

**PIERCE COUNTY
TECHNICAL**

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Introduction

In order to achieve the objectives established in the Comprehensive Plan and in departments themselves, Pierce County develops various plans and programs (technical capabilities). Many of these plans and programs help to mitigate the County's vulnerability to natural hazards. These capabilities range from gathering data that has relevance to mitigation, to implementing physical mitigation projects. These are all considered existing mitigation actions and are catalogued as such. Application of this identification will allow for better coordination and efficiency in implementing new measures as the plans and programs may serve as an existing base from which to pursue these mitigation activities.

Below is a profile of the existing plans and programs, organized by the hazard which they help to mitigate, beginning with multi-hazard technical capabilities. Each profile includes summary of each activity and the Lead Jurisdiction(s).

Multi-Hazard

Community Plans

Hazards Addressed: All

Lead Jurisdiction(s): Advanced Planning (PC PALS)

Community Plans express the voice of local citizens in how the Comprehensive Plan and its development regulations will be carried out in specific communities. Community plans indicate specific land use designations, appropriate densities, and design standards.¹

Buildable Lands Program and Report

Hazards Addressed: All (natural)

Lead Jurisdiction(s): PC PALS

Since 1997, Pierce County and its 23 cities and towns have worked collaboratively in a program to collect annual development permitting data, inventory developable land, and enhance information relating to wetlands and steep slopes. This program is aimed at satisfying the 1997 amendments to GMA and improving accuracy in the information used to determine the capacity of the County's UGAs.

The Buildable Lands Report consolidates incorporated and unincorporated land development data for all urban areas within Pierce County. A substantial amount of information has been collected to assist local jurisdictions in evaluating the effectiveness of their adopted comprehensive plans and associated regulations, and in documenting the methodology in calculating the 20-year population and employment capacity of the adopted UGAs.

Pierce County Capital Facilities Plan

Hazards Addressed: All

Lead Jurisdiction(s): Facilities Management

The overall purpose of the CFP is to use sound fiscal policies to provide adequate public facilities consistent with the Land Use Element of the Comprehensive Plan on a schedule concurrent with, or prior to, the impacts of development. This will allow the County to achieve and maintain adopted standards for LOS, and to exceed the adopted standards when possible. In many instances, the CFP reflects other long-range or master plans which have been adopted by the County Council for certain types of facilities such as the Transportation Improvement Plan, 14-year Ferry Plan, Comprehensive Solid Waste Plan, Comprehensive Flood Control Management Plan, Surface Water Management Plan, and the Parks and Recreation Master Plan. The Capital Facilities Plan does not authorize the expenditure of funds over the six-year time frame of the plan. Rather, the funds for capital projects are appropriated annually in the County's Budget.

Pierce County Transportation Improvement Program

Hazards Addressed: All

Lead Jurisdiction(s): Transportation Services (PC PWU)

The Transportation Improvement Program updates and coordinates Pierce County's future plans for transportation improvement programs and projects. This annually updated document is prepared pursuant to Revised Code of Washington (RCW) Chapters 35.77 and 36.81 which requires cities and counties to file adopted programs yearly with the State Secretary of Transportation. In addition, each urban-area city and county is required to submit a separate program section identifying projects for submittal to the Transportation Improvement Board (TIB) for potential funding under the Urban Arterial Trust Account (UATA) or the Transportation Improvement Account (TIA). This annual update also informs other jurisdictions of Pierce County's current planning direction for transportation needs.

Pierce County Non-Motorized Transportation Plan

Hazards Addressed: EQ; FL; V; L

Lead Jurisdiction(s): Transportation Services (PC PWU)

Pierce County adopted its first Nonmotorized Transportation Plan on July 8, 1997. The plan was incorporated into Pierce County's Comprehensive Plan on June 5, 2000. The Transportation Element along with the County's Community Plans guides the development of a nonmotorized transportation system in Pierce County through roadway improvements, trails, paths, sidewalks, paved shoulders, and bike lanes.

Pierce County Fourteen-Year Ferry Program

Hazards Addressed: All

Lead Jurisdiction(s): Transportation Services (PC PWU)

This program is intended to be a guide that indicates required long range improvements and anticipated revenues and expenditures. Strict adherence is not required. The County is required to prepare long-range plans for capital improvements for all major elements of the ferry system. These plans must be annually updated and a copy of the adopted program must be filed with the County Road Administration Board and the Secretary of Transportation. In addition, the Federal Highway Administration requires all agencies within a Metropolitan Planning Organization (MPO) to annually develop and update their long range Transportation Improvement Plans (TIP) and their Biennial Element (BE).

These state and federal requirements were implemented to assure that the counties have available current plans for a coordinated transportation improvement effort that encompasses all projects regardless of funding

Pierce County Annual Road Program

Hazards Addressed: All

Lead Jurisdiction(s): TBD

TBD

Roads Maintenance Management System (RMS)

Hazards Addressed: All

Lead Jurisdiction(s): Roads Operations Division (PC PW&U)

The RMS program defines maintenance as the preservation and upkeep of a County road including all of its elements, in as nearly as practical its original as-constructed condition or its subsequently improved condition. This includes maintenance, replacement, and minor additions to roadway surfaces, shoulders and side approaches, roadsides, drainage and structures. The inspection and evaluation of the road infrastructure and its elements is defined in all areas to insure that all systems are operational in the event of unforeseen natural disasters that may affect the safety of the traveling public.

Road District Supervisors utilize the RMS guide to develop the annual budget for work programs, plan work, monitor work activities, inspect infrastructure and prepare for emergency related responses.

This includes not only the regular inspection and evaluation of the road infrastructure but includes when necessary measures to clean up small landslides which impact travel, put in protective barriers in some cases to protect the road, and modification of the slopes both above and below some roads. Included in the plan is the understanding that certain

roads while having been created historically to access certain areas or properties in the county have inherent long term landslide problems. In some cases due to the continued landslide threat some road maintenance may be postponed or in some cases eliminated altogether, leading to the eventual closure of the road.

