

# City of Toledo Addendum to the Lincoln County Multi-Jurisdictional Hazard Mitigation Plan

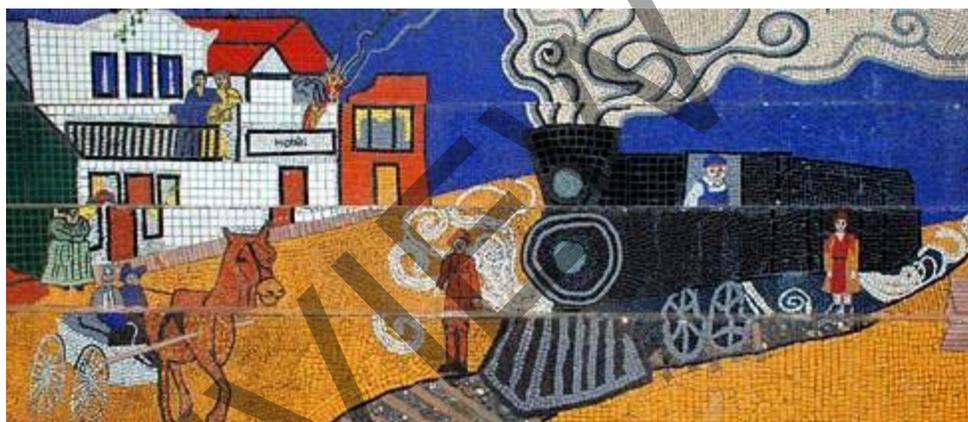


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Volume II: Toledo Addendum



Prepared for:  
City of Toledo



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University of Oregon  
Institute for Policy Research and Engagement  
Oregon Partnership for Disaster Resilience

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## Purpose

This is an update of the City of Toledo addendum to the Lincoln County Multi-Jurisdictional Natural Hazards Mitigation Plan (NHMP). The City of Toledo's original addendum to Lincoln County's NHMP was completed and approved by FEMA in 2009. This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation, and Volume III (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-jurisdictional **Participation** §201.6(a)(3),
- Multi-jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv), and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Toledo's addendum are further discussed throughout the NHMP, and within Volume III, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Toledo adopted their addendum to the Lincoln County Multi-jurisdictional NHMP on [Date, 2020]. FEMA Region X approved the Lincoln County NHMP on [Date, 2020] and the City's addendum on [Date, 2020]. With approval of this NHMP the City is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through [Date, 2025].

## Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Lincoln County planning process (Volume I, Section 3):

***To promote public policy and mitigation activities which will enhance the safety to life and property from natural hazards.***

The 2020 NHMP update Steering Committee reviewed the 2015 plan mission statement and agreed it accurately describes the overall purpose and intent of this plan. This is the exact wording that was present in the 2009 and 2015 plan. The Steering Committee believes the concise nature of the mission statement allows for a comprehensive approach to mitigation planning.

## Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Lincoln County citizens, and public, and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement, and serve as checkpoints, as agencies, and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Lincoln County planning process (Volume I, Section 3). All NHMP goals are important and are listed below in no order of

priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider implementing first, should funding become available.

**Goal 1:** Protect life and reduce injuries resulting from natural hazards.

**Goal 2:** Minimize public and private property damages and the disruption of essential infrastructure and services from natural hazards.

**Goal 3:** Implement strategies to mitigate the effects of natural hazards and increase the quality of life and resilience of economies in Lincoln County.

**Goal 4:** Minimize the impact of natural hazards while protecting, restoring, and sustaining environmental processes.

**Goal 5:** Enhance and maintain local capability to implement a comprehensive hazard loss reduction strategy.

**Goal 6:** Document and evaluate progress in achieving hazard mitigation strategies and action items.

**Goal 7:** Motivate the public, private sector, and government agencies to mitigate the effects of natural hazards through information and education.

**Goal 8:** Apply development standards that mitigate or eliminate the potential impacts of natural hazards.

**Goal 9:** Mitigate damage to historic and cultural resources from natural hazards.

**Goal 10:** Increase communication, collaboration, and coordination among agencies at all levels of government and the private sector to mitigate natural hazards.

**Goal 11:** Integrate local NHMPs with comprehensive plans and implementing measures.

*(Note: although numbered the goals are not prioritized.)*

## **Process and Participation**

This section of the NHMP addendum addresses 44 CFR 201.6(a)(3), *Participation*.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K), and the regulations contained in 44 CFR 201, require that jurisdictions maintain an approved NHMP to receive federal funds for mitigation projects. Local adoption, and federal approval of this NHMP ensures that the city will remain eligible for pre-, and post-disaster mitigation project grants.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Institute for Policy Research and Engagement (IPRE) collaborated with the Department of Land Conservation and Development, Oregon Office of Emergency Management (OEM), Lincoln County, and Toledo to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) Fiscal-Year 2017 (FY17) Pre-Disaster Mitigation (PDM) Competitive Grant Program OR-2018-001 (PDMC-PL-10-OR-2017-02). Members of the Toledo NHMP Steering committee also participated in the County NHMP update process (Volume III, Appendix B).

The Lincoln County NHMP, and Toledo addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. The Toledo NHMP Steering Committee guided the process of developing the NHMP.

### Convener and Committee

The Toledo Planner (contract) serves as the NHMP addendum convener. The convener of the NHMP will take the lead in implementing, maintaining, and updating the addendum to the Lincoln County NHMP in collaboration with the designated conveners of the Lincoln County NHMP (Lincoln County Planning Director and Emergency Manager).

Representatives from the City of Toledo steering committee met formally, and informally, to discuss updates to their addendum (Volume III, Appendix B). The steering committee reviewed and revised the city's addendum, with focus on the plan's risk assessment and mitigation strategy (action items).

The current version of the addendum reflects changes decided upon at the designated meetings and through subsequent work and communication with OPDR. The changes are highlighted with more detail throughout this document and within Volume III, Appendix B. Other documented changes include revisions to the city's Risk Assessment and Hazard Identification sections, Action Items, and Community Profile.

The Toledo Steering Committee was comprised of the following representatives:

- Convener, Justin Peterson, Contract Planner
- Dave Inman, Assistant Fire Chief
- Daniel Ammons, Toledo Fire Department
- Arlene Inukai, Planning Technician/ Assistant Planner
- Bill Zuspan, Public Works Director

## **Public Participation**

Public participation was achieved by posting the NHMP publicly and providing community members the opportunity to make comments and suggestions during the review process. Community members were also provided an opportunity for comment via a survey administered by IPRE (Volume III, Appendix F). During the public review period (Attachment B) there were **no** comments provided.

## **Implementation and Maintenance**

The City Council will be responsible for adopting the Toledo addendum to the Lincoln County NHMP. This addendum designates a steering committee and a convener to oversee the development and implementation of action items. Because the city addendum is part of the county's multi-jurisdictional NHMP, the city will look for opportunities to partner with the county. The city's steering committee will convene after re-adoption of the City of Toledo addendum on an annual schedule; the county is meeting on a quarterly basis and will provide opportunities for participating jurisdictions (cities and special districts) to report on NHMP implementation and maintenance during their meetings. The city's Planner (contract) will serve as the convener and will be responsible for assembling the steering committee. The steering committee will be responsible for identifying new risk assessment data,

reviewing status of mitigation actions, identifying new actions, and seeking funding to implement the city's mitigation strategy (actions). The steering committee will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing, and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating, and training new steering committee members on the NHMP, and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes, and lessons learned during the year.

The convener will also remain active in the County's implementation, and maintenance process (Volume I, Section 4).

The City will utilize the same action item prioritization process as the County (Volume I, Section 4).

## Implementation through Existing Programs

This NHMP is strategic and non-regulatory in nature, meaning that it does not necessarily set forth any new policy. It does, however, provide: (1) a foundation for coordination and collaboration among agencies and the public in the city; (2) identification and prioritization of future mitigation activities; and (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other city plans and programs including the Comprehensive Land Use Plan, Capital Improvements Plan, and Building Codes, as well as the [Lincoln County NHMP](#), and the [State of Oregon NHMP](#).

The mitigation actions described herein (and priority actions in Attachment A) are intended to be implemented through existing plans and programs within the city. Plans and policies already in existence have support from residents, businesses and policy makers. Where possible, Toledo will implement the NHMP's recommended actions through existing plans and policies. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented. Implementation opportunities are further defined in action items when applicable.

Future development without proper planning may result in worsening problems associated with natural hazards. Toledo's acknowledged comprehensive plan is the City of Toledo Comprehensive Plan. The City implements the plan through the Community Development Code.

## Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from residents, businesses and policy makers. Many land-

use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.

Toledo's Addendum includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the addendum helps identify what resources already exist that can be used to implement the action items identified in Toledo's Addendum. Implementing the city's mitigation actions through existing plans and policies increases their likelihood of being supported and getting updated and maximizes the city's resources.

The following are Toledo's existing plans and policies that relate to natural hazards:

- **Comprehensive Plan, 2001, last amended 2016:** A document stating the general, long-range policies that will govern a local community's future development.  
*Relation to Natural Hazard Mitigation:* Contains city-specific information regarding natural hazards within the city's jurisdictional boundaries.
- **Zoning Ordinance, 2020:** Establishes land use zones to regulate the location of building structure and the use of land within the City of Toledo.  
*Relation to Natural Hazard Mitigation:* Contains city-specific hazard related requirements for the placement and construction of the buildings. Issues such as floodplain development, etc. Floodplain development standards are identified in the flood hazard protection ordinance (Toledo Municipal Code 15.16).
- **Subdivision Ordinance, 2014:** An ordinance prescribing regulations governing the subdivision of land.  
*Relation to Natural Hazard Mitigation:* Contains city specific hazard related requirements for the subdivision of parcels, and hazard specific issues such as floodplain development and construction on steep slopes, etc.
- **Toledo Transportation Plan, 2013:** Guides the management of existing transportation facilities and the design and implementation of future facilities.  
*Relation to Natural Hazard Mitigation:* The Transportation Plan may be a resource to identify which roads and transportation systems are most vulnerable to natural disasters. Likewise, the Transportation Plan can be utilized to implement mitigation measures aimed at protecting "transportation disadvantaged" populations in emergency situations. When updated, the Transportation Plan can also include mitigation elements in its implementation considerations.
- **Lincoln County Community Wildfire Protection Plan, 2018:** Assists Toledo clarify and refine priorities for protection of life, property, and critical infrastructure in the wildland-urban interface on public and private lands.  
*Relation to Natural Hazard Mitigation:* Enhances the NHMP risk assessment, identification of hazard zones, and includes mitigation actions to reduce risk to wildfire.

## Government Structure

The Mayor and six-member City Council is the policy making body for Toledo. As the elected legislative body in Toledo, the City Council has overall responsibility for the scope, direction and financing of city services. Council members serve four-year terms, the Mayor also serves on the council and serves two-year terms. Additional departments within the city include the following:

**Administration Department:** The Administration Department is located at City Hall and is responsible for the day-to-day general administration and financial management of the city. The city manager, appointed by the mayor and City Council, is the administrative head of the City of Toledo. The department also includes the city attorney, city recorder, treasurer, utility billing clerk, accounting clerk, planning assistant, and contract planner. The Administrative Department is responsible for the city's comprehensive plan, implementing ordinances, building permits, grant administration and special projects.

**Public Works Department:** The City of Toledo Public Works Department is responsible for maintaining the potable water distribution system, the wastewater collection system, the stormwater system, roadside signage, fleet and equipment, and streets. Currently Public Works has the following employees: a Public Works Director, Public Works Operations Supervisor, Administrative Secretary, five Maintenance Workers, one Mechanical Tech, two Water Plant Operators, two Wastewater Treatment Plant Operators. The Property Maintenance team is also included in the Public Works Department. The Property Maintenance Department provides maintenance to City buildings and facilities. This includes city hall, police, fire, library, parks, and various landscape islands and parking lots. The department consists of a two Property Maintenance Workers and one custodian.

**Police Department:** The Toledo Police Department is responsible for the overall law enforcement, code enforcement, and crime prevention programs for the City of Toledo. The department provides dispatch services to the Police Department, Fire Department, Rural Fire District, Currently the Police Department has fifteen employees: a Police Chief, a Police Sergeant, eight officers, a dispatch supervisor, and four dispatchers.

**Fire Department:** The Toledo Fire and Rescue Department is responsible for emergency response to fires, medical services and disaster management for the City of Toledo and surrounding community. The department consists of four city employees and approximately 40 volunteers.

**Library:** The Public Library is located at 173 NW 7th Street and has about 35,000 items available for borrowing. It has access to 250,000 items through its membership in the Chinook Library Network, a cooperative including public and community college libraries.

**Recreation:** The City of Toledo offers resources for recreation activities of all kinds. The city has several park facilities, tennis courts, and ball fields among other resources.

