayor of Aberdeen, and the Mayor of Hoquiam. Shared anecdotes demonstrated that many attendees experienced flooding personally and were subjected to increasing flood insurance rates. Attendees expressed support for both the Master Plan and the levee project, with many wondering why it would take so many years to build a levee. A survey was conducted at the event and online the week of the open house. Responses to the survey are detailed in a separate summary report.

Questions from attendees:

1. How much can we anticipate flood insurance to decrease?
2. When will flood insurance decrease?
3. Is the expense of the levee worth the investment?
4. How much will the levee cost and how is it funded?
5. What is the timeline/process with the CLOMR and LOMR?
6. My house is raised and never floods, why do I still have flood insurance?
7. Are there any small projects we can do in the meantime while we wait for the levee to be built?
8. Is conveyance enough to pump water?
9. Can there be a dike or wall at the bottom of the hill to keep water from flooding down?
Could the water be trapped and pumped out?
10. Can the railroad be lifted up?
11. Is Peterson Park remodel a good opportunity for water retention?
12. North Aberdeen—will the levee increase risk of flooding east of the Wishkah River?
13. Will the levee displace water to flood elsewhere?
14. How often is there a high tide without rain?
15. What will be done for the West End of Hoquiam? The downtown area is all under water.
16. Why didn't Hoquiam join the Flood Authority? Is it too late to join the Flood Authority?
17. Why isn't Hoquiam getting a levee?
18. Why can't there be a levee built everywhere all at once?
19. Why does the City of Aberdeen require homeowners to raise their houses if they invest more than 50% of the property value in improvements?

TimberWorks: Resiliency & Restoration Plan: Reducing Flood Impacts in Aberdeen & Hoquiam

Community Feedback—Survey Results

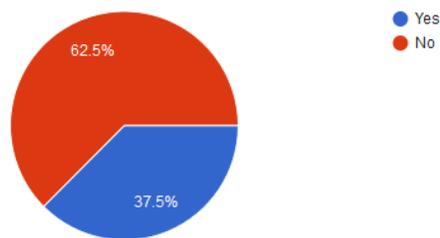
April 2016

Following the first community meeting for the TimberWorks project, it was determined that conducting a survey would be an effective way to collect feedback from community members. The survey was available online at the TimberWorks Web site and given in person at the April 25 community meetings.

Summary of Findings:

Of the 24 respondents to the TimberWorks survey, 50 percent live in Aberdeen and 37.5 percent in Hoquiam, and 12.5 percent were listed as other. The vast majority of respondents were homeowners; however, a sizable minority also owned businesses. Several of the respondents either rented homes or businesses. Most respondents also have flood insurance:

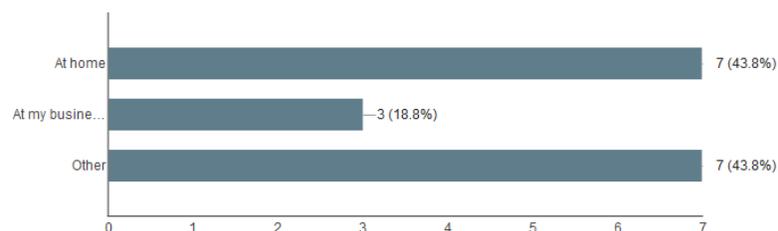
Do you have flood insurance? (24 responses)



Flooding Experiences

There was an equal number of people who had personal experience with flooding or had not.

If you have experienced flooding issues, where have those been? (16 responses)



Those who experienced flooding mostly experienced it at home, although there were a variety of situations respondents experienced flooding in such as with family members, an employer/at a place of employment, or in a previous residence in the area.

In Hoquiam, respondents have seen flooding on 14th Street, near the bridge, the east side, west side, north end, Chenault, Eklund, Karr, Pacific, Aberdeen Ave., Queets, and Cherry Street. Queets Street was the most frequently mentioned area (three respondents). In Aberdeen, respondents have seen flooding in downtown Aberdeen, the west end, the north end, the south side, Pacific, Sumner, B Street, Valley Road, Victory Way, Wishkah Road, the east end of 1st street, Fry Creek, Kelly Creek, Stewart's Park, and the intersection of Harbor Street and Summit Street. Stewart's Park was the most frequently mentioned area (three respondents).

Eighty-eight percent of respondents reported that flooding had impacted them or people they knew financially.

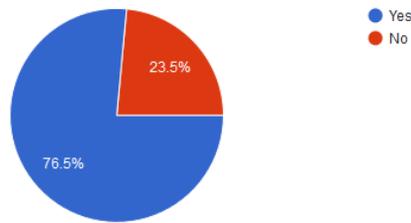
Addressing Flooding

Fifty-nine percent of respondents have made plans to address flooding concerns. Plans included actions such as raising shop floors, obtaining an elevation certificate to lower flood insurance and improve home marketability, changing flood insurance carriers, supporting dikes, retentions, and installing a short concrete wall around their property. Two respondents noted frustration living in Aberdeen, as one had to make their own repairs to a roadway because the city had not addressed the issue and the other was thinking about leaving but had reservations, as his property value decreased so much over 28 years that the return on sale wouldn't be enough to "purchase a [trailer] in the desert."

Suggested opportunities/solutions varied widely among respondents. Five respondents mentioned the creation of a levee (or dike) system/plan. One person mentioned that levees should be placed along the Hoquiam River, the Chehalis River, and the bay; however, another cautioned that there should not be any areas left unprotected. Other ideas suggested: educating the public, culvert improvements, reducing the amount of pavement, building storage retentions in sports parks, and opening Fry Creek.

One hundred percent of respondents agreed that they would like to see investments to improve floodplain management and that open spaces such as parks and fields should be used for stormwater retention. However, on the issue of raising taxes or stormwater fees, people were more divided, although generally supportive. Several respondents abstained from answering, saying their support would be contingent on how much taxes were raised.

Would you be willing to pay more money towards stormwater fees or property taxes if it reduced your flood insurance and reduced flooding?
(17 responses)

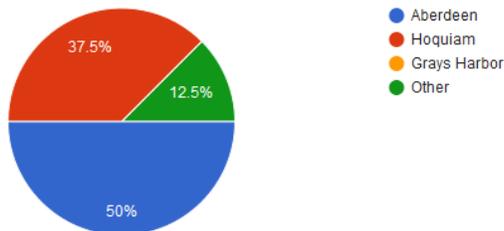


Many of the comments expressed concern with current stormwater mitigation strategies as well as future efforts—especially with diking, as several people pointed out that there may be unintended consequences such as flooding on other properties as a result. The most vulnerable of residents can also be the most harmed, as one respondent from Aberdeen indicated: “I have lived at 717 Valley Rd for 68 years. [In] recent years flooding has increased. [I] have at times [been] unable to get home.” Another respondent said that the issue required immediate action, as “homeowners with mortgages could go into foreclosure. My business is a mortgaged rental in a flood plain.”

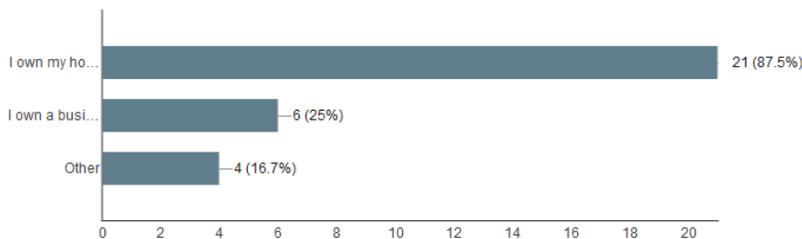
Complete Survey Responses:

Characteristics of respondents

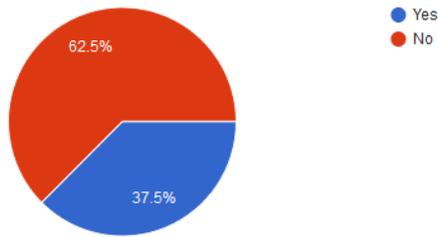
Where do you live? (24 responses)



Are you a business or property owner? (24 responses)

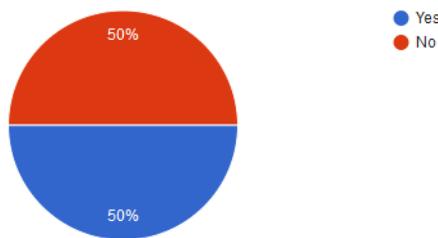


Do you have flood insurance? (24 responses)

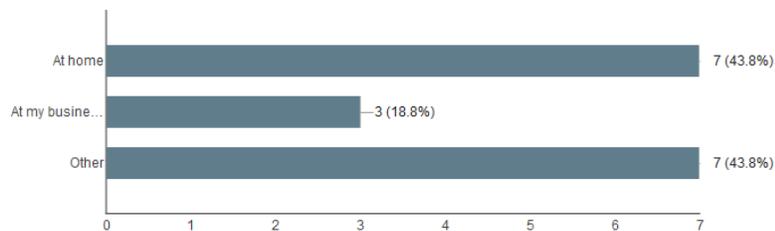


Flooding Experiences

Have you experienced flooding issues? (24 responses)



If you have experienced flooding issues, where have those been? (16 responses)



Please identify areas that you have seen flooding in Aberdeen and/or Hoquiam (19 responses)

Downtown only

14th St. wind waves down 14th St. from bridge

Hoquiam—Most of the east side, west side, Chenault, Eklund, Karr, north end—most all parts.

At my employer's business. Downtown Aberdeen. West end Aberdeen. Area around Aberdeen High School.

West end Aberdeen. North end Aberdeen. South side Aberdeen. North Aberdeen.

My home/office is at the east end of First street (@ the river)—with heavy (11"?) rain street flooded & 2" of water in yard...but water couldn't escape down into the river at low tide!!!

Pacific, Aberdeen Ave., Queets, Cherry St.—All side streets connecting
Cherry, Queets, Simpson

B street/Valley Rd, Wishkah Rd, Downtown Aberdeen

Stewart's Park, B Street, Valley Road

Valley Rd, Stewart's Park, Victory Way

Stewart's Park, Kelly Creek

Queets Street, Sumner Ave - 2639

2600 Sumner Street Blk

Intersection of Harbor St. & Summit St. is a low spot.

Pacific and Fry Creek. Yard on the street every year is different.

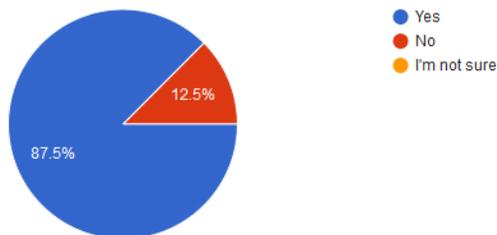
N/A

in rental 2400 Block Simpson / 300 N. 1st., Toe Hills, West Hoq./Aberdeen

East side Hoquiam, West side Hoquiam, Downtown Aberdeen & Hoquiam

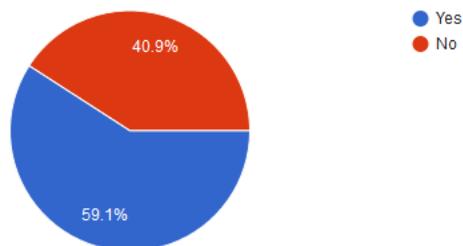
Have you or people you know been financially impacted by flooding?

(24 responses)



Addressing Flooding

Have you made any plans to address flooding concerns? (22 responses)



If so, what plans have you made? (10 responses)

Reside above floodplain.

Raising the shop floor

Obtained elevation certificate in an attempt to lower flood insurance and improve marketability of home.

Obtained elevation certificate in an attempt to lower our flood ins. & improve the homes marketability.

I've had to make my own repairs to roadway shoulders as City of Aberdeen has failed to respond.

Attempting to obtain flood ins.

Tentative: To leave Aberdeen...but, because of this issue my real estate would not yield enough money (after 28 years in the same home) to purchase a trailer in the desert!!!

I ask people, why do I have flood ins. and my house has never been damaged by water in it's 50 years.

Support dikes, retentions, changed flood insurer. On 1st rental—to install short 24" concrete wall around property

Changed flood insurance carriers

What opportunities and/or potential solutions do you see to address flood issues? (11 responses)

Prevention and control of invasive species. All consideration should be made to addressing invasive species (whether plant, animal or disease) when other solutions are implemented. Clean equipment, clean gravel, clean plant material, etc.

Houston's flood problem: Blame the pavement
<http://www.cnbc.com/id/103563889>

Area-wide levee/pump system

Hopefully, a levy plan!

Hopefully, a levy plan.

If you are going to build dikes you'd better make sure you don't leave any areas unprotected because there is no help from the city.

Culvert improvement

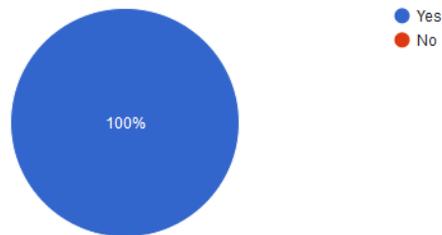
Education of people

Build substantial storage retentions in sports parks, build coffer under slide prone areas to retain water and catch slide material, open Fry Creek

Levy's along Hoquiam River & Chehalis River & the Bay

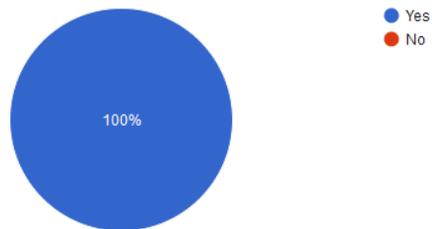
Would you like to see investments made to improve floodplain management?

(18 responses)



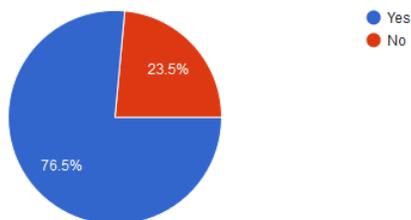
Would you support open space such as parks and fields being used for stormwater retention?

(19 responses)



Would you be willing to pay more money towards stormwater fees or property taxes if it reduced your flood insurance and reduced flooding?

(17 responses)



Is there anything else you would like us to know about your experience with flooding in Aberdeen and Hoquiam? (18 responses)

Better stream and river shading, better pesticide storage in flood zones, and better manure runoff education.

If you dike across Market, all of us on the banks of the Wishkah will likely experience flooding. If you dike the river bank, the narrower stream will likely flood our yard at E. 1st and the Wishkah, or destroy the aesthetics of our property. It seems that you should be sending details to affected property owners. Edith Carter

Restore floodplains and salmon habitat

Insurance did not help me with flooding in the past.

In 1988 when I owned a home in Aberdeen's west end I experienced flooding.

My willingness to pay more money depends on what "more" means.

