5.6 Columbia Corridor Drainage Districts (CCDD)

5.6.1 Mitigation Actions

<table>
<tr><th>Hazard</th><th>Action ID</th><th colspan="8">Mitigation Actions – Columbia Corridor Drainage Districts</th></tr>
<tr><td rowspan="8">Multi-Hazard</td><td rowspan="8">1</td><td colspan="8">Prepare for and reduce impacts from power outages by installing backup portable generator connections at pump stations, backup power at facilities, purchasing back-up pumping equipment, and/or having rental contracts for back-up power and equipment.</td></tr>
<tr><td colspan="3"><u>Plan Goals</u> – 3,5</td><td colspan="5"><u>Hazards Addressed</u> – Flood, Severe Weather</td></tr>
<tr><td colspan="3"><u>Lifelines</u> – Levee and Drainage System</td><td colspan="5">Prioritization Criteria</td></tr>
<tr><td>Implementation Lead</td><td colspan="2">Coordinating Partnerships</td><td>Equity</td><td>Benefit</td><td>Cost</td><td>Risk</td><td>Capacity</td><td>Priority Score</td></tr>
<tr><td>MCDD</td><td colspan="2">PEN 1, PEN 2, SDIC</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>15</td></tr>
<tr><td colspan="8">Potential Funding – Capital Loans, Bonds, FEMA, SPIRE</td></tr>
<tr><td colspan="8">Potential Implementation Methods – CIP, PMLS, Standard Operations, District Budget Authorization</td></tr>
<tr><td colspan="8">Notes – Includes Pump Station 2, Broadmoor, Air Trans, Pump Station 4, Schmeer Rd, and 181st Pump Station.</td></tr>
</table>

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Multi-Hazard	2	**Build relationships with community groups and culturally specific community-based organizations and learn how we can best serve those communities for emergency preparedness and response.**							
		Plan Goals – 1,4,5		Hazards Addressed – All Hazards					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD		**3**	**3**	**3**	**3**	**3**	**15**
		Potential Funding – UFSWQD Revenue (once established), Communications budget							
		Potential Implementation Methods – District Budget Authorization, Emergency Operations Plan, Communications and Public Affairs Plan							
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.							
Multi-Hazard	3	**Develop a Continuity of Operations Plan (COOP) to maintain general District operations during emergencies.**							
		Plan Goals – 3,5		Hazards Addressed – All Hazards					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**
		Potential Funding – Grants, District Assessments							
		Potential Implementation Methods – District Budget Authorization							
		Notes –							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Multi-Hazard	4	**Customize and integrate flood-risk, earthquake-risk, and emergency preparedness curriculum and outreach/communications for the public and partners.**								
		Plan Goals – 1,4		Hazards Addressed – All Hazards						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**2**	**3**	**3**	**3**	**14**	
		Potential Funding – PMLS (Non-Structural), District Assessments, Grants								
		Potential Implementation Methods – PMLS, District Budget Authorization								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								
Multi-Hazard	5	**Adapt and expand ICS training, exercises, and job shadowing opportunities for MCDD staff.**								
		Plan Goals – 3,5		Hazards Addressed – All Hazards						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD		**3**	**2**	**3**	**3**	**3**	**14**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – Emergency Operations Plan								
		Notes –								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Multi-Hazard	6	**Develop and implement asset management program to track asset condition, performance and risk and set priorities for maintenance and repairs in advance of natural hazards.**								
		Plan Goals – 3,5		Hazards Addressed – All Hazards						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD		**2**	**2**	**3**	**3**	**3**	**13**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – Strategic Asset Management Plan								
		Notes –								
Multi-Hazard	7	**Build GIS capacity to improve preparedness and enhance responsiveness and recovery from natural hazards within the Districts.**								
		Plan Goals – 3,5		Hazards Addressed – All Hazards						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD		**2**	**2**	**1**	**2**	**3**	**10**	
		Potential Funding – Grants								
		Potential Implementation Methods – Emergency Operations Plan								
		Notes –								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Earthquake	8	**Improve seismic resilience of hard infrastructure (e.g. pump stations) to reduce downtime by assessing seismic retrofit options to determine feasibility and benefit-cost ratio; planning mitigation investments where practical and cost-effective; and incorporating design criteria for new infrastructure to be seismically resilient.**							
		Plan Goals – 2,3,5		Hazards Addressed – Earthquake					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	Port of Portland, PEN 1, PEN 2, SDIC	**3**	**3**	**1**	**3**	**1**	**14**
		Potential Funding – Grants, Port of Portland Cost-Share, District Assessments							
		Potential Implementation Methods – CIP, District Drainage Master Plans							
		Notes –							
Earthquake	9	**Implement seismic upgrades for MCDD administrative and operations buildings.**							
		Plan Goals - 3		Hazards Addressed – Earthquake					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD		**1**	**2**	**2**	**3**	**3**	**11**
		Potential Funding – District Assessments, Grants, Capital Loans							
		Potential Implementation Methods – District Drainage Master Plans, Emergency Operations Plan							
		Notes –							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Flood	10	**Levee Ready Columbia partners, the Columbia Corridor Drainage Districts, and the Urban Flood Safety & Water Quality District will seek funding to support re-certification and maintaining accreditation of the Columbia River levee systems, including support of federal investments in the system.**							
		Plan Goals – 1,2,3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		USFWQD	MCDD, PEN 1, PEN 2, SDIC, Portland, Multnomah County, Gresham, Fairview, Troutdale, Wood Village	**3**	**3**	**3**	**3**	**3**	**15**
		Potential Funding – General Fund, Local Resources							
		Potential Implementation Methods – Levee Ready Columbia							
		Notes – Maintained action from 2017 NHMP							
Flood	11	**Continue coordination across all jurisdictions for development reviews to prevent unplanned impacts on levee and drainage system.**							
		Plan Goals – 1,3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**
		Potential Funding – Development Review Fees							
		Potential Implementation Methods – District Budget Authorization							
		Notes – Expansion from prior plan to include all Districts							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	12	**Increase capacity, dependability and redundancy for all District pump stations.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**	
		Potential Funding – District Assessments, FEMA HMA, Other Grants								
		Potential Implementation Methods – CIP, PMLS								
		Notes –								
Flood	13	**Conduct training, planning, and modeling exercises that integrate new district mandates: water quality, fish and wildlife habitat, climate change, landscape resilience, equity and social justice, and cultural history.**								
		Plan Goals – 1.3.4		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		UFSWQD	MCDD, PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**	
		Potential Funding – UFSWQD (once established), District Assessments								
		Potential Implementation Methods – District Budget Authorization								
		Notes –								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	14	**Update and maintain Flood Emergency Action Plan to prepare for riverine and internal drainage flooding due to natural hazard emergencies.**								
		Plan Goals – 1,3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**	
		Potential Funding – Direct Assessments, Grant Funding								
		Potential Implementation Methods – District Budget Authorization, Emergency Operations Plan, Flood Emergency Action Plan								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								
Flood	15	**Complete SCADA upgrades at all pump stations to improve data collection and storage, communications, monitoring and surveillance.**								
		Plan Goals – 2,3		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**	
		Potential Funding – Assessments, Capital Loans, Grants								
		Potential Implementation Methods – CIP, District Drainage Master Plans								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	16	**Develop and implement preventative maintenance strategies to monitor performance and increase redundancy at all District pump stations.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – District Drainage Master Plans, Emergency Operations Plan								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								
Flood	17	**Enhance security and surveillance at District pump stations to improve resiliency and increase redundancy in response to a natural hazard emergency.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**3**	**3**	**3**	**15**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – CIP, Districts Budget Authorization								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Flood	18	**Rehabilitate gravity flow system (drainage pipes, slide gates, and inlet/outlet screens) as redundancy to Pump Station 1.**							
		Plan Goals – 3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD		**3**	**3**	**3**	**3**	**3**	**15**
		Potential Funding – District Assessments, Capital Loans, Bonds, Grants							
		Potential Implementation Methods – MCDD Drainage Master Plan							
		Notes –							
Flood	19	**Conduct 2-D flood inundation modeling, graphic design, and map products to improve flood risk analysis and communication with the partners and the public.**							
		Plan Goals – 1,3		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**2**	**3**	**3**	**14**
		Potential Funding – District Assessments, FEMA HMA, Other Grants							
		Potential Implementation Methods – District Budget Authorization, Emergency Operations Plan, Internal Drainage, Emergency Operations Plan							
		Notes –							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Flood	20	**Design, purchase, and install signage in the floodplain for flood evacuation rates and demarcation of the managed floodplain/protected area.**							
		Plan Goals – 1,4,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**2**	**3**	**3**	**14**
		Potential Funding – PMLS (Non-Structural Measures, Grants, District Budget							
		Potential Implementation Methods – Emergency Operations Plan, District Budget Authorization							
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.							
Flood	21	**Improve pump station reliability by installing flow monitors at all district pump stations.**							
		Plan Goals – 3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**2**	**3**	**3**	**3**	**14**
		Potential Funding – District Assessments, Grants							
		Potential Implementation Methods – CIP, District Drainage Master Plans							
		Notes –							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Flood	22	**Rehabilitate or replace drainage pipes and slide gates at 142nd cross levee.**							
		Plan Goals – 3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD		**3**	**2**	**3**	**3**	**3**	**14**
		Potential Funding – District Assessments, Grants							
		Potential Implementation Methods – CIP, District Budget Authorization, District Drainage Master Plans							
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.							
Flood	23	**Convert recent USACE PMLS Study modeling and lessons learned to inform drainage master planning in Districts.**							
		Plan Goals – 3		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**2**	**2**	**3**	**3**	**13**
		Potential Funding – District Assessments							
		Potential Implementation Methods – District Budget Authorization, District Drainage Master Plans, Emergency Operations Plan, Internal Drainage Emergency Action Plan							
		Notes –							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	24	**Protect levee toe from hydraulic scouring caused by anticipated increased frequency loading in the wet season under current climate models.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD		**3**	**3**	**2**	**3**	**2**	**13**	
		Potential Funding – PMLS, Grants, Bonds								
		Potential Implementation Methods – District Budget Authorization, PMLS, Levee Ready Columbia								
		Notes – This action includes conventional and nature-based solutions								
Flood	25	**Evaluate temporary flood control structure needs, determine the best options for each closure (including automated systems where beneficial), invest in needed closure structures, and create clear job sheets for each closure for emergency response.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**3**	**2**	**3**	**2**	**13**	
		Potential Funding – District Assessments, Planning Grants, Capital Loans, Bonds or Grants								
		Potential Implementation Methods – District Budget Authorization, Emergency Operations Plan, Flood Emergency Action Plan								
		Notes –								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	26	**Coordinate with partners in floodplain resilience planning, environmental zoning, and development standards within floodplains to increase / maintain green infrastructure and to increase flood resilience within building standards.**								
		Plan Goals – 1,2,3						Hazards Addressed – Flood		
		Lifelines – Levee and Drainage System						**Prioritization Criteria**		
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	City of Portland, PEN 1, PEN 2, SDIC	**3**	**2**	**2**	**3**	**3**	**13**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – District Budget Authorization								
		Notes –								
Flood	27	**Raise levee near I-5 cloverleaf & Marine Drive interchange.**								
		Plan Goals – 3,5						Hazards Addressed – Flood		
		Lifelines – Levee and Drainage System						**Prioritization Criteria**		
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2	**2**	**3**	**3**	**3**	**2**	**13**	
		Potential Funding – PMLS, Levee Ready Columbia, Grants, District Assessments, Bonds								
		Potential Implementation Methods – PMLS, CIP, Levee Ready Columbia, District Budget								
		Notes –								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	28	**Decommission or install valve replacements for Gate Tower & associated drainage pipes between MCDD and SDIC to address hydrologic connection vulnerabilities between drainage basins.**								
		Plan Goals – 3		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	SDIC	**1**	**3**	**3**	**3**	**3**	**13**	
		Potential Funding – Levee Ready Columbia, CIP, District Assessments, Bonds, Grants								
		Potential Implementation Methods – PMLS, CIP, Levee Ready Columbia, District Budget								
		Notes –								
Flood	29	**Analyze and address houseless community's impacts on flood management system and access.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**3**	**2**	**2**	**3**	**3**	**13**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – District Budget Authorizations, Public Affairs Program								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	30	**Relocate and replace PIR and Vanport Pump Stations with upgrades for backup power connection, seismic resilience, wind event resilience, pumps and discharge lines, and addition of automatic trash rake system.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1	**1**	**3**	**3**	**3**	**3**	**13**	
		Potential Funding – City of Portland Cost-Share, FEMA HMA								
		Potential Implementation Methods – CIP, District Budget Authorization								
		Notes –								
Flood	31	**Address oversteepened toe of levee for Columbia Slough southwest levee enhancement.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**2**	**2**	**3**	**3**	**3**	**13**	
		Potential Funding – Levee Ready Columbia, Bonds, Grants								
		Potential Implementation Methods – Levee Ready Columbia Budget, District Budget Authorization, CIP								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Flood	32	**Address vulnerabilities from animal burrows on Columbia River MCDD Levee of NE Corner Rehab.**							
		Plan Goals – 3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD		**2**	**2**	**3**	**3**	**3**	**13**
		Potential Funding – Levee Ready Columbia, Bonds, Grants							
		Potential Implementation Methods – Levee Ready Columbia Budget, District Budget Authorization, CIP							
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.							
Flood	33	**Replace, and potentially increase capacity of, the primary stormwater pumping station for the Sandy Pump Station.**							
		Plan Goals – 3,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	SDIC	**3**	**3**	**1**	**3**	**3**	**13**
		Potential Funding – Local Resources, US Economic Development Administration grants, FEMA HMA, US EPA Grants, Oregon Infrastructure Finance Authority Loans							
		Potential Implementation Methods – SDIC Capital Improvement Plan							
		Notes –							