## Continued Public Participation

An open public involvement process is essential to the development of an effective NHMP. To develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include opportunities for the public, neighboring communities, local, and regional agencies, as well as, private, and non-profit entities to comment on the NHMP

during review. Keeping the public informed of efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation, and maintenance. As such, the City is committed to involving the public in the NHMP review and update process (Volume I, Section 4). The City posted the plan update for public comment before FEMA approval, and after approval will maintain their addendum to the NHMP on the City's website: <https://www.cityoftoledo.org/>

In addition, natural hazards information dissemination is conducted throughout the year when opportunities present themselves via the city offices and website.

## NHMP Maintenance

The Lincoln County Multijurisdictional Natural Hazard Mitigation Plan and city addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the county plan update process, the city will also review and update its addendum. The convener will be responsible for convening the steering committee to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

These questions will help the steering committee determine what components of the mitigation plan need updating. The steering committee will be responsible for updating any deficiencies found in the plan.

## Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3)(iv), *Mitigation Strategy*.

The City's action items were first developed through a two-stage process during the 2009 NHMP development and revised in 2015. In stage one, OPDR facilitated a work session with the steering committee to discuss the city's risk and to identify potential issues. In the second stage, OPDR, working with the local steering committee, developed potential actions based on the hazards and the issues identified by the steering committee. During the 2019-2020 update process OPDR re-evaluated the Action Items with the county and local steering committees and updated actions, noting what accomplishments had been made and if the actions were still relevant; any new action items were identified at this time. For additional information see the discussion near the end of this document.

The City's actions are listed in Table TA-1. For more detailed information on each action, see the action forms within Attachment A of this addendum.

In addition, there are 18 County Action Items that include the city as an "Affected Jurisdiction" (Table TA-13). For more detailed information on the county actions that involve city participation, see Volume I, Section 3 and the action item forms within Volume III, Appendix A.

### Priority Action Items

Table TA-1 presents a list of mitigation actions. The steering committee decided to modify the prioritization of action items in this update to reflect current conditions (risk assessment), needs, and capacity. High priority actions are shown in bold text with grey highlight. The City will focus their attention, and resource availability, upon these achievable, high leverage, activities over the next five-years. Although this methodology provides a guide for the steering committee in terms of implementation, the steering committee has the option to implement any of the action items at any time. This option to consider all action items for implementation allows the committee to consider mitigation strategies as new opportunities arise, such as capitalizing on funding sources that could pertain to an action item that is not currently listed as the highest priority. Refer to Attachment A for detailed information for each high priority action. Full text of the plan goals referenced in Table TA-1 is located on page TA-2.

**Table TA-1 City of Toledo Action Items**

Natural Hazard Action ID	Action Item	Coordinating Organization (Lead)	Cost	Timing
Toledo #1	Educate citizens about natural hazards preparedness.	Fire Department	L	Ongoing
Toledo #2	Evaluate the structural integrity of the Olalla Reservoir Dam (Georgia Pacific owned/operated) and the Mill Creek Reservoir Dam.	Public Works	M to H	Short
Toledo #3	Seismically retrofit vulnerable facilities and infrastructure to increase their resiliency to seismic hazards. Consider both structural and non-structural retrofit options.	Public Works	H	Long
Toledo #4	Implement specific hazard objectives identified in the city's Comprehensive Plan.	Planning	M to H	Ongoing
Toledo #5	Continue compliance with the National Flood Insurance Program.	Planning	L	Ongoing
Toledo #6	Obtain lidar collection data from DOGAMI	Planning	L	Short
Toledo #7	Identify and address community's vulnerability to a natural gas explosion following a seismic event.	Public Works	L	Medium
Toledo #8	Evaluate and implement mitigation projects for areas of the city that are at risk of landslide.	Public Works	M to H	Long
Toledo #9	Work with the owners of repetitive flood loss buildings in the city (particularly along Yaquina Bay road, Business Hwy 20, and in the A Street area) to identify cost effective mitigation strategies including consideration of relocation, elevation, or buy-out.	Planning/ Floodplain Manager	H	Long
Toledo #10	Relocate Police Station out of tsunami inundation zone and establish a police communications system safe from disasters.	Police	H	Short
Toledo #11	Relocate Public Works out of the floodplain and the tsunami inundation zone.	Public Works	H	Long

Source: City of Toledo NHMP Steering Committee, 2020.

Cost: L (less than \$50,000), M (\$50,000-\$100,000), H (more than \$100,000)

Timing: Ongoing (continuous), Short (1-4 years), Medium (4-10 years), Long (10 or more years)

## Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein, and within Volume I, Section 2, and Volume III, Appendix C. The risk assessment process is graphically depicted in Figure TA-1. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

**Figure TA-1 Understanding Risk**



# Hazard Analysis

The Toledo NHMP steering committee reviewed and revised the plan’s Hazard Analysis and Risk Assessment section. Changes from their previous HVA and the County’s HVA were made where appropriate to reflect distinctions in probability, vulnerability, and risk from natural hazards unique to the City of Toledo, which are discussed throughout this addendum.

Table TA-2 shows the hazard analysis matrix for Toledo listing each hazard in rank order from high to low. The table shows that hazard scores are influenced by each of the four categories combined. For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities but does not predict the occurrence of a hazard. See Volume I, Section 2: Risk Assessment of the Lincoln County NHMP for a description of the methodology.

One catastrophic hazard (Cascadia Subduction Zone earthquake) and four chronic hazards (landslide, windstorm, winter storm (snow/ice), riverine flood) rank as the top hazard threats to the City (Top Tier). Drought, crustal earthquake, wildfire, and local tsunami comprise the next highest ranked hazards (Middle Tier). Coastal flood, distant tsunami, volcanic event, and tornado comprise the lowest ranked hazards in the City (Bottom Tier).

**Table TA-2 Hazard Analysis Matrix – City of Toledo**

Hazard	Maximum				Total Threat Score	Hazard Rank	Hazard Tiers
	History	Vulnerability	Threat	Probability			
Landslide	20	50	100	70	240	#1	Top Tier
Windstorm	20	50	100	70	240	#2	
Winter Storm (Snow/Ice)	18	35	90	70	213	#3	
Earthquake (Cascadia)	10	50	100	49	209	#4	
Flood (Riverine)	20	25	80	70	195	#5	
Drought	16	35	50	56	157	#6	Middle Tier
Earthquake (Crustal)	10	35	80	21	146	#7	
Wildfire	10	25	70	35	140	#8	
Tsunami (Local)	2	20	50	49	121	#9	
Flood (Coastal)	10	15	50	35	110	#10	Bottom Tier
Tsunami (Distant)	8	5	30	49	92	#11	
Volcanic Events	2	5	40	7	54	#12	
Tornado	2	10	10	7	29	#13	
Coastal Erosion	The city is not affected by this coastal hazard, as such it is not included.						

Source: City of Toledo NHMP Steering Committee (2020)

Table TA-3 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Lincoln County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

**Table TA-3 Probability and Vulnerability Comparison**

Hazard	Toledo		County	
	Probability	Vulnerability	Probability	Vulnerability
Coastal Erosion	*	*	High	Low
Drought	High	Moderate	High	Moderate
Earthquake (Cascadia)	Moderate	High	Moderate	High
Earthquake (Crustal)	Low	Moderate	Low	Moderate
Flood (Coastal)	<b>Moderate</b>	<b>Low</b>	High	Moderate
Flood (Riverine)	High	Moderate	High	Moderate
Landslide	High	High	High	High
Tornado	<b>Low</b>	Low	High	Low
Tsunami (Distant)	Moderate	Low	Moderate	Low
Tsunami (Local)	Moderate	<b>Moderate</b>	Moderate	High
Volcanic Event	Low	Low	Low	Low
Wildfire	<b>Moderate</b>	Moderate	High	Moderate
Windstorm	High	High	High	High
Winter Storm (Snow/Ice)	High	Moderate	High	Moderate

Source: City of Toledo NHMP Steering Committee and Lincoln County NHMP Steering Committee (2020)

Note: \* - Hazard not ranked and does not affect the city.

## Community Characteristics

Table TA-4, Appendix C (Volume III), and the following section provide information on City specific demographics and assets. Many of these community characteristics can affect how natural hazards impact communities, and how communities choose to plan for natural hazard mitigation. Considering the city specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2012 and 2019 the City grew by 25 people (1%).<sup>1</sup> According to the State’s official coordinated population forecast, between 2019 and 2040 the City’s population is forecast to grow by 19% to 4,165.<sup>2</sup> Median household income increased held steady between 2012 and 2017.<sup>3</sup> The City has an educated population with 87% of residents 25 years, and older holding a high school degree, 14% have a bachelor’s degree or higher. As of 2019, Toledo High School and the Lincoln County School District have 77% and 76% graduation rates respectively.

Toledo sits seven miles inland from the Central Oregon coastline, and development spans a total of 2.3 square miles. Toledo includes industrial and commercial development but is zoned primarily residential. Where and how the city decides to grow may influence the city’s level of vulnerability to natural hazards. Toledo’s Comprehensive Plan addresses land use needs within the city and the Urban Growth Boundary. In response to Statewide Planning Goal 7, the city additionally addresses development in relation to floods, tsunamis, earthquakes, landslides, weak foundation soils, high groundwater, wind/winter storms, and wildfires. Please see “Existing Mitigation Activities” below for details regarding Goal 7 within Toledo’s Comprehensive Plan, Article 7.

<sup>1</sup> Portland State University, Population Research Center, "Annual Population Estimates", 2019.

<sup>2</sup> Portland State University, Population Research Center, "Oregon Population Forecast Program Cycle 1 (2014-2017)". 2017.

<sup>3</sup> Social Explorer, Table T57, U.S. Census Bureau, 2013-2017 and 2008-2012 American Community Survey Estimates.

Figure TA-2 shows the city of Toledo's zoning map. New development has complied with the standards of the [Oregon Building Code](#), and the city's development code including their floodplain ordinance.

## Economy

Toledo's commercial areas developed along primary routes and residential development followed nearby (see Figure TA-2).

Most workers residing in the city (84%, 1,484 people) travel outside of the city for work primarily to Toledo and Newport.<sup>4</sup> A significant population of people travel to the city for work, (75% of the workforce, 839 people) primarily from Newport.

Just over 55% of the resident population 16 and over is in the labor force (1,566 people) and are employed in a variety of occupations including office and administrative support (16%), and professional and related (12%), production (11%), management, business, and financial operations (9%), sales (9%), and personal car and service (9%), occupations.<sup>5</sup>

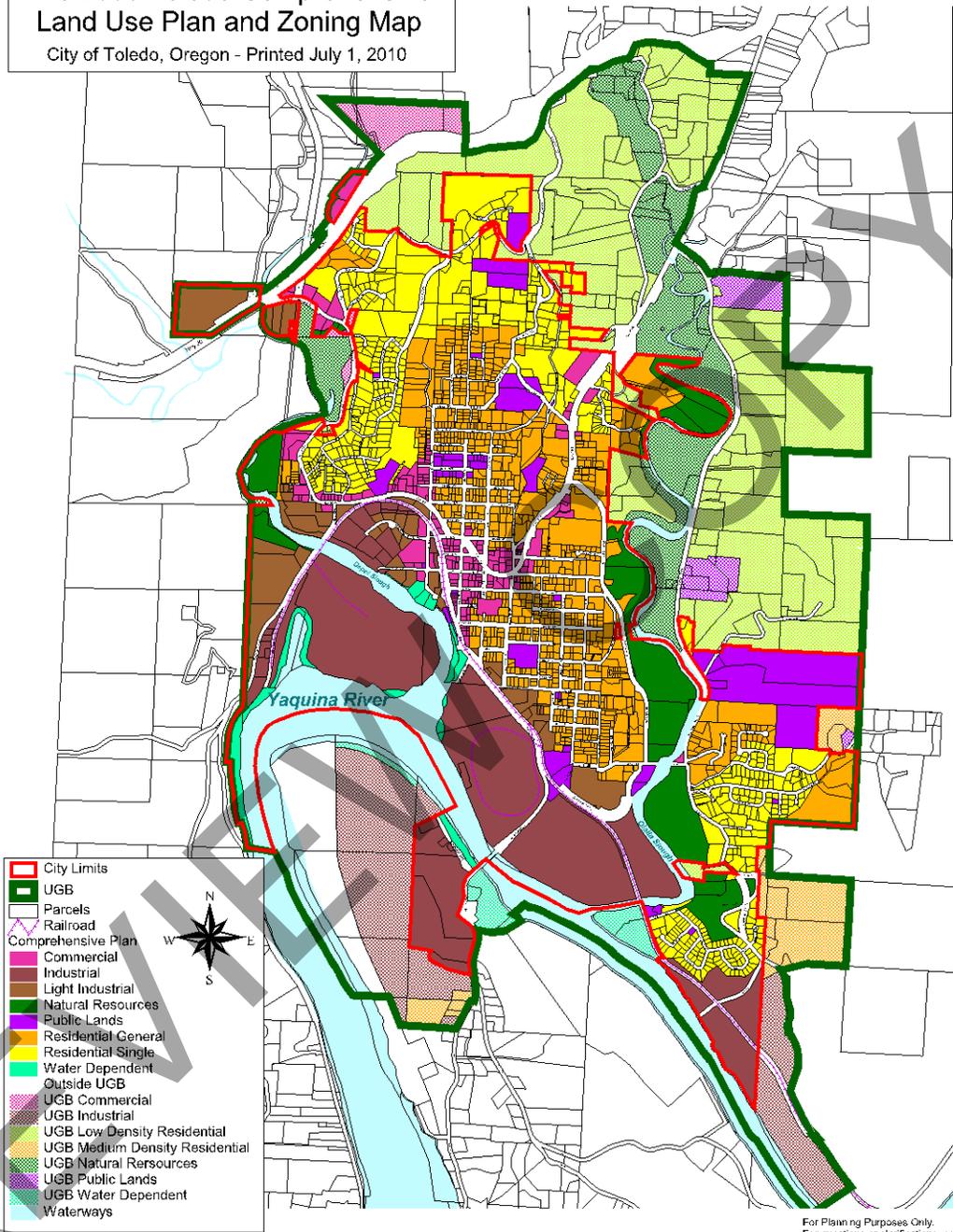
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<sup>4</sup> U.S. Census Bureau. LEHD Origin-Destination Employment Statistics (2002-2017). Longitudinal-Employer Household Dynamics Program, accessed on April 25, 2020 at <https://onthemap.ces.census.gov>.