GIS and CountyView

Hazards Addressed: All

Lead Jurisdiction(s): GIS Division (PC ISD)

CountyView is a desktop geographic information system. The software is based on ESRI's ArcView and is customized for Pierce County data and applications. The software is used to create hazard maps and plot hazard reports for recovery purposes.

Critical Area Data Enhancement Project

Hazards Addressed: EQ; FL; V; L; WUI

Lead Jurisdiction(s): PC PALS through the PC Buildable Lands Program

The presence of critical areas such as wetlands, steep slopes, and streams may substantially reduce the development potential of individual parcels. In the review of projects, jurisdictions rely on various data sources, such as the National Wetland Inventory and the Soil Survey to determine the presence of critical areas. Problems with these existing data sources have been discovered, and the development community and governmental entities generally accept the notion that current inventories underestimate the total acreage consumed by critical areas. This being the case, Pierce County initiated a project to enhance the critical area representation in the analysis. It should be noted that not all cities and towns participated in this project. Some jurisdictions were not able to participate because of data constraints, while some pursued independent verification.

The inventory materialized through analysis of various environmental and hydrological attributes. The review of soils, elevation contours, and vegetation enabled technicians in coordination with biologists to distinguish probable wetland boundaries and steep slopes. Comparing existing delineated wetland boundaries with output from the project verified the reliability of the approach. The intent of the project was to enhance the critical area assumptions for buildable lands analyses. The project was not intended to delineate or verify the presence of a critical area at a project level.²

Pierce County Mitigation 20/20 Database

Hazards Addressed: All

Lead Jurisdiction(s): PC DEM

Mitigation 20/20 is a program purchased for jurisdictions by the State of Washington. It is used to help quantify and catalogue risk, vulnerability, and mitigation measures. Pierce

County used the program in developing this and other mitigation plans. Pierce County DEM keeps and updates this database as necessary.

NOAA Weather Radio Information Network

Hazards Addressed: All

Lead Jurisdiction(s): PC DEM

NOAA Weather Radio broadcasts warnings and post-event information for all types of hazards—weather (such as tornadoes, storms, and floods), natural (such as earthquakes, forest fires, and volcanic activity), technological (such as chemical releases, oil spills, nuclear power plant emergencies, etc.), and national emergencies. Working with other Federal agencies and the Federal Communications Commission's (FCC) Emergency Alert System (EAS), NOAA Weather Radio is an all-hazards radio network, making it the single source for the most comprehensive weather and emergency information available to the public. Weather radios are readily available at small appliance and hardware stores throughout the region.

The program identified weather radios as a means of providing Mt. Rainier hazard and warning information to the population living in the upper Nisqually valley, donated NOAA Weather Radios to every home and business in the Upper Nisqually River basin, and set up training for those at risk, both on the programming of the radios and what to do if there should be a threat from the volcano.

Pierce Responder

Hazards Addressed: All

Lead Jurisdiction(s): GIS Division (PC ISD); PC DEM

The web-based Responder System contains information, floor plans, pictures and aerial maps of schools and public facilities. The data can be accessed by emergency personnel in the field via wireless modems.

PC-NET Program

Hazards Addressed: All

Lead Jurisdiction(s): PC DEM

Pierce County Neighborhood Emergency Teams (PC-NET) is a neighborhood-oriented approach to emergency preparedness and homeland security. It is based on the belief that a cooperative effort between a county and its citizens is the only sure way to protect a neighborhood and to prepare for a major disaster.

DEM University

Hazards Addressed: All

Lead Jurisdiction(s): PC DEM

The County offers training in Rescue Systems I and II, ICS/EOC Interface, Trench Rescue, Rope Rescue & Rigging, Multi-Hazard Safety Workshop for Schools, Emergency Preparedness for Home and Office, and ATC 20 and 21. ATC 20 and 21 are discussed in the earthquake section below.

Pierce County Intra-Governmental Emergency Management Training and Education

Hazards Addressed: All

Lead Jurisdiction(s): PC DEM

TBD

Emergency Training and Exercise

Hazards Addressed: All

Lead Jurisdiction(s): TBD

TBD

Emergency Preparedness Public Education (Puyallup, Little Puyallup, and Livable Communities Fairs)

Hazards Addressed: All

Lead Jurisdiction(s): PC DEM

Pierce County DEM employs a booth at many of the fairs in Pierce County throughout the year. The purpose of these booths is to educate the public on the hazards that affect the region and what individuals can do to be better prepared. This public education activity is a means of distributing materials and information relating to hazard preparedness and mitigation.

Underground Electric Utilities

Hazards Addressed: Earthquake, Severe Storms

Lead Jurisdiction(s): Tacoma Power, Ohop Mutual, and other utility providers.

Tacoma Power, which serves much of populated Pierce County, requires undergrounding of utilities in new subdivisions. This benefits the utility in reduced maintenance costs due to power line damage. Tacoma Power's practice has been to absorb 30% of the

undergrounding costs where retrofitting has been done, based upon its analysis of the financial benefit to the utility. Other major public utilities serving the area are Ohop Mutual Power, and the major private utility provider, Puget Sound Energy.

Ohop Mutual Power also requires undergrounding of electrical wires when new developments are built. Puget Sound Energy, however, leaves discretion to the developer. Ohop and Tacoma Power, asserts that undergrounding of wires results in fewer outages and reduces the inconvenience to customers.