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	34	**Incorporate climate and equity into flood modeling/planning, factoring in updated precipitation and hydrologic forecasts and anticipated impacts on communities.**								
		Plan Goals – 1,2,3,4		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		UFSWQD	MCDD, PEN 1, PEN 2, SDIC	**3**	**2**	**2**	**3**	**2**	**12**	
		Potential Funding – Grants, District Assessments, USFWQD Revenue								
		Potential Implementation Methods – District Budget Authorization								
		Notes –								
Flood	35	**Regrade and bench oversteepened levee banks on the Columbia River.**								
		Plan Goals – 3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**2**	**2**	**2**	**3**	**3**	**12**	
		Potential Funding – District Assessments, FEMA HMA, Other Grants								
		Potential Implementation Methods – CIP, District Budget Authorization								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	36	**Improve drainage pathways through pipe improvements or daylight open channels in areas such as Meadow Drive and Middlefield Road.**								
		Plan Goals – 3		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**2**	**2**	**3**	**3**	**3**	**12**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – CIP, District Drainage Master Plans								
		Notes –								
Flood	37	**Identify and create redundant channels and pipes to allow for additional flood storage and flow paths.**								
		Plan Goals – 3		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**2**	**2**	**1**	**3**	**3**	**11**	
		Potential Funding – Grants, District Assessments								
		Potential Implementation Methods – CIP, PMLS, Drainage Master Plans								
		Notes –								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts								
Flood	38	**Plan for landscape resilience, including identifying open spaces within the managed floodplain (or brownfield sites that could be converted to open space), developing solutions for flood storage (or other objectives), and creating a worklist for future study/modeling to quantify services that provided by those sites.**								
		Plan Goals – 2,3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		UFSWQD	MCDD, PEN 1, PEN 2, SDIC	**3**	**2**	**1**	**3**	**2**	**11**	
		Potential Funding – UFSWQD Revenue Steam								
		Potential Implementation Methods – UFSWQD Budget Authorization								
		Notes –								
Flood	39	**Upgrade levee management practices by implementing measures that increase early-warning times prior to failures.**								
		Plan Goals – 2,3,5		Hazards Addressed – Flood						
		Lifelines – Levee and Drainage System		**Prioritization Criteria**						
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**	
		MCDD	PEN 1, PEN 2, SDIC	**2**	**2**	**2**	**3**	**2**	**11**	
		Potential Funding – District Assessments, Grants								
		Potential Implementation Methods – Emergency Operations Plan, District Drainage Master Plans								
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.								

Hazard	Action ID	Mitigation Actions – Columbia Corridor Drainage Districts							
Flood	40	**Plan designated safe zones for people who cannot safely evacuate in the event of a levee breach and flood.**							
		Plan Goals – 1,3,4,5		Hazards Addressed – Flood					
		Lifelines – Levee and Drainage System		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	PEN 1, PEN 2, SDIC	**3**	**2**	**1**	**3**	**2**	**11**
		Potential Funding – District Assessments, Grants							
		Potential Implementation Methods – Emergency Operations Plans							
		Notes – This strategy reflects a top theme from the Fall 2021 public survey on natural hazard mitigation priorities.							
Flood	41	**Support agency partners to improve joint stormwater assets that are essential to the existing internal drainage system.**							
		Plan Goals – 2,3,5		Hazards Addressed – Flood					
		Lifelines – Disaster Sheltering		**Prioritization Criteria**					
		Implementation Lead	**Coordinating Partnerships**	**Equity**	**Benefit**	**Cost**	**Risk**	**Capacity**	**Priority Score**
		MCDD	City of Portland, Port of Portland, PEN 1, PEN 2, SDIC	**2**	**2**	**1**	**3**	**1**	**9**
		Potential Funding – District Assessments, Interagency Cost-Share, Grants							
		Potential Implementation Methods – District Drainage Master Plans, Emergency Operations Plan, Internal Drainage Emergency Action Plan							
		Notes –							

5.6.2 Districts Overview

As noted in the plan introduction, six separate drainage and levee management bodies are collected in this volume as Columbia Corridor Drainage Districts. Of the six, four drainage districts – Multnomah County Drainage District (MCDD), Peninsula Drainage District #1 (PEN 1), Peninsula Drainage District #2 (PEN 2), and the Sandy Drainage Improvement Company (SDIC) – are current drainage and levee management districts. While the risk of flood is central to this chapter, the risk of other natural hazards varies by District. Within the hazard assessment and mitigation strategy sections of this chapter, each District is examined independently to reflect the current needs and vulnerabilities within their respective boundaries.