<sup>5</sup> Social Explorer, Tables A17008 & A17002, U.S. Census Bureau, 2013-2017 American Community Survey Estimates.

**Figure TA-2 Zoning Map**

The 2000 Toledo Comprehensive  
Land Use Plan and Zoning Map  
City of Toledo, Oregon - Printed July 1, 2010



For Planning Purposes Only.  
For questions or clarifications, contact  
the Planning Dept. at (541) 336 2247.

Source: City of Toledo

**Table TA-4 Community Characteristics**

Population Characteristics		
<b>2012 Population</b>	3,465	
<b>2019 Population</b>	3,490	
<b>2040 Forecasted Population</b>	4,165	
Race (non-hispanic or latino) and Ethnicity (Hispanic)		
White	93%	
Black/ African American	0%	
American Indian and Alaska Native	1%	
Asian	0%	
Native Hawaiian and Other Pacific Islander	1%	
Some Other Race	0%	
Two or More Races	2%	
Hispanic or Latino (of any race)	4%	
<b>Limited or No English Spoken</b>	0	0%
Vulnerable Age Groups		
Less than 15 Years	607	17%
65 Years and Over	631	18%
Age Dependency Ratio		1.19
Disability Status		
Total Population	819	23%
Children (Under 18)	83	11%
Working Age (18 to 64)	414	19%
Seniors (65 and older)	322	51%
Income Characteristics		
Households by Income Category		
Less than \$15,000	174	13%
\$15,000-\$29,999	280	21%
\$30,000-\$44,999	178	13%
\$45,000-\$59,999	201	15%
\$60,000-\$74,999	198	15%
\$75,000-\$99,999	156	12%
\$100,000-\$199,999	104	8%
\$200,000 or more	57	4%
<b>Median Household Income</b>		\$48,281
Poverty Rates		
Total Population	665	19%
Children (Under 18)	252	34%
Working Age (18 to 64)	337	16%
Seniors (65 and older)	76	12%
Housing Cost Burden (Cost > 30% of household income)		
Owners with Mortgage	166	20%
Renters	219	41%

Source: U.S. Census Bureau, 2013-2017 American Community Survey; Portland State University, Population Research Center, "Annual Population Estimates", 2019. Portland State University, Population Research Center, "Oregon Population Forecast Program Cycle 1 (2014-2017)". 2017.

Housing Characteristics		
Housing Units		
Single-Family	1,226	76%
Multi-Family	265	17%
Mobile Homes	129	8%
Year Structure Built		
Pre-1970	1,028	63%
1970-1989	415	26%
1990-2009	163	10%
2010 or later	14	2%
Housing Tenure and Vacancy		
Owner-occupied	815	50%
Renter-occupied	533	33%
Seasonal	75	5%
Vacant	197	12%

Toledo is situated on a bend of the Yaquina River and is surrounded by wooded hills seven miles inland from the Central Oregon Coast. Toledo is the only inland coastal community with a deep-water channel. The city's topography is very hilly. Nearby bodies of water include the Pacific Ocean and Yaquina River.

The climate in Toledo is moderate. Average monthly temperatures range from lows of 39-42° F (November through April) to highs of 65° F (July through September) degrees. The driest months are July and August (average about 0.8 inches of precipitation per month) the wettest months are November through January (average 10-11 inches of precipitation per month). Toledo has an average annual precipitation of approximately 67.5 inches (71%, 47.6 inches fall November through March).

## Asset Identification

The following assets identified by the City of Toledo were first gathered from the Asset Identification meetings held with community members in 2007. These assets were confirmed and updated by the City steering committee during the 2019-2020 update process.

## Cultural and Historic Resources

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important. The National Register of Historic Places and the State Historic Preservation Office lists historic sites and properties within the city:<sup>6</sup>

The following list includes the four properties that are listed on the National Register of Historic Places:

- Chitwood Bridge, Yaquina River, 1926
- Pacific Spruce Saw Mill Tenant Houses, 146-192 NE 6<sup>th</sup> Street, 1920
- The Ahnkuti Site (35-LNC-76), Address Restricted
- St John's Episcopal Church, 110 NE Alder Street

The following list includes 39 other properties listed on the State Historic Preservation Office website:

- Spruce Division Mill Site Mouth Of Depot Slough 1918
- Akin Block, 155 N Main St, c.1923
- Bank of the West, 112 S Main St, c.1969
- Bateman Building, 119 N Main St, c.1911
- Cascade Services, 203 N Main St, c.2000
- City Hall, 206 N Main St, c.1939
- Dannans Cleaners, 300-318 S Main St, c.1954
- Depot Slough, Hwy 20, 1910
- ELKS, 123 E Alder, c.1956
- Farrington's, 139 S Main St, c.1928
- Gaither Motors, 170 N Main St, c.1926
- Graham Garage, 355-359 N Main St, c.1924
- Heffners & Bensons Variety Store, 281-297 N Main St, c.1911
- House, 145 E 1st St, c.1920
- House, 167 E 1st St, c.1920
- House, 177 E 1st St, c.1920
- House, 878 NW 5th, c.1948
- House, 146 SE Alder St, c.1900
- House, 157-195 NE Alder St, c.1887
- House, 144 E Graham St, c.1900

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<sup>6</sup> Oregon Historic Sites Database, <http://heritagedata.prd.state.or.us/historic/>, accessed July 17, 2020.

- House, 192 E Graham , c.1950
- IOOF Hall, 305 N Main St, c.1911
- Ivan Kelly Studio, 108 E Graham St, c.1920
- Leader Building, 404 N Main St, c.1959
- Main Stream Music, 199 S Main St, c.1960
- Masonic Building, 192 S Main St, 1901
- Methodist Episcopal Church, 199 NE 1st St, c.1887
- Methodist Thrift Shop, 109 N Main St, c.1895
- Penneys Building, 323-333 N Main St, c.1928
- Professional Building, 213-235 S Main St, c.1957
- St Johns Episcopal Parsonage, 140 NE Alder St, c.1920
- Sunnyside, 159-181 S Main St, c.1930
- Toledo Eagles # 2219, 161 SE 2nd St, c.1940
- Toledo Library, 150 NE Alder St, c.1920
- Toledo Post Office, 138 NW 1st St, c.1960
- Updike Building, 334-320 N Main St, c.1926
- Yaquina Bay Hotel, 160 N Main St, c.1922
- Yaquina Building, 208-246 S Main St, c.1926
- Yaquina River Museum of Art 151 NE Alder St c.1900

In addition, community recreational amenities include Toledo's Municipal Pool, the Olalla Valley Golf Course, kayaking, fishing, bowling, bird-watching, the city library, and city parks. Seasonal attractions include the Summer Festival and Fireworks in July, the Antique Street Fair and Wooden Boat Festival in August, the Art Walk in September and Hometown Holiday in December.

## Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to act in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets, such as fire stations, and water and wastewater treatment facilities.

Toledo has the following critical facilities (**bold** indicates facility was included in the Risk Report):

- **Police department**, 250 W Highway 20, vulnerable to flood and tsunami
- **Fire department/ EMS facility**, 285 NE Burgess Road
- Public works shop facility, 415 NW Industrial Park Way, vulnerable to local tsunami and flood
- City hall, 206 N Main Street, vulnerable to earthquake and heavy snow
- Water treatment plant, 860 NE Reservoir Lane, vulnerable to landslide/ earthquake
- Four water storage reservoir tanks:
  - Ammon Road – 1 MG
  - Graham Street – 0.4 MG
  - Clearwell Storage – 0.85 MG
  - Skyline Drive Storage – 1.9 MG

- Wastewater treatment plant, 1105 SE Fir Street, vulnerable to flood, tsunami, and earthquake
- **Elementary school**, 600 SE Sturdevant Road, vulnerable to earthquake
- **Junior/ Senior high school**, 1800 NE Sturdevant Road, vulnerable to earthquake
- **Samaritan Toledo Medical Clinic**, 199 Hwy 20
- **Port of Toledo**, 496 NE Hwy 20

## Transportation

Mobility plays an important role in Toledo, and the daily experience of its residents, and businesses. Motor vehicles represent the dominant mode of travel through, and within the City. Toledo is also served by Lincoln County Transit Route 493 with service running six days a week with stops in Toledo. The Coast to Valley Express provides public transit service between Newport and Corvallis and includes stops in Toledo.

### Roads/Seismic lifelines

Seismic lifeline routes help maintain transportation facilities for public safety and resilience in the case of natural disasters. Following a major earthquake, it is important for response and recovery agencies to know which roadways are most prepared for a major seismic event. The Oregon Department of Transportation has identified lifeline routes to provide a secure lifeline network of streets, highways, and bridges to facilitate emergency services response after a disaster.<sup>7</sup>

System connectivity and key geographical features were used to identify a three-tiered seismic lifeline system. Routes identified as Tier 1 are considered the most significant and necessary to ensure a functioning statewide transportation network. The Tier 2 system provides additional connectivity to the Tier 1 system, it allows for direct access to more locations and increased traffic volume capacity. The Tier 3 lifeline routes provide additional connectivity to the systems provided by Tiers 1 and 2.

Highway 20 (Tier III) and Business 20 are important arterials in and near the City and Highway 20 is a major east-west transportation routes connecting the coast to the Willamette Valley. Highway 101 (Tier I), to the west, is the major north-south transportation route connecting Toledo to other coastal cities (see Figure TA-3).

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<sup>7</sup> Oregon Department of Transportation. Oregon Seismic Lifeline Evaluation, Vulnerability Synthesis, and Identification, *Oregon Seismic Lifeline Routes*, May 15 2012.

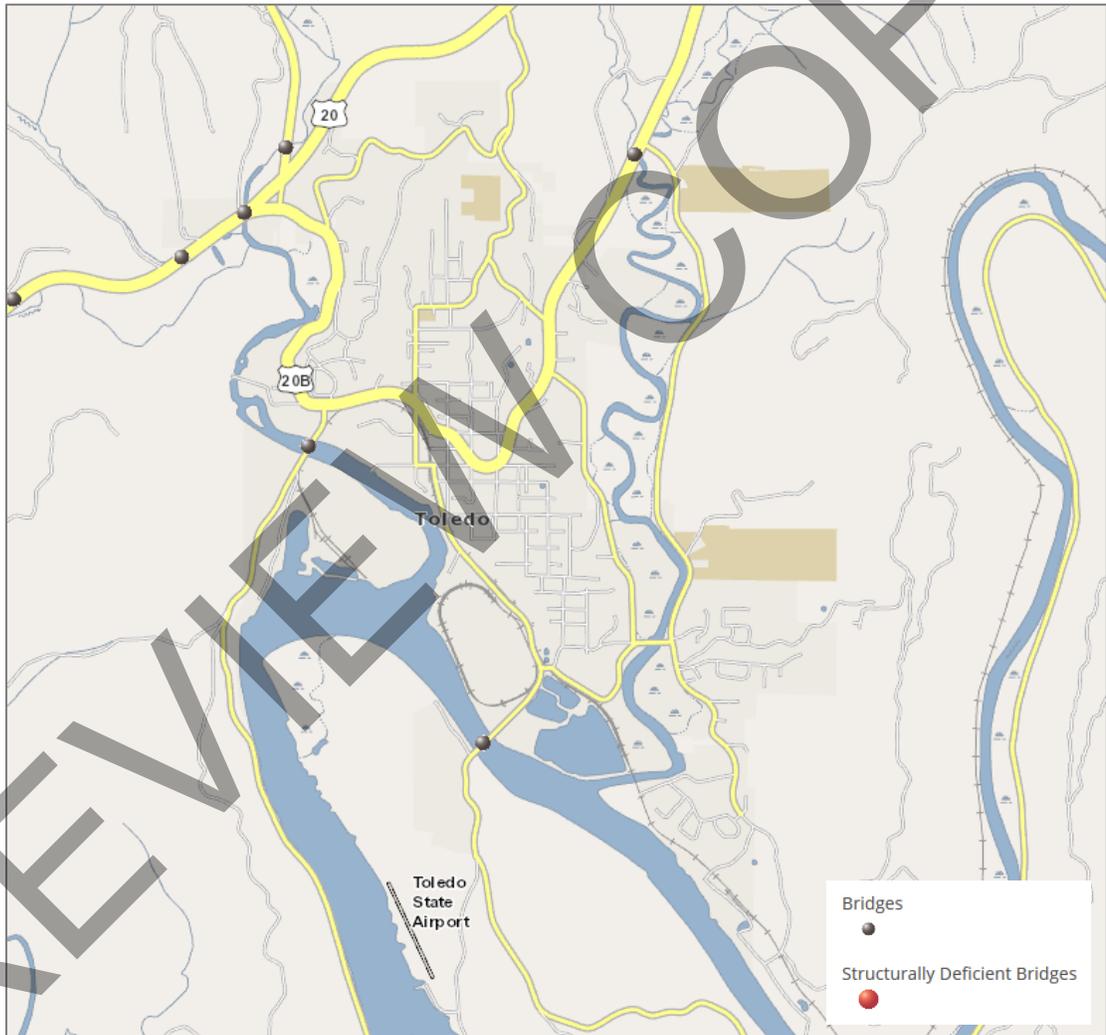


## Bridges

Because of earthquake risk, the seismic vulnerability of the city's bridges is an important issue. Non-functional bridges can disrupt emergency operations, sever lifelines, and disrupt local and freight traffic. These disruptions may exacerbate local economic losses if industries are unable to transport goods. Bridges and culverts within the city that are critical or essential include (see Figure TA-4):