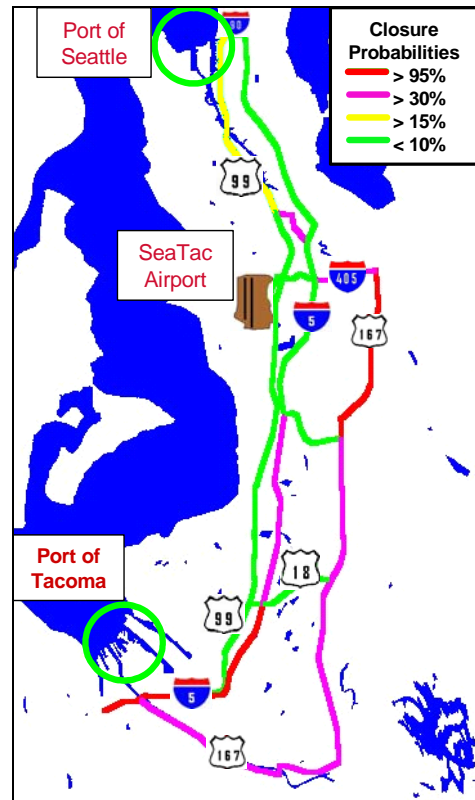
This helps prevent the breaking of power lines during storms of all types resulting in continued electrical coverage to citizens in the County and also leads to decreased maintenance costs in line repairs after storms and earthquakes.

Earthquake Hazard

“Port to Port” Transportation Corridor Earthquake Vulnerability Project

Lead Jurisdiction(s): PC DEM, King County DEM, Business and industrial partners, FEMA, WSDOT, EQE International, USGS, UW.

A two year long economic and engineering study of the seismic vulnerability of highway corridors linking the Port of Tacoma and the Port of Seattle comprised the centerpiece of King & Pierce Counties’ Project Impact. Significant partners in the study contributed new earthquake scenarios and projected ground motions (USGS); liquefaction information (DNR); construction data on individual bridges along the route (WSDOT); economic impact assessment of transportation system outages to businesses and the community at large (UW Geography Department); and contingency route planning conducted individually by the counties, to determine how detours could be managed at critical failure points.



The Port to Port Transportation Corridor Seismic Vulnerability Project aims to determine economic consequences of transportation system failures between the ports of Tacoma and Seattle following a major earthquake. The study reviews the economic and transportation effects of six potential earthquake scenarios on I-5, Washington 167,

Washington 99 and major rail lines. The project is the first to anticipate and potentially mitigate earthquake damage within the transportation corridor.

Port to Port incorporates updated earthquake fault data from the USGS, DNR, WSDOT. The data is used to determine the vulnerability of bridges and elevated roadway structures. Estimated costs and time to restore transportation routes were developed by WSDOT and EQE International, an earthquake-oriented risk management and engineering firm hired to conduct the study.

In the last step, a University of Washington economist used the outage information to interview major manufacturers, businesses, utilities and others regarding the economic consequences of a major earthquake. With this data, traffic engineers, emergency managers, business owners and operators will be able to weigh the cost of system failure against the cost of retrofitting the corridor to a higher seismic resistance level.³

Funds received from the U.S. Department of Transportation (\$20,000) also permit updating of bridge restoration data to improve forecasting of outage times, contingency route use, and economic damages.

Contingency Route Planning

Lead Jurisdiction(s): City of Tacoma, involved the Washington State Patrol, City of Fife, WSDOT, PC, and others.

As an element of the Port to Port Project, both King County and Pierce County assembled inter-jurisdictional teams to plan contingency routes for major potential bridge outages. Pierce County selected the Puyallup River Bridge as its planning model. Over several months, the participants created a plan to route traffic around a bridge outage for an extended period of time. This inter-jurisdictional contingency route plan is the first of its kind, and intended to present a model for future cooperation and emergency response.

County Facilities Seismic Evaluation

Lead Jurisdiction(s): PC Facilities Management

The County budgeted funds in 2002 for a seismic evaluation of the County-City Building, the County's principal administrative structure, which houses the Sheriff's Administration, Courts, Prosecutor, Executive and Legislative Offices, Facilities Management, Emergency Management and other County functions. This building was constructed in 1959 and sustained relatively small damage in the 2001 Nisqually Earthquake. However, it is the location of critical public safety and emergency management functions and has top priority for seismic structural evaluation. Funds have also been budgeted for evaluation in 2002 of the County's public works shops, which may not meet current seismic codes, and are critical to timely and effective emergency response.

Other County-owned facilities, including the Puget Sound Behavioral Health (PSBH) buildings, Remann Hall and the “Main” Jail, constructed in 1984, are also in line for a seismic review. The Pierce County Annex has recently been the subject of a partial upgrade, tied in with work related to re-roofing and HVAC.

Bridge Seismic Retrofit Program and Report

Lead Jurisdiction(s): Transportation Program (PC PW&U), WSDOT

Pierce County’s 160 bridges have been the subjects of an ongoing seismic retrofit program.

(Seattle Only) The bridge seismic retrofit program has essentially completed retrofitting all of the single column bridges. The next category of bridges, those with multiply columns in each bent, raise questions as to what the correct and most economical approach should be to retrofitting. Research will focus on assessing the seismic vulnerability of typical multi-column bent bridges and providing retrofit strategies that do not require the treatment of every column in every bent. Retrofitting every column would be both time and cost prohibitive. Primary benefit would be cost savings.⁴

Following this program, WSDOT produced the "Bridge Seismic Retrofit Program Report."

Earthquake Home Retrofit Program

Lead Jurisdiction(s): City of Seattle, PC PALS

The City of Seattle convened a regional group of residential building industry contractors, officials and architects, to design this program. Components of the program include:

- prescriptive standards for certain wood-frame residential buildings, of up to four units;
- training for homeowners in evaluating their own homes and doing the work, or hiring a contractor; and
- contractor training programs aimed at providing homeowners the option of hiring out the retrofit work.