The Columbia Corridor Drainage Districts Joint Contracting Authority (CCDDJCA) is an intergovernmental entity that combines the four drainage districts into a single funding and contract administration body. Eventually, the four districts will fully consolidate into the Urban Flood Safety and Water Quality District (UFSWQD), created by the Oregon State Legislature in 2019 to modernize the work of the multiple drainage districts covering the 27 miles of levees and water conveyance infrastructure under these four districts. Once in place, the UFSWQD will continue the flood safety work of the independent districts while adding additional services.

Because the CCDDJCA and UFSWQD cover the same territory as the four independent drainage districts combined, they are included with averaged risk ratings and combined mitigation strategies. When the districts are consolidated, CCDDJCA and UFSWQD will already have NHMP requirements in place and can seamlessly maintain eligibility for Federal hazard mitigation grants.

As special districts of Oregon, the Columbia Corridor Drainage Districts are limited purpose units of government, and the hazard mitigation strategies identified herein are subject to their flood safety statutory authorities. The term Columbia Corridor Drainage Districts (Districts) will be used for the remainder of the chapter and will refer to all six entities.

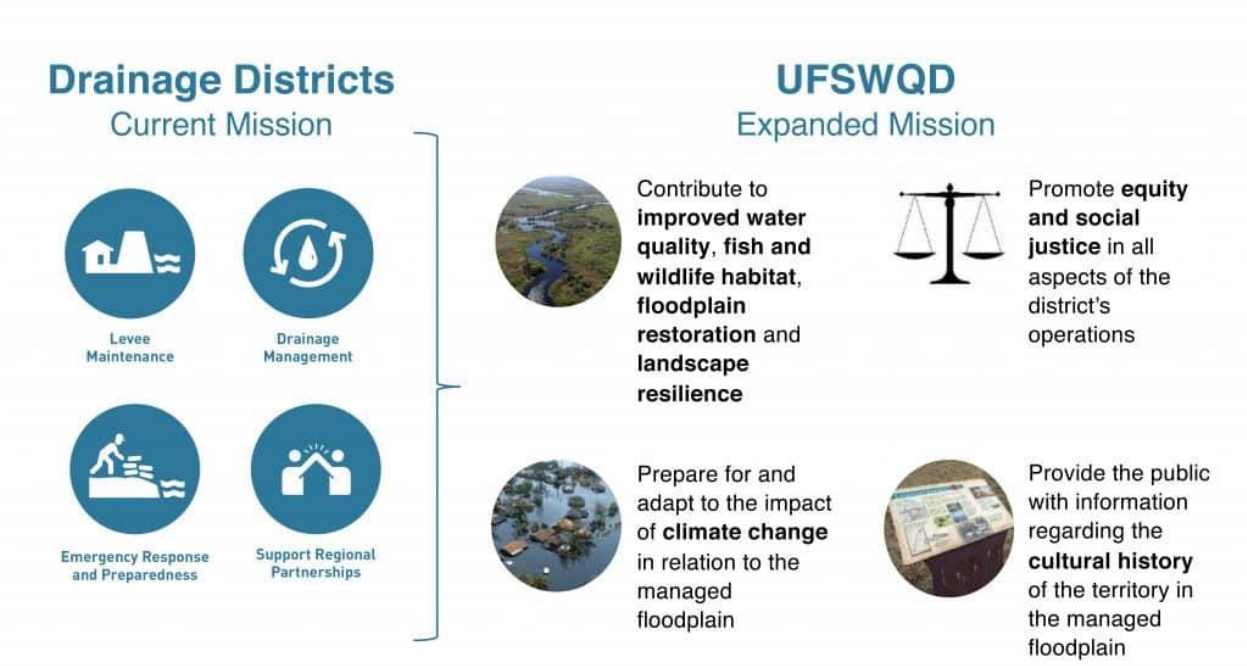

Figure 182 - Drainage Districts' current and expanded mission

With new requirements for Special Districts to have their own NHMPs to manage FEMA Hazard Mitigation grants, the Districts elected to join this multi-jurisdictional plan. As a first-time plan participant, the Districts are not updating actions and priorities from prior plans but making comprehensive assessment of risks from natural hazards and vulnerabilities that can mitigate that risk.

- *About the Districts*

The Districts operate and maintain drainageways and levees that were first built between 1917 and 1920 to support year-round farming and industry. At that time there were only 500 homes behind the levees, and most of the land was either unimproved or agricultural. Now, the system protects the Portland International Airport, a regional Exposition Center, the backup water supply for the City of Portland, thousands of homes, and three major interstates. The area is also home to hundreds of businesses and approximately 10% of Multnomah County's employment base. The drainageways and levee system are essential to the protection of the daily life of 7,500 residents and the nearly 13,000 acres of land amounting to $7.3 billion in assessed property value.

Since 2013, Levee Ready Columbia (LRC, previously Levee Improvement Project) has been working toward recertification of the levee system with FEMA, as well as maintaining active status in USACE's Rehabilitation and Inspection Program. To do so, and maintain accreditation by FEMA of the levee system, LRC has been working to understand the vulnerabilities and deficiencies that exist within the levee system, as well as to define the assets (structural, historical, community, environmental, and cultural) that the Districts protect. This has involved extensive engineering investigations (primarily geotechnical, civil, and structural) of the pump stations and levee prism.

- *Geography*

The four independent drainage districts are located in the northern portion of Multnomah County along the South shore of the Columbia River. They are bounded to the west by North Portland Rd (Near Smith and Bybee Lakes) and to the east by the Sandy River. The southern border of the Districts generally coincides with Columbia Boulevard apart from the Sandy Drainage Improvement Company (SDIC), which shares a southern border with a railroad line.

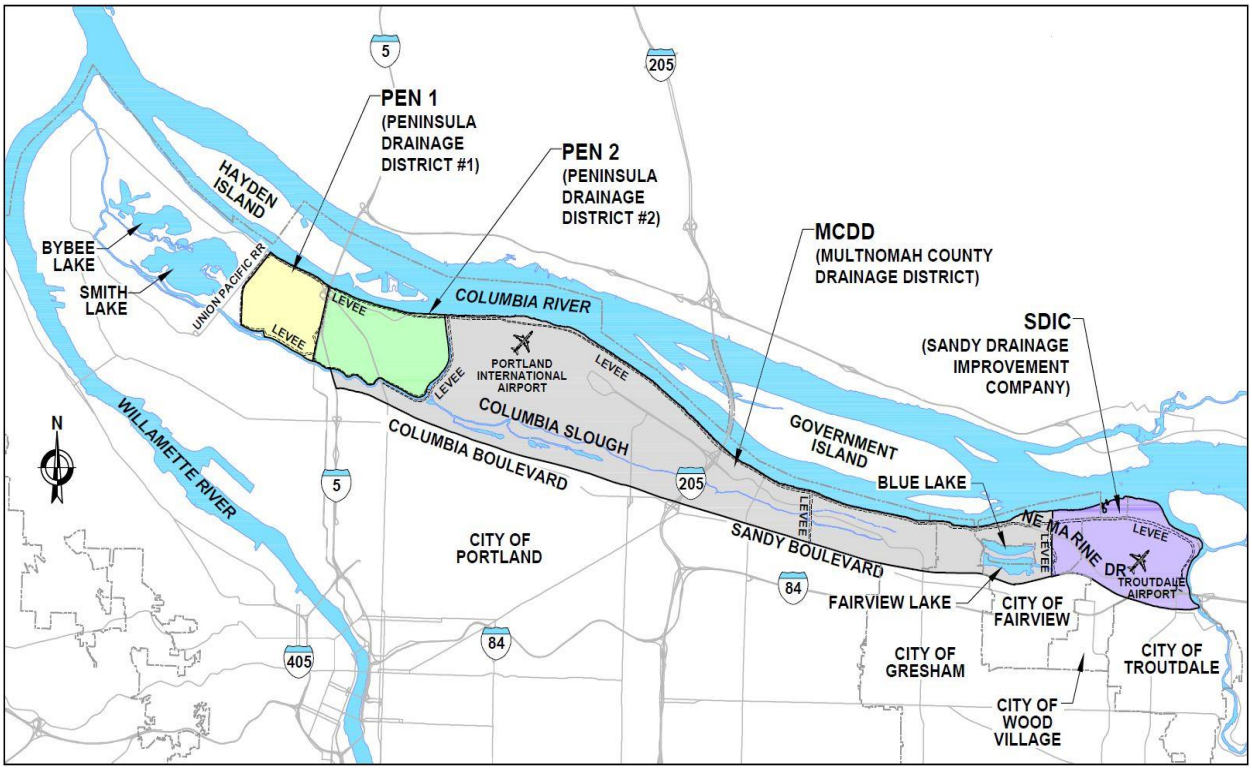

Figure 183 – Map showing the location of the independent Drainage Districts

- Peninsula Drainage District No. 1, established in 1917, 1.6 square miles
- Peninsula Drainage District No. 2, established in 1917, 2.5 square miles
- Multnomah County Drainage District No. 1, established in 1917, 13.4 square miles
- Sandy Drainage Improvement Company, established in 1917, 2.4 square miles

The entire four-district levee system is maintained by the MCDD on behalf of all districts. SDIC is set alongside the Sandy River on its eastern border and has a setback levee at its confluence with the Columbia River.

