

Section 1: Flooding

The City of Cottage Grove has provided online access to mapping tools that include floodplain maps (www.cottagegrove.org). Additionally, the State Department of Geology and Mineral Industries (DOGAMI) provides the online tool HAZVU, which is available to the general public: <http://www.oregongeology.org/hazvu/>.

Detailed mapping resources can be found at Lane County GIS, located at: <http://www.lanecounty.org/Departments/IS/GIS/Pages/default.aspx>.

Flooding Profile

The City of Cottage Grove is located south of the confluence of the Row River and the Coast Fork of the Willamette River. These two rivers as well as Silk, Mosby, and Bennett Creeks contribute to the flooding hazard in Cottage Grove. The city itself is located wholly within the Coast Fork Willamette Watershed Basin.

The Coast Fork of the Willamette River runs north then northeast through the center of the city along a fairly narrow, channelized corridor that has seen development since the founding of the community in the 1860's. The original channel has been heavily modified. Some slight movement of the Coast Fork Willamette channel has been seen in its more northern reaches within City limits.

The Row River forms the City's eastern boundary. Its channel remains fairly natural, with multiple meanders and a wide, vegetated floodplain. Much of the Row River floodplain in the City is under City of Cottage Grove ownership as a measure of floodwater control. The Row River joins the Coast Fork of the Willamette River immediately to the north of the city's urban growth boundary. Silk Creek enters the city from the west from the foothills of the Coast Range. This creek flows through the back yards of several residential neighborhoods before crossing under River Road via a culvert to join the Coast Fork. Mosby Creek joins the Row River east of the City, west of Dorena Lake.

The U.S. Army Corps of Engineers operates 13 multi-purpose flood control projects (dams) in the Willamette Valley Project, nine of which are located in Lane County, and were constructed between 1941 and 1968.

The Dorena Dam was built on the Row River upstream of Cottage Grove in 1942. This federally owned dam is operated and maintained by the U.S. Army Corps of Engineers, as a part of the Willamette Valley Project. The structure is 154 high, and has 131,000 acre feet of storage in this earthen type dam.

The Cottage Grove Dam was built on the Coast Fork Willamette River upstream of Cottage Grove in 1943. Like Dorena, the dam is owned federally, operated and maintained by the U.S. Army Corps of Engineers as a part of the Willamette Valley Project. The structure is 103 feet high, and has 50,000 acre feet of storage in an earthen type dam.

A primary purpose of the Willamette Valley Project is flood control, although the reservoirs only control flooding on 50% of the tributaries in the Willamette Basin. Reservoirs are maintained at full pool from May to September for recreation, and drained in the fall for the wet season to provide storage capacity for winter storms. Most riverine flooding in Cottage Grove occurs along tributaries and rivers with no flood control devices, such as Silk Creek and Mosby Creek.

Flooding occurs when climate, geology, and hydrology combine to create conditions where river and stream waters flow outside of their usual course and “overspill” beyond their banks. In Lane County, the combination of these factors, augmented by ongoing development, create chronic seasonal flooding conditions. Lane County spans a wide range of climatic and geologic regions from the Pacific coast to the high Cascades. This diversity results in considerable variation in precipitation. The average annual precipitation ranges from less than 40 inches in the Willamette Valley to over 100 inches in the Coast Range and along the west slope of the Cascades. Snowmelt from the Central Cascades provides a continuous water source throughout the year, and can contribute significantly to flooding.

Flooding is most common from October through April, when storms from the Pacific Ocean bring intense rainfall to the area. Larger floods result from heavy rains that continue over the course of several days, augmented by snowmelt at time when the soil is near saturation from previous rains.

Previous Occurrences

Cottage Grove has a long history of flood events. The most heavily flooded areas are the low lands along the Row and Willamette Rivers, and the properties adjacent to Silk Creek. The following historical recount of flooding was developed from the Cottage Grove Development Timeline created by community members using data from local historical resources, such as the Cottage Grove Museum. The complete timeline is attached as Appendix H.