To date in Pierce County interest has been sporadic. Homeowner training was offered following the Nisqually Earthquake. Sixteen building departments in King and Pierce Counties have adopted this comprehensive program.

Project Impact

Lead Jurisdiction(s): PC DEM

In 1998, Pierce County became part of FEMA's "Project Impact," an initiative to stimulate local communities to develop "Disaster Resistant Communities" through public/private partnerships. Communities were encouraged to develop mitigation initiatives responsive to local hazards and loss histories.



Project Impact of King & Pierce Counties was established as an interlocal entity of the two counties, combining their 1998 Project Impact funds to support several community-selected initiatives to mitigate against future earthquake damage in Washington's two most populous counties, with a combined population of 2.4 million (2000 census).

As of November 2001, the projects listed below have been undertaken as part of Project Impact:

Project LifeLines

This project maps critical routes and critical facilities in a four county region: King, Pierce, Snohomish and Kitsap. Financed by Washington State Department of Transportation, this project was conducted by Project Impact with the help of participating cities and counties. The final product, a CD-ROM version of the maps and databases, should be available to participants by January 1, 2002. This low cost effort has benefit to the participants in identifying critical routes that reach beyond political boundaries, and ties the region together facilitating emergency response planning. Databases will be maintained by individual cities and towns.

Project Impact TV

This series of programs, produced by Rainier Communications Commission, has developed and aired some 25 programs dealing with mitigation and disaster preparedness. Through powerful partnerships with other public television stations, these programs have been shown on 29 channels, including King and Pierce counties, and many city, county, school, and tribal channels. Programs are aired repeatedly by these stations, reaching broad audiences multiple times, helping to reinforce the culture of mitigation.

Small Business Mitigation

Small businesses are especially vulnerable to failure from temporary closures. According to the Washington State Office of Financial Management (OFM), some 40% finance operations on personal credit cards and are ill prepared to survive disasters. Other studies indicate that most small



Computer damage in Olympia, WA offices following Nisqually Earthquake Feb. 28, 2001

businesses forced to shut down temporarily as a result of disaster will not be in business a year later.

Project Impact's objectives in educating small businesses about the importance of mitigation are to:

- Develop local business alliances with Chambers of Commerce, business associations, universities, local government and citizens.
- Recruit and train students from local universities in hazard recognition, risk analysis and mitigation, to form one to one, on site relationships with business.
- Supply businesses with a "checklist" approach to identifying critical functions to be mitigated.
- Develop recognition of interdependencies in the business community.
- Create new markets for mitigation goods and services.

Since its inception the project has focused efforts in Parkland, Puyallup, University Place, Fife and Lakewood, training nearly 100 students from the University of Puget Sound and Pacific Lutheran University in nonstructural mitigation techniques and how to approach businesses. Literally hundreds of businesses have received an in person message from a visiting student team.

KidsFair—Nonstructural Mitigation Project

This media campaign was conducted under contract with KOMOABC4 to encourage schools, businesses and residents to secure computers, monitors and other electronic equipment to avoid damage or loss in the event of a moderate earthquake. Bank of America donated funds for over 1,000 tie downs to be placed in schools; and in 1999 and 2000, Project Impact had a presence at KOMO KidsFair, distributing several hundred tie downs to interested citizens. This media campaign dramatically increased public recognition of Project Impact and the role of mitigation in preventing damage.

PC KidsCorps—Childcare Non-Structural Retrofit Program

Lead Jurisdiction(s): PC DEM; American Red Cross

This began as a Project Impact program, has since been modified, and is now a Citizen Corps program that performs nonstructural seismic retrofits of non-profit childcare centers throughout Pierce County. To date, the KidsCorps has retrofitted 16 childcare centers, 15 in Pierce County, training over 378 volunteers in nonstructural retrofit techniques, and protecting some 1478 children who will pass through the centers. There are over 70 nonprofit childcare centers in Pierce County which would benefit from this program, and the projects will continue as long as funding support and volunteers partners are available. These projects serve multiple objectives:

- Protecting small children against harm from moderate to strong earthquakes.

- Training of volunteers, especially students, in mitigation techniques to be applied in their home and business lives.
- Teaching childcare center staff in nonstructural mitigation techniques.
- Providing information to childcare center parents, staff and members of churches or organizations in which the childcare centers are located.
- Providing a local media opportunity to convey the message of mitigation and community service.

Volcanic Hazard

Mt. Rainier Response Plan

Lead Jurisdiction(s): PC DEM

The goal of the Mt. Rainier Response Plan is to:

- Develop a comprehensive multi-jurisdiction plan on how to respond to a Mt. Rainier emergency, either eruptive or non-eruptive.
- Involve a wide range of public and private agencies and organizations in the formulation of this plan.
- Test the plan.
- Update the plan as necessary.

Representatives from over 20 agencies and the private sector assisted in the development of this plan. They included representatives from state, Federal and local government as well as private organizations such as the American Red Cross. In order to test the plan, Pierce County in coordination with four of the cities and towns located in the County applied for and were accepted for an Integrated Emergency Management Course (S930 - IEMC: Specific on Volcano Hazards) at FEMA's training center at Mt. Weather, Virginia. One hundred people from different disciplines and agencies from throughout the County, many of the cities and towns located therein, Washington State EMD and a representative of the local press attended this course. Updating of the plan is an ongoing process with input from all the affected jurisdictions.



Mt. Rainier Evacuation Plan

Lead Jurisdiction(s): PC DEM; Valley Evacuation Planning Group

The goal of the Mt. Rainier Evacuation Plan is to:

- Facilitate the rapid evacuation of people from areas threatened by a lahar.
- Identify methods for warning the population at risk.
- Develop a method of emergency route identification.
- Develop responsibilities for traffic control, closure of roads into the valleys, and changing all roads out of the valley into exit only roads.