Taken as a whole, the Districts share area within the cities of Portland, Gresham, Troutdale, and Fairview, as well as portions of unincorporated Multnomah County. As special purpose units of government, they are authorized to provide flood safety services within their jurisdictional boundaries.

- *Topography*

Being in the natural floodplain of the Columbia River, the topography of the Districts is generally flat and low-lying. As such, the Districts contain several lakes, wetlands, sloughs, side channels, and other areas prone to ponding during rain events. In addition to these features, man-made levees and embankments are present throughout the Districts. These areas act primarily as hydraulic barriers and create drier upland zones.

- *Population*

Although the territory of the Districts overlays that of city and county jurisdictions, information about the population of those living in levee-protected areas have been included in this plan when available.

Table 44 – Population in levee-protected areas by Drainage District (For population details, see Community Profile chapter). Data from DOGAMI estimate.

District	Estimated Population
Peninsula Drainage District #1 (PEN 1)	15
Peninsula Drainage District #2 (PEN 2)	2,480
Multnomah County Drainage District (MCDD)	4,927
Sandy Drainage Improvement Company (SDIC)	14
Total:	**7,436**

Unsheltered residents also reside in the served areas, although individual counts or estimates are not available at the District level. Many of these individuals are often located along roadways, including on the levee, and near waterways or low-lying areas that are highly susceptible to flooding under even minor flooding scenarios.

The Districts serve to protect a large workforce for industrial and manufacturing facilities, hotels and correctional facilities, and protect the Portland International Airport (PDX), a primary source of incoming travelers to the area.

Table 45 – Workforce in levee-protected areas by Drainage District (For population details, see Community Profile chapter). Data from DOGAMI estimate.

District	Estimated Workforce
Peninsula Drainage District #1 (PEN 1)	1,167
Peninsula Drainage District #2 (PEN 2)	4,506
Multnomah County Drainage District (MCDD)	47,119
Sandy Drainage Improvement Company (SDIC)	6,062
Total:	**58,854**

- *Land Use and Zoning*

Most of the land in the Districts is classified as industrial zoning, land uses consist of residential, commercial, and parks and open space. The Districts have several protected green spaces, including Blue Lake Regional Park and Big Four Corners (MCDD), Children's Arboretum Park (PEN 2), Vanport Wetlands (PEN 1), and TRIP Wetlands (SDIC).

While not subject to the same land use requirements as cities and counties, and without the authority to regulate land use decisions, the Districts are aware of increased in-fill and impervious areas within their borders. Recent examples include the conversion of Portland Meadows (park zoning) to industrial/commercial property in PEN 2; conversion of open farmland at Cereghino Farms (MCDD-East) to industrial/commercial property; and conversion of open industrial land on Port of Portland property to warehouses (including Amazon) in SDIC.

Expanding impervious area in the Districts increases flows that can affect the capacity of pumping systems and increase the risk of flooding. The Districts have completed drainage master plans to address growth within the system, including upsizing pumping capacity, evaluating green infrastructure solutions, and assessing the condition of culverts to mitigate surface flooding risk. Several mitigation strategies included in this chapter reflect the priorities identified in the drainage master plans.

- *Transportation*

The major interstates of the Districts include I-5 and I-205, which both include major bridges that cross the Columbia River into Washington State. Many residents, workers, and travelers use these bridges to gain access to or from the resources within the Districts. The major roads in the Districts include:

  - NE Columbia Boulevard – an east-west traversing road along the southern border of the Districts
  - NE Marine Drive – an east-west traversing road adjacent to the Columbia River in the Districts
  - Martin Luther King Jr Dr. – a north-south traversing road in Pen 2
  - NE Airport Way – an east-west traversing road in MCDD, providing access to PDX Airport

The MAX light-rail provides mass public transportation connecting downtown Portland with both the Expo Center (PEN 1) and the PDX Airport (MCDD), as well as Tri-Met bus services. Transportation systems within the Districts also serve as terminals and throughways for freight movement through trucking and rail.

- *Utilities*

Electric utilities in the Districts are provided by either PacifiCorp (Pacific Power) or Portland General Electric (PGE). Pacific Power services the Districts west of NE 122nd and PGE services the area east of NE 122nd. PGE's Troutdale Substation in SDIC is the lone energy facility within the Districts.

The City of Portland provides drinking water, sewer and stormwater services to the residents and workers in the western Districts (PEN 1, PEN 2, and portions of MCDD), with services in the eastern Districts (portions of MCDD and SDIC) being provided by the Cities of Fairview, Wood Village, Gresham, and Troutdale. The Districts also contain and protect important natural areas owned by the City of Portland as well as the Columbia South Shore Well Fields, the second largest source of drinking water in Oregon.

- *Critical Facilities*

The critical facilities identified for the operation of the Districts are pump stations and MCDD's main campus, which includes administrative and operational offices. Pump stations and gravity outfalls are critical facilities to District operations as the primary methods for moving water through and out of the District's internal drainageways. Other critical facilities that exist in the protected levee areas are listed below.

- Airports
- Bridge
- Childcare Facilities
- Community Center
- County Assets
- Fire Stations
- Homeless Shelters
- Jails
- Law Enforcement Facilities
- Licensed Medical Facilities
- Residential Care Facility
- Schools
- Urgent Care Centers

Additional assets that the levees and drainage system protect include:

- The Columbia South Shore Well Fields (MCDD)
- The Oregon Air National Guard (MCDD)
- Portland Expo Center (PEN 1)
- Portland International Raceway (PEN 1)
- Historic Vanport (PEN 1)
- Cascade Station (MCDD)
- Troutdale Reynolds Industrial Park (SDIC)

5.6.3 Local Hazard Analysis

Earthquake – Risk Rating Moderate (All Districts)

See Earthquake Section for more detailed risk and vulnerability information.

The Districts' levee system, pump stations, and drainage channels are primarily located on historic floodplain and are very susceptible to ground liquefaction and severe ground-shaking. The built environments vary from district to district, but PEN 2 and MCDD have larger residential populations, as well as large commercial-industrial areas that would likely be affected by liquefaction and shaking damage. All District entities assessed the risk as moderate due to the long return period between earthquakes in this region.

In a magnitude 9.0 Cascadia Subduction Zone earthquake, ground-shaking would be consistently moderately strong across the Districts. Permanent ground deformation caused by liquefaction would be moderate to high throughout the Districts, with greater impacts to the western Districts.

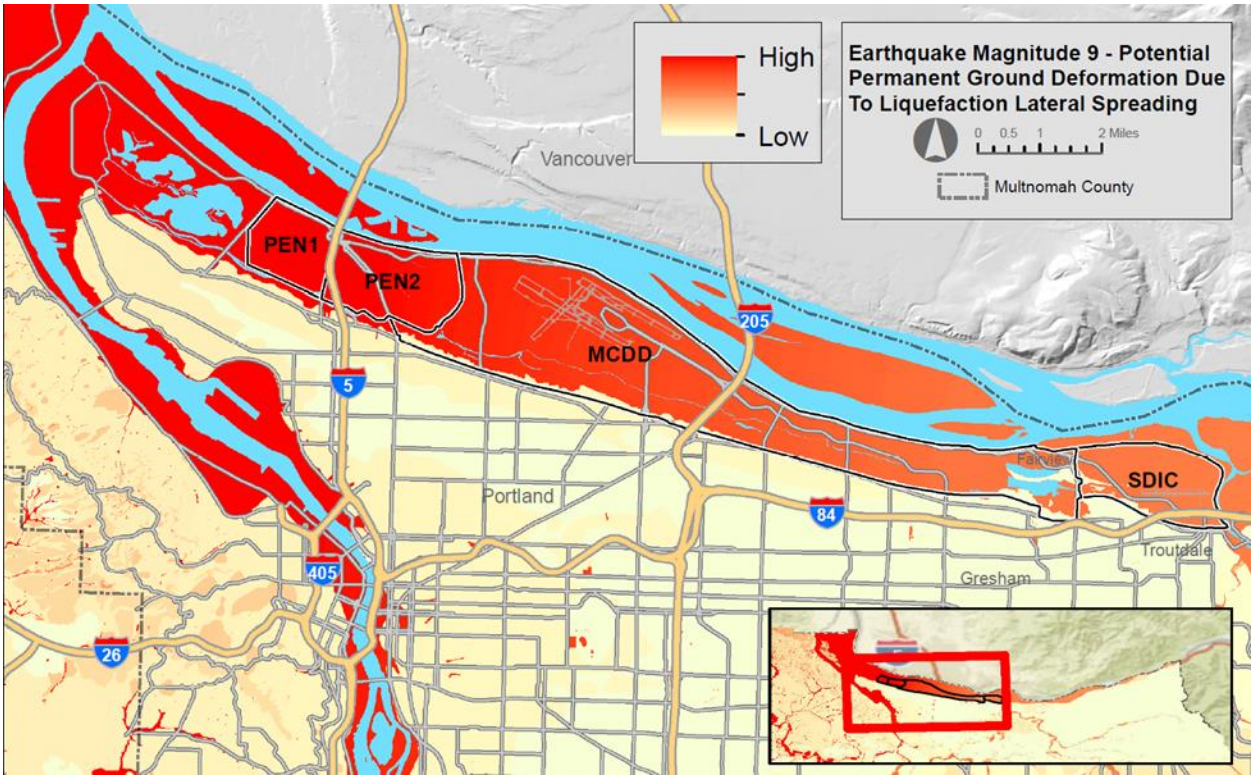

Figure 184 - Map of potential impacts in the Districts from a magnitude 9.0 Cascadia Subduction Zone earthquake.