- 1861 Floods hit the area
- 1881 Floods in the town
- 1926 People rode rowboats into the Bartell Hotel
- 1933 Flood in the town
- 1946 January heavy rains...4.32 inches-Floods
- 1961 February Floods-4.74 inches in 24 hours
- 1963 High water at Christmas
- 1964 High water again
- 1985 Flooding in the area with heavy rains
- 1996 100 inches of rain, flooding along Silk Creek, Mosby Creek

Since the construction of Cottage Grove and Dorena Dams in the 1940s, flooding has been less severe along the Row River and Coast Fork of the Willamette. These dams have reduced the expected 100-year stream discharges (volume of water flowing in the rivers). Hence expected flood elevations and overall flood potential for

major flood events along these rivers have been substantially reduced. The flood hazard areas shown on the current Flood Insurance Rate Maps (FIRM) for Cottage Grove assume that the dams are operating properly. Dam failure hazards are not addressed by the FIRM.

Despite the reduction in flood potential from construction of the dams, the Cottage Grove area continues to face flood risks from the Coast Fork Willamette and Row Rivers as well as smaller creeks like Silk Creek and Bennett Creek. Flood risk on these smaller streams has not been reduced by the dams.

The most recent major flood event occurred in February 1997. Unusually heavy rains over the four-day period from February 5th to February 8th resulted in significant flooding on numerous rivers and streams throughout western Oregon. The 1997 flood may have been about a 250-year event. During this flood event, Silk Creek flooded adjacent properties, and the Row River raised high enough to damage the city's current water treatment intake facility. Damage to Lane County businesses, residences and infrastructure was estimated to be roughly \$19 million dollars for this February 1997 storm.

In January 2011, several days of heavy rain caused isolated flooding throughout the County, although little or no flooding occurred within Cottage Grove. Saturated soils caused the loss of the Coast Fork Willamette River bank in a few locations, and overloaded storm drains caused isolated street flooding in the community. These locations were documented by city maintenance staff for future maintenance. At the end of the event, the U.S. Army Corps of Engineers opened the floodgates on the Cottage Grove and Dorena Dams, rapidly raising the levels of the Coast Fork and Row Rivers. The prolonged high waters weakened many riparian trees along the Coast Fork. Although Lane County activated its EOC during this event, Cottage Grove had no need to do so.

It should be noted that stormwater is not treated in the City wastewater system. There exist remnants within the city of older piping that combines stormwater into the sewer system, increasing unnecessary costs in waste water treatment. These remnants are addressed and removed on a case by case basis when found and as funding is available.

The City of Cottage Grove takes a three pronged approach to addressing flood hazards in the city:

- Administration of regulations applying to private property.
- Maintenance / enhancement of City-owned facilities and utilities.
- Education and awareness of flood risks.

In addition to this three pronged approach, the city is mindful of meeting all minimum federal requirements with regard to federal flood legislation, laws, regulations, and local code. These include compliance with Presidential Executive Order 11988 (1977) "Floodplain Management" as amended in 2015, and incorporation of changes into current city code. The City also prepares needed documentation for the National Flood Insurance Program (NIFP).

The City has established a Floodplain Manager in the person of the Community Development Director. The City is actively participating in the Community Assistance Visit (CAV) program, which is a major component of the NFIP's Community Assistance Program (CAP). The most recent CAV occurred on February 11, 2016 with positive reviews, and no administrative or potential violations identified. The City intends to proactively continue its efforts to reduce flood risk.

Flooding Hazard Assessment

Hazard Identification

FEMA last produced Flood Insurance Rate Maps (FIRM) for Cottage Grove that detail the flood hazard areas in 1999. These 100-year floodplain and floodway maps have been digitized and reproduced for the City of Cottage Grove by Lane County, and can be seen in Figure 5: "Flood Zones City of Cottage Grove", below.

As of March, 2016, 206 parcels have been identified as either being wholly or partially within the Special Flood Hazard Area. 150 properties have natural or artificial wetlands on part or all of the property.