An initial plan was developed and placed in the CEMP as Emergency Support Function (ESF) 24 Tab 1. It is also contained in chapter VI of the Mt. Rainier Volcanic Hazards Response Plan. This plan, called the “Valley Evacuation Plan, Carbon and Puyallup River Valleys, Pierce County, Washington,” has the goal of facilitating the rapid evacuation of the thousands of people at risk in the Carbon and Puyallup valleys.

The plan is under continuous review to make sure that it operates in an optimal fashion. This plan works directly in conjunction with other portions of both the Pierce County CEMP and the Mt. Rainier Volcanic Hazards Response Plan.

Evacuation signs are placed throughout the valley to identify the evacuation routes, which would be used during a volcano emergency. The signs make visible the routes out of the valley, which the public would need to follow to get to safety making it much easier to channel traffic out of the valley, and they serve as a constant reminder for the public that there is a volcanic hazard associated with living in the valleys. It would increase general public awareness of the volcanic threat in Pierce County, reaching that part of the public who have been unaware of it in the past.

Lahar Warning System

Lead Jurisdiction(s): PC DEM with CVO

The lahar warning system serves to:

- Detect lahars within the Carbon and Puyallup river valleys.
- Implement an automated warning system which limits human involvement allowing rapid warning of the population at risk.
- Develop a pilot system which can then be exported to other areas around the world with similar lahar problems. Create a system which will eliminate false alarms.

In 1998, members of the Cascade Volcano Observatory, an office of the USGS, and DEM installed acoustic flow monitors (AFMs) in the upper Carbon and Puyallup river valleys. These sensors are able to pick up the vibrations from a lahar flowing down the valley, and broadcast that information by radio to both the County emergency dispatchers and the Washington State EOC. After two years of testing the system became operational in 2000.



This system enables the County and state to issue warnings to the jurisdictions in those valleys that might be affected by the lahar. Additionally, portions of the valley have a low wattage radio (95.3 FM) that broadcasts information when the alarm is sounded.

Further methods of warning the public are the Emergency Alert System (EAS) and the NOAA All-Hazards Radio Network. Activation of the system would send a message to KIRO radio to be broadcast. This warning could then be picked up and rebroadcast by other stations to their listening audiences in the threatened area.

Flood Hazard

Pierce County Low Impact Development Study

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

The purpose is to evaluate the potential to implement low impact development (LID) concepts in Pierce County. The primary goal of low impact development is to generate no measurable impacts to aquatic environments by mimicking the predevelopment site hydrology. This is accomplished by using site design techniques and natural systems that store, infiltrate, evaporate and detain runoff. This study helps determine the feasibility to reduce stormwater impacts of residential development in the County through the application of LID techniques to three sites and to evaluate the costs, through a benefit-cost analysis, of LID as compared to conventional development.

Specifically, the use of LID concepts are being explored as a means of reducing impacts to aquatic systems by identifying development measures which promote natural hydrologic functions such as evaporation and infiltration and reduce or eliminate water quality impacts.⁵

Pierce County Water Programs Comprehensive Emergency Management Plan

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

TBD

WRIA 15 Kitsap Basin Water Pollution Control and Abatement Plan, as amended, 1976

(Flood Insurance Study for Pierce County, Washington, Volumes 1 and 2. August 1987. Federal Emergency Management Agency. Ground-Water Flooding in Glacial Terrain in Southern Puget Sound, Washington. USGS Fact Sheet 111-00. September 2000. Prepared by Jones, M., J. Joseph, and T. Olsen. United States Geological Survey.)

Lead Jurisdiction(s): TBD

TBD

1990 Puyallup River Flood Control Management Plan

Lead Jurisdiction(s): TBD

TBD

Puyallup River Basin Comprehensive Flood Control Management Plan (CFCMP)

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

Adopted in 1991, the plan was prepared to minimize the impacts on the use of land within the river valleys of the Puyallup River, White River, and Carbon River.

The 1990 Puyallup River Flood Control Management Plan recommended amending the floodplain regulations as follows:

- Prohibit any increase in flood elevation within a floodway;
- Prohibit any new development or fill in a floodway that would increase the base flood elevation by more than .01 of a foot;
- Prohibit new development or fill in the floodplain;
- Prohibit storage of any hazardous materials in the floodplain; and
- Require structures to be flood-proofed to at least two feet above the base flood level.

Pierce County Repetitive Loss Plan

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

The Repetitive Loss Plan summarizes the flooding problems within the identified repetitive loss areas and explains the process used to evaluate alternative solutions and develop an action plan of preferred solutions. It addresses properties with flood insurance claims not previously identified in other County reports.

Pierce County Storm Drainage and Surface Water Management Plan

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

Over a decade ago, the Pierce County Storm Drainage and Surface Water Management Plan (1991 Plan) was completed. This Plan contained structural and nonstructural

measures to address flooding and water quality problems areas in the County. Many of the stormwater projects carried out by the Water Programs Division were identified by the 1991 Plan.

The 1991 Plan recommended upgrades to a number of culverts that were determined to be undersized. Five of these culverts were categorized as high-priority projects due to their risk of over-topping and impacting traffic. The 1991 Plan also recommended increasing the channel capacity of a portion of Lacamas Creek, removing reed canary grass and sediment to reduce flooding.

Watershed Action Plans

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

Watershed planning is an important component of the nonpoint-source pollution program in the Puget Sound Water Quality Management Plan.

The Puget Sound Water Quality Authority, in cooperation with DOE, adopted and subsequently revised the Nonpoint Rule (Chapter 400-12 WAC) to guide local watershed planning and management.

Under the Puget Sound Plans program addressing nonpoint-source pollution, a committee of local representatives in each Puget Sound county identified and ranked its watersheds. Watershed management committees develop action plans to prevent and reduce nonpoint pollution and to restore and protect habitat in priority watersheds.