A magnitude 6.8 Portland Hills Fault crustal earthquake is expected to impact the Districts more substantially than a Cascadia Subduction Event. This increased effect would be seen in both ground shaking and liquefaction. The damage potential is “heavy” in the western Districts to “moderate/heavy” in the eastern Districts. The shaking is “violent” in the western Districts and “severe” in the eastern Districts.

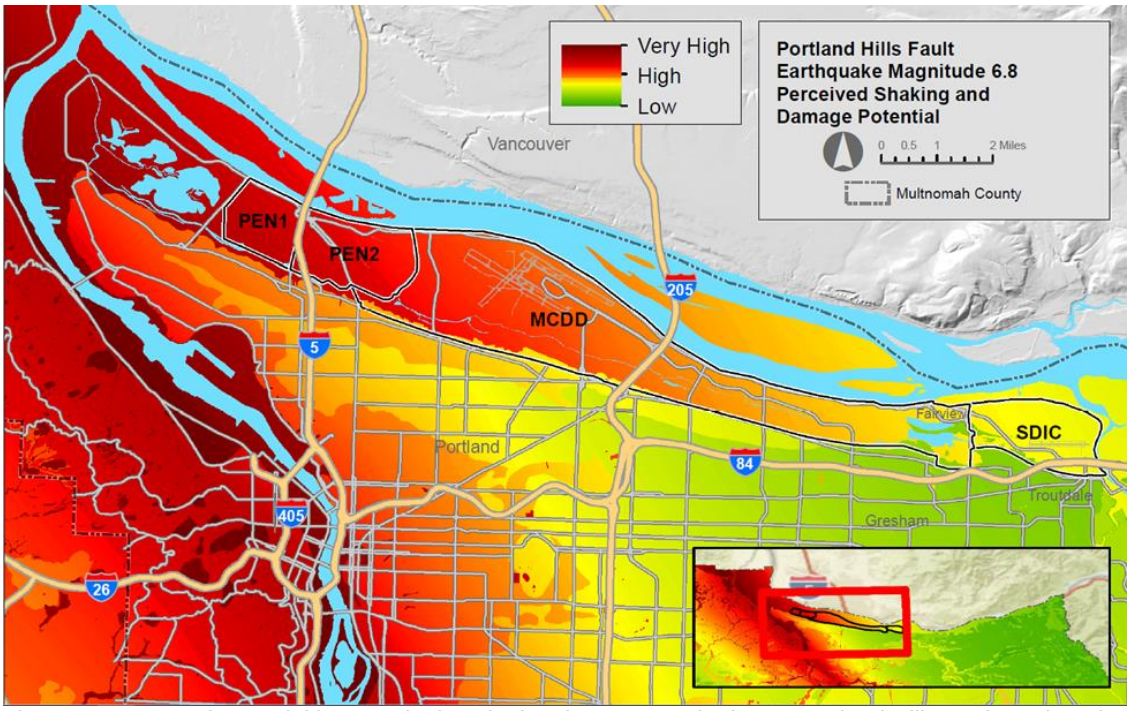

Figure 185 - Map of potential impacts in the Districts from a magnitude 6.8 Portland Hills Fault earthquake.

Flood – Risk Rating High (All Districts)

See Flood Section for more detailed risk and vulnerability information.

Flood is considered a high risk hazard across the entire levee system. The Districts' levee system, pump stations, and drainage channels all exist for the purpose of mitigating flood hazards. Levee systems protect low-lying areas along the Columbia River, including thousands of residents and billions of dollars in assessed property and annual economic activity. Though the probability of levee failure within the Districts is low, the direct impacts would be significant for the participating jurisdictions of this plan.

Many areas of the Districts are mapped under FEMA's Flood Insurance Rate Map (FIRM) system as having a reduced risk of flooding due to levees. Other areas are mapped as being at risk for a 0.2% annual chance flood hazard (the eastern Planning Area) or a 1% annual chance flood hazard, where interior flooding within the levee system can occur or undeveloped areas where levee protection may not be complete.

An interactive version of this map shaking is "violent" in the western Districts and "severe" in the eastern Districts.

An interactive version of this map can be found here (Flood Hazard – Effective FEMA Flood Data)

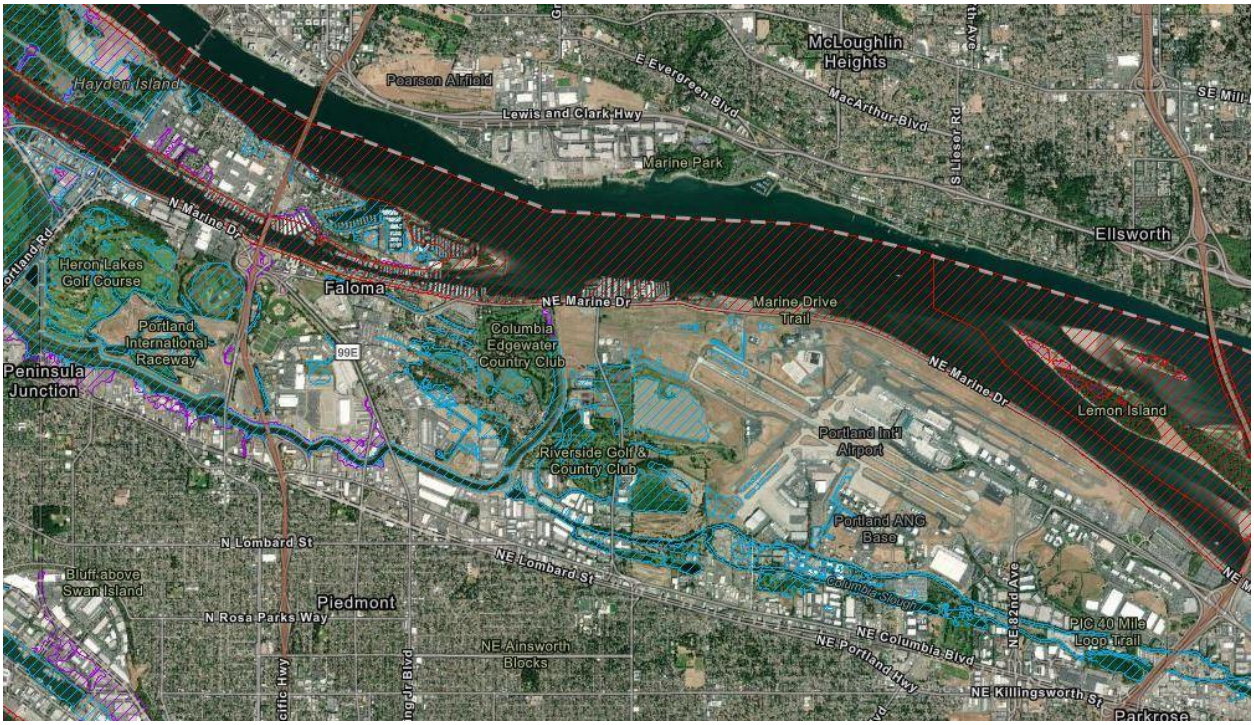

Figure 186 - FEMA National Flood Insurance Rate Maps in western districts showing 1% annual chance flood probability (100-year) in blue and the .2% annual chance flood area (500-year) in purple. The floodway is shown in red. Map from DOGAMI HazVu Site.