I'm willing to pay if it did not become an outrageous amount. In the block we live in (2600 Pacific, Hoq.) properties around us flooded severely. Ours however, did not, at all.

Other properties on our block, flooded, however ours did not!!

I'm new to the area.

Willingness to pay: maybe

Aberdeen's stormwater system is not adequate or designed to handle current problems.

Concern that new levees will force water into already marginal areas. Family land is very low lying. I'm a property owner, though I've only experienced flooding at my mom's home.

I have lived at 717 Valley Rd—for 68 years— recent years— flooding has increased— have at times—unable to get home—

I'm in a rental unit.

I'm retired on fixed income.

No, not now!!

do it ASAP or (unreadable) homeowners w/ mortgages could go into foreclosure. My business is a mortgaged rental in a flood plain.

Many empty lots in both cities—create small lot parks & flood retention— connect them together

TimberWorks: Restoration and Resiliency Master Plan Report Back—Community Meeting #3: Open House October 25, 2016

On October 25, 2016, consultants Maul Foster & Alongi, Inc.; Forterra; and KPFF hosted an open house for community members in the cities of Aberdeen and Hoquiam. This was the final community meeting before finalization of the Master Plan. The objective of the open house was to present preliminary recommendations to community members and provide the opportunity for feedback on proposed projects before finalizing the Master Plan and implementation strategy.

Meeting Details:

The meeting was well-attended, with 39 attendees signing in at the event. Attendees included residents, property owners, councilmembers, Mayor Eric Larsen of Aberdeen, Grays Harbor County, Chehalis River Basin Land Trust, Grays Harbor Conservation District, Friends of Grays Harbor, Port of Grays Harbor, Neighborworks, and press presence from Grays Harbor Herald, KXRO, and The Daily World.



The open house agenda included:

1. Update on Status of Planning Process
2. Review What We've Learned
3. Discussion of Proposed Solutions
4. Prioritization—Small Groups
5. Next Steps

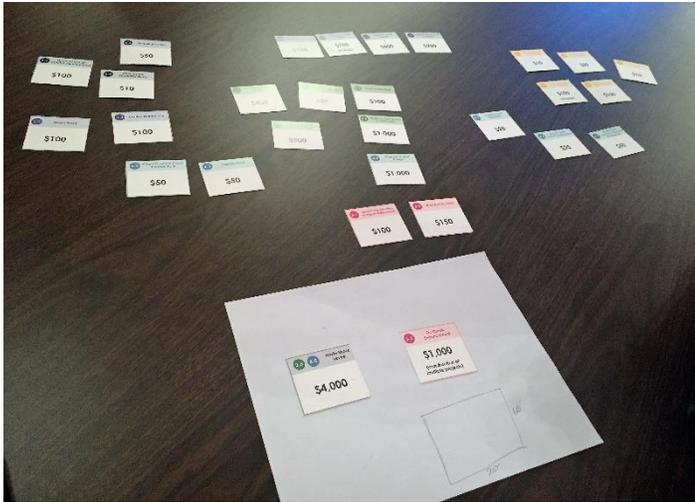
Prioritization Feedback:

The prioritization component included six break-out groups ranging in size from two to ten people. Participants were directed to sit at a table based on geographic interest. Cards for each proposed project were given, with a cost forecasted. Groups were directed to pick the projects they would like to fund based on a \$5,000 budget limit. Groups were faced with the challenging decision of how to prioritize the North Shore Levee Project (valued at \$4,000) and the Fry Creek Restoration Project (valued at \$1,000). All of the groups prioritized those as the top projects for funding. Retention/storage parks and conveyance systems were also highly prioritized.

Many participants had questions about whether the North Shore Levee cost included the upgrading of pumps and improving storm drain capacity. The consultants conceded for purposes of this activity that the \$4,000 cost would include those projects, since the levee project cannot move forward without those improvements. Other participants questioned the true cost of the projects and posited that the Fry Creek Restoration project could be scaled back considerably to focus on restoration and not emphasizing pedestrian and user access such as bridges and paths. One group prioritized the North Shore Levee and Fry Creek Restoration, but suggested that these projects likely

would take a long time to implement and that there might be opportunities to fund some of the less expensive projects, such as green stormwater infrastructure, in the meantime as a way to demonstrate progress to the community.

Overall, the prioritization activity was successful at demonstrating the true challenge the jurisdictions face with funding implementation. There was vast agreement that the North Shore Levee and Fry Creek Restoration projects should be prioritized, and participants expressed support for the cities to move forward with those projects.



Fry

Timberworks: Flood Resiliency and Restoration Plan

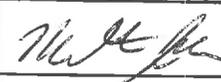
Sign-In - March 31st, 2016

Name	Email	Phone #	City of Residence
1 Philip E George	N/A	360 532 2808	Hoquiam, WA
2 ARNIE MARTIN	arnold6.martin@comcast.net	612-0437	HOQUIAM
3 CLOZIA ROGERS		360-249-1293	WDFW
4 Dan Richard			
5 Margo Shortt			
6 Jake Schild	JSchild@thedailyworld.com	507-424-4219	Hoquiam, WA
7 Doug Pelings	Douglas Pelings@att.net	(360) 591-1679	Aberdeen,
8 Brad Seward		360 532 9137	Ab
9 Dee Anne Shaw	dshaw@aberdanwa.gov	360-580-7975	Ab
10 Jeff Cook	stonepine@me.com	360-580-3488	Aberdeen
11 DAVE MURNEN	d@murnen@Aberdeen-NRS.com	581 3970	HOQ
12 Dow Ross		53-2-1858	Ab.
13 Josh Ambrose	jambrose@cityofhoquiam.com	360-314-0401	City of Hoquiam
14 DARRYL KING	DARRYLKING@GMAIL	530 5899	SHULTON
15			

Fry

Timberworks: Flood Resiliency and Restoration Plan

Sign-In - March 31st, 2016

Name	Email	Phone #	City of Residence
1 Ken McDonald	Kenneth Hugh McDonald @ gmail. com	580-6128	Hopkinton
2 Ray Spryzi	2409 Bay Ave Hwy	532-7906	
3 John Rhodes	to railrhodes@AOL.com	360-532-2142	Aberdeen
4 BARBARA PORTER	barbaraspporter@hotmail.com	360-500-1039	Hogwiam
5 Dru Garson	dru@graysharbo. org	(360) 532-7888	Aberdeen
6 Joe Meyer	jmeyer@graysharbo.	11	11
7 MARK JOHNSON		206 276 6576	ABERDEEN
8 Ma H Johnson		360-580-5439	Aberdeen
9 NICHOLAS CORR	nicholas.corr@mail.house.gov		
10 Katie Allen	Katie.r.allen@mail.house.gov	202-225-5919	Wash. DC
11 Dick Knoph		360-533-6713	HOGWAM.
12 Nancy Simmons		360 533 7352	ABERDEEN
13 Candi Benner	candi@steinmaninsurance.com	(360) 532-2021	Aberdeen
14 John Tanner	jtanner@ensignservices.net	(360) 532-7882	Hogwiam
15 Clint Heard	cheard@ensignservices.net	360-209-9275	Aberdeen

Wilson

Timberworks: Flood Resiliency and Restoration Plan

Sign-In - March 31st, 2016

Name	Email	Phone #	City of Residence
1 GLORIA ROGERS		360-249-1293	WDFW
2 Dee Anne Shaw			Ab
3 Jeff Cook	stonepine@me.com	360-580-3488	Aberdeen
4 Tom Lagergren	tomgren@comcast.net	360-533-7641	Aberdeen
5 Ellen Lagergren		" "	" "
6 Therese Julius	tjulius@ghco.org		
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Timberworks: Flood Resiliency and Restoration Plan

Sign-In - April 28th, 2016

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Timberworks: Flood Resiliency and Restoration Plan

Sign-In - April 28th, 2016

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Timberworks: Flood Resiliency and Restoration Plan

Sign-In - April 28th, 2016

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Timberworks: Flood Resiliency and Restoration Plan

Sign-In - October 25th, 2016

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Timberworks: Flood Resiliency and Restoration Plan

Sign-In - October 25th, 2016

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Timberworks: Flood Resiliency and Restoration Plan

Sign-In - October 25th, 2016

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APPENDIX B

PROJECT CONCEPT SHEETS



Project 0-1: Stormwater System Maintenance

Focus Area: City-wide

Project Location: City-wide

Ownership: Cities of Aberdeen and Hoquiam

Concept: Conduct systematic and regular inspection and clearing of the storm drain system, including catch basins and culverts and maintenance of outfall pumps.

Purpose: The capacity of the storm drain system fundamentally depends on the condition of the catch basins, culverts, and conveyance pipes. The system gets clogged by sediment eroding from slopes, leaves, and other debris carried by stormwater. The City Public Works Departments create and implement a schedule of regular maintenance to inspect and clear the system to ensure that it functions at its maximum potential.

Flood Benefit: Maintenance is critical to ensuring that the existing storm drain system provides the maximum capacity to convey stormwater runoff and floodwaters.

Habitat Benefit: There is minimal habitat benefit to maintenance operations, although total suspended solids (TSS) loading to local waterways may be reduced when stormwater lines are routinely cleaned out.

Community Benefit: The primary benefit of maintenance activities to the community is preventing or minimizing impacts from flooding.

Planning-Level Cost Forecast

Budgets for the cities of Aberdeen and Hoquiam for storm drain system maintenance and operations have averaged and \$430,000 and \$530,000 respectively, in recent years. These efforts are funded primarily by stormwater utility rates.

Project 0-2: Rainwater Capture and Reuse

Focus Area: City-wide

Project Location: Multiple residential, commercial, and industrial properties

Ownership: Public and private properties

Concept: The cities and their partners can establish a program to subsidize use of cisterns and rain barrels to capture stormwater runoff from the roofs of residential, commercial, and industrial buildings. Cisterns and rain barrels can be installed across the community as a cost-effective, flexible stormwater runoff solution.

Purpose: Capturing and storing rainwater can reduce the peak volume of runoff and stormwater pollutants that are discharged to the stormwater drainage system. They can also reduce demand and costs for treated water for irrigation or graywater uses such as flushing toilets.

Flood Benefit: Individual rain barrels and cisterns typically can store 50 to 300 gallons of water. Collectively, this can create a significant impact. As an example, in a period of six years the City of Seattle RainWise program has installed 470 cisterns and 850 rain gardens that control a combined 16.5 million gallons of stormwater per year.

Habitat Benefit: Rainwater storage projects will not be implemented in fish and wildlife habitat areas, so will not have direct impacts on habitat. However, the reduction of stormwater runoff peak volumes can reduce the impacts of high-velocity, high-volume flows to waterways. In addition, rainwater storage projects can reduce the amount of stormwater pollutants typically associated with runoff that reaches fish and wildlife habitat areas.

Community Benefit: Storage and reuse of rainwater can reduce homeowner and business costs for irrigation and use of potable water. Rainwater storage projects provide home and business owners with an opportunity to directly participate in stormwater-management solutions where they live and work.

Planning-Level Cost Forecast

Typical installation costs range from \$70 - 250 for 50-gallon rain barrels to \$1,000 - 1,500 for 300-gallon barrels or cisterns.¹² These costs could be funded by local stormwater utility rates and grants from private foundations. Some local governments have established programs that reduce property owners' stormwater utility rates if they implement rainwater capture or infiltration systems.



¹ Puget Sound Stormwater BMP Cost Database. Prepared for Washington State Department of Ecology. Prepared by Herrera Environmental Consultants. January 4, 2012.

² <http://www.kingcounty.gov/environment/stewardship/nw-yard-and-garden/rain-barrels.aspx>

Project 0-3: Urban Forest Program

Focus Area: City-wide

Project Location: Multiple residential and commercial properties

Ownership: Public and private properties

Concept: The cities and their partners can establish a program to plant trees on properties and along streets.

Purpose: Trees reduce stormwater runoff by intercepting rainwater on leaves and draw down groundwater levels through evapotranspiration. Trees also enhance the aesthetics of streets and properties.

Flood Benefit: Much like stormwater detention and infiltration facilities, trees reduce total runoff volumes and peak runoff rates, alleviating pressure on stormwater-conveyance systems. It has been estimated that approximately 30 percent of annual rainfall in the Pacific Northwest is captured through interception, storage, and evapotranspiration by evergreen.³



Habitat Benefit: Trees provide habitat for birds and small mammals. They also provide shading for streams and wetlands, reducing water temperature.

Community Benefit: Urban forests and street trees provide important flood-reduction benefits while also providing aesthetic benefits for home and business owners. Tree-lined streets provide an urban connection to the natural world, generating interest in the streetscape and the businesses that occupy it. Additional benefits include enhanced air quality, traffic calming, and safer walking environments. Sponsored tree-planting activities can also provide home and business owners with an opportunity to directly participate in stormwater-management solutions where they live and work.

Planning-Level Cost Forecast

Numerous communities in the Pacific Northwest have implemented successful urban tree planting programs, bolstered by the support of corporate sponsorship, nonprofit organizations, and community volunteer planting efforts. Estimated capital costs vary and have been estimated at up to \$150 per tree. Costs can largely be offset by in-kind volunteer services, donations, and sponsorship.

³ Herrera Environmental Consultants. The effects of trees on stormwater runoff. Report prepared for Seattle Public Utilities, February 14, 2008.

Project 0-4: Stormwater System Capacity Analysis

Focus Area: City of Aberdeen

Concept: Conduct hydraulic analysis of storm drain system and physical condition assessment of problem areas to evaluate conveyance pipe condition and capacity.

Purpose: The stormwater-conveyance system includes pipes that were installed before 1950 and that were not designed to meet current stormwater runoff flows. The stormwater system analysis conducted as part of the City of Hoquiam's Comprehensive Surface Water Plan in 1999 found that conveyance pipes through much of the community were undersized compared to flows generated by a ten-year-recurrence-interval rain event. Additionally, much of the drain pipe network was placed at a depth that likely is saturated with groundwater during portions of the year. It is assumed that there is significant infiltration of groundwater into the system that further limits its capacity to convey stormwater runoff. The City of Aberdeen has not conducted a similar detailed analysis of the capacity of the stormwater drain system. The study would identify constriction points where pipe sizes are too small to convey stormwater runoff flows, leading to catch basins surcharging and flooding streets. The physical condition of conveyance pipes can be evaluated with video surveys in targeted areas with recurring flooding, such as Cherry Street.

Flood Benefit: If targeted improvements to storm pipes can be identified, there is potential to increase capacity of the system and decrease the risk of the system surcharging and flooding streets.

Habitat Benefit: The stormwater conveyance pipes provide no significant habitat benefits, nor do they cause adverse impacts.

Water Quality Benefit: The existing stormwater-conveyance system was not designed to provide water quality treatment.