- Depoe Bay Slough, Yuina Bay Rd (1962), (Bridge ID 12131A)
- Yaquina River, Butler Bridge Rd (1956), (Bridge ID 12132A)
- West Olalla Slough, US 20 at MP F8.17 (1936), (Bridge ID 02275)
- Depot Slough, US 20 (1960), (Bridge ID 00439B)

**Figure TA-4 Oregon Bridges and Structurally Deficient Bridges**



Source: Oregon Department of Transportation, ODOT TransGIS, accessed August 6, 2020

More information on Seismic Design of bridges is on the ODOT website:

<https://www.oregon.gov/odot/Bridge/Pages/Seismic.aspx>

## Railroads

Railroads are major providers of regional and national cargo and trade flows. Railroads run through the Willamette Valley region and provide a vital transportation link to the City of

Toledo. The Portland & Western (PNWR) provides freight service to/from the city. There is no passenger rail service in the city.

Rails are sensitive to icing from the winter storms that can occur in the region. For industries in the region that utilize rail transport, these disruptions in service can result in economic losses. The potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.

### Airports

The Toledo State Airport is located south of the city on the east side of the Yaquina River. The Newport Municipal Airport is approximately 12 miles southwest in the South Beach area of Newport. The city has no commercial service airports. The nearest commercial airports are in Eugene and Portland.

### Ports

The Port of Toledo accommodates a wide variety of users to retain and create jobs and increase economic development. The Port district covers 443 square miles including the cities of Siletz and Toledo and unincorporated Lincoln County located along the Yaquina River. The Port includes the Toledo Shipyard, industrial leases, and recreational facilities.

### Utility Lifelines

Utility lifelines are the resources that the public relies on daily such as, electricity, fuel and communication lines. If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical infrastructures, like dams and power plants, as they transmit the power generated from these facilities.

Generally, the network of electricity transmission lines running throughout the city is operated by Central Lincoln PUD (see their addendum for more information). The Williams Gas Pipeline provides natural gas that is delivered to customers in the city by Northwest Natural Gas. These lines may be vulnerable as infrequent natural hazards, like earthquakes, could disrupt service to natural gas consumers across the region.

The city water, wastewater, and stormwater (culvert) systems include the following:

#### Water Infrastructure

- Water Treatment Plant (ca. 1976): 860 NE Reservoir Ln
- Reservoirs: Mill Creek Reservoir (ca. 1967, 250 acre-feet)
  - Storage Tank: Ammon Road – 1 MG (ca. 1970)
  - Storage Tank: Graham Street – 0.45 MG (ca. 1968)
  - Storage Tank: Clearwell Storage – 0.85 MG
  - Storage Tank: Skyline Drive Storage – 1.9 MG (ca. 2014)
- Pump stations:
  - Mill Creek Raw Water Pump Station (ca. 1968): 1132 SE River Road
  - Siletz River Intake/Pump Station (ca. 2015): 24772 Siletz Hwy/east side of City of Siletz
  - Seal Rock Finished Water Pump Station (provides water for the Seal Rock Water District, see addendum for more information): 1621 S Bay Road
  - Wagon Road Water Pump Station: 1209 NE Wagon Road

### Wastewater Infrastructure

- Wastewater (Sewage) Treatment Plant: 1105 SE Fir St
- Wastewater pump stations:
  - Lincoln Way = 1615 NW Lincoln Way
  - High School = 1660 NE Hwy 20
  - A Street = 200 NW 1st Street
  - Ammon Road = 1298 SE Sturdevant Road
  - Butler Bridge = 675 SE Butler Bridge Road

### Stormwater Infrastructure (e.g. Culverts)

- Tidegate/stormwater station: 440 NW 1<sup>st</sup> Street

## **Community Organizations and Programs**

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on several issues, one of which could be natural hazard preparedness and mitigation. The countywide community organizations that are active within the city and county and may be potential partners for implementing mitigation actions can be found in Appendix C: Community Profile.

## **Lincoln County School District**

The Lincoln County School District has three schools in Toledo including Toledo Elementary and Toledo Jr/Sr High (outside city limits). For more information on School District assets see their addendum in Volume II.

## **Existing Mitigation Activities**

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions better understand risk and can assist in documenting successes. Within the City of Toledo, specific hazard objectives are listed within the city's Comprehensive Plan (dated 2000):

Overall Objectives:

1. Identify potential natural hazard areas where development may occur when appropriate safeguards can minimize the impact of hazards upon development and impacts of new development upon adjoining properties.
2. Identify and preserve known natural hazard areas best retained for open space, yards, natural resource areas, wildlife habitats, recreation, or other non-structural uses.

3. Maintain an inventory of areas subject to natural disasters and hazards. The inventory shall be used to determine the suitability of a location for development and, if necessary, be used to limit the development to a level consistent with the degree of a hazard, the disaster potential and the environmental protection policies in the Comprehensive Plan.
  - a. The city shall utilize the Soil Survey of Lincoln County Area, Oregon July, 1997 (and later editions), the Environmental Geology of Lincoln County Oregon - Bulletin 81 (Department of Geology and Mineral Industries, 1973), the Environmental Hazard Inventory Coastal Lincoln County (RNKR Associates, 1977), the All Hazard Mitigation Plan: Lane, Lincoln, and Linn Counties, Oregon (G & E Engineering Systems, Inc. 1998) and other appropriate materials as guides for developing policies and regulations to minimize damages from developing in hazardous areas.
4. Develop comprehensive and effective safeguards for developments within known natural hazard areas by requiring the use of special design and construction features to reduce potential risks/damages in accordance with state building codes, other state codes, federal regulations, and local codes.

Specific hazard objectives are also listed. The Comprehensive Plan can be viewed online at the city's website, or at City Hall.

## Hazard Profiles

The following sections briefly describe relevant information for each profiled hazard. More information on Lincoln County hazards can be found in Volume I, Section 2 *Risk Assessment* and in the [Risk Assessment for Region 1, Oregon Coast, Oregon SNHMP \(Draft, 2020\)](#).

In addition, the Oregon Department of Geology and Mineral Industries (DOGAMI) conducted a multi-hazard risk assessment (Risk Report) for Lincoln County, including the City of Toledo. The study was funded through the FEMA Risk MAP program and was completed in 2020. The Risk Report provides a quantitative risk assessment that informs communities of their risk related to the following natural hazards: coastal erosion, Cascadia Subduction Zone earthquake and tsunami, flood, landslide, and wildfire (summarized herein). The City hereby incorporates the Risk Report into this NHMP addendum by reference ([DOGAMI, OFR-XX](#)).

### Coastal Erosion

The City of Toledo does not border the Pacific Ocean; as such, coastal erosion is not considered to be a hazard within the community.

### Drought

The steering committee determined that the city's probability for drought is **high**, meaning at least one incident is likely within the next 35 years and that their vulnerability to drought is **moderate**, meaning more than 10% of the city's population or property could be affected by a major drought event. *These ratings have not changed since the previous NHMP.*

Volume I, Section 2 of Lincoln County's NHMP adequately describes the causes and characteristics of drought hazards, as well as the history, location, extent, and probability of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of a drought.

The Siletz River is Toledo's primary water supply during the summer months, and Mill Creek, its dam and its reservoir (circa 1967, 65 feet tall with a permitted storage capacity of 250 acre-feet) is the primary water source during the winter months.<sup>8</sup> The city owns about 400 acres of the Mill Creek Watershed above the reservoir and the remainder is owned by the U.S. Forest Service. Storage capacity is limited, and the city's steering committee believes that increased storage capacity may assist in mitigating the impact of a severe drought event. The Toledo Steering Committee additionally noted that emergency shut-off valves may increase the amount of water that the city's able to supply in the aftermath of a high magnitude earthquake event.

Water from the city reservoirs is treated at the water treatment facility that can treat up to 3.0 million gallons per day (mgd) or 2,080 gallons per minute (gpm); current typical flows range from 850 to 1,200 gpm. Following treatment water flows via 12 to 16-inch water transmission mains to four water storage tanks (combined over 3.35 million gallons capacity) provides enough water supply for about 3.7 days under current demand.<sup>9</sup> The city

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<sup>8</sup> City of Toledo, [Water System Master Plan](#), 2017.

<sup>9</sup> City of Toledo, [Water Management and Conservation Plan](#), 2017.

has about 35 miles of piping and is separated into three pressure zones. The City has enough capacity to meet current and anticipated future demand.

#### Future Climate Projection:

According to OCCRI report “*Future Climate Projections: Lincoln County*” (Appendix G) the probability of future drought conditions (low summer soil moisture, low spring snowpack, low summer runoff, low summer precipitation, and high summer evaporation) is expected to be more frequent by the 2050s.

## Vulnerability Assessment

Due to insufficient data and resources, Toledo is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. State-wide droughts have historically occurred in Oregon, and as it is a region-wide phenomenon, all residents are equally at risk. Structural damage from drought is not expected; rather the risks apply to humans and resources. Industries important to the City of Toledo’s local economy such as fishing and the timber industry have historically been affected, and any future droughts would have tangible economic and potentially human impacts.

In addition to reduced water supplies, a drought will increase the chances of wildfire and significantly reduce tourism activities. The city has a [Water Management and Conservation Plan](#) that includes water curtailment measures that will go into effect in the event of a drought.

## Earthquake

The steering committee determined that the city’s probability for a Cascadia Subduction Zone (CSZ) Earthquake event is **moderate**, meaning one incident may occur within the next 35 to 75 years and that their vulnerability to a CSZ event is **high**, meaning that more than 10% of the City’s population or property could be affected by a major CSZ earthquake event. The steering committee determined that the city’s probability for a crustal earthquake event is **low**, meaning one incident may occur within the next 100 years and that their vulnerability to a Crustal Earthquake event is **moderate**, meaning that between 1% and 10% of the city’s population or property could be affected by a major crustal earthquake event. *The city’s probability to crustal earthquake was decreased since the previous NHMP, all other ratings have remained the same.*

Volume I, Section 2 of Lincoln County’s NHMP adequately describes the causes and characteristics of earthquake hazards, as well as the history, location, extent, and probability of a potential event. Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any site. In many major earthquakes, damages have primarily been caused by the behavior of the soil.