An interactive version of this map can be found here (Flood Hazard – Effective FEMA Flood Data)

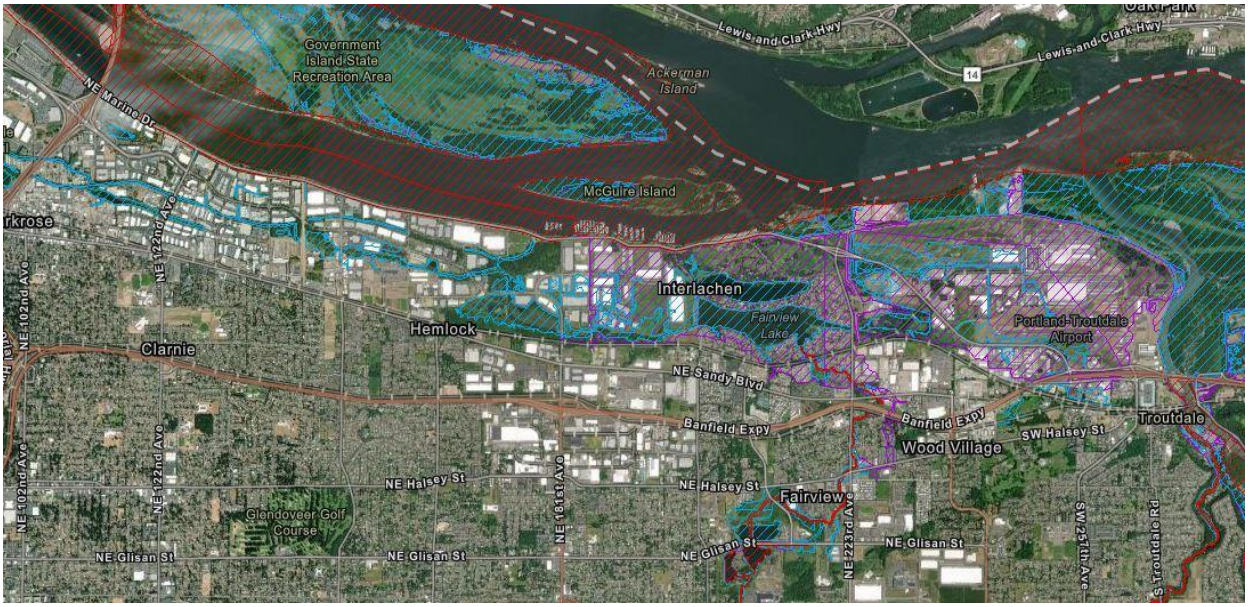

Figure 187 - FEMA National Flood Insurance Rate Maps in eastern districts showing 1% annual chance flood probability (100-year) in blue and the .2% annual chance flood area (500-year) in purple. The floodway is shown in red. Map from DOGAMI's HazVu site.

The Districts recently completed a 3-year New Start Feasibility Study with USACE as a part of the Portland Metropolitan Levee System (PMLS) Project. In the PMLS' Final Report & Environmental Assessment[90], the US Army Corps of Engineers determined there would be substantial benefit from federal investment in levee system improvements including: creating a new setback levee, raising and widening sections of the levee, and providing backup power connections to pump stations. If approved, construction could start as early as 2025.

In addition, flooding may exacerbate channel migration and potentially impact MCDD and SDIC, depending on erosion patterns at the Sandy River Delta and the potential for the creation of new channels or reoccupation of historical channels.

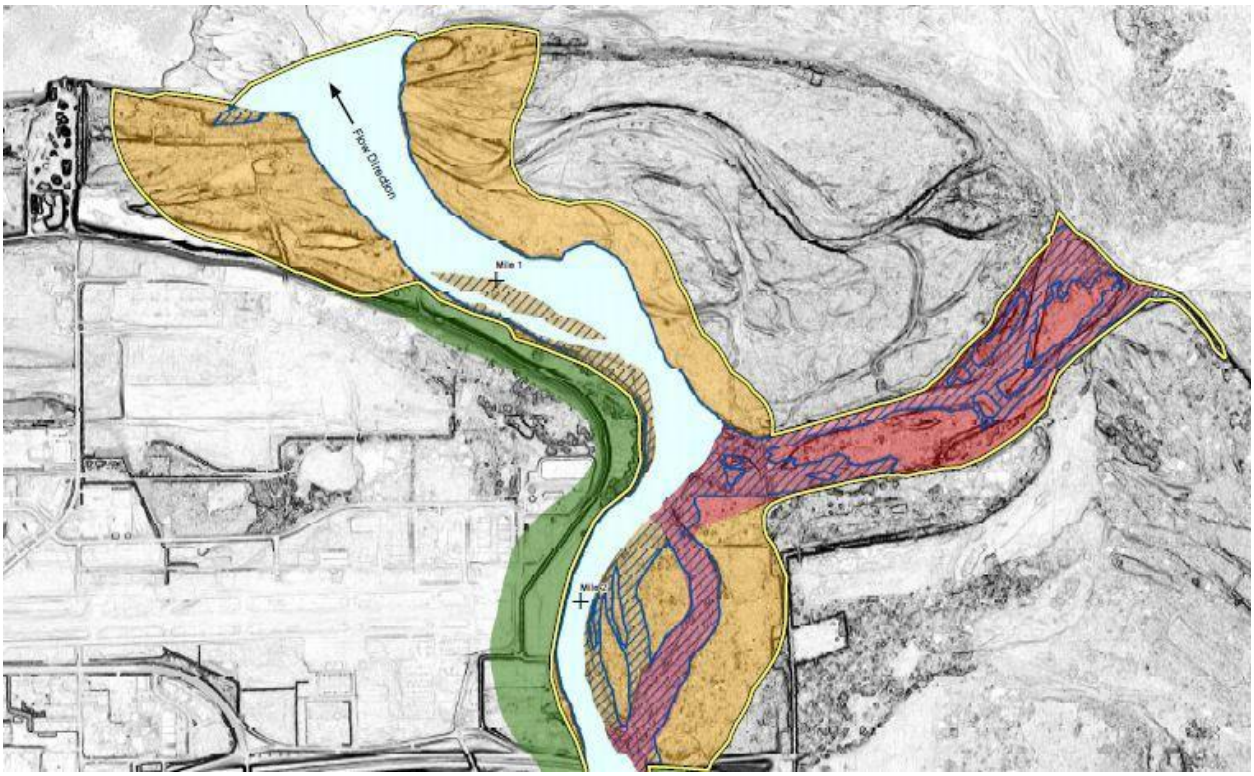

Figure 188 - Potential channel migration on the Sandy River. The yellow areas have risk from bank erosion in the next 100 years, the red areas have risk from the formation of a new river channel, the blue shaded areas are previous locations of the river channel at some point between 1955-2019, and the green areas are where built structures have eliminated risk of channel migration. Map from DOGAMI.

Landslide – Risk Rating Low (All Districts)

See Landslide Section for more detailed risk and vulnerability information.

Landslide risk in the Districts is low due to predominantly low-lying land with minimal slopes. All four districts and combined entities rated landslide as being of relative low risk. There is no identified probability for deep landslides within the levee-protected areas. While the overall risk of shallow landslides is low, the 27 miles of levee may experience some erosion, landslides and

[90] Published in coordination with the US Army Corps of Engineers in 2021. https://usace.contentdm.oclc.org/digital/collection/p16021coll7/id/18451

settling during heavy rains or high water events. Shallow landslide susceptibility is expected in berm areas along roads and the levee system itself, with the most susceptible areas along NE Cornfoot Road between NE 47th and Alderwood Road in Portland.

An interactive version of this map can be found here (Landslide Susceptibility – Susceptability to Shallow Landslides)

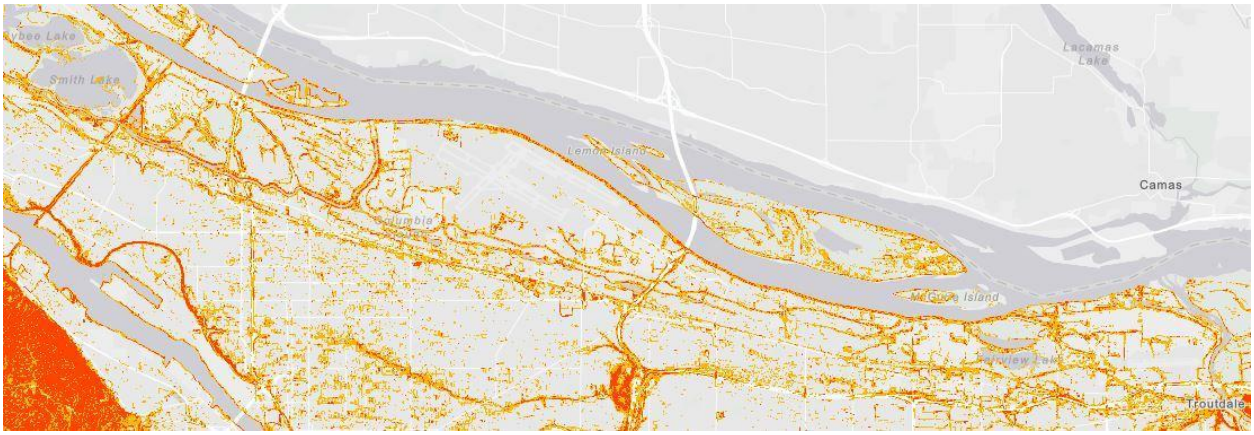

Figure 189 - Shallow landslide susceptibility in the Columbia Corridor Drainage Districts. Map from DOGAMI SLIDO site.