Community Benefit: The primary community benefit of evaluation of the conveyance system is protection of property from flood events.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning Study Feasibility	\$200,000-400,000*	Ecology Integrated Stormwater Grants
Total Cost	\$200,000-400,000*	

* Range of cost will depend on geographic extent and level of detail of the study.

Project 1-1: Moon Road Shoreline Restoration

Focus Area: West Hoquiam

Project Location: Moon Island Road and end of South Adams Street

Ownership: City of Hoquiam and Port of Grays Harbor

Size: Moon Island Road 2,500+ linear feet of shoreline; Adams Street, 500 linear feet of shoreline

Concept: Remove debris along the shoreline, including derelict pilings, an abandoned foundation, and concrete rubble. The upland roads could be elevated to prevent coastal flooding of critical infrastructure, including the City of Hoquiam wastewater lagoons. Moon Island Road could potentially be moved back from the shoreline to reduce the need for armoring and increase estuarine habitat area. Both of these project sites have been identified in the Restoration Plan component of the Shoreline Master Program Update for the City of Hoquiam.



Purpose: The shoreline habitat in the vicinity of these project sites is in fairly good condition. Removal of debris would enhance estuarine habitat that is important for rearing juvenile salmon and other species. Elevating the roads on the upland side of these shorelines would reduce risk from coastal flood events and sea level rise.

Flood Benefit: Increasing the elevation of Moon Road would provide flood protection to the City of Hoquiam wastewater treatment plant, infrastructure, and properties in this area. The scattered arrangement of existing debris contributes to localized erosion.

Habitat Benefit: Removal of debris and riprap and establishment of riparian vegetation would provide improved salmonid rearing habitat, shorebird foraging habitat, and longshore sediment transport, and could potentially improve forage fish spawning habitat.

Community Benefit: These sites are easily accessible and therefore provide opportunities for public access to the water; education; and interpretation.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$55,000-105,000 ¹	Washington Coastal Restoration Initiative Salmon Recovery Funding Board
Construction	Moon Island Road: \$210,000-\$385,000 ^{2,3} Adams Street: \$70,000- \$130,000 ^{2,4}	Aquatic Lands Enhancement Account Washington Wildlife and Recreation Program
Total Cost	\$335,000- \$620,000	

¹Design and permitting cost is 20% of total construction cost.

²Excavation depth of existing roadway is 1 foot.

³Length of Moon Island Road is 2,300 linear feet, width is 20 feet, and grade is elevated by 1 foot.

⁴Length of Adams Street is 500 linear feet, width is 20 feet, and grade is elevated by 1 foot.

Project 1-2: Bioretention Retrofits

Focus Area: West Hoquiam

Project Location: Hoquiam Middle School and Triangle Parks along Emerson Avenue

Ownership: Hoquiam School District and City of Hoquiam

Size: Can vary to fit site

Concept: Construct bioretention cells (rain gardens) in a currently undeveloped area south of the middle school and in the triangle-shaped park spaces along Emerson Avenue. The school bioretention cell would be sized to detain runoff from the roof and paved areas of the middle school and one of the high school parking lots. The project could be implemented with an educational focus, providing students with an opportunity to learn about the water cycle, watersheds, stormwater runoff, and flooding, and to be engaged in the conceptual design and construction of the facility (spreading amended soil and woodchips and installing and maintaining plants).



Purpose: These projects would reduce stormwater runoff from a large, impervious area. This would reduce stormwater runoff volumes and decrease peak flows that are currently conveyed through the stormwater drainage system.

Flood Benefit: Depending on the size of the facility, it could be expected to provide 1.5 to 2 acre-feet of stormwater runoff storage.

Habitat Benefit: The project sites are not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by treatment of runoff as it filters through the amended soil in the bioretention cell. The vegetation plantings could also provide habitat for birds and other wildlife.

Water Quality Benefit: The project could be designed to function as both a flood detention basin and a water quality treatment facility. Detention of runoff and floodwaters allows for settlement of suspended sediments. Metals and other pollutants adhere to sediments, so reductions of concentrations would be expected. Published literature on detention basins indicate average removal rates of 72 percent of total suspended solids (TSS), 16 percent of total phosphorus (TP), and 93 percent of zinc (Zn). If the facility is designed to function as a bioretention cell with soil media and vegetation, additional water quality improvements would be expected. Studies of bioretention cells have found average removal rates of 99 percent TSS, 5 percent of TP, and 99 percent of Zn.⁴

Community Benefit: The proposed projects are located on highly visible public property. There are great education opportunities associated with this project that could engage students and teachers in design, construction, and long-term maintenance and an outdoor learning space. It is assumed that some of the paved area is not currently highly utilized as parking or play area.

⁴ Tetra Tech. Stormwater best management practices (BMP) performance analysis. Prepared for U.S. Environmental Protection Agency—Region 1, March 2010.

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Project Concept Sheets

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$6/square foot ¹	Ecology Integrated Stormwater Grants Private Foundations
Construction	\$30/square foot ²	
Total Cost	\$36/square foot	

¹ Design and permitting cost is 20 percent of total construction cost.

² Construction costs based on project experience and Puget Sound stormwater BMP cost database, prepared by Herrera Environmental Consultants for Washington State Department of Ecology, January 4, 2012.

Project 1-3: Enhance and Certify Levee

Focus Area: West Hoquiam

Project Location: Along Hoquiam River, potentially extending from confluence with the Little Hoquiam River to mouth of the Hoquiam.

Concept: There are existing berms along portions of the western bank of the Hoquiam River that serve as flood control levees, but have not been approved by the Federal Emergency Management Agency (FEMA). The City of Hoquiam could analyze the condition of the existing berms and make improvements as needed to meet current flood control standards. This would likely require reconstructing portions of the levee, increasing levee height, and filling in gaps where there is currently no levee.

Purpose: This project would be designed to prevent flooding from extreme high tides and coastal storms. FEMA approval of a re-constructed levee would allow the area protected behind the levee to have its designation on the Flood Insurance Rate Map changed and for flood insurance to no longer be required.



Flood Benefit: The levee would be designed to provide protection from the 100-year coastal flood event. Based on the design, the number of properties protected by the levee would vary, but could include as many as 2,035, with an assessed value of more than \$200 million.

Habitat Benefit: The shoreline of the Hoquiam River in this area is urbanized, with extensive armoring and little riparian vegetation. Assuming the levee enhancement project occurs above the ordinary high water mark, it is assumed that there would be little negative impact to fish habitat. Through this project, there is some potential to enhance in-water and riparian habitat by increasing the amount of vegetation and large wood debris to the edge of the river.

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Project Concept Sheets

Community Benefit: The levee project would provide protection from coastal flooding to most of downtown Hoquiam. It is estimated that as many as 2,035 properties could be protected behind the levee, reducing flood risk and providing a financial benefit to property owners, who would no longer be required to obtain flood insurance.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$300,000 - \$600,000 for 60% design	Chehalis River Basin Flood Authority
Construction	<i>Cost for improvement of the levee could vary widely depending on the alignment and design, so cannot be reasonably estimated at this time.</i>	

Project 1-4: Upgrade Stormwater Outfall Pumps

Focus Area: West Hoquiam

Project Location: Multiple

Concept: Replace existing stormwater pumps with modern, higher power, more efficient pumps.

Purpose: During normal conditions, stormwater pipes drain by gravity to outfalls on the Hoquiam River or Grays Harbor. During very high tides, pumps are activated to pump the water out. The City of Hoquiam Surface Water Management Plan identified nine outfall pumps that did not have sufficient capacity to pump for the 100-year flood. Three of those pumps were recommended as high priorities for replacement: Ramer Street Outfall Pump, K Street Outfall Pump, and 10th Street Outfall Pump. Replacing these pumps will increase the ability of the system to manage flood events. Demonstrating the capacity to drain the 100-year rain event is also a critical part of the FEMA approval process for the levee (project 1-3).



Flood Benefit: Higher capacity pumps would improve conveyance of stormwater through the entire storm drain system. This is expected to provide immediate, high flood control benefit.

Habitat Benefit: The pumps provide no significant habitat benefits or adverse impacts.

Water Quality Benefit: There is potential to incorporate water quality treatment such as settling basins or filtration in association with the pump systems.

Community Benefit: The primary community benefit of upgrading the pumps is protection of property from flood events.

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 Project Concept Sheets

Planning-Level Cost Forecast

The following cost estimates for upgrades to pump stations were prepared as part of the City of Hoquiam Comprehensive Surface Water Master Plan. Costs were adjusted using the Consumer Price Index from cost estimates originally calculated in 1999 dollars. These cost estimates include allowance for design and 20 percent contingency.

Drainage Basin	Estimated Cost for Upgrade	Funding Opportunities
New 10th Street Pump Station: Upgrade to 6,000 gallons per minute (gpm)	\$870,000	Chehalis River Basin Flood Authority; Ecology Integrated Stormwater Grants; U.S. Department of Agriculture Water and Waste Disposal Loans
New K Street Pump Station: Upgrade to 14,000 gpm	\$1,800,000	
New Ramer Street Pump Station: Upgrade to 3,500 gpm	\$514,000	
Total Cost	\$3,184,000	

Project 1-5: Upgrade Stormwater Conveyance Capacity

Focus Area: West Hoquiam

Project Location: Along K Street and Ramer Avenue

Concept: Install new, larger diameter storm drain pipes in targeted areas to increase capacity of drainage system and reduce flooding.

Purpose: Hydraulic modeling conducted in the Comprehensive Surface Water Management Plan found that the conveyance pipes that run along K Street and drain much of Downtown Hoquiam are undersized. That plan recommended replacing existing storm drain trunk lines under K Street with new pipes that have double the diameter. The modeling indicated that increasing the size of these pipes would reduce flooding both in the immediate vicinity of those lines and in the upper extent of the basin at Emerson Avenue.

Flood Benefit: Increasing the size of the storm drain pipes increases the capacity of the system to store and convey runoff, thereby reducing the risk of the system surcharging and flooding streets.

Habitat Benefit: The stormwater conveyance pipes provide no significant habitat benefits or adverse impacts.

Water Quality Benefit: The existing stormwater conveyance system was not designed to provide water quality treatment.

Community Benefit: The community benefit of increased capacity of the conveyance system is protection of property from flood events.

Planning-Level Cost Forecast and Funding Opportunities

The City of Hoquiam Comprehensive Surface Water Master Plan included a cost estimate to upgrade nearly all of the storm drain trunk lines in the K Street Outfall Basin. Adjusting costs using the Consumer Price Index, from estimates originally calculated in 1999 dollars, leads to a total of \$1.7 million. The storm drain lines could be upgraded in phases to manage cost.

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	<i>Included in total</i>	Ecology Integrated Stormwater Grants; U.S. Department of Agriculture Water and Waste Disposal Loans
Construction	<i>Included in total</i>	
Total Cost	\$1,700,000	

Project 2-1: Cherry and Queets Green Streets

Focus Area: East Hoquiam

Project Location: Cherry and Queets Streets from 23rd Street to 28th Street

Concept: Create stormwater retention and water quality treatment capacity within the existing right-of-way through use of permeable paving and bio-retention cells. The green street features could be integrated into the sides of the existing street through design that maintains existing driveway and street access points and enhances aesthetics.

Purpose: The green street elements would provide additional capacity to convey stormwater and flood waters. They would also improve water quality through filtration in the amended soils in the swales. This would reduce stormwater runoff volumes and decrease peak flows that are currently conveyed through the stormwater drainage system. The green street features would be designed as a public realm amenity that would also improve the aesthetic appeal of the street and sidewalks.

Flood Benefit: Depending on the size of the facility, it could be expected to provide approximately 0.2 acre-feet of storage per city block. Over the 9-block reach, the total storage volume is approximately 2 acre-feet.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by treatment of runoff as it filters through the pervious pavement and amended soil in the bio-retention cell. The vegetation plantings could also provide habitats for birds, butterflies, and other wildlife.

Water Quality Benefit: The project could be designed to provide both stormwater/flood detention and water quality treatment. Studies of porous pavement and bioretention cells used in tandem in streetscapes have found removal rates as high as 99% for TSS, 38% for TP, and 99% for Zn.⁵

Community Benefit: The proposed project is located on public right of way that is highly visible. The design would enhance the character of the street, making it a more pleasant environment to live on and to walk, bike, or drive through.



⁵ Tetra Tech, 2010. Stormwater Best Management Practices (BMP) Performance Analysis, prepared for United States Environmental Protection Agency – Region 1, March 2010.

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 Project Concept Sheets

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	N/A	
Design and Permitting	\$230,000-\$430,000 ¹	Ecology Integrated Stormwater Grants
Construction	\$1,150,000-\$2,150,000 ^{2,3}	
Total Cost	\$1,380,000-\$2,580,000	

¹ Design and permitting cost is 20% of construction cost.

² Add five-foot permeable paver shoulder/parking area along curb.

³ Add six-foot wide vegetated swale between curb and sidewalk in existing planter strip.

Project 2-2: Property Acquisition

Focus Area: East Hoquiam

Project Location: Queets Streets from 23rd Street to 28th Street

Concept: Landslides have impacted several homes along Queets Street. Some of these properties have been so damaged that they have been condemned. Over time, the bluff along this area has proven to be unstable; threats to public welfare and property due to landslide potential continue to exist. To avoid these threats, additional properties in this area could be acquired and houses moved or razed. The resulting green space could also create an opportunity for floodwater storage and detention of slide debris.

Purpose: To minimize threats to public welfare and property from landslide hazards and to increase capacity for storage of flood waters and eroded sediment.

Flood Benefit: Stormwater retention swales could be constructed in the area to provide storage of stormwater runoff.



Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project area could be planted with native vegetation to stabilize soils and provide wildlife habitat.

Water Quality Benefit: If a flood detention basin or bio-retention facility were constructed in this area, it would provide water storage and treatment. Detention of stormwater runoff and flood waters allows for settlement of suspended sediments. Metals and other pollutants adhere to

sediments, so reductions of concentrations would be expected. Any detention or bio-retention facilities designed for this location would need to account for the high sediment load coming from the bluff. High sediment loads can be managed by integrating a sediment forebay or sediment trap into the storage treatment system.

Community Benefit: Buyout of properties in areas prone to landslides reduces risk to people and property. The proposed project is located along a public street. The site could be designed to provide a passive recreation amenity.

Planning-Level Cost Forecast and Funding Opportunities

Costs for property buyouts will vary based on the specific parcels and number of sites. Assessed values for properties along the north side of Queets Street, including land and improvement values, range from approximately \$44,000 to \$157,000. Property acquisition could be funded with Community Development Block Grant dollars.

Project 2-3: Olympic Stadium Flood Control Park

Focus Area: East Hoquiam

Project Location: Adjacent to Olympic Stadium

Concept: Remove some portion of existing paved parking and grassy area and excavate to build a flood detention basin or bio-retention cell. The facility would be sized to fit the space, allowing for maintenance of sufficient parking for the stadium.