Based on historical occurrence Lane County and by extension, Cottage Grove, can expect a significant flood event every 15 – 20 years; however, much of this risk is mitigated through dams and efforts undertaken by the Corps of Engineers. A failure of either the Cottage Grove Dam or Dorena Dam would cause significant flooding in the area, far beyond the scale of a naturally occurring flood event.

This is considered to be an unlikely possibility, requiring a "perfect storm" of factors such as the reservoirs being at full pool (normally occurring only during the summer recreation season), combined with saturated soils (a winter wet season phenomenon). These conditions rarely occur at the same time.

Flooding potential is most common from October through April when storms from the Pacific Ocean bring steady and occasionally intense rainfall, and soil saturation remains high. Flooding can be aggravated when streams are altered by human activity, such as through channelization of streams or loss of wetlands. Many types of flood hazards exist in Oregon, including riverine floods, flash floods (resulting from locally intense thunderstorms, ice jams, and dam failures), coastal floods, shallow area and urban flooding, and playa flooding.

Riverine flooding is affected by the intensity and distribution of rainfall, soil moisture, seasonal variation in vegetation, and water-resistance of the surface areas caused by urbanization. Flash flooding is a localized flood that results from a short duration of intense rainfall across a limited geographic area. During extended periods of intense rainfall, stormwater conveyance systems can be overwhelmed and flooding of surrounding neighborhoods can result.