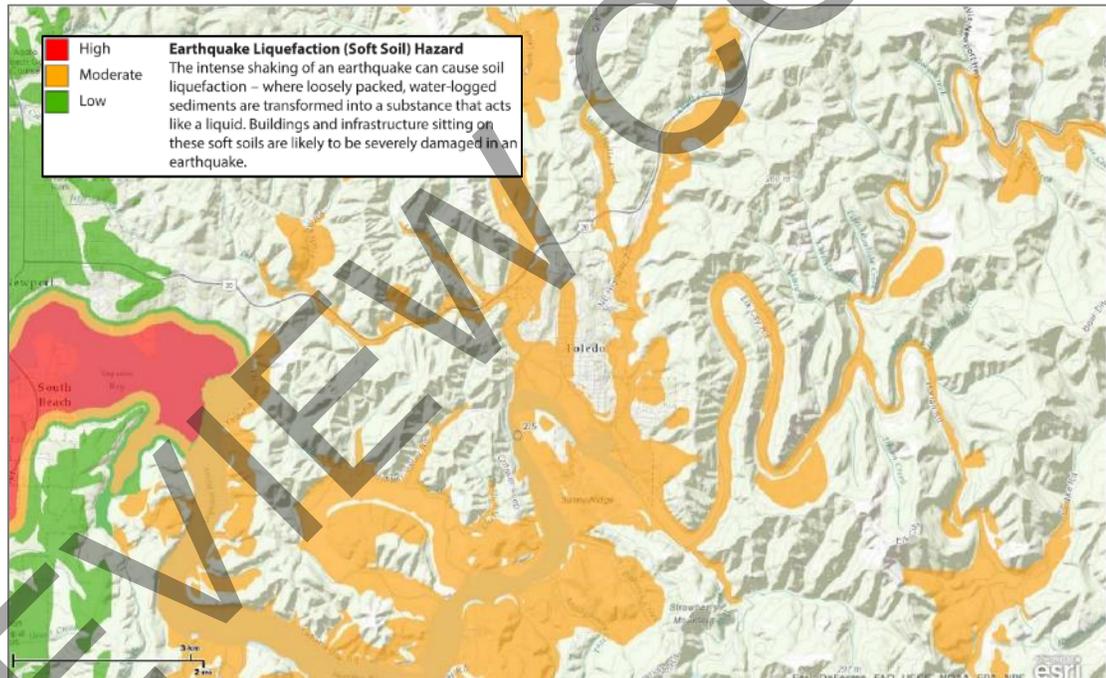
The Pacific Northwest experienced a subduction zone earthquake estimated at magnitude 9 on January 26, 1700. The earthquake generated a tsunami that caused damage as far away as Japan. Cascadia subduction zone earthquakes and associated tsunamis have occurred on average every 500 years over the last 3,500 years in the Pacific Northwest. The time between events has been as short as 100 to 200 years and as long as 1,000 years. The

geologic record indicates that over the last 10,000 years approximately 42 tsunamis have been generated off the Oregon Coast in connection to ruptures of the CSZ (19 of the events were full-margin ruptures and arrived approximately 15-20 minutes after the earthquake).<sup>10</sup>

The Oregon Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has undertaken a rigorous program in Oregon to identify seismic hazards, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides.

The figures below show earthquake hazards that affect the city, including the soft soil/liquefaction hazard (Figure TA-5), expected ground shaking for crustal events (Figure TA-6), and for the Cascadia Subduction Zone event (Figure TA-7). The extent of the damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event. The soft soils figure below shows that in general the soils in Toledo have low to moderate liquefaction potential; the areas of the population along the coastline are more susceptible to liquefaction than areas further in land and away from rivers.

**Figure TA-5 Earthquake Liquefaction (Soft Soil) Hazard**



Source: [Oregon HazVu: Statewide Geohazards Viewer](#) – To explore and view map detail click hyperlink to left.

Shaking from the combined earthquake scenario is expected to be very strong to violent for much of Toledo as shown in Figure TA-6. The figure also shows one historically active fault southeast of the city.

<sup>10</sup> DLCD. *Oregon State Natural Hazard Mitigation Plan*. 2020 (Draft).

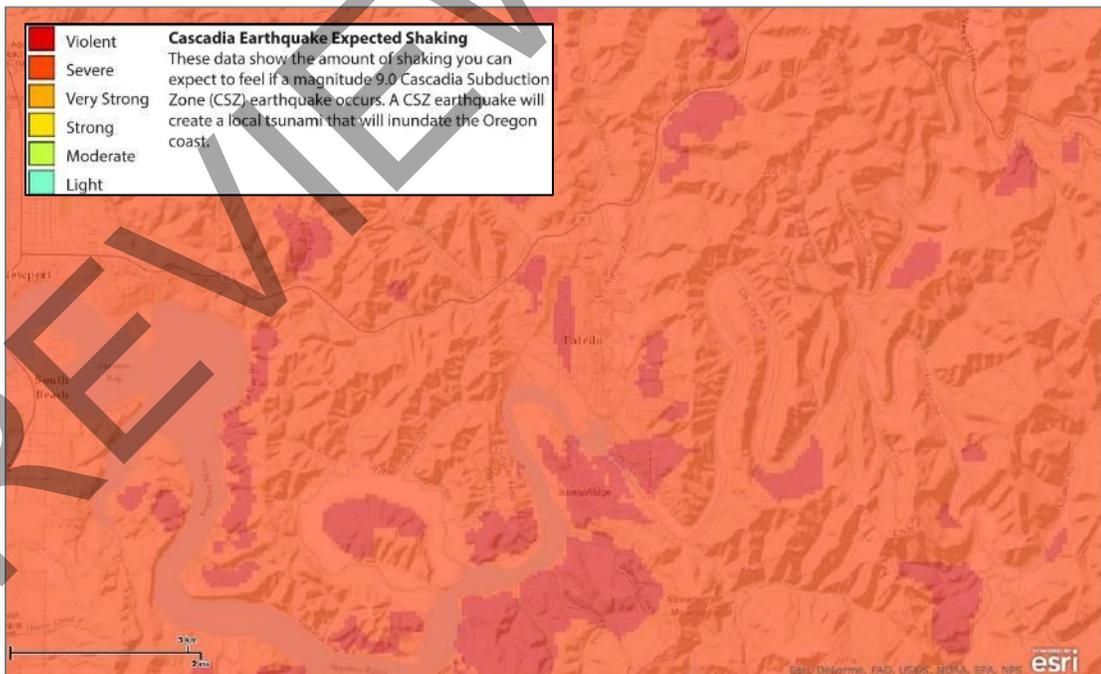
**Figure TA-6 Combined Earthquake Events Expected Shaking and Active Faults**



Source: [Oregon HazVu: Statewide Geohazards Viewer](#) – To explore and view map detail click hyperlink to left.

Figure TA-7 shows expected shaking with a Cascadia Earthquake. The figure shows that the entire city will receive severe to violent shaking.

**Figure TA-7 Cascadia Earthquake Expected Shaking**



Source: [Oregon HazVu: Statewide Geohazards Viewer](#) – To explore and view map detail click hyperlink to left.

## Vulnerability Assessment

The city's concentrated population and resources, as well as the soil characteristics and relative earthquake hazards described above are cause for significant effort toward mitigating the earthquake hazard. The city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, reservoirs, cell towers, the Samaritan North Lincoln Hospital, and City Hall were identified by the Steering Committee as vulnerable assets. The city would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region wide. Education and outreach regarding earthquakes (and resultant tsunami) is an ongoing endeavor in Toledo.

### 2007 Rapid Visual Survey

Building codes were implemented in Oregon in the 1970s, however, stricter standards did not take effect until 1991 and early 2000s. As noted in the community characteristics section (Table TA-4), approximately 67% of residential buildings were built prior to 1990, which increases the City's vulnerability to the earthquake hazard (according to the Risk Report 71% of all buildings are pre-code and 12% are low code)<sup>11</sup>. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table TA-5; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI, that have not been retrofitted, using their Rapid Visual Survey (RVS), no buildings have a very high (100% chance) collapse potential, while two (2) have a high (greater than 10% chance) collapse potential. To fully assess a buildings potential for collapse, a more detailed engineering study completed by a qualified professional is required, but the RVS study can help to prioritize which buildings to survey.

### Mitigation Activities

Earthquake mitigation activities listed here include current mitigation programs and activities that are being implemented by Toledo agencies or organizations.

A primary mitigation objective of the city is to construct or upgrade critical and essential facilities and infrastructure to withstand future earthquake events. Seismic retrofit grant awards per the [Seismic Rehabilitation Grant Program](#)<sup>12</sup> have been funded to retrofit the Toledo High School gym (outside city) (2013-14 grant award, \$1,468,092). Additionally, the School District has retrofitted at risk schools through local resources (see the Lincoln County School District addendum for more information).

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<sup>11</sup> DOGAMI, Open-File Report O-20-xx, Lincoln County Natural Hazard Risk Report (August 2020), Table D-2.

<sup>12</sup> The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

**Table TA-5 Rapid Visual Survey Scores**

Facility	Site ID*	Level of Collapse Potential			
		Low (< 1%)	Moderate (>1%)	High (>10%)	Very High (100%)
<b>Schools</b>					
Toledo [Elementary] School** (600 SE Sturdevant Road)	Linc_sch05			X	
Toledo [Jr/ Sr] High School (Not in City)** (1800 NE Sturdevant Road)	Linc_sch11			<b>SRGP 2013-14 \$1,468,092</b>	
No Longer in Use ( <i>former Olalla Center site</i> )** (805 NE Reservoir Lane)	Linc_sch20		X		
<b>Public Safety</b>					
City of Toledo Fire Department** (285 NE Burgess Road)	Linc_fir22	X			
Port of Toledo ( <i>former Fire Department</i> )** (496 E Hwy 20)	Linc_fir06			X	
Toledo Police Department** (250 W Hwy 20)	Linc_pol07	X			

Source: [DOGAMI 2007. Open File Report 0-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment](#). Notes: “\*” – Site ID is referenced on the [RVS Lincoln County Map](#); “\*\*” – Facility determined to be vulnerable to CSZ earthquake and should expect moderate to complete damage (> 50% probability). DOGAMI Risk Report (2020).

Notes: The Toledo Fire Department Building (496 E Hwy 20) was assessed by DOGAMI, but was sold to the Port of Toledo; The Olalla Center for Children and Families was assessed by DOGAMI, but has since moved to a new location (321 SE 3<sup>rd</sup> Street).

The city’s steering committee additionally identified the following earthquake-related vulnerabilities:

- The city’s topography is [likely] prone to earthquake-induced landslides;
- In the event of a magnitude (M) 9 earthquake event, the city will likely be isolated from larger cities in the Willamette Valley, as well as coastal communities. Post-disaster self-reliance is essential;
- Post-disaster communication may be hindered; the acquisition of satellite phones may be a beneficial emergency-response related investment;
- Access to hospitals will be difficult;
- The city will likely need to accommodate a large section of Newport’s population post-earthquake and/or tsunami. Currently, the city is not equipped to house and/or provide services for an influx of residents;
- The Olalla Reservoir Dam may breach and cause severe flooding;
- The Mill Creek Reservoir Dam may breach and cause severe flooding;
- Toledo City Hall is comprised of unreinforced masonry and may collapse in the event of a high magnitude earthquake; and
- The city’s Georgia Pacific Paper Mill may be hazardous in the event of an earthquake. Further study is needed.

## Natural Hazard Risk Report for Lincoln County

The **Risk Report** (DOGAMI, OFR-XX) provides hazard analysis summary tables that identify populations and property within Lincoln County that are vulnerable to earthquake. The Risk Report provides a distinct profile for Toledo.

According to the Risk Report the following resident population and property (public and private) within the study area may be impacted by the profiled magnitude 9.0 Cascadia Subduction Zone (CSZ) event. *Note: Due to the simultaneous nature of a CSZ earthquake and tsunami, loss estimates have been separated in the following tables to avoid double counting. Building losses within the tsunami zone are considered total. See the tsunami section for additional information.*

The Risk Report performed an analysis of buildings, including critical facilities, to determine exposure for each community. According to the Risk Report the following resident population and property (public and private) within Toledo may be impacted by the profiled earthquake scenarios (Table TA-6). *Note: Due to the simultaneous nature of a CSZ earthquake and tsunami, loss estimates have been separated in the following tables to avoid double counting. Building losses within the tsunami zone are considered total. See the tsunami section for additional information.*<sup>13</sup>

Approximately 26% of the City's population (902 people) may be displaced by a magnitude 9.0 CSZ earthquake and tsunami event. Of those, approximately less than 1% will be impacted by the accompanying tsunami. *Note: The data does not include potentially impacted visitor populations that may be lodging or at a public venue during a CSZ earthquake and tsunami event.* Earthquakes will impact every building in the City, to some degree, by a CSZ magnitude 9.0 earthquake and tsunami. Building damage (loss) estimates are reported for buildings expected to be damaged by the earthquake outside of the tsunami inundation zone (medium-sized). Additional exposure information is provided for buildings within the tsunami inundation zone to obtain the combined total damage (loss) estimate. Buildings reported as "damaged" in the area *outside* the tsunami zone include yellow tagged (extensive, limited habitability) and red tagged (complete, uninhabitable) buildings, while 100% of buildings exposed *inside* the tsunami inundation area are considered "damaged" (complete, uninhabitable). The City has 810 buildings that are expected to be damaged by the CSZ earthquake and tsunami event. The combined (earthquake and tsunami) value of building damage losses are \$125.6 million.

The Risk Report estimated losses show that the age of the building stock is the primary metric of earthquake vulnerability. Communities with older building stock are expected to have higher losses. However, if buildings were retrofitted to at least "moderate code" standards the impact of the event would be reduced. The Risk Report concludes that loss estimates for the City drop from 43% to 37% (\$17.9 million decrease in loss) when all buildings are upgraded to at least moderate code level.<sup>14</sup> *Note: earthquake vulnerability retrofit benefits are minimized in areas of liquefaction and landslide where additional geotechnical mitigation would be needed.*

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<sup>13</sup> DOGAMI, *Lincoln County Natural Hazard Risk Report* (August 2020), Table A-18.

<sup>14</sup> Ibid. Table B-2.