The lead implementing agency coordinates implementing entities, identifies funding sources and provides annual watershed report cards on progress and barriers to the watershed community, Ecology and the Puget Sound Water Quality Authority. Watershed management councils are appointed to help lead agencies oversee and implement the plan, involve the public and develop the watershed report card.

Program Services Section staff assist and track implementation of Watershed Action Plans developed under the state's WAC 400-12 process. Six Watershed Action Plans have been or are currently being developed:

- Chambers-Clover Creek Watershed Action Plan
- Key Peninsula Gig Harbor Islands Watershed Action Plan
- Lower Puyallup Watershed Action Plan
- Upper Puyallup Watershed Characterization and Action Plan
- Nisqually River Management Plan
- Penrose Point/Mayo Cove Water Quality Protection Plan

The action plans address sources of nonpoint source pollution and beneficial uses of water. In tracking implementation, staff work and support local watershed councils.

Basin Plans

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

Water Programs is developing 10 basin plans that cover all 26 Pierce County basins. The plans are updates to Pierce County's 1991 Surface Water Management Plan. That plan was developed prior to passage of the state's Growth Management Act, adoption of the County's Comprehensive Land Use Plan, issuance of the state's National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit to Pierce County, and listing of chinook salmon and bulltrout under the Endangered Species Act (ESA). These events and others, including designations of numerous Pierce County water bodies on the state's polluted waters list (303d list) and status under the federal Community Rating System (CRS) for flood hazard reduction, have necessitated Water Programs' integrated basin approach. Finally, the basin plans ensure financial accountability of the program by directing expenditures collected within individual basins to the surface water management priorities in those basins.

Program Services Section staff conduct comprehensive, integrated surface water management plans for each of Pierce County's 26 basins. They direct the capital projects and programmatic activities of the Water Programs. The Section applies a multi-disciplinary approach involving engineering, planning, and natural resource management to the basin planning function.

The Basin Plans support (or further) Pierce County's:

- Compliance with its federal Clean Water Act NPDES municipal stormwater permit;
- Compliance with the ESA by eliminating or reducing existing potential habitat issues that could cause "jeopardy" for protected species;
- Upgrade to a Class 4 Community Rating under FEMA's CRS;
- Hazard Mitigation Planning, as required by FEMA (as a result of congressional action) to retain eligibility for federal disaster relief funds; and
- Submittal to the Washington Department of Fish and Wildlife (WDFW) for a programmatic approval agreement under RCW 77.55.100, which allows for programmatic approval in lieu of project-by-project permitting.

The first specific goals and objectives of the Basin Plans is to reduce flood hazards. These include:

- Incidents of property loss and repeat damage will be reduced.
- Streams will not be adversely impacted by flood events.
- Pierce County's standing under the FEMA CRS will improve.
- New development will be located outside of flood prone areas.⁶

Chambers-Clover Management Plan Project: Watershed Management Plan

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

Elements of the plan that relate to flooding are covered under the headings Flooding, Aquifer Flooding, and Stormwater Recharge. Within these, the plan identifies the general scope and nature of the problems and references the appropriate plan for each Issue.

Flooding

Flooding is a significant problem in the Chambers-Clover Watershed and can occur due to a number of causes, including: an increase in the amount of impervious surface; excessive stream flows; stream blockages; undersized stormwater culverts; or a high ground water table. For the Clover Creek Basin, flooding issues are being addressed in the unincorporated portion of Pierce County through Pierce County Water Programs' Basin Plan. This issue is also being addressed, at least in part, through the Community Plans, proposed new stormwater regulations, and Pierce County's Habitat Protection and Restoration regulatory package. The issue of flooding, both from surface water and from ground water (Issue #5), is interrelated with the issue of stormwater recharge to the ground water (Issue #6).

Aquifer Flooding

Flooding caused by a high water table has occurred in areas of the Chambers-Clover Watershed during recent years with especially high precipitation. The Clover Creek Basin Plan will work to address this problem within the Clover Creek Basin. The extent of this problem in the remaining portion of the Watershed has not been determined. If successful at increasing stormwater recharge, then ground water flooding may become a greater problem. This is also an issue of timing. This issue is interrelated with Issues #4 and #6.

Stormwater Recharge

Recharge to the Chambers-Clover Watershed is provided by precipitation, some of which is routed through the stormdrainage system to streams, lakes, or directly into Puget Sound. The intent of this issue is to increase stormwater recharge where feasible and to minimize additional loss of recharge due to an increase in the amount of impervious surfaces. This is a balancing act in that some treated stormwater discharge to streams and lakes may be needed to support these waterbodies. Also, it is important to ensure that the recharge water is of high enough quality to protect beneficial uses. This Issue needs to consider previous, existing, and potential stormwater regulations, the Clover Creek Basin Plan, the Chambers-Clover Creek Watershed Action Plan (nonpoint pollution plan), the purchase of flood plains, and the Low Impact Development Guidelines.

Nisqually River Management Plan, 1987

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

The plan provides recommended policies and implementation guidelines for the Nisqually River Management Plan. The plan is based on the work of the Nisqually River Task Force. The key issues the Task Force had to address include public access to the river, flood control and emergency warning systems, fish and wildlife protection and enhancement, local public desires to maintain existing rural landscape and economy, and the balancing of local private property owner rights with statewide public interest rights in this river of statewide significance. The plan makes specific recommendations relating to flood control such as property acquisition, native species restoration, and the removal of levees.