Purpose: This project would provide flood storage in an area of the community that experiences chronic flooding problems. The flood control park could be connected via French drains and conveyance pipes to receive runoff from the foothills and adjacent streets. Detention of water in the facility would reduce stormwater runoff volumes and decrease peak flows, which are currently conveyed through the stormwater drainage system.



Flood Benefit: Depending on the size of the facility, it could be expected to provide up to 5 acre-feet of stormwater runoff storage.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by treatment of runoff as it filters through the amended soil in the bio-retention cell. The vegetation plantings could also provide wildlife habitats.

Water Quality Benefit: The project could be designed to function as both a flood detention basin and water quality treatment facility. Detention of runoff and flood waters allows for settlement of suspended sediments. Metals and other pollutants adhere to sediments, so reductions of concentrations would be expected. Published literature on detention basins indicate average removal rates of 72% of TSS, 16% of TP, and 93% of Zn. If the facility is designed to function as a bioretention cell with soil media and vegetation, additional water quality improvements would be expected. Studies of bio-retention cells have found average removal rates of 99% TSS, 5% of TP, and 99% of Zn.⁶

Community Benefit: The proposed project is located on public property that is highly visible. There are great education and interpretation opportunities associated with this project that could engage local residents.

⁶ Tetra Tech, 2010. Stormwater Best Management Practices (BMP) Performance Analysis, prepared for United States Environmental Protection Agency – Region 1, March 2010.

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Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	N/A	
Design and Permitting	\$60,000-\$115,000 ¹	Ecology Integrated Stormwater Grants
Construction	Olympic Stadium Flood Storage Basin: \$270,000-\$500,000 ^{2, 3} Supplementary Improvements per LF of Road: \$40,000-\$80,000	
Total Cost	\$370,000-\$695,000	

¹ Design and permitting cost is 20% of construction cost.

² Assumed basin surface area is 1.75 acres and depth is 3 feet.

³ Maintain 20% of soil onsite for perimeter grading.

Project 2-4: Upgrade Stormwater Outfall Pumps

Focus Area: East Hoquiam

Project Location: Bay Avenue and 28th Street

Concept: Replace existing stormwater pump with modern, higher power, more efficient pumps.



Purpose: Most of the eastern portion of Hoquiam, from 23rd Street to Myrtle Street, drains to a single pump station at the corner of Bay Avenue and 28th Street. The City of Hoquiam Surface Water Management Plan identified that this facility did not have sufficient capacity to pump the volume of runoff generated by the 10-year recurrence interval rain event. Replacing the pump will increase the ability of the system to manage heavy rain and flood events over a large drainage basin that extends north to Cherry Street. Demonstrating the capacity to drain the 100-year rain event is also a critical part of the FEMA approval process for the levee (project 2-5).

Flood Benefit: Higher capacity pumps would improve conveyance of stormwater through the entire storm drain system. This is expected to provide immediate, high flood control benefit.

Habitat Benefit: The pumps provide no significant habitat benefits or adverse impacts.

Water Quality Benefit: There is potential to incorporate water quality treatment such as settling basins or filtration in association with the pump systems.

Community Benefit: The primary community benefit of upgrading the pumps is protection of property from flood events.

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Project Concept Sheets

Planning-Level Cost Forecast

The following cost estimates for upgrades to pump stations were prepared as part of the City of Hoquiam Comprehensive Surface Water Master Plan. Costs were in 1999 dollars and adjusted to 2016 dollars using a factor for inflation.

Drainage Basin	Estimated Cost for Upgrade	Funding Opportunities
New Bay Avenue Pump Station: Upgrade to 163,000 gpm	\$6,900,000	Ecology Integrated Stormwater Grant; USDA Water and Wastewater Disposal Loan

Project 2-5: North Shore Levee

Focus Area: East Hoquiam & West Aberdeen

Project Location: Extends along the Hoquiam River, Chehalis, and Wishkah Rivers

Concept: Since at least the 1940s, there have been plans to construct a levee around the peninsula of land between the Hoquiam and Wishkah Rivers. The flood control project will include multiple elements, as appropriate, based on existing development and conditions including earthen levee, floodwalls, and elevated streets.



Purpose: This project would be designed to prevent flooding from extreme high tides and coastal storms. FEMA approval of a levee would allow the area protected behind the levee to have its designation on the Flood Insurance Rate Map changed and for flood insurance to no longer be required.

Flood Benefit: The levee would be designed to provide protection from the 100-year coastal flood event. Based on the design, the number of properties protected by the levee would vary, but may include as many as 7,392 parcels with an assessed value of more than \$1.3 billion.

Habitat Benefit: The shoreline in this area is highly urbanized, with extensive armoring and little riparian vegetation. Assuming the levee enhancement project occurs above the ordinary high water mark, it is assumed that there would be little negative impact to fish habitat. There is some potential to enhance in-water and riparian habitat through this project by increasing the amount of vegetation and large woody debris to the edge of the river.

Community Benefit: The North Shore levee project would provide protection from coastal flooding to residential, commercial, and industrial areas of Aberdeen and Hoquiam. It is estimated that 7,392 properties could be protected behind the levee, reducing flood risk and providing a financial benefit to property owners, who would no longer be required to obtain flood insurance for commercial loans.

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Project Concept Sheets

Planning-Level Cost Forecast and Funding Opportunities

Cost estimates and a funding strategy for construction of the North Shore levee are currently being developed as part of the on-going design process.

Project 2-6: Upgrade Stormwater Conveyance Capacity

Focus Area: East Hoquiam

Project Location: Focus on Bay Avenue, 24th Street and 28th Street

Concept: Install new, larger-diameter storm drain pipes in targeted areas to increase capacity of drainage system and reduce flooding.

Purpose: Hydraulic modeling conducted in the Comprehensive Surface Water Management Plan found that a number of conveyance pipes are undersized in the drainage basin that covers most of East Hoquiam and discharges to the Bay Avenue pump station. That plan recommended replacing existing storm drain trunk lines in Bay Avenue, 24th Street, and 28th Street with new pipes that are generally twice the diameter. The modeling indicated that increasing the size of these pipes would reduce flooding both in the immediate vicinity of those lines and in the upper extent of the basin around Cherry Street.

Flood Benefit: Increasing the size of the storm drain pipes increases the capacity of the system to store and convey runoff, thereby reducing the risk of the system surcharging and flooding streets.

Habitat Benefit: The stormwater conveyance pipes provide no significant habitat benefits or adverse impacts.

Water Quality Benefit: The existing stormwater conveyance system was not designed to provide water quality treatment.

Community Benefit: The community benefit from increased capacity of the conveyance system is protection of property from flood events.

Planning-Level Cost Forecast and Funding Opportunities

The City of Hoquiam Comprehensive Surface Water Master Plan included a cost estimate to upgrade nearly all of the storm drain trunk lines in the Bay Avenue Outfall Basin. That cost estimated was adjusted from 1999 dollars to 2016 dollars using a Consumer Price Index factor for inflation. The storm rain lines could be upgraded in phases to manage cost.

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	<i>Included in total cost</i>	Ecology Integrated Stormwater Grants; U.S. Department of Agriculture Water and Waste Disposal Loans
Construction	<i>Included in total cost</i>	
Total Cost	\$3,400,000	

Project 3-1: Land Conservation in Fry Creek Watershed

Focus Area: Fry Creek Basin

Project Location: Headwaters of Fry Creek, north of Cherry Street

Concept: Conserve land in the upper watershed of the Fry Creek basin through acquisition, conservation easements, or other mechanisms.

Purpose: Development in the Fry Creek headwaters would likely lead to increased stormwater runoff and exacerbate downstream flooding risk. Forested condition of the upper watershed maximizes the potential for interception, storage, and evapotranspiration of rainfall.

There are six major landholders in the upper watershed: The City of Aberdeen, Grays Harbor Public Utility District, Grays Harbor County, Weyerhaeuser, Fruit Growers Supply, and Geo Dan Land. The Geo Dan parcel has been platted for residential development.

The City could partner with land trusts that are active in the area, including the Chehalis River Basin Land Trust and Forterra, to enter into agreements with land owners to acquire fee simple ownership or conservation easements on these properties.

Flood Benefit: Maintaining the upper watershed in a forested condition will minimize potential for increased runoff and erosion and transport of sediment that would be associated with development of the area.

Habitat Benefit: The upper watershed of Fry Creek provides approximately 745 acres of contiguous forested habitat with streams, steep slopes, and wetlands. This provides quality habitat for fish and wildlife species. The Salmon and Steelhead Habitat Limiting Factors report for WRIA 22/23 states that timber harvesting and off-road vehicle use in the upper watershed have degraded in-stream habitat by causing sedimentation.

Water Quality Benefit: Forested conditions provide interception and storage of runoff. Forests maintain soil stability and limit erosion that causes increased turbidity in waterways.

Community Benefit: Formal protection of the upper watershed would avoid potential increased runoff and flooding that may be associated with clearing and development. If the land was placed in a protected status, a passive trail network could potentially be developed, which would provide a recreational amenity to the community.



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Planning-Level Cost Forecast and Funding Opportunities

The assessed value of three privately owned parcels (tax identification numbers 517100110000, 317090611000, and 317090643001) totaling 378 acres in the upper Fry Creek watershed is \$480,770. It is assumed that the properties already in public ownership could be managed to remain in forested condition through local agreements or land transfers that would not incur costs beyond transaction negotiations.

Likely sources of funding for conservation easements or acquisition of these properties include the Land and Water Conservation Fund, Washington Wildlife Recreation Program, and the Chehalis River Basin Flood Authority.

Project 3-2: Fry Creek Restoration and Flood Reduction

Focus Area: Fry Creek

Project Location: Corridor along Fry Creek from Cherry Street south to Port Industrial Way

Concept: The Fry Creek corridor is a frequently flooded, highly urbanized stream with opportunity for enhancement at a number of locations. Enhancement of the Creek should be approached in phases and include the following elements:

- Replacing culverts to allow fish passage and remove flow constrictions that contribute to flooding
- Grading the stream bank to increase sinuosity and create a floodplain bench to increase capacity to contain and convey high water flows
- Creating public access and recreation amenities such as trails and overlooks
- Daylighting the section of Fry Creek that is in an underground pipe between Sumner and Simpson Avenues
- Pump station and tide gate improvements, including features to improve fish passage

Purpose: Alleviate flooding in areas adjacent to Fry Creek while also enhancing habitat quality and creating a public recreation amenity.



Flood Benefit: City Public Works staff and Public Utility District staff have stated that one of the factors contributing to flooding is water backing up at culverts along Fry Creek. Removing or replacing culverts will allow the Creek to convey higher flows downstream and avoid overtopping its banks. Increasing the channel length through sinuosity and capacity by grading to create flood benches will also increase the capacity to contain high flows within the banks of the creek.

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Habitat Benefit: Fry Creek is reported to be a salmon-bearing stream though it has been highly urbanized. There are opportunities to enhance habitat for salmonid rearing and foraging habitat along the approximately 0.8-mile length of the creek between Port Industrial Way and the northern side of the Public Utility District facility. Habitat enhancement can include increasing stream length and structural complexity, planting native vegetation along the stream corridor, and improving access to high quality habitat in the headwaters of the Creek.

Water Quality Benefit: Planting riparian buffers and increasing the length and complexity of the creek will contribute to improved water quality by providing shading and greater potential for settlement of suspended solids, aeration, and metabolism of nutrients.

Community Benefit: Fry Creek has the potential to be developed into an open space and recreational amenity for the community. Enhancements along the stream corridor can include pedestrian and bicycle trails, overlooks, and public spaces. Crime prevention through environmental design (CPTED) principles should be considered in design of improvements to address issues such as lines of sight to ensure the space is safe for the community.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$700,000-1,305,000 ¹	Washington Coastal Restoration Initiative; Floodplains by Design; Chehalis River Basin Flood Authority; Ecology Integrated Stormwater Grants
Construction	Floodplain reconnection north of Simpson Avenue: \$400,000-\$770,000 ² Daylight Fry Creek: \$310,000-\$580,000 Culvert Replacements: \$340,000-\$1,000,000 Simpson to Pacific Avenues: \$200,000-\$365,000 ³ Fish Friendly Tidegate and Pump Station Replacement: \$2,135,000-\$3,965,000	
Total Cost	\$4,085,000-\$7,985,000	

¹ Design and permitting cost is 20% of total construction cost.

² Existing creek area is 1.6 acres.

³ Land acquisition is 0.3 acres.

Project 3-3: West End Playfield Flood Control Feature

Focus Area: Fry Creek

Project Location: West End Playfield, South of Bay Avenue, between Oak and Maple Streets

Ownership: City of Aberdeen

Size: 2.5–3.5 acres

Concept: Excavate the southern portion of the park to provide an area for flood storage during high flow events. The area can be designed to provide functional play space when not flooded.

Purpose: Duffy Creek flows through a pipe in the lowlands of Aberdeen. The pipe system has cross connections to Fry Creek at Sumner Street and 2nd Street, crossing through West End Playfield. Creating a pond, constructed wetland, or flood overflow storage area in the park would provide storage that would increase the capacity of the drainage system and reduce upstream flooding.

Flood Benefit: Depending on the size of the facility, it could be expected to provide 7–10 acre-feet of flood storage.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by treatment of runoff as it filters through the amended soil in the bioretention cell. The vegetation plantings could also provide bird, butterfly, and wildlife habitats.

Water Quality Benefit: The project could be designed to function as both a flood detention basin and water quality treatment facility. Detention of runoff and flood waters allows for settlement of suspended sediments. Metals and other pollutants adhere to sediments, so reductions of concentrations would be expected. Published literature on detention basins indicate average removal rates of 72% of TSS, 16% of TP, and 93% of Zn. If the facility is designed to function as a bioretention cell with soil media and vegetation, additional water quality improvements would be expected. Studies of bioretention cells have found average removal rates of 99% TSS, 5% of TP, and 99% of Zn.

Community Benefit: The proposed project is located in a public park that is in the process of being upgraded. The flood control elements would complement the recreation amenities planned for the park. There are also public education opportunities associated with this project that could include interpretive signage and be connected with school programs.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$90,000-\$170,000 ¹	Integrated Stormwater Grants Chehalis River Basin Flood Authority
Construction	\$460,000-\$860,000 ²	Integrated Stormwater Grants Chehalis River Basin Flood Authority
Total Cost	\$550,000-\$1,030,000	

¹ Design and permitting cost is 20% of total construction cost.

² Assumed basin area is 3.5 acres and excavation depth is 3 feet.