**Table TA-6 Potentially Displaced Residents and Exposed Buildings, Earthquake**

Community Overview: Toledo						
Population		Buildings		Critical Facilities	Total Building Value (\$)	
3,465		1,954		7	288,238,000	
Exposure Analysis: Earthquake CSZ M9.0 (Deterministic) Scenario						
Potentially Displaced Residents		Damaged Buildings			Exposed Building Value	
Number	Percent	Number	Percent	Critical Facilities	Loss Estimate (\$)	Loss Ratio
898	25.9%	770	39.4%	6	123,401,000	42.8%
Exposure Analysis (within Tsunami Zone - Medium)						
4	0.1%	40	2.0%	0	2,234,000	0.8%
Total Exposure						
902	26.0%	810	41.5%	6	125,635,000	43.6%

Source: IPRE. Data adapted from DOGAMI. 2020. Lincoln County Natural Hazard Risk Report. Table A-18.

**Critical Facility Vulnerability<sup>15</sup>**

- Toledo Fire and Rescue Station 41 (City)
- Toledo Police Department (City)
- Olalla Center for Children and Families (non-profit)
- Arcadia School: District Offices (Lincoln County School District)
- Toledo Elementary School (Lincoln County School District)
- Toledo Jr/Sr High School (Outside City) (Lincoln County School District)
- Port of Toledo (Port)

Note: It is expected that bridges in the area may be impassable by vehicles for over 24 months. As such bringing resources into Toledo by sea and air will be necessary.

**Tsunami**

The steering committee determined that the city’s probability for a distant tsunami event is **moderate** meaning one incident may occur within the next 35 to 75 years and that their vulnerability to a distant tsunami event is **low**, meaning that less than 1% of the city’s population or property could be affected by a major distant tsunami event. The steering committee determined that the city’s probability for a local tsunami event is **moderate**, meaning one incident may occur within the next 35 to 75 years and that their vulnerability to a local tsunami event is **moderate**, meaning that between 1% and 10% of the City’s population or property could be affected by a major local tsunami event. *The city’s probability to distant tsunami, and their vulnerability to a local tsunami event, decreased since the previous NHMP, all other ratings have remained the same.*

Volume I, Section 2 of Lincoln County’s NHMP adequately describes the causes and characteristics of tsunami hazards, as well as the history, location, extent, and probability of

<sup>15</sup> Ibid, Table A-19.

a potential event. The Pacific Northwest experienced a subduction zone earthquake estimated at magnitude 9 on January 26, 1700. The earthquake generated a tsunami that caused damage as far away as Japan. Cascadia subduction zone earthquakes and associated tsunamis have occurred on average every 500 years over the last 3,500 years in the Pacific Northwest. The time between events has been as short as 100 to 200 years and as long as 1,000 years. The geologic record indicates that over the last 10,000 years approximately 42 tsunamis have been generated off the Oregon Coast in connection to ruptures of the CSZ (19 of the events were full-margin ruptures and arrived approximately 15-20 minutes after the earthquake).<sup>16</sup> Distant tsunamis happen more regularly than CSZ related local tsunamis.

It is difficult to predict when the next tsunami will occur. According to the Oregon NHMP the coast has experienced 25 distant tsunamis in the last 145 years with only three causing measurable damage. Thus, the average recurrence interval for tsunamis on the Oregon coast from distant sources would be about six (6) years. However, the time interval between events has been as little as one year and as much as 73 years. Since only a few tsunamis caused measurable damage, a recurrence interval for distant tsunamis does not have much meaning for the City.

A 9.0 magnitude earthquake originating from Japan caused approximately \$7.1 million worth of damages along the Oregon Coast. Particularly, there was extensive damage to the Port of Brookings (Curry County; \$6.7 million), as well as the Port of Toledo (Lincoln County; \$182,000), and Charleston Harbor (Coos County; \$200,000); Salmon Harbor on Winchester Bay (Douglas County) and the South Beach Marina in Newport (Lincoln County) were also affected. On March 15, 2011 Governor Kitzhaber declared a State of Emergency was declared by Executive Order in Curry County. Approximately 40% of all docks at the Port of Brookings were destroyed or rendered unusable (including a dock leased by the U.S. Coast Guard) compromising commercial fishing and U.S. Coast Guard operations. Along the Oregon Coast local officials activated the Emergency Alert System and sirens, implemented “reverse 9-1-1” and conducted door-to-door notices in order to evacuate people from the tsunami inundation zone. Local governments activate their Emergency Operations Centers and the state activated its Emergency Coordination Center. For more information view Volume II, Hazard Annex.

In 1995, the Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379); digitized in 2014 ([O-14-09](#)). SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, and Oregon Administrative Rules (OAR) 632-005, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. Figure TA-8 shows the regulatory tsunami inundation line showing the much of the residential development west of Highway 101, and areas in, and adjacent to, the harbor are vulnerable to tsunami. It should be noted that the updated tsunami inundation maps (described below) show an increased vulnerability in many areas (Figure TA-9). Note: HB 3309 (2019) effective January 1, 2020 repealed the ban on building “new essential facilities, hazardous facilities,

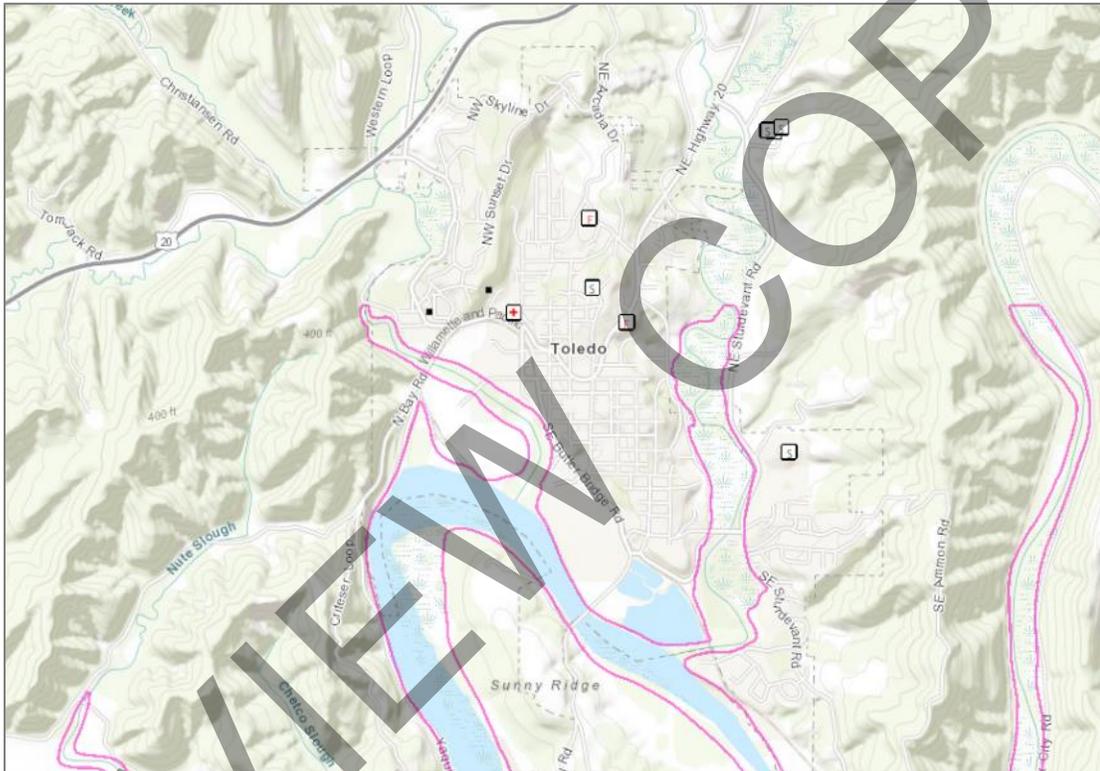
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<sup>16</sup> Oregon Natural Hazard Mitigation Plan. Department of Land Conservation and Development. 2015

major structures, and special occupancy structures” inside the tsunami inundation zone (SB 379 line):<sup>17</sup>

Toledo has put forth much effort to educate and inform citizens of tsunami hazards found within the city. Much of the city is outside of the expected tsunami inundation zone, however, damage is expected to occur on various properties, roads, bridges, communication systems, and critical infrastructure within Toledo, among other assets described in the county’s plan. Toledo recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

**Figure TA-8 Regulatory (SB 379) Tsunami Inundation Line**



Source: [Oregon HazVu: Statewide Geohazards Viewer](#) – To explore and view map detail click hyperlink to left.

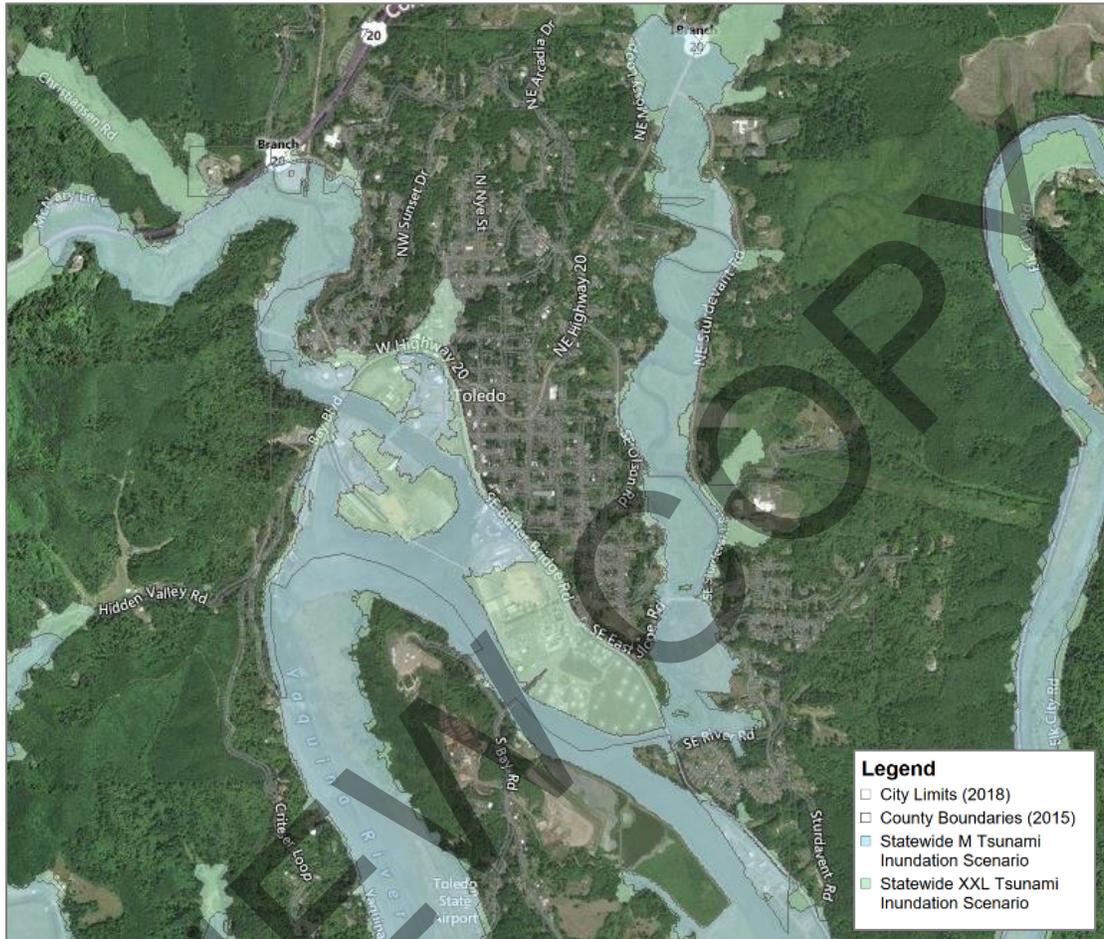
Tsunami inundation maps were created by the Department of Geology and Mineral Industries (DOGAMI) to be used for emergency response planning for coastal communities. Maps were created for local and distant source tsunami events. The local source tsunami inundation maps display the output of computer modeling showing five tsunami event scenarios shown as “T-shirt” sizes S, M, L, XL, and XXL. Figure TA-9 shows the M and XXL tsunami inundation scenarios. The distant source tsunami inundation maps show the potential impacts of tsunamis generated by earthquakes along the “Ring of Fire” (the Circum-Pacific belt, the zone of earthquake activity surrounding the Pacific Ocean). The distant tsunami inundation maps model the 1964 Prince William Sound event (Alaska M9.2) and a hypothetical Alaska Maximum event scenario; only the Alaska Maximum Wet/ Dry

<sup>17</sup> Oregon Legislature. HB 3309 (2019).

<https://olis.leg.state.or.us/liz/2019R1/Downloads/MeasureDocument/HB3309>

Zone is shown on the map. Both the local and distant source tsunami inundation maps show simulated wave heights and inundation extents for the various scenarios.

**Figure TA-9 Tsunami Inundation Map (M and XXL Scenarios)**



Source: [Oregon Explorer: Map Viewer](#) – To explore and view map detail click hyperlink to left.

For more information on the regulatory and non-regulatory maps visit the Oregon Tsunami Clearinghouse resource library:

Regulatory (SB 379) - <http://www.oregongeology.org/tsuclearinghouse/pubs-regmaps.htm>

(Note: HB 3309, effective January 1, 2020, repealed ban on building essential facilities within the tsunami inundation zone, SB 379 line.)