Clover Chambers Creek Groundwater Management Plan

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

TBD

Puyallup River Water Quality Management Plan (as amended)

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

TBD

Lake Tapps Facilities Plan (as appended)

Lead Jurisdiction(s): TBD

TBD

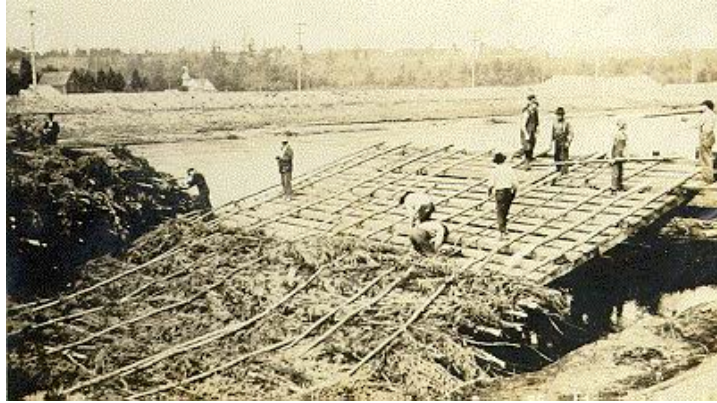
Pierce County River Improvement Program

Lead Jurisdiction(s): TBD

Since the turn of the century, Pierce County River Improvement (PCRI) has been active in river management projects throughout Pierce County. With the goal of minimizing flood damage to crops and homes, the first levees were built along the Puyallup River in 1906. The formation in 1914 of Inter-County River Improvement, a cooperative effort with King County, began construction on the Lower Puyallup and the White River levee system.

The historical emphasis has been structural alternatives, such as levees and river dredging, to protect other land uses adjacent to the rivers. Starting in 1914, the first of several major realignments moved portions of the Puyallup River to its current location.

Over the years, flood control projects have been constructed throughout the County, including the Puyallup, White, and Carbon Rivers.



Brush mats were woven on a catamaran and set in place with rocks for bank stabilization. May 1916



Diversion of Clarks Creek into new channel. September 1916

Today, PCRI is responsible for maintaining nearly 92 miles of levees along the Puyallup, White, and Carbon Rivers.

Other services include access road grading/mowing and vegetation and debris management to maintain channel flood capacity. The County quarry near the town of Orting is also operated by PCRI. During flood events, PCRI coordinates flooding information with other emergency response agencies and provides emergency levee construction and repair.

Preserving the fishery resources in Pierce County's rivers is now a major consideration in all of River Improvement's operations. Projects are coordinated with the Washington State Department of Fisheries and the Puyallup Tribe of Indians in an effort to minimize fisheries impacts.

With the completion of the "Puyallup River Basin Comprehensive Flood Control Management Plan", PCRI is moving into the future and developing a more comprehensive approach to floodplain management.

Recommendations in the plan include both structural and non-structural alternatives that continue to:

- Coordinate and standardize floodplain regulations for all municipalities throughout the basin.
- Regulate floodplain development to minimize non-compatible uses.
- Develop a flood warning system for the major rivers.
- Begin a Public Awareness program promoting responsible uses of the floodplain area.
- Construct "setback" levees and other structural alternatives further away from the river to allow for a more natural riverine environment.

Floodplain Mapping

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

Floodplain mapping in Pierce County is enhanced by new mapping of ground water flood hazard areas. Water Programs is also working closely with FEMA's study contractor on the first major re-mapping effort since the original flood hazard maps were issued in 1987. A channel migration zone study for Puyallup, White, and Carbon Rivers has also been started.

To enhance public access to valuable and fragile historic documents, the River Improvement map archive, with survey documents dating back to the 1880's, has been scanned and is available for viewing electronically.

Using Flood Control Assistance Account Program (FCAAP) and Real Estate Excise Tax (REET) funds, Water Programs acquired five properties totaling \$873,000 as of December 1; two additional acquisitions are pending. In November, Pierce County was notified it had received an additional \$1.43 million from FEMA for the acquisition of repetitive flood loss properties in 2003.

General Purpose Hydrology Database

Lead Jurisdiction(s): TBD

TBD

Title and Plat Notification

Lead Jurisdiction(s): TBD

TBD

Pierce County Flood Warning and Response Program

Lead Jurisdiction(s): Water Programs Division (PC PW&U), NWS, and PC DEM

The purpose of the Pierce County Flood Warning and Response System and Program is to provide early detection of flood events and to respond in-kind to provide emergency flood response services to public facilities and the general public where possible. It is collaborative effort involving Water Programs, PC DEM and the National Weather Service (NWS). The system is comprised of the following elements:

- Gage System: part of the Stream Gaging Program with USGS. Also involved is the US Department of Agriculture Natural Resources Conservation Service Sno-Tel Program.
- Flood Monitoring/Forecasting: This element consists of the Real-Time Flood Alert and Simulation for the Puyallup River Basin. It uses the Streamflow Synthesis and Reservoir Regulation (SSARRS) computer program. The model is capable of river flow predictions up to two days in advance.

The system that is in place and the tools that it provides to County managers, emergency response personnel, engineers, and federal, state, and local agencies provides an effective means to respond appropriately and efficiently in the overall goal of reducing flooding impacts to people and property. Warning lead times with the system can be up to 6 hours depending upon the nature of the storm and flood event.

Levee and Dike Maintenance Program

Lead Jurisdiction(s): TBD

TBD

Repetitive Flood Loss Property Acquisition Program

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

The program is based on FEMA’s repetitive loss program of purchasing flood prone properties subject multiple flood insurance losses. It provides the ability to purchase flood prone property within unincorporated Pierce County for willing residents as part of the NFIP. This program is funded through FEMA, DOE, Pierce County Real Estate Excise Tax, and Pierce County Surface Water Management fees. A tool used to identify flood prone property as part of this program is the Pierce County Repetitive Loss Plan. Below is a summary of property acquisitions from FEMA under the Hazard Mitigation Grant Program.