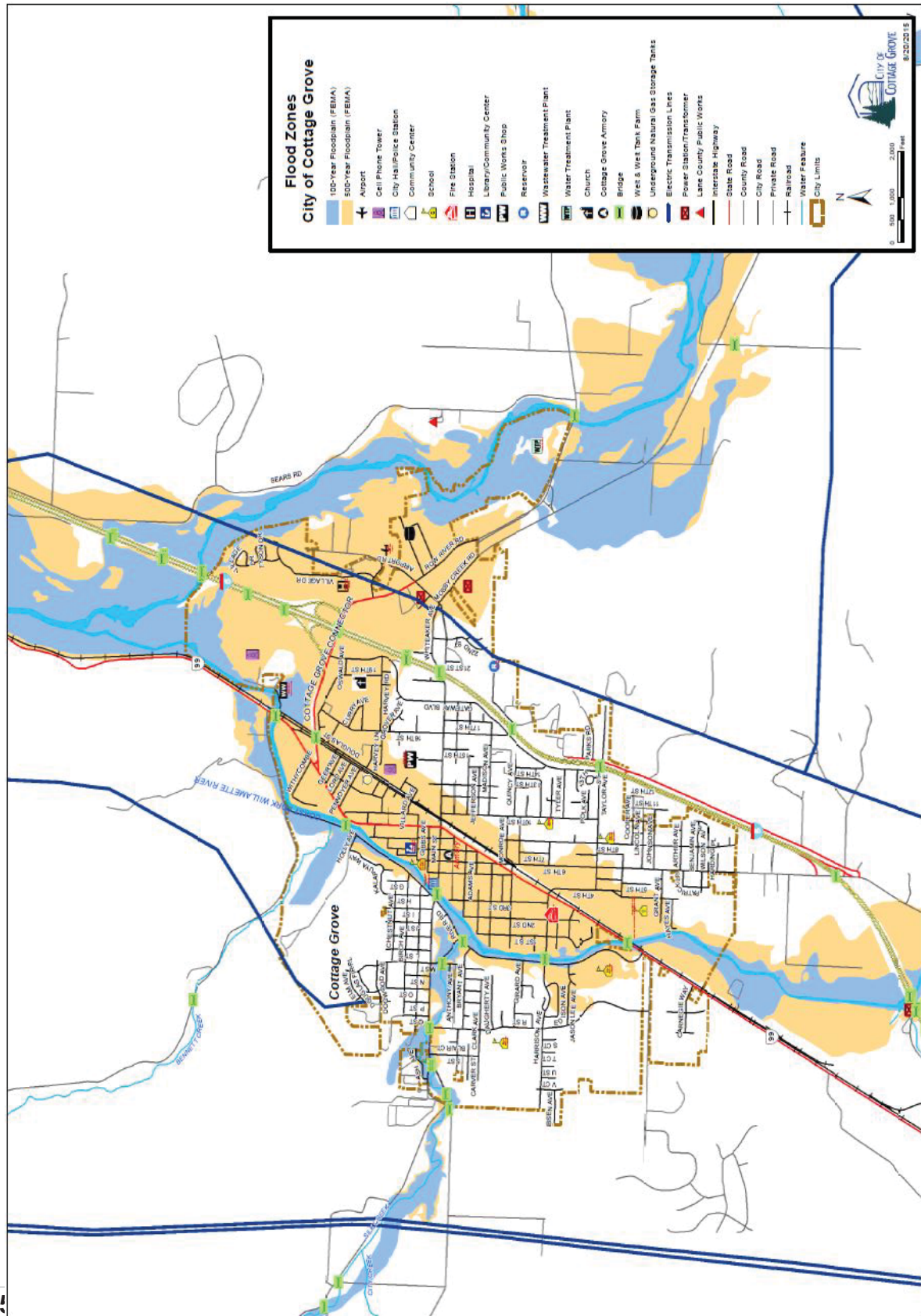
Table 8: Flood Warning Types

Riverine Flooding
Flood Potential Outlook (FPO): Announcement to alert the public of potentially heavy rainfall that could send rivers and streams into flood or aggravate an existing flood.
Flood Watch: Announcement to inform the public that current or developing conditions indicate a threat of flooding, but occurrence is neither certain nor imminent.
Flood Warning: An announcement by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage forecasts.
Flood Statement: A statement issued by the NWS to inform the public of flooding along major streams in which there is not a serious threat to life or property. It may also follow a flood warning to give later information.

Flash Floods
Flash Flood Watch: Announcement that current or developing conditions indicate potential flash flooding in the watch area
Flash Flood Warning: Issued to inform the public that flash flooding is in progress, imminent, or highly likely.
Flash Flood Statement: A statement by the NWS which provides follow-up information on flash flood watches

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Figure 5: Flood Zones City of Cottage Grove



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Vulnerability Assessment and Risk Analysis

Community assets located in the 100-year floodplain include the Row River Water Treatment Facility, the Wastewater Treatment Facility, the Middlefield Golf Course, North Regional Park, Row River Nature Park, Willamette River Greenway Trail, and the Row River Trail. Bridges may also be impacted, and can be found in Figure 5: “Flood Zones City of Cottage Grove”.

The critical facilities that face flood hazards in the 100-year floodplain are major facilities that if incapacitated would cause tremendous problems for the City as well as citizens. Bridges are vulnerable to flooding because debris can choke bridges and cause them to collapse under the increased pressure. The City of Cottage Grove relies on bridges for transportation, as the Coast Fork of the Willamette River divides the city with all critical facilities located on the east portion of the city. A collapse of all bridges would leave the west portion of the city isolated from emergency services.

Potential 100-year flood events affect less than 5 % of the property within the City of Cottage Grove. A 500-year flood event would impact approximately one third of the land located within city limits. Dorena Dam failure could impact the eastern third of the city, particularly the Cottage Grove Airport, the Cottage Grove Community Hospital, Welt & Welt, and Wal-Mart. Failure of the Cottage Grove dam would inundate over one half of the city, including all of the historic core and Hwy 99.

Based on potential impacts, high long term probability, and presence of development and infrastructure in riparian areas, a **High Vulnerability** classification is assigned for flood. Our Hazard Risk Assessment model ranks riverine flooding as the highest threat in Cottage Grove (score of 174).

Repetitive Flood Loss

The City of Cottage Grove works to mitigate problems regarding flood issues when they arise. Throughout history, some areas in the city have proven more susceptible to flooding issues and may have incurred repetitive losses, meaning they have more than two National Flood Insurance Program (NFIP) claims in a ten-year period. There have been 10 claims to NFIP in Cottage Grove since its inception in 1978. Of those claims only 3 were closed for a total of \$5,068.63 in payouts. According to the most current data from Oregon Department of Land Conservation and Development (DLCD), there are no properties in Cottage Grove that meet the criteria for repetitive loss at this time.