Severe Weather – Risk Rating High (All Districts)

See Severe Weather Section for more detailed risk and vulnerability information.

All Districts rated Severe Weather as a high risk. Weather events due to climate change are expected to increase vulnerability and will continue to be a significant concern for District operations as well as those living in the protected areas.

Over the last five years, winter storms have significantly disrupted transportation routes and utilities. Snow events are a key driver for flooding, and strong winter storms have increased incidences of landslides in the region. Severe windstorms threaten damage to District equipment and cause power outages. These outages may be significant when windstorms coincide with high precipitation events, requiring resilient backup power for pumps. Windstorms may also create extreme risk for wildfire in grassy levee areas when they coincide with dry summer conditions.

Locations with severe urban heat island effects are throughout District areas, coinciding primarily with areas of dense industrial development, especially airport infrastructure.

[An interactive version of this map can be found here]

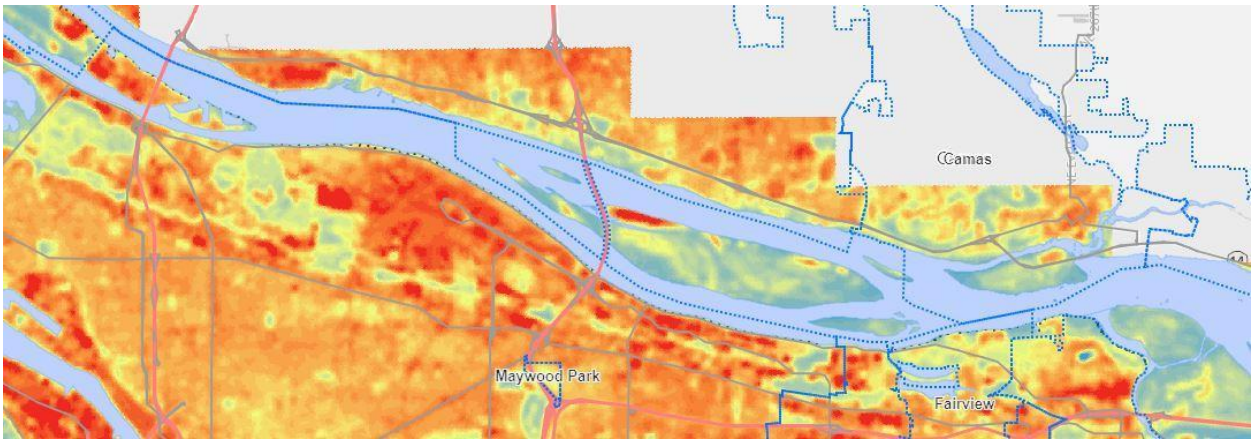

Figure 190 - Urban heat island potential in the Districts. Map from Metro.

Drought is not a significant issue for the Districts, and residents and businesses in the District areas receive water from Bull Run or aquifer well fields, which are recharged year round and are less impacted by seasonal drought. Droughts pose a risk of drying out vegetation and creating wildfire conditions.

Volcano

- *MCDD, SDIC – Risk Rating Moderate*
- *PEN 1, PEN 2, UFSWQD, CCDDJCA – Risk Rating Low*

See Volcano Section for more detailed risk and vulnerability information.

Volcanic effects to levee systems are greatly affected by their proximity to the Sandy River lahar zone. MCDD and SDIC have system operations on each side of the mouth of the Sandy River, which is the primary area of concern for these fast moving debris flows. This risk area could be very large and impacts extremely severe in a 'worst-case' Mount Hood eruption or more limited in extent and scope in a less violent event.

An interactive version of this map can be found here (Volcano Hazard – Moderate Hazard Zone)

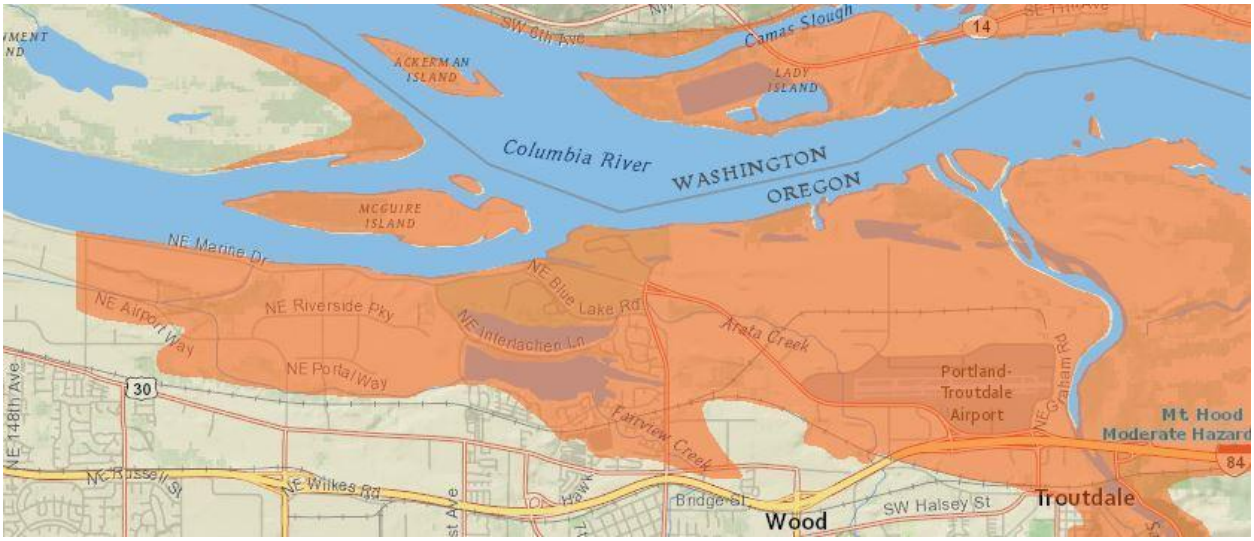

Figure 191 - Map showing risk from a volcanic lahar in an extra-large eruption (10,000-100,000 year event) of Mount Hood. Map from DOGAMI HazVu site. The study used for this image was limited to a fixed geographical boundary – effects from such a major lahar would extend further downriver beyond the western boundary indicated by the DOGAMI map.

Due to its overlapping geography along the western bank of the Sandy River Delta, SDIC has a very comparable risk level to Troutdale of both major and moderate lahars. The lahar would certainly affect drainage in the low-lying area by changing the hydrology and potentially damaging the Sandy Pump Station, which drains the basin to the Columbia River. It would also likely damage areas protected by the levee, including the Troutdale Airport, commercial areas, manufacturing/warehouse buildings, and other industrial business structures. It is unclear how it might affect the levees, which are built of sand and silt, but it's reasonable to expect impacts that may require repairs to maintain their levels of protection from flooding.

Due to its overlapping geography with Fairview near the western bank of the Sandy River Delta, eastern portions of MCDD (risk mapping ends at about NE 158th in Portland but effects would continue farther west) have a very comparable risk level to Fairview in case of a major lahar. The lahar would certainly affect drainage in the low-lying area by changing the hydrology and potentially damaging Pump Station 4 (and another smaller pump station) draining the upper basin to the Columbia River. It would also likely damage areas protected by the levee, including commercial areas, manufacturing/warehouse buildings, and other industrial business structures. It is also unclear how it might affect the levees, which are built of sand and silt, but is reasonable to imagine they would be impacted in some way and may need repairs to maintain their levels of protection from flooding.

The remaining drainage districts, as well as the western portions of MCDD, are outside of the zone and are not expected to suffer lahar impacts. As such, the hazard risk rating reflects this different level of risk between the districts.

Falling ash could impact surface waters and potentially damage utility pumping stations and other structures. Ash would also pose a significant health risk to those living or working in levee-protected areas.

Wildfire and Wildfire Smoke

- ***MCDD, PEN 2, UFSWQD, CCDDJCA – Risk Rating Moderate***
- ***PEN 1, SDIC – Risk Rating Low***

See Wildfire Smoke Section for more detailed risk and vulnerability information.

Wildfire and Wildfire Smoke risk is moderate in MCDD and PEN 2 due to the prevalence of large, drought-prone grassy areas and houseless resident camps with limited access to emergency communications and evacuation notices. PEN 1 and SDIC have slightly lower vulnerability. The average risk for the UFSWQD is closer to moderate than low.

Areas identified as having the highest risk of large fire impact by the Oregon Wildfire Explorer are along North Portland Road at the western edge of PEN1, residential areas around the Columbia Edgewater Country Club, the Blue Lake Regional Park area, and the Sandy River Delta. Most industrialized areas and open wetlands in the levee districts are considered low risk for wildfires starting or spreading into a large urban fire.

Wildfire smoke could impact levee operations due to unhealthy outdoor working conditions and is a significant health risk to those living in levee-protected areas, as with the other participating jurisdictions.