FEMA-1079 Floods November 1995	
Pierce County PW Puyallup River	\$750,000
FEMA-1100 Floods February 1996	
Pierce County EM Nisqually Acquisitions	\$2,035,032
FEMA-1159 Holiday Storms (Dec 96/Jan 97)	
Pierce County Acquisition	\$1,500,000
Pierce County (Needed) Acquisition Cost Overrun	\$146,130
Pierce County Acquisition (New award)	<u>\$1,248,987</u>
Total to Pierce County	\$5,680,149

Retention Dams

Lead Jurisdiction(s): Army Corps of Engineers

Retention dams prevent the damage from floods in the lower White River and Puyallup Valleys from floodwaters carried down by the White River into the lowlands of Pierce County.

The only dam currently specifically created as a flood control dam is the Mud Mountain Dam under the control of the Army Corps of Engineers. This program, while not under County control, is instrumental in the protection of the citizens of Pierce County. It protects the lower White and Puyallup basins—the area from Enumclaw to the Port of Tacoma—from floodwaters coming from the upper White River and its tributaries.

Roadside Vegetation Programs

Lead Jurisdiction(s): Road Operations Division (PC PW&U)

Pierce County's annual roadside vegetation management program features the safe use of federal and state approved herbicides along with mechanical brush cutting to control grasses and weeds along county roads. It allows stormwater to freely drain from the roadway and limits erosion by encouraging the growth of native vegetation species.

Capital Improvement Program

Lead Jurisdiction(s): Water Programs Division (PC PW&U)

The Division's Capital Improvement Program (CIP) completed several projects in 2002, including the Fife Heights Pipeline from 66th Ave. E. to Pacific Highway, West Tapps Drive Pond, Larson revetment, Glen Oaks Drainage Improvement, final construction items on the South Hill Pump Station, and acquisition of land for future projects, including next year's Woodland Creek Detention Pond.

Severe Storms Hazard

Warm and Dry Program

Lead Jurisdiction(s): PC Community Services

The Program helps the homeowner that needs a small amount of work, but can't afford the repairs. Project loans are usually for amounts under ten-thousand dollars (\$10,000). Repairs are preventative to the point that, if all a homeowner needs is a new roof, the program can keep the house from sustaining further damage from leaks and dry rot. Our housing team provides assistance to clients through all stages of rehabilitation.

Tree Maintenance

Lead Jurisdiction(s): Road Maintenance (PW&U)

Pierce County Road Maintenance includes among its standards the identification and removal of potentially dangerous trees. Tree maintenance should also be included in mitigation education for the public. Often the initiative in this strategy is led by electric utilities, whose lines may be threatened by tall trees outside their right of way.

The tree maintenance program helps protect the public from fallen trees. The program also provides maintenance of electric utilities during and after storms through the removal of either trees or limbs which might impact power and phone lines.

Landslide Hazard

TBD

Tsunami and Seiche Hazard

TBD

Wildland/Urban Interface Fire Hazard

Pierce County Fire Service Emergency Resource Plan

Lead Jurisdiction(s): TBD

TBD

Fire Safety Burn Bans

Lead Jurisdiction(s): Fire Prevention Bureau (PC DEM); PCFCA; DNR

Burn bans help curtail accidental spread of fire through eliminating many of the sources of potential fires during the driest and hottest part of the fire season. The authority to declare a fire safety burn ban in unincorporated Pierce County, by agreement, rests with the Pierce County Fire Marshal, the President of the Pierce County Fire Chiefs Association (PCFCA) and DNR. While the Fire Marshal does have sole authority under the Fire Code, in Pierce County these agencies have agreed to work as a team to reduce logistical problems and confusion. Areas affected by seasonal burn bans are those outside the County's UGA but within Pierce County. Outdoor burning is banned by statute within the UGA.

Burning Permits

Lead Jurisdiction(s): Fire Prevention Bureau (PC DEM)

The burning permit requirements and processes help curtail accidental spread of fire, and helps decrease the quantity of air, water and soil pollution throughout Pierce County.

Authority to grant outdoor burn permits lies with the fire districts within Pierce County; however, since January 2001 all outdoor burning within the Urban Grown Area has been banned by State law. In general, these restrictions prohibit land clearing fires and residential burning of other vegetative debris within incorporated cities and urbanized areas. Also, changes were made to include areas that are now or have been in violation of federal carbon monoxide standards. The restrictions are intended to curtail not only accidental fires but also those fires that contribute to air, water and soil pollution.

Public Education

Lead Jurisdiction(s): Fire Prevention Bureau (PC DEM); Local fire districts

The Pacific Northwest Wildfire Coordinating Group is comprised of Oregon, Washington, State and Federal agencies and prepares and distributes information for home and business owners located in forested areas. These publications are available in hard copy and on the Internet to home and business owners. Some Pierce County Fire Districts, such as East Pierce Fire & Rescue, emphasize wildland fire prevention and has a wildland firefighting team.

Public education increases public understanding of the hazards associated with fire in forested areas, and decreases the number of accidental fires started by people in the wilderness areas and rural areas of the state.

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Endnotes

¹ Pierce County Planning and Land Services web site.

<http://www.co.pierce.wa.us/pc/services/home/property/pals/landuse/commplans.htm>. [Accessed 12/03]

² Pierce County Planning and Land Services. Pierce County Buildable Lands Report. September, 2002. P. 14-15.

³ http://www.fema.gov/regions/x/2000/r10_70.shtm. [Accessed 12/03].

⁴ <http://rip.trb.org/browse/dproject.asp?n=7751>. [Accessed 12/03]

⁵ Pierce County Low Impact Development Study. CH2MHill, Inc. April, 2001. p. 5-6.

⁶ Pierce County Water Programs, Comprehensive Basin Planning.

<http://www.co.pierce.wa.us/pc/services/home/environ/water/swm/BasinPlans/basinplansindex.htm>