Project 4-1: Land Conservation in Upper Canyon Court

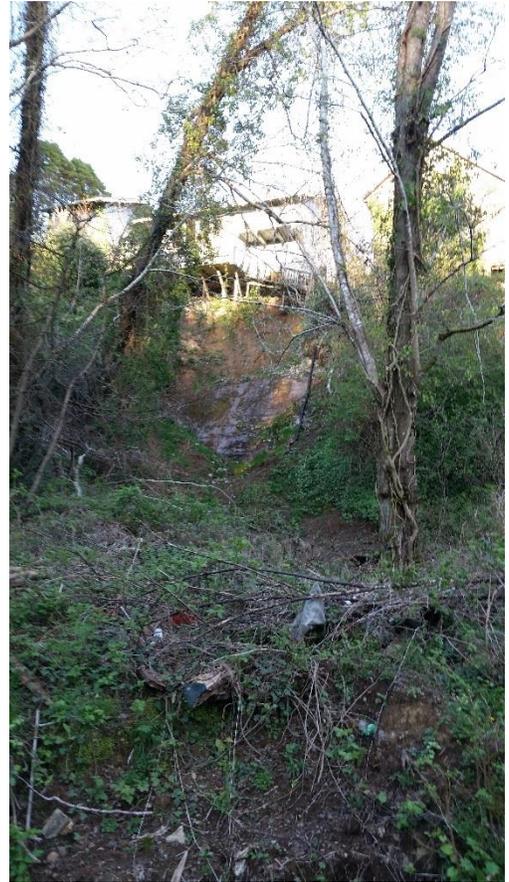
Focus Area: West Aberdeen

Project Location: Headwaters of Division Creek, north of West 6th Street

Concept: Conserve land in the upper watershed of the Division Creek basin through acquisition, conservation easements, or other mechanisms and construct improvements to reduce flooding and sedimentation.

Purpose: The foothills north of Canyon Court are characterized by residential development above steep slopes. This area is prone to landslides, sedimentation of Division Creek, and flooding. A sediment catch basin has been installed under the West 6th Street overpass. The basin traps sediment that would otherwise be conveyed to the stormwater system, clog the pipes and contribute to flooding. However, there is no bypass system, so when the basin is filled with sediment, City Public Works crews clean it out while the creek is actively flowing through it, which can lead to re-suspension of sediments.

The steep slopes are protected by the City of Aberdeen Critical Areas Ordinance, so no additional development is likely to occur on the slopes. There are undeveloped parcels of land between West 6th Street and Alden Road that present an opportunity for land conservation and enhancements that could improve habitat, water quality, and provide recreational opportunities. The area presents opportunities to reconnect the stream to its floodplain, allowing high flows to overtop the bank, spread out, and for sediments to settle before reaching Canyon Court. The existing sediment trap could also be improved to include a bypass so the creek can flow around it during routine maintenance to clear out accumulated sediment.



Flood Benefit: Maintaining the upper watershed in a forested condition will minimize potential for increased runoff that would be associated with development of the area.

Habitat Benefit: There is approximately 2.5 acres of contiguous forested habitat with streams, steep slopes, and wetlands north of Canyon Court. This projects quality habitat for fish and wildlife species.

Water Quality Benefit: Forested conditions provide interception and storage of runoff. Forests maintain soil stability and limit erosion that causes increased turbidity in waterways.

Community Benefit: If the land was placed in a protected status, a passive trail network could be developed that connects to the existing Sherwood Forest trail and provides a recreational amenity to the community.

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Project Concept Sheets

Planning-Level Cost Forecast

The assessed value of five privately owned parcels immediately north of Canyon Court, totaling 2 acres, is \$7,500. Likely sources of funding for conservation easements or acquisition of these properties include the Land and Water Conservation Fund, Washington Wildlife Recreation Program, and the Chehalis River Basin Flooding Authority.

Project 4-2: Finch Playfield Flood Control Park

Focus Area: West Aberdeen

Project Location: Finch Playfield

Concept: Excavate and regrade the playfield to serve as a flood detention basin during extreme events. Play structures and ball fields would be accessible all other times.

Purpose: This project would provide flood storage in an area of the community that experiences chronic flooding problems. Canyon Creek runs underground in a 42" diameter pipe on the west side of the park. A bypass conveyance system could be designed that carries a portion of the flow to the flood control park during high water events. Detention of water in the facility would decrease peak flows that are currently conveyed through the stormwater drainage system.



Flood Benefit: Depending on the size of the facility, it could be expected to provide 2 to 2.5 acre-feet of flood water storage.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by detention of water that would allow suspended solids to settle.

Water Quality Benefit: The project could be designed to function as both a flood detention basin and water quality treatment facility. Detention of runoff and flood waters allows for settlement of suspended sediments. Metals and other pollutants adhere to sediments, so reductions of concentrations would be expected. Published literature on detention basins indicate average removal rates of 72% of TSS, 16% of TP, and 93% of Zn. If the facility is designed to function as a bioretention cell with soil media and vegetation, additional water quality improvements would be expected. Studies of bioretention cells have found average removal rates of 99% TSS, 5% of TP, and 99% of Zn.⁷

Community Benefit: The proposed project creates opportunity for multiple uses of an existing public space. Interpretive and educational signage could be installed to engage local residents.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$30,000-\$60,000 ¹	Ecology Integrated Stormwater Grants
Construction	Finch Playfield Flood Storage Basin: \$140,000-\$260,000 Supplementary Improvements/LID Retrofits: \$20,000-\$40,000	
Total Cost	\$190,000-\$360,000	

¹ Design and permitting cost is 20% of total construction cost.

² Assumed basin surface area is 0.75 acres and depth is 3 feet.

⁷ Tetra Tech, 2010. Stormwater Best Management Practices (BMP) Performance Analysis, prepared for United States Environmental Protection Agency – Region 1, March 2010

Project 4-3: Franklin Field Flood Control Park - Upgrade

Focus Area: West Aberdeen

Project Location: Franklin Field

Concept: Install a pump and conveyance pipes to increase the capacity of Franklin Field to store flood waters.

Purpose: The City of Aberdeen excavated Franklin Field down approximately four feet to serve as a temporary flood storage area. The project appears to have reduced flooding impacts in the surrounding area. By installing pumps and conveyance pipes, a system could be designed for the storage area to receive runoff during earlier and in lower intensity rain events. This would reduce the flow of water in the rest of the storm system.

Flood Benefit: Installation of pumps and connection to the conveyance system will effectively increase stormwater runoff storage.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by detention of water that would allow suspended solids to settle.

Water Quality Benefit: Detention of runoff and flood waters allows for settlement of suspended sediments. Metals and other pollutants adhere to sediments, so reductions of concentrations would be expected. Published literature on detention basins indicate average removal rates of 72% of TSS, 16% of TP, and 93% Zn.⁸

Community Benefit: The proposed project creates opportunity for multiple uses of an existing public space. Interpretive and educational signage could be installed to engage local residents.



Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$45,000-\$85,000 ¹	Ecology Integrated Stormwater Grants
Construction	\$230,000-\$420,000	
Total Cost	\$275,000-\$505,000	

¹ Design and permitting cost is 20% of total construction cost.

⁸ Tetra Tech, 2010. Stormwater Best Management Practices (BMP) Performance Analysis, prepared for United States Environmental Protection Agency – Region 1, March 2010.

Project 4-4: Upgrade Stormwater Outfall Pumps

Focus Area: West Aberdeen

Project Location: Multiple locations

Concept: Replace existing stormwater pumps with modern, higher power, more efficient pumps.

Purpose: Most of the stormwater drainage basins in West Aberdeen lead to stormwater outfalls with pumps. The pumps serve to increase the flow through the system and to allow the system to continue to drain when tides are higher than the elevation of the outfall. The interior drainage analysis conducted for the proposed Northside Levee project indicated that the pumps lacked capacity to convey the volume of water generated by the 100-year rainfall event. Upgrading the pumps will increase the capacity of the drainage system, thereby reducing the frequency of catch basins surcharging and overflowing into streets during high intensity rain events. Upgrading the outfall pumps will also be a requirement for obtaining FEMA accreditation of the proposed levee.

Flood Benefit: Higher capacity pumps would improve conveyance of stormwater through the entire storm drain system. This is expected to provide immediate, high flood control benefit.

Habitat Benefit: The pumps provide no significant habitat benefits or adverse impacts.

Water Quality Benefit: There is potential to incorporate water quality treatment such as settling basins or filtration in association with the pump systems.

Community Benefit: The community benefit of upgrading the pumps is related to protection of property from flood events.

Planning-Level Cost Forecast and Funding Opportunities

Cost estimates and a funding strategy are being prepared for outfall pumps as part of the North Shore levee project.

Project 4-5: North Shore Levee

See Project 2-5 for description.

Project 4-6: Stewart Creek Culvert Replacement

Focus Area: West Aberdeen

Project Location: Valley Road (culvert identification 127W0319 and 127W0320)

Concept: Replace existing undersized culvert with larger structure designed to meet fish passage requirements.

Purpose: This project would address an identified fish passage barrier on a stream with a relatively high quality habitat. The undersized culvert likely serves as a bottleneck that contributes to upstream flooding during high flow events.

Flood Benefit: A larger-size culvert would remove an assumed flow restriction on Stewart Creek, reducing upstream flooding frequency and depth.

Habitat Benefit: The culvert replacement would improve fish passage and flow connectivity to approximately 1 acre of wetland habitat. A culvert assessment conducted by the Mason Conservation District states that Stewart Creek has the potential to support Coho Salmon, Sea Run Cutthroat Trout, and Resident Trout.

Water Quality Benefit: The project would reduce flooding, which entrains contaminants from roadways and developed areas into runoff.

Community Benefit: The community benefits of the project are reducing impacts from flooding and supporting fish populations.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	N/A	
Design and Permitting	<i>Included in total cost</i>	Washington Coastal Restoration Initiative
Construction	<i>Included in total cost</i>	
Total Cost	\$100,000 - \$175,000 ⁹	

⁹ Based on similar culvert replacement projects in the region.

Project 4-7: Stewart Creek Confluence Floodplain Connectivity

Focus Area: West Aberdeen

Project Location: West of North B Street, between 8th and 10th Avenues

Concept: Conduct a feasibility study of the potential to replace existing culverts under North B Street and enhance the quality of existing wetlands on the western side of North B Street.

Purpose: Increase floodplain connectivity and habitat quality in an existing wetland near the confluence of Stewart Creek and the Wishkah River.



Flood Benefit: Increasing the hydraulic connectivity between the floodplain and stream will create greater capacity to store floodwaters during high flow events in both Stewart Creek and the Wishkah River. The quantitative implications of changes would be evaluated in the feasibility study.

Habitat Benefit: Both Stewart Creek and the Wishkah River are salmon-bearing waterbodies. There is potential to enhance approximately 1 acre of floodplain habitat, which would provide rearing, foraging, and refuge habitat for juvenile salmon during high flow events. *Note: this project was identified in the City of Aberdeen Shoreline Master Program's Restoration Plan.*

Water Quality Benefit: Floodplain habitats provide water quality benefits through slowing and retaining flood waters, allowing suspended sediments to settle out.

Community Benefit: Providing greater flood storage capacity in this area has the potential to decrease flooding risk to developed areas downstream.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	\$25,000 - \$50,000	Washington Coastal Restoration Initiative
Design and Permitting	<i>Unable to define at this stage</i>	
Construction	<i>Unable to define at this stage</i>	
Total Cost	<i>Unable to define at this stage</i>	

Project 5-1: Wilson Creek Fish Passage Study

Focus Area: East Aberdeen

Project Location: Wilson Creek corridor from Henry Street south to Highway 12

Concept: Conduct study to evaluate existing culverts and evaluate options to meet fish passage requirements.

Purpose: A culvert assessment conducted by the Mason Conservation District indicated that Coho salmon were observed in Wilson Creek and that the stream has potential to support Sea Run Cutthroat Trout and Resident Trout. There are currently six (6) culverts in the lower reach of Wilson Creek, from Henry Street south to confluence with the Chehalis River. The culvert assessment confirmed that two of the culverts are barriers to fish passage and that others may present barriers.



Flood Benefit: Local residents and City of Aberdeen Public Works staff have stated that flooding often occurs in the lower reach of Wilson Creek. Removing or replacing culverts with larger crossings would address assumed flow restrictions on Wilson Creek, reducing upstream flooding frequency and depth.

Habitat Benefit: The culvert replacement would allow fish passage to approximately 2 miles of stream habitat north of Highway 12. *Note: this project was identified in the City of Aberdeen Shoreline Master Program's Restoration Plan.*

Water Quality Benefit: The project would reduce flooding, which entrains contaminants from roadways and developed areas into runoff.

Community Benefit: The community benefits of the project are reducing impacts from flooding and supporting fish populations.

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Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	\$10,000 - \$15,000	Washington Coastal Restoration Initiative
Design and Permitting	<i>Unable to define at this stage</i>	
Construction	<i>Unable to define at this stage</i>	
Total Cost	<i>Unable to define at this stage</i>	

Project 5-2: Wilson Creek Floodplain Reconnection

Focus Area: East Aberdeen

Project Location: North Fairfield Street and Summit Street

Concept: The lower reach of Wilson Creek has been highly modified. The stream has been straightened, directed through culverts, and piped beneath residences. Enhancement of the Creek could be limited to a reach owned by the City of Aberdeen (tax parcel identification 029801100100) or extended through acquisition of properties. Design concepts should include laying back the existing stream bank, thereby creating a bench to increase flood flow storage volume in the channel and more gentle slopes that could support vegetation.



Purpose: Increase the flood storage of Wilson Creek within the channel and flood bench and enhance habitat quality.

Flood Benefit: Increasing the volume of water that could be stored in the channel and flood bench would reduce the frequency and extent of flooding in the surrounding area. Assuming that a flood reduction and stream habitat project was implemented on the approximately 0.5-acre City of Aberdeen–owned parcel south of Summit Street, approximately 1 to 1.5 acre feet of flood storage could be created.

Habitat Benefit: A culvert assessment study conducted by the Mason Conservation District indicated that Coho salmon were observed in Wilson Creek and that the stream has potential to support Sea Run Cutthroat Trout and Resident Trout. There is potential to increase the length of stream channel by adding sinuosity and to increase habitat complexity through planting native vegetation and installing structures such as large woody debris.

Water Quality Benefit: Increased residence time of water in the stream increases the opportunity for reduction of nutrients and settlement of suspended solids.

Community Benefit: The stream enhancement project could create a public park space and enhance the character of the surrounding area.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$20,000-\$35,000 ¹	Washington Coastal Restoration Initiative; Floodplains by Design; Chehalis River Basin Flood Authority; Ecology Integrated Stormwater Grants
Construction	\$95,000-\$175,000 ²	
Total Cost	\$115,000-\$210,000	

¹ Design and permitting cost is 20% of total construction cost.

² Assumed project area is 0.45 acres, and depth is 2 feet.