An interactive version of this map can be found here (Wildfire Potential Impacts – Overall Potential Impacts)

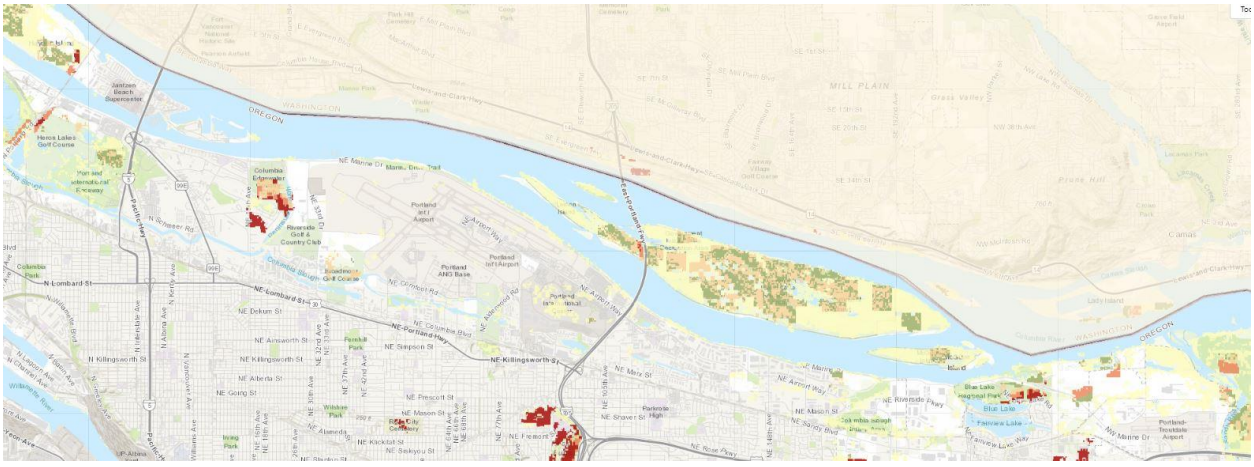

Figure 192 - Potential wildfire impact across the Columbia Corridor Drainage Districts. Areas in red would see very high impacts to structures, infrastructure, or natural resources. Areas in orange would see moderate impacts and areas in yellow would have lower impacts. Map from Oregon Wildfire Explorer with data from PNW-QWRA.

5.6.4 Hazard Risk Scores

The identified levels of risk from each hazard were determined by the Columbia Corridor Drainage Districts, using a scoring methodology designed by Oregon Emergency Management, and applied across the state to contextualize local risk perception.

Columbia Corridor Drainage Districts Natural Hazard Risk Analysis

Hazard	History (Weight Factor = 2)		Vulnerability				Probability (Weight Factor = 7)		Risk Score	Risk Ranking
			Average (WF = 5)		Max (WF = 10)					
Earthquake (all)	2 x	**1**	5 x	**10**	10 x	**10**	7 x	**2**	**166**	**Moderate**
Flood (all)	2 x	**10**	5 x	**5**	10 x	**10**	7 x	**9**	**208**	**High**
Landslide (all)	2 x	**1**	5 x	**1**	10 x	**2**	7 x	**2**	**41**	**Low**
Severe Weather (SDIC)	2 x	**10**	5 x	**10**	10 x	**10**	7 x	**10**	**240**	**High**
Severe Weather (P1/P2/MC)	2 x	**9**	5 x	**10**	10 x	**10**	7 x	**10**	**238**	**High**
Severe Weather (CCDDJCA/UFSWQD)	2 x	**9**	5 x	**10**	10 x	**10**	7 x	**10**	**238**	**High**
Volcano (SDIC/MCDD)	2 x	**1**	5 x	**1**	10 x	**10**	7 x	**1**	**114**	**Moderate**
Volcano (P1/P2)	2 x	**1**	5 x	**1**	10 x	**5**	7 x	**1**	**64**	**Low**
Volcano (CCDDJCA/UFSWQD)	2 x	**1**	5 x	**1**	10 x	**6**	7 x	**1**	**74**	**Low**
Wildfire (MCDD)	2 x	**4**	5 x	**5**	10 x	**6**	7 x	**6**	**135**	**Moderate**
Wildfire (P1/SDIC)	2 x	**4**	5 x	**4**	10 x	**4**	7 x	**6**	**110**	**Low**
Wildfire (P2/CCDDJCA/UFSWQD)	2 x	**4**	5 x	**4**	10 x	**5**	7 x	**6**	**120**	**Moderate**

5.6.5 CCDD Aligned Plans and Other Implementation Mechanisms

Overview

The Columbia Corridor Drainage Districts have a different mitigation position compared to other participants in this plan, as a special district with authority focused on flood mitigation. All current planning and processes are focused on that goal, and are reflected in the number of mitigation actions in this plan directly tied to master planning and the Capital Improvement Program. The Districts manage an essential flood mitigation lifeline for the entire county, with 100 years of experience and expertise in infrastructure-based flood risk reduction. That long history of work is being broadened by a need for incorporating adaptive flood management strategies, and future climate change projections are becoming an essential component for ongoing and future implementation mechanisms. The Districts, as they approach consolidation,

are also working on building a community-driven all-hazards approach to resilience, even while only having authority to regulate flood.

- District Drainage Master Plans
  - Drainage Master Plans for each of the Columbia Corridor Drainage Districts were completed from 2018-2022. Each Plan provides a clear understanding of the existing drainage system within the levee systems and an outline of improvements to address both existing and future needs. To help MCDD mitigate risk, each Plan identifies capital investments to address internal drainage issues and present conceptual project solutions to be considered in the District's Capital Improvement Plan process.
    - MCDD – June 2019
    - PEN 1 – September 2022
    - PEN 2 – June 2019
    - SDIC – January 2021
- Emergency Operations Plan (under development, expected Summer 2023)
  - The Emergency Operations Plan (EOP) describes the Districts' approach to preparing for and responding to emergencies.
  - The EOP defines the roles, responsibilities and legal authorities of the Districts to mitigate flood risk within an all hazards approach and helps fulfill Federal Emergency Management Agency (FEMA) and US Army Corps of Engineers (USACE) requirements stipulating that levee operators have emergency response plans for their flood management systems.
- Flood Emergency Action Plan - Adopted July 2016
  - The purpose of the Flood Emergency Action Plan (FEAP) is to establish protocols and responsibilities for MCDD in the event of a Columbia River flood emergency within the Columbia Corridor.
  - As an annex of the EOP, the FEAP will provide a consistent framework to help residents, landowners, and partner agencies have higher awareness regarding MCDD's emergency response during rain events.
- Internal Drainage Emergency Action Plan (under development, expected Summer 2023)
  - The purpose of the Drainage Emergency Action Plan (DEAP) is to establish protocols and responsibilities for Multnomah County Drainage District #1 (MCDD) as first responders in the event of a drainage flood emergency within the levee system in the Columbia Corridor.
  - As an annex of the EOP, the DEAP will provide a consistent framework to help residents, landowners, and partner agencies have higher awareness regarding MCDD's emergency response during rain events.
- Levee Ready Columbia
  - Levee Ready Columbia is a partnership of over twenty public, private, nonprofit, and community-based organizations committed to reducing the risk of flooding within the Columbia Corridor Drainage Districts.
  - After several years of research and discussion, the LRC partners worked with local state legislators to introduce legislation to reform and modernize the way the local levee system is managed and to make a more robust set of financial tools available to support the system going forward. The State Legislature almost unanimously passed the legislation, and it was signed into law by the Governor in late July 2019. The new structure management will be permanent in 2024 and has been designed to:

        - Meet long-term flood safety needs and shifting federal standards;
        - Create a less fragmented framework for management and decision-making
        - Provide for a more equitable distribution of costs based on services and benefits received;
        - Allow for improved environmental stewardship along the levees and drainageways, which is currently prohibited under the drainage district structure; and
        - Create a more democratic and transparent selection process for board members in which significantly more people have a voice.
- MCDD Capital Improvement Plan
    - MCDD recognizes that strategic investment of its assessment dollars includes improvements to assets it owns or maintains. MCDD's Capital Improvement Plan (CIP) represents a list of projects prioritized to maximize the benefits to the internal drainage and levee systems managed by the district.
- MCDD Strategic Asset Management Plan
    - MCDD is committed to ongoing maintenance and investment in its infrastructure to ensure a modern system that will fulfill the district's mission.
    - MCDD's Strategic Asset Management Plan (SAMP) outlines the strategies and tactics required to modernize the agency's asset management approach by institutionalizing appropriate industry best practices.
- Portland Metro Levee Study
    - US Army Corps of Engineers, report completed in June 2021
    - The Portland Metro Levee System (PMLS) Feasibility Study (study) is a flood risk management general investigations feasibility study being conducted by the Portland District U.S. Army Corps of Engineers (Corps) in partnership with the Columbia Corridor Drainage Districts Joint Contracting Authority (CCDD).
    - The purpose of the study is to analyze current flood risks in the system, develop projections of future without-project conditions and identify flood risk management options that could meet current and future needs within the policies and regulations of the Corps. Implementation of this study could lead to a federally supported construction component if a solution is found to be in the federal interest.