Non-Regulatory Tsunami-Inundation Maps:

<http://www.oregongeology.org/tsuclearinghouse/pubs-inumaps.htm>

Evacuation maps (brochures) are available for the populated areas of Lincoln County. The Department of Geology and Mineral Industries (DOGAMI) developed the evacuation zones in consultation with local officials; local officials developed the routes that were reviewed by the Oregon Department of Emergency Management (OEM). The maps show the worst-case scenario for a local source and distant source tsunami event and are not intended for land-use planning or engineering purposes.

For more information on the evacuation brochures visit the Oregon Tsunami Clearinghouse resource library:

<http://www.oregongeology.org/tsuclearinghouse/pubs-evacbro.htm>

A free application is also available that displays the evacuation routes in coastal areas of Oregon: [http://www.nanoos.org/mobile/tsunami\\_evac\\_app.php](http://www.nanoos.org/mobile/tsunami_evac_app.php)

## Vulnerability Assessment

In 2013, DOGAMI produced new Tsunami Inundation Maps (TIMs) for the entire Oregon coast. The TIMs identify both local and distant Tsunami Inundation Zones (TIZs) by event size. The maps also tabulate the affected buildings located within the local and distant source tsunami inundation zones. The Risk Report section below provides detailed information on the impact to the City from a CSZ earthquake and medium tsunami.

Although Toledo has relatively few developed properties within the tsunami inundation zones, the city expects to see an influx of Newport residents following a large tsunami event. Likely, this will be the city's greatest tsunami-related impact. Toledo is currently unprepared for such an increase, and will be unable to house, feed, and care for a much larger population. The city's steering committee noted that the city may want to increase its capacity to handle such a population surge, and that the Emergency Response Plan should account for such a scenario.

Severe damage could occur to low-lying areas of the city in a local source tsunami event, including roads, bridges, communication systems, and infrastructure within Toledo. Some damage is also may occur in a large distant source tsunami event (such as the 2011 Tohoku tsunami) particularly to the low-lying areas of town including the Port of Toledo. The city of Toledo recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

As shown in Table TA-4 there are about 129 manufactured housing units (mobile homes) in Toledo. Manufactured homes built prior to 2003 are subject to slipping off their foundations potentially compromising the occupants' ability to exit. The compromised egress may hinder timely evacuation.

Population vulnerability is characterized in terms of exposure, demographic sensitivity, and short-term resilience of at-risk individuals. Nate Wood, et al. (USGS) performed a cluster analysis of the data for coastal communities in the Pacific Northwest to identify the most vulnerable communities in the region.<sup>18</sup> Wood, et al. conducted a comprehensive analysis to derive overall community clusters based on (1) the number of people and businesses in the tsunami hazard zone, (2) the demographic characteristics of residents in the zone, and (3) the number of people and businesses that may have insufficient time to evacuate based on slow and fast walking speeds. According to the study Lincoln County (including Toledo) has relatively low numbers of "residents, employees, or customer-heavy businesses" inside the tsunami hazard zones and will likely have enough time to reach high ground before a tsunami wave arrives.

### Natural Hazard Risk Report for Lincoln County

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<sup>18</sup> Nathan J. Wood, Jeanne Jones, Seth Spielman, and Mathew C. Schmidlein. "Community clusters of tsunami vulnerability in the US Pacific Northwest", PNAS 2015 112 (17) 5354-5359.

The **Risk Report** ([DOGAMI, OFR-XX](#)) provides hazard analysis summary tables that identify populations and property within Lincoln County that are vulnerable to tsunami. The Risk Report provides a distinct profile for Toledo.

The Risk Report performed an analysis of buildings, including critical facilities, to determine exposure for each community. According to the Risk Report the following resident population and property (public and private) within Toledo may be impacted by the profiled tsunami scenario (Table TA-7).

Less than one percent (1%) of the city’s population (15 people) may be displaced by a magnitude 9.0 CSZ tsunami event (note there are additional people that will be displaced by the earthquake). This is slightly more people than those exposed within the Senate Bill 379 line (10 people). Building damage (loss) estimates are reported for buildings expected to be damaged by the tsunami inundation zone (medium-sized and SB 379). All 60 buildings exposed *inside* the tsunami inundation area are considered “damaged” (complete, uninhabitable); the number of buildings damaged is lower under the SB 379 scenario (22 buildings). No critical facilities are expected to be damaged under the CSZ M9.0 scenario or the SB 379 scenario.

**Table TA-7 Potentially Displaced Residents and Exposed Buildings, Tsunami**

Community Overview: Toledo						
Population		Buildings		Critical Facilities	Total Building Value (\$)	
3,465		1,954		7	288,238,000	
Exposure Analysis: Tsunami CSZ M9.0 (Deterministic) Scenario						
Potentially Displaced		Exposed Buildings			Exposed Building	
Number	Percent	Number	Percent	Critical Facilities	Value (\$)	Percent
15	0.4%	60	3.1%	0	5,754,000	2.0%
Exposure Analysis: Tsunami SB 379 Regulatory Line						
10	0.3%	22	1.1%	0	1,277,000	0.4%

Source: IPRE. Data adapted from DOGAMI. 2020. Lincoln County Natural Hazard Risk Report. Table A-18.

Critical Facility Vulnerability<sup>19</sup>

- There are no critical facilities exposed to the profiled tsunami scenarios.

Note: Although critical facilities are not exposed to the profiled tsunami scenarios it is expected that bridges in the area may be impassable by vehicles for over 24 months. As such bringing resources into Toledo by sea and air will be necessary.

**Flood**

The steering committee determined that the city’s probability for riverine flood is **high**, meaning at least one incident is likely within the next 35-year period and that their vulnerability to riverine flood is **moderate**, meaning that between 1% and 10% of the City’s

<sup>19</sup> DOGAMI, Lincoln County Natural Hazard Risk Report (August 2020), Table A-19.

population or property could be affected by a major riverine flood event. The probability of a coastal flood is **moderate**, meaning one incident is likely within the next 35 to 75-year period and that their vulnerability to coastal flood is **low**, meaning that less than 1% of the City's population or property could be affected by a major coastal or riverine flood event. *The vulnerability rating for riverine flood decreased since the previous NHMP. The probability and vulnerability for coastal flood decreased since the previous NHMP. Note: coastal flood "VE" zones do not occur in Toledo, however, the Yaquina River is tidally influenced and coastal backwater flooding compounds riverine flooding within the city.*

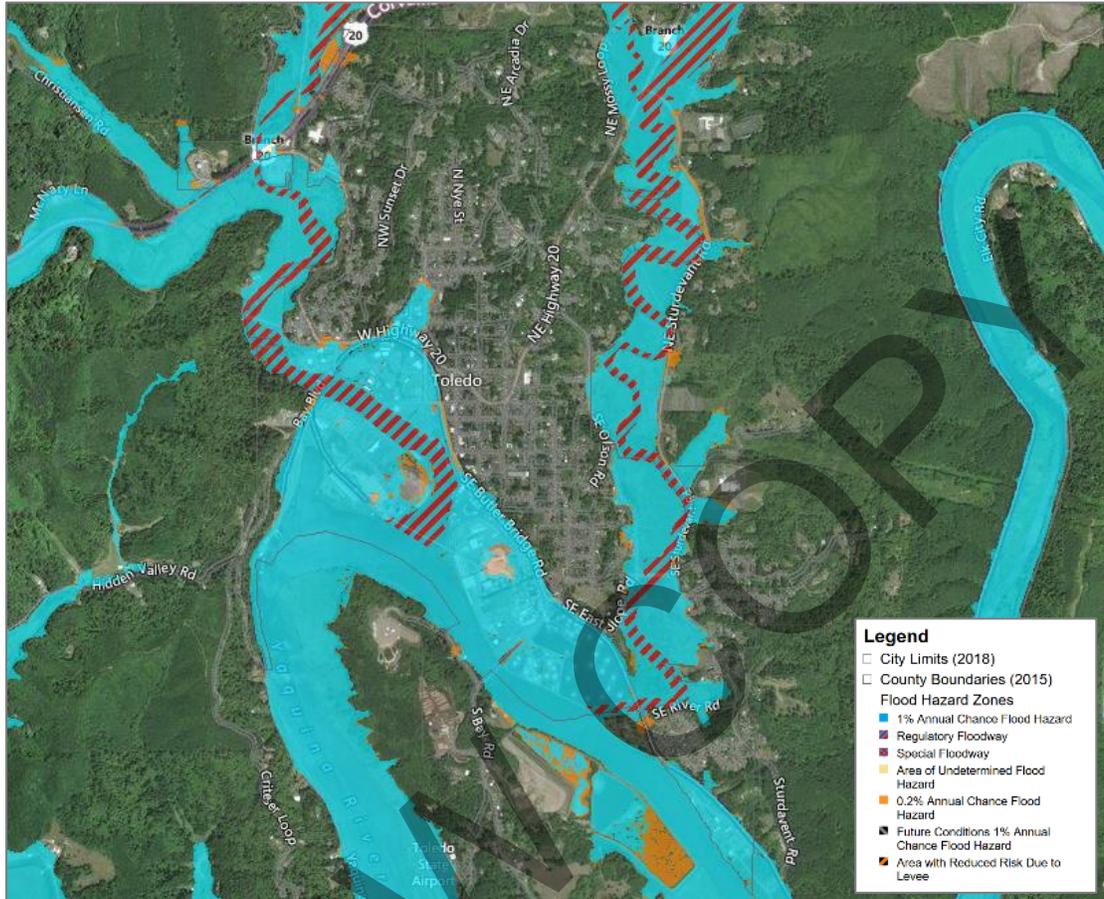
Volume I, Section 2 of Lincoln County's NHMP adequately describes the causes and characteristics of coastal and riverine flood hazards, as well as the history, location, extent, and probability of a potential event. Flooding typically occurs within the city when storm drains back up and/or pumps fail to work. The Yaquina River borders the City of Toledo, but riverine flooding is typically not an issue. The extent of flooding varies depending on rainfall, and/or precipitation levels throughout the year. Toledo's most significant flood events occurred in 1964 and 1996, and heavy rain in 1999 caused flooding along A Street. Three landslides additionally affected city residents during that same event. Landslides are the most common flood-related impacts within the community.

FEMA has mapped most of the flood-prone streams in Oregon for 100- and 500-year flood events. A 100-year flood (a flood with a one percent probability of occurring within any given year) is used as the standard for floodplain management in the United States and is referred to as a base flood; also known as the Special Flood Hazard Area (SFHA). The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. Flood Insurance Rate Maps (FIRMs) prepared by FEMA provide the most readily available source of information for 100-year floods (Figure TA-10). These maps are used to support the NFIP. FIRMs delineate 100- and 500-year (a flood with a 0.2-percent probability of occurring within any given year) floodplain boundaries for identified flood hazards. These maps represent a snapshot in time, and do not account for later changes which occurred in the floodplains. According to Oregon Explorer about 34% of the City is within the 100-year floodplain, and less than 1% is within the 500-year floodplain (see Figure TA-10).

#### Future Climate Projection:

According to OCCRI report "*Future Climate Projections: Lincoln County*" (Appendix G) the intensity of extreme precipitation is expected to increase as the atmosphere warms. The magnitude of the wettest days and the wettest consecutive five days is expected to increase by about 13% (range 4% to 28%) by the 2050s under the higher emissions scenario relative to historical baselines. The probability of winter flood risk will increase within coastal rain-dominated watersheds (such as the Siletz River) due to projected greater winter precipitation and warmer winter temperatures that will cause precipitation to fall more as rain than snow. There will also be an increase in atmospheric river events. Additionally, coastal flooding is expected to increase due to sea level rise (SLR) and changing wave dynamics. Sea level is projected to rise by 1.7 to 5.7 feet by 2100. Tidal wetlands and estuaries throughout the county are also expected to experience changes to their composition and area, thereby impacting their ability to naturally mitigate flood events.