Project 5-3: Pioneer Boulevard—Stormwater Retrofit

Focus Area: East Aberdeen

Project Location: Pioneer Boulevard

Concept: Integrate stormwater runoff controls into Pioneer Boulevard. This could include low impact development techniques such as bio-retention swales or pervious pavement.

Purpose: Uncontrolled stormwater runoff from Pioneer Boulevard has contributed to erosion of the steep slope on the east side of the road. Stormwater runoff controls should be implemented to reduce those impacts and provide water quality treatment.

Flood Benefit: Prevents erosion of steep slopes that create landslide risk and convey sediments to catch basins and Wilson Creek, which reduces the capacity to convey floodwaters.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by treatment of runoff leading to enhancement of habitat in Wilson Creek. Any vegetation plantings that could be integrated into bio-retention swales could also provide bird and wildlife habitats.

Water Quality Benefit: Increased residence of time of water in the stream increases the opportunity for reduction of nutrients and settlement of suspended solids.

Community Benefit: The project would reduce impacts to private property from erosion of the steep slope and risk of landslide impacts.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	\$25,000 - \$50,000	Ecology Integrated Stormwater Grants
Design and Permitting	<i>Unable to define at this stage</i>	
Construction	<i>Unable to define at this stage</i>	
Total Cost	<i>Unable to define at this stage</i>	

Project 5-4: Enhance and Certify Levee

Focus Area: East Aberdeen

Project Location: Along Wishkah River, potentially extending from Henry Street to confluence with the Chehalis River.

Concept: There are existing berms along portions of the eastern bank of the Wishkah River and the north bank of the Chehalis River that serve as flood control levees, but have not been approved by the Federal Emergency Management Agency (FEMA). The City of Aberdeen could analyze the condition of the existing berms and make improvements as needed to meet current flood control standards. This would likely require reconstructing portions of the levee, increasing levee height, and filling in gaps where there is currently no levee.

Purpose: This project would be designed to prevent flooding from extreme high tides and coastal storms. FEMA approval of a re-constructed levee would allow the area protected behind the levee to have its designation on the Flood Insurance Rate Map changed and for flood insurance to no longer be required.

Flood Benefit: The levee would be designed to provide protection from the 100-year coastal flood event.

Habitat Benefit: The shoreline of the Wishkah River in this area is urbanized, with extensive armoring and little riparian vegetation. Assuming the levee enhancement project occurs above the ordinary high water mark, there would be little negative impact to fish habitat. There is some potential to enhance in-water and riparian habitat through this project by increasing the amount of vegetation and large wood debris to the edge of the river.

Community Benefit: The levee project would provide protection from coastal flooding to most of downtown Hoquiam. It is estimated that as many as 121 properties with an assessed value of over \$54 million could be protected behind the levee, reducing flood risk and providing a financial benefit to property owners, who would no longer be required to obtain flood insurance.

Planning-Level Cost Forecast and Funding Opportunities

Based on the design effort for the North Shore Levee, it is expected that preparing a 60% design sufficient to apply for a Conditional Letter of Map Revision from FEMA would cost \$200,000 - \$400,000. Depending on the alignment and design, the cost for construction of the levee could vary widely, so it cannot be reasonably estimated at this time.

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$300,000 - \$600,000	Chehalis River Basin Flood Authority
Construction	<i>Unable to define at this stage</i>	
Total Cost	<i>Unable to define at this stage</i>	

Project 5-5: Land Conservation in Wilson Creek Watershed

Focus Area: East Aberdeen

Project Location: Headwaters of Wilson Creek

Concept: Conserve land in the upper watershed of the Wilson Creek basin through acquisition, conservation easements, or other mechanisms.

Purpose: Development in the Wilson Creek headwaters would likely lead to increased stormwater runoff and exacerbate downstream flooding risk. Forested condition of the upper watershed maximizes the potential for interception, storage, and evapotranspiration of rainfall.



There are two major landholders in the upper watershed: Aberdeen Landing LLC and Fruit Growers Supply. A residential development has been proposed for the Aberdeen Landing LLC property.

The City could partner with land trusts that are active in the area, including the Chehalis River Basin Land Trust and Forterra, to enter into agreements with land owners to acquire fee simple ownership or conservation easements on these properties.

Flood Benefit: Maintaining the upper watershed in a forested condition will minimize potential for increased runoff and erosion and transport of sediment that would be associated with development of the area.

Habitat Benefit: The upper watershed of Fry Creek provides over 650 acres of contiguous forested habitat with streams, steep slopes, and wetlands. This provides quality habitat for fish and wildlife species.

Water Quality Benefit: Forested conditions provide interception and storage of runoff. Forests maintain soil stability and limit erosion that causes increased turbidity in waterways.

Community Benefit: Formal protection of the upper watershed would avoid potential increased runoff and flooding that may be associated with clearing and development. If the land was placed in a protected status, a passive trail network could potentially be developed, which would provide a recreational amenity to the community.

Planning-Level Cost Forecast and Funding Opportunities

The costs of land protection in this area would depend on the extent of area protected and the mechanism utilized (easements or fee simple acquisition). Likely sources of funding for easements or acquisition include the Land and Water Conservation Fund, Washington Wildlife Recreation Program, and the Chehalis River Basin Flood Authority.

Project 5-6: North Aberdeen Feasibility Study

Focus Area: East Aberdeen

Project Location: East side of the Wishkah River, north of the Young Street Bridge.

Concept: Much of this area is low elevation land in the 100-year floodplain with relatively limited stormwater and flood control infrastructure.

Purpose: Conduct a study to confirm causes of flooding in this area and evaluate the cost effectiveness of alternatives solutions to address the challenges.

Flood Benefit: The feasibility study would evaluate options to reduce flood risk related to coastal and local flood events.

Habitat Benefit: There are multiple streams and wetlands in this area that could potentially be enhanced for both habitat and flood control functions.

Water Quality Benefit: Currently, there is little to no water quality controls in the stormwater system in this area. Actions to treat stormwater runoff before it enters natural waterways could reduce pollutant loadings.

Community Benefit: Implementation of recommendations identified in the study may reduce the frequency and impact of flooding on the surrounding community. Stormwater controls could also be considered, such as green streets (see Project 2-1), which would enhance the character of the neighborhood while also reducing pollutant loading to the creek.



Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	\$50,000 - \$100,000	Chehalis River Basin Flood Authority, Washington Coastal Restoration Initiative (WCRI); Floodplains by Design
Design and Permitting	<i>Unable to define at this stage</i>	
Construction	<i>Unable to define at this stage</i>	
Total Cost	<i>Unable to define at this stage</i>	

Project 6-1: Shannon Slough Enhancement

Focus Area: Shannon Slough

Project Location: Shannon Slough north of Custer Street

Concept: With the development of Seaport Landing, there is an opportunity to enhance the lower reach of Shannon Slough to improve fish and wildlife habitat, thereby creating opportunities for education and interpretation.



Purpose: Enhance habitat quality and create an educational public recreation amenity.

Flood Benefit: Enhancement of Shannon Slough could incorporate a berm on the edge of the riparian area to provide flood protection for the Seaport Landing property.

Habitat Benefit: Shannon Slough is presumed to provide foraging and rearing habitat for salmon. Native plantings were installed in the 1990s as part of a settlement for a Clean Water Act violation by Weyerhaeuser. Habitat enhancements could include invasive species control and under-planting around the conifers that have matured from that previous restoration effort. The vegetated riparian corridor could be widened and include interpretive trails and bio-retention swales to treat stormwater runoff from the Seaport Landing facility. The potential for removal of the piling field at the mouth of the slough should also be considered.

Water Quality Benefit: Increasing the width of the vegetated riparian buffers and construction of bio-retention swales in the riparian zone would reduce pollutant loadings from runoff from the Seaport Landing facility.

Community Benefit: As part of Seaport Landing, Shannon Slough could be incorporated into environmental education programs and become part of a public trail system around the property. Quinault Indian Nation members regularly fish the Chehalis River near the mouth of Shannon Slough, as protected by their treaty rights. Enhancements of Shannon Slough would support those treaty fishing rights.

TimberWorks: Resiliency and Restoration Master Plan
Project Concept Sheets

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$50,000 - \$75,000	Washington Coastal Restoration Initiative (WCRI); Floodplains by Design
Construction	<i>Unable to define at this stage</i>	Washington Coastal Restoration Initiative (WCRI); Floodplains by Design
Total Cost	<i>Unable to define at this stage</i>	

Project 6-2: Alder Creek Enhancement Study

Focus Area: South Aberdeen

Project Location: Corridor along Alder Creek, from Grays Harbor College to Chehalis River

Concept: Much of the length of Alder Creek has been urbanized. The stream has been straightened, directed through culverts, and re-directed around roads and buildings. There are opportunities to enhance the Creek along its entire length through culvert replacement, invasive species control, and stormwater runoff management in the drainage. Based on observations and data analysis by Grays Harbor College researchers, dissolved oxygen levels can be very low in Alder Creek and populations of deleterious bacteria are elevated.



Purpose: Conduct a study to identify flow constrictions on Alder Creek to alleviate flooding and enhance fish passage.

Flood Benefit: Increasing the volume of water that could flow through Alder Creek would reduce the frequency and extent of flooding in the surrounding area.

Habitat Benefit: Based on observations by Grays Harbor College researchers, Coho salmon and non-migratory fish such as sticklebacks live in Alder Creek. There is potential to increase habitat variety and quality through control of non-native invasive species, planting native vegetation, and installing structures such as large woody debris in the stream.

Water Quality Benefit: The low flow conditions of Alder Creek likely contribute to the low dissolved oxygen levels and high bacterial populations in the stream. There is little to no water quality controls in the stormwater system that discharges to Alder Creek. Actions to treat stormwater runoff before it enters the creek would reduce nutrient loadings that support bacteria populations.

Community Benefit: Implementation of recommendations identified in the study may reduce the frequency and impact of flooding on the surrounding community. Stormwater controls could also be considered, such as green streets (see Project 2-1), which would enhance the character of the neighborhood while also reducing pollutant loading to the creek.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Planning and Feasibility	\$25,000 - \$50,000	Washington Coastal Restoration Initiative (WCRI); Floodplains by Design
Design and Permitting	<i>Unable to define at this stage</i>	
Construction	<i>Unable to define at this stage</i>	
Total Cost	<i>Unable to define at this stage</i>	

Project 6-3: Shopping Center Bio-retention Retrofit

Focus Area: South Aberdeen

Project Location: South Shore Mall

Ownership: Private

Size: 0.5–0.75 acres

Concept: Remove some portion of existing paved parking area and excavate to build a bio-retention cell (rain garden). The bio-retention cell would be sized to detain runoff from the paved areas of the shopping center.



Purpose: This project would reduce stormwater runoff from a large, impervious area that eventually discharges to Alder Creek. This would reduce stormwater runoff volumes, decrease peak flows, and reduce pollutant loadings that are currently conveyed through the stormwater drainage system to the creek.

Flood Benefit: Depending on the size of the facility, it could be expected to provide 1.5 - 2 acre-feet of stormwater runoff storage.

Habitat Benefit: The project site is not directly connected to a surface waterway, so there is no direct fish habitat benefit. However, the project would provide water quality benefits by treatment of runoff as it filters through the amended soil in the bioretention cell. The vegetation plantings could also provide bird, butterfly, and wildlife habitats.

Water Quality Benefit: The project could be designed to function as both a flood detention basin and water quality treatment facility. Detention of runoff and flood waters allows for settlement of suspended sediments. Metals and other pollutants adhere to sediments, so reductions of concentrations would be expected. Published literature on detention basins indicate average removal rates of 72% of TSS, 16% of TP, and 93% Zn. If the facility is designed to function as a bioretention cell with soil media and vegetation, additional water quality improvements would be expected. Studies of bioretention cells have found average removal rates of 99% TSS, 5% of TP, and 99% of Zn.¹⁰

Community Benefit: The proposed project is located in a highly visible shopping center. There are great opportunities to demonstrate green stormwater management techniques to the community through a project in this location.

Planning-Level Cost Forecast and Funding Opportunities

Phases	Cost Forecast	Funding Opportunities
Design and Permitting	\$110,000 - \$160,000 ¹	Ecology Integrated Stormwater Grants
Construction	\$550,000 - \$800,000 ²	
Total Cost	\$660,000 - \$960,000	

¹ Design and permitting cost is 20% of total construction cost.

² Assumed project area is 0.6 acres, and depth is 1.5 feet.

¹⁰ Tetra Tech, 2010. Stormwater Best Management Practices (BMP) Performance Analysis, prepared for United States Environmental Protection Agency – Region 1, March 2010.

APPENDIX C

FUNDING GUIDE



TIMBERWORKS FUNDING GUIDE

Prepared for

CITIES OF ABERDEEN AND HOQUIAM

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Introduction

This guide is a resource for the Cities of Aberdeen and Hoquiam to explore external funding opportunities for projects identified in the TimberWorks Resiliency and Restoration Master Plan that address flood risk reduction, habitat restoration, and public access. The guide presents a summary of the following characteristics of funding sources

Eligibility—Describes the types of organizations eligible by grant guidelines or statutory limitations to receive grants and/or loan subsidies.

Applicability—Grants have certain allowable uses for the funds; “applicability” describes those restrictions.

Match/Equity—Most grants require a local match, or in the case of loans, a debt to equity requirement; “match/equity” describes those thresholds.

Limits—This is the maximum allocated in a single grant or loan.

Conditions—Most grant sources have specific conditions and terms for reimbursement, distribution of funds, or other requirements. Conditions are included in “Notes” when applicable.

Contact—The best available contact information as of this guide’s issue date is listed. Contact information is fluid and changes frequently.

Federal Emergency Management Agency (FEMA)

FEMA provides preparedness grants to state, local, territorial, and tribal governments in the form of non-disaster grants such as Hazard Mitigation Assistance Grants (HMAs), Pre-Disaster Mitigation Grants, and Flood Mitigation Assistant Grants. These grants support, develop, and sustain capabilities to maintain key functions of local governments, transit systems, ports, and other agencies during emergencies and high-consequence disasters.

Emergency Management Division—HMAs

Grants are provided to communities, states, and tribal governments to reduce effects of future disasters. HMAs are **available to the State of Washington only after the presidential declaration of a disaster.**

- Applicant must be in good standing with the National Flood Insurance Program (NFIP) and in compliance with state Growth Management Act requirements.
- Cost share is 75 percent federal and 25 percent nonfederal cost share.
- Structure elevation, mitigation reconstruction, localized and non-localized flood risk reduction projects, infrastructure retrofit, are all eligible mitigation projects.
- Applicant must have FEMA-approved Hazard Mitigation Plan to be eligible.