Existing Flood Mitigation Activities

Flood mitigation activities listed here include current mitigation programs and activities that are being implemented by the City of Cottage Grove or other agencies or organizations.

Flood Mitigation Projects

Cottage Grove has actively pursued several flood hazard mitigation activities in an effort to reduce vulnerability to damage and disruption from flooding events. Efforts include:

- Cottage Grove participates in the National Flood Insurance Program, which enables property and business owners to qualify for federally underwritten flood insurance.
- In 2008, the City replaced the Row River Water Treatment Facility intake structure with a flood-proof intake structure.
- The City has been working with the Coast Fork Willamette Watershed Council to pursue funding to re-connect the Row River Nature Park wetlands to the Row River to encourage riparian meandering and lessen flood hazard.
- The City has begun replacing and hardening stormwater outfalls into the Coast Fork to ensure that flood waters continue to drain into the river during high-water events.
- The City has adopted a Stormwater Management Plan. The goal of this plan is to protect citizens and property from urban flooding through planning for and building adequate green and gray stormwater systems.
- The City has participated in dam failure scenarios with the Lane County Emergency Preparedness Coalition, South Lane County Fire & Rescue, USACE and the Cottage Grove Community Hospital.

Flood Mitigation Objectives and Action Items

The flood mitigation Objectives and their associated Action Items below and in the appendices provide direction on specific activities that the City of Cottage Grove, organizations, and residents may undertake to reduce risk and prevent loss from flood events. Each Objective is followed by Action Items that are intended to achieve in part or in whole the Objective they are attached to. These Objectives and Actions may be used by local decision makers in pursuing strategies for implementation.

Agency Coordination

1) Seek training and exercise opportunities with other agencies and jurisdictions.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Cottage Grove Community Development Department (CGCDD); Oregon Dept. of Transportation (ODOT); NW Natural Gas; Pacific Power; Eugene Public Utilities District (EPUD)
Priority:	High

2) Work with United States Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) on Upper Willamette Valley Flood Insurance Map Update project.

Estimated Cost:	None / Staff time
Timeline:	Ongoing
Responsible Agency:	CGCDD; USACE; FEMA
Priority:	Low

3) Coordinate with Coast Fork Willamette Watershed Council, USACE, and Oregon Department of Fish and Wildlife on Row River Nature Park flood storage improvements.

Estimated Cost:	High
Timeline:	3-5 years
Responsible Agency:	Coast Fork Willamette Watershed Council, State and Federal Agencies
Priority:	Medium/High

4) Participate in state-wide water management group led by USACE for flood controlled streams (join conference call held on a weekly, bi-weekly, or as needed basis). Participate in Northwest Regional Floodplain Management Association (NORFMA) and Association of State Floodplain Managers (ASFM).

Estimated Cost:	Low / Staff time
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD; NORFMA
Priority:	High

Critical Facilities Protection

1) Evaluate and flood-proof City-owned Critical Facilities within the 500 year floodplain.

Estimated Cost:	High
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	Low

Flood Loss Mitigation

1) Increase awareness of localized flood risk and safety: Use outreach programs to advise home and property owners of risks to life, property, health, and safety. Increase outreach to residential and commercial residents of the city on additional measures property owners can take to reduce their risk to flooding, and facilitate funding for mitigation measures.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD; Public Works
Priority:	High

2) Extend the freeboard requirement.