Eligibility	Applicability	Match/Equity	Limits
Emergency management agency or similar office of the 50 states, territories, or tribes; local governments eligible as sub-applicants.	Long-term hazard mitigation planning and projects, as well as planning and projects to reduce or eliminate risk of flood damage to buildings that are insured under the NFIP on an annual basis.	25% nonfederal cost share.	Different each year.
<p>Contact: Regional: Kenneth Murphy, 425-487-4600 https://www.fema.gov/hazard-mitigation-assistance</p>			

Pre-Disaster Mitigation Grant Program

These are funds appropriated by the Consolidated Appropriations Act for states, tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program. Local governments are considered sub-applicants and must apply to their state (for FY 2016, the State of Washington is eligible to receive \$575,000).

Eligibility	Applicability	Match/Equity	Limits
Territories, tribes, and states. Individual homeowners and businesses may apply through sub-applicants such as state, local, and tribal governments; nonprofit entities can apply as sub-applicants.	Helps communities to implement a sustained pre-disaster natural hazard mitigation program. These could be physical hazard mitigation projects or development of mitigation plans. FEMA requires that grantee develop and adopt a hazard mitigation plan as a condition for receiving these types of non-emergency funds for mitigation projects.	25% cost share required (can be as low as 10% for small, impoverished communities).	\$3 million for mitigation projects, \$400K for new mitigation plans, \$150,000 for mitigation plan updates.
<p>Contact: Washington: Tim Cook, Washington Emergency Management, 253-512-7072; tim.cook@mil.wa.gov https://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf</p>			

Flood Mitigation Assistance (FMA) Program

FMA programs are authorized under, and are funded by income collected by, the NFIP. The FMA program provides funding to projects/measures that reduce or eliminate long-term risk of flood damage to buildings and other structures that are insured by the NFIP. Entities receiving grants must have hazard mitigation plans approved by FEMA prior to grant receipt. Local governments must submit applications through the state as sub-applicants. Recipients must provide the nonfederal share of the costs and cover all costs deemed ineligible for grant funding. Mitigation projects can include:

- Building elevation
- Flood-proofing
- Stormwater management
- Minor localized flood reduction projects

Eligibility	Applicability	Match/Equity	Limits
Territories, tribes, and states. Individual homeowners and businesses may apply through sub-applicants such as state, local, tribal, and local governments; nonprofit entities can apply as sub-applicants.	Flood mitigation projects that will limit damage to existing buildings or structures, in order to reduce dependence on flood insurance.	25% cost share required, but could be 10% or 0% of Repetitive Loss and Severe Repetitive Loss properties, respectively.	\$100K maximum. \$50K for state plans, \$25K for local government plans. 2016 total funding was \$199 million.
<p>Contact: Washington: Tim Cook, Washington Emergency Management, 253-512-7072; tim.cook@mil.wa.gov https://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf</p>			

Economic Development Administration (EDA)

The EDA provides funding through direct grants and cooperative agreements to state and local governments and nonprofit organizations in economically distressed areas. The Public Works and Economic Adjustment programs are the largest. Proposals should be based on a locally developed, comprehensive economic development strategy (CEDS).

Public Works and Economic Development Facilities Program

These programs provide funds for construction or rehabilitation of public infrastructure and facilities necessary to generate or retain private-sector jobs and investments, attract private-sector capital, and promote regional competitiveness.

Eligibility	Applicability	Match/Equity	Limits
State, local, and tribal governments; political subdivisions; institutions; and higher education and public and private nonprofit organizations	Construction or rehabilitation of essential public infrastructure and facilities, including investments that expand and upgrade infrastructure to attract new industry, support technology-led development, redevelop brownfield sites, assist in disaster recovery, and provide eco-industrial development.	50% match, but an additional 30% can be provided, based on region's need.	Max not stated, but funded max of \$3 million in 2015. Average of \$1.4 million.
Note: No grants to individuals.			
Contact: Regional: A. Leonard Smith, 206-220-7660; lsmith7@eda.doc.gov Washington: Jacob Macias, 206-220-7666; jmacias@eda.gov			

Economic Adjustment Assistance Program

These funds are for strategy development, infrastructure construction, and revolving loan funds capitalization. The program is designed to respond flexibly to pressing economic recovery issues in different communities across the country. Potential source of financial assistance for the redevelopment aspect of disaster recovery.

Eligibility	Applicability	Match/Equity	Limits
State, local, tribal governments; political subdivisions; institutions; and higher education.	Provides a wide range of technical, planning, and infrastructure assistance in regions experiencing adverse economic changes that may occur suddenly or over time, including natural disasters.	50% match, but an additional 30% can be provided, based on region's need.	Max not stated, but funded max of \$3 million in 2015. Average of \$1.4 million.
<p>Notes: Strategy investments help organize and carry out a planning process in order to develop a CEDS tailored to the community's specific economic problems and opportunities. Implementation investments support one or more activities identified in an EDA-approved CEDS. Awards may be used for activities such as developing and updating a CEDS and for implementing the CEDS by carrying out projects for site acquisition and preparation, construction, rehabilitation, equipping facilities, technical assistance, market or industry research and analysis, and other activities set out in 13 CFR 307.3.</p>			
<p>Contact: Regional: A. Leonard Smith; lsmith7@eda.doc.gov Washington: Jacob Macias, 206-220-7666</p>			

Planning Program

The Planning Program helps support planning organizations, including district organizations and Indian tribes, in the development, implementation, revision, or replacement of CEDS, and for related short-term planning investments and state plans designed to create and retain higher-skill, higher-wage jobs, particularly for the unemployed and underemployed in the nation's most economically distressed regions.

Eligibility	Applicability	Match/Equity	Limits
State, local, tribal governments; political subdivisions; institutions; nonprofits; economic development districts; and higher education.	Assists recipients in creating regional economic development plans designed to build capacity and guide economic prosperity and resiliency. Development, implementation, revision, or replacement of CEDS; related short-term planning investments.	50% match, but an additional 30% can be provided, based on region's need.	\$300K.
<p>Notes: Planning activities supported by these grants must be part of a continuous process involving the active participation of private-sector representatives (as defined in 13 CFR 300.3), public officials, and private citizens. In addition, they must include: (a) analysis of local economies; (b) identification of economic development goals; (c) determination of project opportunities; and (d) formulation and implementation of an economic development program that includes systematic efforts to reduce unemployment and increase incomes. Current investment priorities include applications that help develop and enhance regional industry clusters and assist local leaders in understanding and applying the principles of entrepreneurship and technological innovation. See 13 CFR 303.1 and 303.</p> <p>Individuals are not eligible.</p>			
<p>Contact: Regional: A. Leonard Smith; asmith7@eda.doc.gov Washington: Jacob Macias, 206-220-7666; jmacias@eda.gov</p>			

Federal Housing Finance Agency

Community Development Cash Advance for Economic Development

Loan program that provides funding for housing and economic development activities in distressed neighborhoods. Supports community-oriented mortgage lending that can be used to target commercial and economic development, including industrial, manufacturing, social service, public facilities, and infrastructure projects.

Eligibility	Applicability	Match/Equity	Limits
State and local governments; private entities.	Cash advance for projects targeted to economic development activities such as commercial, industrial, social services, infrastructure, and public facilities. This can include brownfield cleanup and redevelopment; housing; commercial and economic development; commercial, industrial, manufacturing, social services, and public facility projects; infrastructure projects; funding for community facilities. In the past, it has included disaster relief.	Loan.	Vary.
<p>Notes: Loans in three-to-30-year advance; \$1.3 billion in 2012.</p>			
<p>Contact: EDA Regional Director: A. Leonard Smith, 206-220-7660; asmith@eda.gov Washington: Jacob Macias, 206-220-7666; jmacias@eda.gov</p>			

U.S. Department of Agriculture

Business and Industry Guaranteed Loan Program

Provides funding and technical assistance to community-led environmental projects, specifically building and real estate development and the purchase of machinery and equipment.

Eligibility	Applicability	Match/Equity	Limits
Regional, local, and tribal governments; cooperatives, corporations, partnerships, trusts, and other profit and nonprofit organizations; individuals.	Helps finance construction and purchase capital; improve economic and/or environmental climate.	Loan.	Max \$10 million for single borrower; max \$40 million for organization.
Notes: Maximum loan length of 30 years on real estate; 15 years for equipment; seven years for working capital. Annual renewal fees required.			
Contact: Western Washington State Director: Roni Baer, 509-454-5740; see http://www.rd.usda.gov/programs-services/business-industry-loan-guarantees			

Intermediary Re-lending Program

Capitalizes locally run revolving loan funds for small businesses that are unable to secure financing from banks for real estate and equipment purposes.

Eligibility	Applicability	Match/Equity	Limits
Individual citizens, those in rural communities (fewer than 25k people), corporations, partnerships, limited liability companies, nonprofits, public bodies.	Helps finance construction and purchase capital and pollution control and abatement. Can be used for acquisitions or repairs to support businesses that create jobs.	Loan.	Max \$2 million first loan; \$1 million after; total aggregate debt capped at \$15 million.
Notes: Repayment over 30 years; interest rates at 1% per annum; debt capped at \$15 million.			
Contact: Washington State Program Director: Ted Anderson, 509-924-7350; ted.anderson@wa.usda.gov			

Rural Business Opportunity Grant Program

Promotes sustainable economic development in rural communities with exceptional needs. Funds economic planning for rural communities and businesses as well as for the training of rural entrepreneurs and economic development officials.

Eligibility	Applicability	Match/Equity	Limits
Public bodies, nonprofit corporations, economic development organizations, tribal governments, cooperatives in communities of fewer than 50k.	Rural business; local, regional, and community development; training, planning, and coordination efforts. Assists with regional economic development planning, feasibility studies, market development, business training, technical assistance for entrepreneurs, and establishing business incubators.	Grant.	\$100K max.
<p>Notes: Organization may be in an urban or suburban area, but all work must benefit rural residents and businesses. Must result in economic development; estimated \$2.25 million was available for 2014; between 10% and 30% of applicants received funding.</p>			
<p>Contact: Washington State Grant Admin: Carlotta Donisi, 360-704-7724; Carlotta.donisi@wa.usda.gov</p>			

Rural Business Enterprise Grant Program

Provides grants to public bodies and private nonprofit corporations for projects designed to finance and facilitate the development of small and emerging private or nonprofit businesses. It may fund projects as varied as business district infrastructure projects, capital improvement projects, business incubators, and downtown revitalization projects. The program can also provide business revolving loan funds. The program provides grants to local governments, not directly to private business.

Eligibility	Applicability	Match/Equity	Limits
Rural public entities; tribes; and rural, private nonprofit corporations.	Funding for infrastructure and capital for emerging businesses.	Grant.	Grants generally range between \$10K and \$500 K.
Note: Smaller projects are given higher priority, although there is no maximum level of grant funding.			
Contact: Washington State Grant Admin: Carlotta Donisi, 360-704-7724; Carlotta.donisi@wa.usda.gov			

Water and Waste-Disposal Loans

Funds for developing and repairing water, sewer, storm drainage, and solid-waste systems in rural areas.

Eligibility	Applicability	Match/Equity	Limits
Public bodies, nonprofit corporations, and Indian tribes unable to obtain the required credit at reasonable rates and terms.	Developing and repairing water (including drinking water), sewer, storm drainage, and solid-waste systems.	Grants and loans.	Vary.
Note: Populations of under 10,000.			
Contact: Washington State Director: Mario Villanueva, 360-704-7740; see http://www.rd.usda.gov/contact-us/state-offices/wa			

U.S. Department of Housing and Urban Development (HUD)

Community Development Block Grant Program

This is a flexible program through HUD that provides funding to communities for their development needs. It provides financial assistance to increase and drive economic development activities that have the potential to increase employment and business opportunities for low-income communities. This includes a grant specifically for disaster relief, including flood response, following the presidential declaration of a state of disaster.

Eligibility	Applicability	Match/Equity	Limits
State, regional, and local governments; tribes; and designated disaster areas (for disaster relief program).	Activities must benefit mostly low- to moderate-income persons. Project must also either prevent slums or address urgent community development needs that pose a serious and immediate threat. With regard to disaster relief, eligible activities include recovery efforts involving housing, economic development, and infrastructure.	Grant.	Vary.
<p>Notes: Seventy percent of funds must benefit low-/moderate-income persons; prevent or eliminate slums; and meet urgent community development needs; \$3.1 billion in 2014.</p> <p>HUD distributes funds to state agencies annually. Applicants should apply to the appropriate state agency to be considered for funding. The name of the agency for each state, along with contact information, is provided below.</p>			
<p>Contact: Washington: Department of Commerce: Karen Roe, Program Manager, 360-725-3018; karen.roe@commerce.wa.gov</p>			

Washington State Department of Ecology (Ecology)

Floodplains by Design

Floodplains by Design is a public/private collaborative partnership integrating flood-risk reduction with habitat protection and restoration. These funds are used to implement comprehensive projects designed to fit the river system. The goals of the program are to (1) reduce flood hazards, (2) restore salmon populations, (3) increase agricultural viability, (4) improve water quality, and (5) enhance outdoor recreation.

Eligibility	Applicability	Match/Equity	Limits
Counties, cities, federally recognized Indian tribes, special-purpose districts, salmon recovery lead entities, regional fisheries enhancement groups, conservation districts, and nonprofit organizations.	Funds must address several program goals with each project or portfolio of projects (e.g., flooding, salmon, and water quality). Funding is typically focused on Puget Sound, but is not reserved for it. Successful proposals will be broadly supported at the local level, and will clearly demonstrate how the benefits of completing the project will be achieved.	30% match.	None.
<p>Notes: \$35.5 million distributed for the 2015–17 biennium; Ecology typically requests around \$50 million per biennium. There is also a small pot of funding for “Small Projects” with costs below \$500,000 for the 2015–17 biennium on top of the \$35.5 million for large projects.</p>			
<p>Contact: Scott McKinney, Ecology, 360-407-6131; scott.mckinney@ecy.wa.gov</p>			

Integrated Stormwater Grants

Ecology manages four primary funding programs related to stormwater infrastructure: Centennial Grants, Clean Water State Revolving Loan Fund, 319 Grants, and Stormwater Financial Assistance Program. To streamline application submittal and review, Ecology has coordinated the application process for each of these programs into the Integrated Stormwater Grant application process. This coordinated process is also referred to as the Combined Water Quality Program Financial Assistance Program. Each of the programs are described individually below.

Centennial Grants

This program is funded by state dollars, provided primarily via the State Building Construction Account. The Centennial program provides grants for water quality infrastructure and nonpoint source pollution projects to improve and protect water quality. Eligible infrastructure projects are limited to wastewater treatment construction projects for financially distressed communities. Eligible nonpoint projects include stream restoration and buffers, on-site septic repair and replacement, and education and outreach.

Eligibility	Applicability	Match/Equity	Limits
Local agencies, federally recognized tribes, special-purpose districts, and conservation districts.	Applications due annually in October. Eligible project types include wastewater facility construction (financial hardship communities), agricultural BMP implementation, education and stewardship, water quality monitoring, and riparian and wetlands habitat restoration and enhancement.	25% for non-point source pollution projects.	Grant limits vary, based on project type: <ul style="list-style-type: none"> - Hardship communities (Wastewater Treatment Facility): up to \$5 million - Cash-only match: \$500,000 - In-kind contributions: \$250,000
Note: For information on Centennial Grants, follow this link: http://www.ecy.wa.gov/programs/wq/funding/fundprgms/Cent/oppCent.html .			
Contact: Patricia Brommer, Ecology, 360-407-6566; patricia.brommer@ecy.wa.gov			

Clean Water State Revolving Loan Fund

These are federal funds, matched by states at 20%. The 51 CWSRF programs function like environmental infrastructure banks by providing low interest loans to eligible recipients for water infrastructure projects. As money is paid back into the state’s revolving loan fund, the state makes new loans to other recipients for high priority, water quality activities. Repayments of loan principal and interest earnings are recycled back into individual state CWSRF programs to finance new projects that allow the funds to "revolve" at the state level over time.

Eligibility	Applicability	Match/Equity	Limits
Counties, cities, towns, special districts, and tribes.	These funds can be used for wastewater or stormwater facility construction, planning, or preconstruction. This includes water reclamation facilities, wetland restoration, groundwater planning, and watershed planning.	None	Funding varies each year. No more than 50% of available funds can go to a single applicant.
Note: For information: http://www.ecy.wa.gov/programs/wq/funding/fundprgms/CWSRF/oppSRF.html			
Contact: Shelly McMurry; SRF Fund Coordinator; shelly.mcmurry@ecy.wa.gov ; 360-407-7132 Daniel Thompson; SRF Fund Coordinator; daniel.thompson@ecy.wa.gov ; 360-407-6510			

Stormwater Financial Assistance Program

Stormwater capacity grants are noncompetitive and are awarded to holders of Phase I and Phase II National Pollutant Discharge Elimination System (NPDES) municipal permittees for activities and equipment necessary for permit implementation. Grants of Regional or Statewide Significance are competitive grants that assist permittees in completing projects that will benefit multiple permittees.

The capital grants have had several different names over the years, including Low Impact Development and State Wide Retrofit, Low Impact Development Grants, and Supplemental Statewide Stormwater Grants. Beginning in CY2014/FY2016, capital stormwater grant monies will be known as the Stormwater Financial Assistance Program (SFAP). Application for these funds will be made through the annual Combined Water Quality Program Financial Assistance Program.

Funding to develop construction plans for stormwater capital projects is available through the SFAP Pre-Construction Grants. Preconstruction funding may be available as part of the combined program or may run as a stand-alone program.

Eligibility	Applicability	Match/Equity	Limits
Generally, Phase I and Phase II NPDES municipal permittees. Cities, counties, and ports are eligible for the SFAP only without an NPDES municipal permit and after SFY16 funding cycle.	Depending on the subprogram, project types may include activities to implement an NPDES permit, address existing pollution problems, and provide a high level of water quality benefit, as well as for green retrofit projects.	SFAP: 15% for communities that meet hardship criteria, otherwise 25%. Stormwater capacity grants, Grants of Regional or Statewide Significance or SFAP preconstruction: no match required.	Varies by subprogram (please refer to link below for additional details).
<p>Note: For information on Stormwater Financial Assistance opportunities, follow this link: http://www.ecy.wa.gov/programs/wq/funding/FundPrgrms/Stormwater/oppSW.html.</p>			
<p>Contact: Jessica Schwing, Ecology, 360-407-6216; jessica.schwing@ecy.wa.gov</p>			

Section 319

Section 319 was established to address nonpoint sources of water pollution. EPA offers an annual grant to Washington to implement its plan to control nonpoint sources of pollution, Washington’s Water Quality Management Plan to Control Nonpoint Sources of Pollution. The grant from EPA requires a 40 percent state match, and Ecology provides this match through Centennial grants for nonpoint source pollution control projects.

Eligibility	Applicability	Match/Equity	Limits
Counties, cities, towns, water and sewer districts, port districts, conservation districts, irrigation districts, tribes, and major institutions	Eligible categories include watershed planning, water quality monitoring, etc.	SFAP: 15% for communities that meet hardship criteria, otherwise 25%. Match for Onsite Sewage System repair and replacement is 50 percent.	\$100K max.
Note: For information: https://www.epa.gov/polluted-runoff-nonpoint-source-pollution/319-grant-program-states-and-territories			
Contact: Helen Bresler; 360-407-6551; Helen.Bresler@ecy.wa.gov			

Washington State Recreation and Conservation Office

Aquatic Lands Enhancement Account

Financial assistance for projects, including land acquisition, restoration, improvement of aquatic lands for public purposes, and public access. Intended to restore ecological functions and/or develop attractive public uses.

Eligibility	Applicability	Match/Equity	Limits
Local agencies, state agencies, Native American tribes.	Funding to increase public access and habitat improvement projects. Eligible projects: acquisition, restoration, improvement of aquatic lands.	50% match; 10% for local agencies.	Acquisition up to \$1 million; development up to \$500K; restoration up to \$500K.
Notes: Grants are awarded on a biannual basis. Projects must increase public access. Approximately \$5 million is allotted to projects biennially.			
Contact: Grant Manager: Ben Donatelle, 360-725-3932; ben.donatelle@rco.wa.gov			

Washington Wildlife Recreation Program

This program provides funding for a broad range of land protection and outdoor recreation projects, including park acquisition and development, habitat conservation, farmland preservation, and construction of outdoor recreation facilities. The purpose is to preserve potential outdoor recreational space and protect it from future development.

Eligibility	Applicability	Match/Equity	Limits
Local agencies, special-purpose districts, state agencies, tribes, salmon-recovery entities, and nonprofits.	Eligible projects include land acquisition, including leases and easements, to limit future development. Ecological restoration, bank stabilization, and channel reconfiguration are also eligible.	50% min.	Depends on project type: acquisition up to \$1 million; development up to \$500K; restoration up to \$1 million.
Notes: Comprehensive plan required in order to apply, except for farmland preservation. Biennial grant.			
Contact: Grant Manager: Ben Donatelle, 360-725-3932; ben.donatelle@rco.wa.gov			

Chehalis River Basin Flood Authority

This program was created in 2008 by the Washington State Legislature to provide funding to advance the long-term strategy for the Chehalis Basin projects to reduce flood damage and restore aquatic species. The program includes a programmatic environmental impact statement; data collection; engineering design of future construction projects; feasibility analysis; and engagement of state agencies, tribes, and other parties. In general, the authority funds projects that provide predominantly localized and quantifiable benefit, can be completed within the funding cycle, are supported by the jurisdiction within which the project is proposed, and are vetted and advanced through a public entity such as a city, county, conservation district, or agency. Furthermore, local projects are envisioned as helping with flooding, not causing adverse effects to fish or habitat, and (where possible) providing multiple, quantifiable benefits.

Eligibility	Applicability	Match/Equity	Limits
Local agencies and tribes that have entered into the Flood Authority inter-local agreement.	<p>The authority supports projects that: (1) improve emergency response; (2) advance improved public infrastructure protection; (3) improve local or community flood-hazard reduction; (4) advance conservation district-initiated flood-hazard reduction; and (5) demonstrate innovation (e.g., thinking beyond traditional bank stabilization techniques in favor of natural system designs), partnerships, cost-sharing/leveraging resources, multiple benefits, and proactive vetting with agencies and tribes.</p> <p>In addition, the authority typically will not fund projects/phases in excess of \$3 million for the stage/phase being proposed.</p>	No match required.	\$3 million per project or phase.
<p>Note: For information on the Flood Authority, follow this link: https://www.ezview.wa.gov/site/alias_1492/33948/default.aspx.</p>			
<p>Contact: Scott Boettcher, 360-480-6600; scottb@sbgh-partners.com</p>			

Salmon Recovery Funding Board

Salmon recovery grants are awarded by the Salmon Recovery Funding Board to protect and restore salmon habitat. The board funds projects that protect existing, high-quality habitats for salmon, and that restore degraded habitat to increase overall habitat health and biological productivity. The board also awards grants for feasibility assessments to determine future projects and for other salmon-related activities. Projects may include the actual habitat used by salmon and the land and water that support ecosystem functions and processes important to salmon.

Applicants must submit their proposals to their local lead entity (e.g., Chehalis Tribe) rather than directly to the board. The lead entity is responsible for assembling a ranked list of projects from its area and submitting them to the board for consideration.

Eligibility	Applicability	Match/Equity	Limits
Local agencies, tribes, special-purpose districts, state agencies, private landowners, regional fisheries enhancement groups, and nonprofit organizations.	Applicants must demonstrate how their projects address the goals and actions defined in the regional recovery plans or lead entity strategies.	15% match minimum, although no match is required for design-only projects.	None (design-only projects capped at \$200,000).
Note: For information on the Salmon Recovery Funding Board, follow this link: http://rco.wa.gov/grants/salmon.shtml .			
Contact: Kirsten Harma, Lead Entity Coordinator, 360-488-3232; kharma@chehalis tribe.org			

Washington Coast Restoration Initiative (WCRI)

The goal of the WCRI is to restore forests, water quality, and fish and wildlife habitat through the highest-priority projects on the Washington coast and its tributary river systems (e.g., Chehalis River basin). These projects will both provide restoration jobs to local people now and ensure sustainable natural resource jobs in the future. Funding is prioritized for projects that can demonstrate local support, generate or maintain jobs, and leverage existing funding (e.g., from Salmon Recovery Funding Board).

Eligibility	Applicability	Match/Equity	Limits
Local agencies, tribes, special-purpose districts, and nonprofit organizations, and eligible to receive state funding. Grant applicants must also have a local sponsor, such as a city or county government.	Projects must have clear and tangible restoration and community benefits. Program focuses on restoration activities, rather than on engineered solutions to reducing flood risk.	No match required, although encouraged.	None.
Note: For information on WCRI, follow this link: http://www.washingtonnature.org/marine/coastalrestoration/main/ .			
Contact: Garrett Dalan, 206-550-8423; garrett.dalan@TNC.ORG			

National Park Service / Washington State Recreation and Conservation Office

Land & Water Conservation Fund

Provides grants for the acquisition, development, and protection of public outdoor recreation areas and facilities.

Eligibility	Applicability	Match/Equity	Limits
State and local government.	Funds for preserving, developing, and ensuring accessibility to outdoor recreation, including parks, trails, wildlife lands, and other lands and facilities. Can preserve open space and its ecological functions, or limit development by funding acquisition.	50% match.	\$250K-\$750K.
Note: \$39.9 million distributed in 2013.			
Federal Contact: Grants Program Manager, Pacific West Region; 206-220-4123 State Contacts: Recreation and Conservation Office: Ben Donatelle, 360-725-3932; ben.donatelle@rco.wa.gov			

Washington State Department of Natural Resources

Urban and Community Forestry Program

This program provides technical, educational and financial assistance to Washington's cities and towns, counties, tribal governments, non-profit organizations, and educational institutions. Explore the links below to learn more.

Eligibility	Applicability	Match/Equity	Limits
Cities, towns, counties, tribes, non-profits, and major institutions.	Funds for forestry management, maintenance plans based on tree inventory, strategic plans, enhancement of urban forests, and other related projects.	50% match.	Depends on allocation from USDA. A maximum of \$15K has been typical in recent years.
Note: More information at http://www.dnr.wa.gov/URBANFORESTRY#financial-assistance			
State Contacts: Linden Lampman; 360-902-1703; linden.lampman@dnr.wa.gov			

Transportation Improvement Board (TIB) Programs

Urban Arterial Program

This program funds projects in the areas of safety, growth and development, mobility, and physical condition of roads and related transportation infrastructure. It is intended to correct unsafe conditions, maximize development potential, correct physical and structural deficiencies, improve traffic, and use sustainable design.

Eligibility	Applicability	Match/Equity	Limits
Cities and counties, focusing on urban areas of more than 5,000 people.	Projects are often aimed, in part, at improving flood potential caused by poor slope stability or poor stormwater controls or conveyance. As a whole, these projects are intended to improve the overall conditions of arterial roadways, as listed above. This does not fund utilities. Projects can include reconstruction, rehabilitation, and new streets.	Min 10-20%, but depends on valuation of grantee.	Vary (In 2015, \$80 million spread over 35 projects).
Contact: TIB Executive Director: Steve Gorchester, 360-586-1139; SteveG@TIB.wa.gov			

Arterial Preservation Program

This program provides funding for overlay of federally classified arterial streets in cities with a population of more than 5,000 and an assessed valuation of less than \$2 billion. The program focuses on maintenance of existing arterials.

Eligibility	Applicability	Match/Equity	Limits
<p>Cities and counties, focusing on urban areas of more than 5,000 people; valued at less than \$2 billion.</p>	<p>Similar to Urban Arterial Program, but focused on maintenance. Projects are often aimed, in part, at improving flood potential caused by poor slope stability or poor stormwater controls or conveyance. As a whole, these projects are intended to improve the overall conditions of arterial roadways, as described above.</p>	<p>Cities valued at less than \$1 billion are required to match 10%; cities valued at \$1 billion and \$2 billion are required to match 15% (15% for Aberdeen).</p>	<p>Vary (in 2015, \$13 million spread over 28 projects).</p>
<p>Contact: TIB Executive Director: Steve Gorcester, 360-586-1139; SteveG@TIB.wa.gov</p>			

Special-Purpose District

Metropolitan Parks District (MPD)

Cities and/or counties may create a metropolitan park district for the “management, control, improvement, maintenance, and acquisition of parks, parkways, boulevards, and recreational facilities.” Park districts may levy property taxes or issue bonds for this work. A district must be approved by a majority of voters at any general or special election.

Eligibility	Applicability	Match/Equity	Limits
<p>Cities or counties; boundaries can be drawn to create a district to include all or a portion of a county.</p>	<p>Funds derived by a district could support acquisition and maintenance of facilities (e.g., floodable parks). Local funds such as those derived through a district levy or bond are particularly useful in leveraging state and federal grants that often require a local match.</p>	<p>None—although would provide critical match to state / federal grants that do require match.</p>	<p>Levy: 75 cents per \$1,000 of assessed valuation in the district.</p> <p>Non-voted bond: .25 percent of the value of taxable property in the district.</p> <p>Total indebtedness may be issued in the amount of 2.5 percent of the value of taxable property with the approval of 60 percent of the voters in the district at a general or special election.</p>
<p>Note: For information on the creation of MPDs, follow this link: http://app.leg.wa.gov/rcw/default.aspx?cite=35.61.</p>			
<p>Policy Expert Contact: J. Dee Frankfourth, Trust for Public Land, 206-274-2920; dee.frankfourth@tpl.org</p>			