Estimated Cost:	Low
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	High

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- 3) Mitigate flooding by limiting or restricting how development occurs in flood prone areas through actions such as: Prohibit or limit floodway development through regulatory and/or incentive-based measures; Limit the density of developments in the floodplain; Require that floodways be kept as open space; Manage and enforce a riparian buffer ordinance to protect water resources and limit flood impacts; Limit fill in floodplain areas.**

Estimated Cost:	Low
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	High

- 4) Develop a long term plan for Open Space land acquisitions (purchases by the City) for floodway protection (in 4 specific lots within the Floodplain).**

Estimated Cost:	High
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	Low

Floodplain Management

- 1) Designate a local floodplain manager and/or CRS coordinator who achieves Certified Floodplain Manager (CFM) certification.**

Estimated Cost:	Low
Timeline:	Completed / Ongoing
Responsible Agency:	CGCDD
Priority:	Medium

- 2) Conduct NIFP community workshops to provide information and incentives for property owners to acquire flood insurance.**

Estimated Cost:	Low
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	Low

- 3) Require and maintain FEMA elevation certificates for all new and improved buildings located in floodplains. (Records are maintained in the Cottage Grove Community Development Office.)**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

4) Include requirements in the local floodplain ordinance for homeowners to sign non-conversion agreements for areas below base flood elevation.

Estimated Cost:	None / Staff Time
Timeline:	1-3 Years
Responsible Agency:	CGCDD
Priority:	Low

5) Maintain and provide access to Flood Insurance Rate Maps.

Estimated Cost:	None/staff time
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

6) Implement damage reduction measures for existing, publically owned, buildings such as acquisition, relocation, retrofitting, and maintenance of drainage ways and retention basins.

Estimated Cost:	High
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	Low

7) Improve flood warning, emergency response, and evacuation planning. (Alert Sense)

Estimated Cost:	Medium
Timeline:	Ongoing
Responsible Agency:	CGCDD
Priority:	High

Stormwater Management and Improvement

- 1) Integrate Natural Hazard Mitigation plan goals and policies with Total Maximum Daily Loads (TMDL) plan goals and policies.**

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

- 2) Rehabilitate and manage riparian areas under city ownership to improve function; utilize stream restoration to ensure adequate drainage and diversion of stormwater; and protect and enhance landforms that serve as natural mitigation features (i.e., riverbanks, wetlands, buffers etc.).**

Estimated Cost:	High TBD
Timeline:	Ongoing → 3-5 Years
Responsible Agency:	Public Works; CGCDD
Priority:	Low

- 3) Obtain and install a River Flow Gauge at the mouth of Mosby Creek at confluence of Row River.**

Estimated Cost:	Medium
Timeline:	3-5 Years
Responsible Agency:	CGCDD
Priority:	High

4) Pursue funding for culvert resizing.

Estimated Cost:	High
Timeline:	2-5 years
Responsible Agency:	Public Works; CGCDD
Priority:	Medium

5) Develop stormwater management standards in Development Code.

Estimated Cost:	Medium
Timeline:	1-3 Years
Responsible Agency:	Public Works; CGCDD
Priority:	High

6) Enforce Riparian Development standards.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD, Coast Fork Willamette Watershed Council
Priority:	Medium

7) Coordinate with Coast Fork Watershed Council on riparian area restoration and education programs.

Estimated Cost:	Low
Timeline:	Ongoing
Responsible Agency:	Public Works; CGCDD; Coast Fork Willamette Watershed Council
Priority:	Low

- 8) Join or schedule yearly (or bi-annual) river/stream cleanup projects with the public at-large, and facilitate debris removal activities with Coast Fork Watershed Council and United States Forest Service (USFS) to use debris removed from the Coast Fork and Row Rivers for wildlife habitat in the Row River Nature Park.**

Estimated Cost:	Low
Timeline:	Annual / Biannual basis
Responsible Agency:	Public Works; CGCDD; Coast Fork Willamette Watershed Council
Priority:	Medium

- 9) Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.**

Estimated Cost:	Low / Staff Time
Timeline:	3-5 Years
Responsible Agency:	Public Works; CGCDD; Coast Fork Willamette Watershed Council
Priority:	Medium

- 10) Compensate an owner for partial rights, such as easement or development rights, to prevent a property from being developed.**

Estimated Cost:	High
Timeline:	Long Term
Responsible Agency:	Public Works; CGCDD
Priority:	Low