**Figure TA-10 Flood Hazard Zones (100- and 500-year floodplains)**

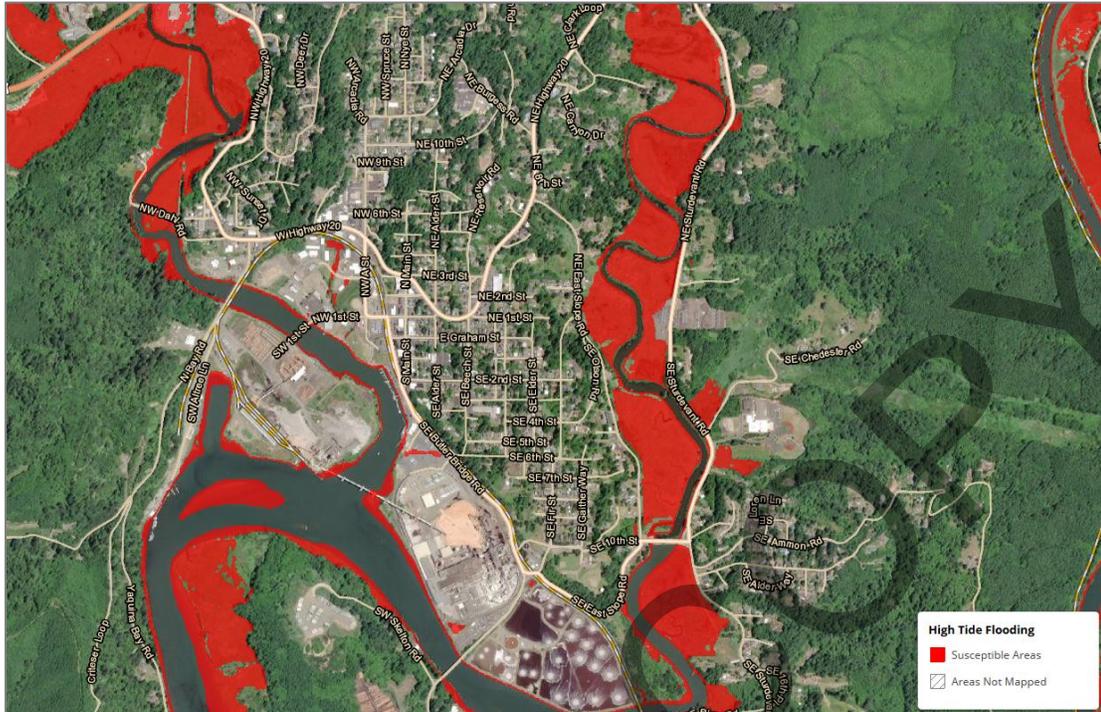


Source: [Oregon Explorer: Map Viewer](#) – To explore and view map detail click hyperlink to left.

## Vulnerability Assessment

A floodplain vulnerability assessment combines the floodplain boundary, generated through hazard identification, with an inventory of the property within the floodplain. Understanding the population and property exposed to natural hazards will assist in reducing risk and preventing loss from future events. The city is most vulnerable within the Special Flood Hazard Area which includes low lying areas surrounding A Street and the Port of Toledo, including the Georgia Pacific manufacturing facility. Note: The city considers riverine flooding to be the primary concern but recognizes that tidally influenced flooding (backwater flooding) may compound riverine flooding within the city. Figure TA-11 shows areas of concern for tidally influenced flooding (coastal flooding) in the City. Areas around NW A Street, near Hwy 20 (Business) and the railroad, and Dahl Road, where it travels over Depot Slough, among other low-lying areas are of concern. The Risk Report does not include analysis for coastal flooding within Toledo, however, coastal flooding (including backwater flooding) is studied for portions of the Yaquina River near Newport (for more information see DOGAMI Open-file Report [O-15-06](#)).

**Figure TA-I I High Tide Flooding**



Source: [NOAA Coast Flood Exposure Mapper](#) – To explore and view map detail click hyperlink to left.

### Natural Hazard Risk Report for Lincoln County

The **Risk Report** ([DOGAMI, OFR-XX](#)) provides hazard analysis summary tables that identify populations and property within Lincoln County that are vulnerable to flood. The Risk Report provides a distinct profile for Toledo.

The Risk Report provides a flood analysis for four flood scenarios (10-, 50-, 100-, and 500-year). The 100-year flood scenario is used for reporting since it is commonly used as a reference level for flooding and is the standard FEMA uses for regulatory purposes. In addition to the riverine flood scenarios coastal flooding information is available for the 100-year flood scenario for the city. The Risk Report only analyzed buildings within a flood zone, or within 500 feet of a flood zone. First-floor building height and presence of basements was also considered. Buildings with a first-floor height above the flood level were not included in the flood loss estimate, however, their assumed building occupants (residents) were counted as potentially displaced. According to the Risk Report the following resident population and property (public and private) within Toledo may be impacted by the profiled flood scenario (Table TA-8).

Just under three percent (3%) of the City's population (87 people) may be displaced by flooding. These people are expected to have mobility or access issues due to surrounding water. About eight percent (8%) of the City's buildings (151 buildings) are exposed to the flood hazard and may be damaged. The loss estimate for exposed buildings is \$23.3 million (about eight percent of total building value). The Police Department is vulnerable to flood.

**Table TA-8 Potentially Displaced Residents and Exposed Buildings, Flood**

Community Overview: Toledo						
Population		Buildings		Critical Facilities	Total Building Value (\$)	
3,465		1,954		7	288,238,000	
Exposure Analysis: Flood (1% Annual Chance)						
Potentially Displaced Residents		Damaged Buildings			Exposed Building Value	
Number	Percent	Number	Percent	Critical Facilities	Loss Estimate (\$)	Loss Ratio
87	2.5%	151	7.7%	1	23,272,000	8.1%

Source: IPRE. Data adapted from DOGAMI. 2020. Lincoln County Natural Hazard Risk Report. Table A-18.

Critical Facility Vulnerability<sup>20</sup>

- Toledo Police Department

**National Flood Insurance Program (NFIP)**

FEMA’s Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) are effective as of October 10, 2019. Table TA-9 shows that as of August 2019, the City has nine (9) National Flood Insurance Program (NFIP) policies in force, representing almost \$2.3 million in coverage. Of those, seven (7) are for properties that were constructed before the initial FIRMs. The last Community Assistance Visit (CAV) for the City was February 22, 2000. The table shows that five flood insurance policies are for residential structures, primarily single-family homes and four are for non-residential structures. Flood insurance covers only the improved land, or the actual building structure. There have been two (2) paid flood insurance claims for a combined total of \$33,157.

The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain management program.

The NFIP’s Community Rating System (CRS) recognizes jurisdictions for participating in floodplain management practices that exceed NFIP minimum requirements. The City does not participate in the CRS and, therefore, does not receive discounted flood insurance premiums for residents in a special flood hazard zone.

The Community Repetitive Loss record for Toledo identifies no Repetitive Loss<sup>21</sup> or Severe Repetitive Loss Properties<sup>22</sup>.

<sup>20</sup> DOGAMI, Lincoln County Natural Hazard Risk Report (August 2020), Table A-19.

<sup>21</sup> A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

<sup>22</sup> A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP, and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000, and with cumulative amount of such claims payments exceeding \$20,000; or for which at least

**Table TA-9 Flood Insurance Detail**

	Lincoln County	Toledo
Effective FIRM and FIS	10/18/2019	10/18/2019
Initial FIRM Date	-	3/1/1979
Total Policies	2,325	9
Pre-FIRM Policies	1,067	7
<b>Policies by Building Type</b>		
Single Family	1,685	4
2 to 4 Family	57	1
Other Residential	462	0
Non-Residential	121	4
Minus Rated A Zone	98	0
Minus Rated V Zone	3	0
Insurance in Force	\$585,856,500	\$2,323,200
Total Paid Claims	343	2
Pre-FIRM Claims Paid	265	2
Substantial Damage Claims	53	0
Total Paid Amount	\$5,479,221	\$33,157
Repetitive Loss Structures	64	0
Severe Repetitive Loss Properties	12	0
CRS Class Rating	NP	NP
Last Community Assistance Visit	-	2/22/2000

Source: Department of Land Conservation and Development, August 2019. Repetitive Flood Loss information provided by FEMA correspondence on September 10, 2020. NP = Not Participating.

## Landslide

The steering committee determined that the city's probability for landslide is **high**, meaning at least one incident is likely within the next 35-year period, and that their vulnerability to landslide is **high**, meaning that more than 10% of the City's population or property could be affected by a major landslide event. *These ratings have not changed since the previous NHMP.*

Volume I, Section 2 of Lincoln County's NHMP adequately describes the causes and characteristics of landslide hazards, as well as the history, location, extent, and probability of a potential event.

The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries or take lives.

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2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Landslide susceptibility exposure for Toledo is shown in Figure TA-12. Approximately 60% of the City has very high or high, and 14% moderate, landslide susceptibility exposure.<sup>23</sup> In general, the areas of greater risk are located adjacent to rivers and creeks and indicate potential areas of erosion. *Note that even if a City has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard and assets.*

**Future Climate Projection:**

According to OCCRI report “*Future Climate Projections: Lincoln County*” (Appendix G) the intensity of extreme precipitation is expected to increase as the atmosphere warms. The magnitude of the wettest days and the wettest consecutive five days is expected to increase by about 13% (range 4% to 28%) by the 2050s under the higher emissions scenario relative to historical baselines. Landslide risk is not expected to change significantly.

## Vulnerability Assessment

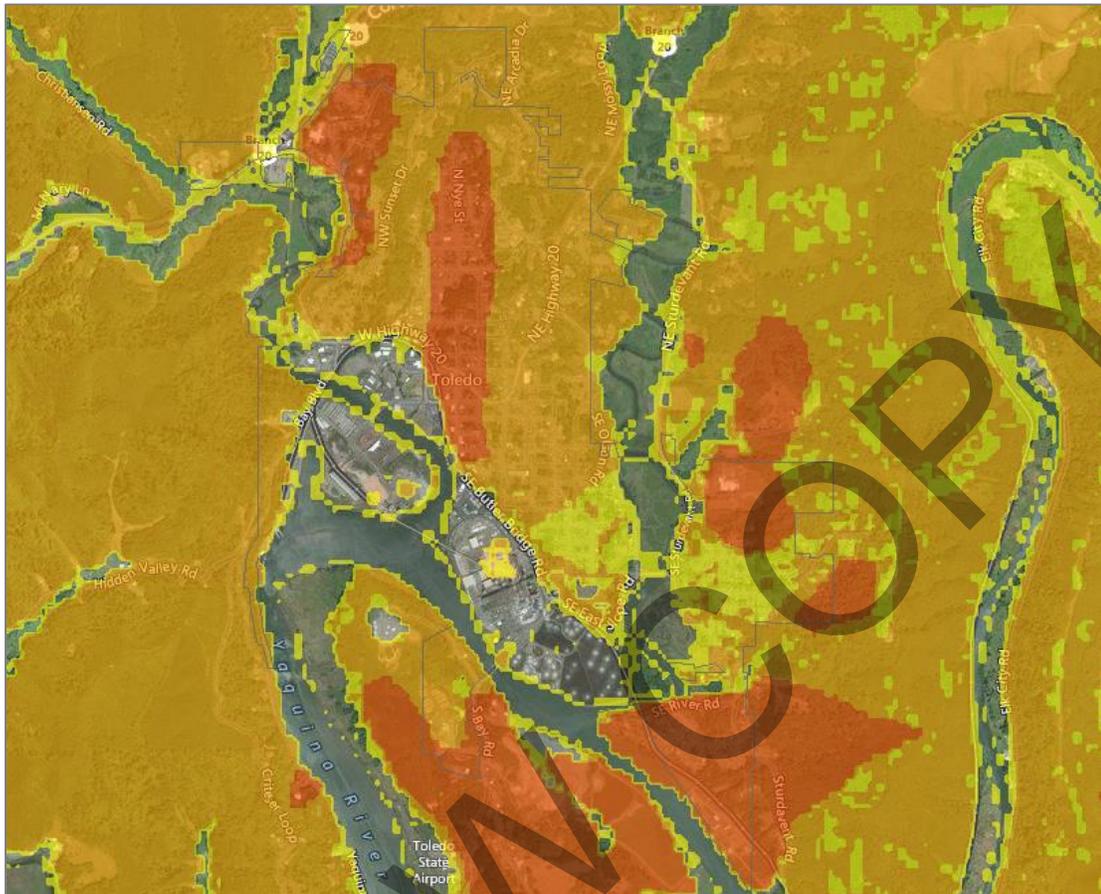
Toledo has very steep slopes, and a long history of logging practices increase the probability that landslides will occur. Homes on Nye Street suffered landslide-related damages following Oregon’s 1996 storms, and slides accompanied storms in 1966 and 1999.

Potential landslide-related impacts are adequately described within the county’s plan, and include infrastructure damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Lincoln County, and thoroughfares beyond city limits are susceptible to obstruction as well. As such, Toledo is vulnerable to isolation for an extended period.

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<sup>23</sup> DOGAMI. [Open-File Report, O-16-02](#), *Landslide Susceptibility Overview Map of Oregon* (2016)

**Figure TA-12 Landslide Susceptibility Exposure**



Low	Landsliding unlikely. Areas classified as Landslide Density = Low (less than 7%) and areas classified as Slopes Prone to Landsliding = Low.
Moderate	Landsliding possible. Areas classified as Landslide Density = Low to Moderate (less than 17%) and areas classified as Slopes Prone to Landsliding = Moderate OR areas classified as Landslide Density = Moderate (7%-17%) and areas classified as Slopes Prone to Landsliding = Low.
High	Landsliding likely. Areas classified as Landslide Density = High (greater than 17%) and areas classified as Slopes Prone to Landsliding = Low and Moderate OR areas classified as Landslide Density = Low and Moderate (less than 17%) and areas classified as Slopes Prone to Landsliding = High.
Very High	Existing landslides Landslide Density and Slopes Prone to Landsliding data were not considered in this category. Note: the quality of landslide inventory (existing landslides) mapping varies across the state.

Source: [Oregon Explorer: Map Viewer](#) – To explore and view map detail click hyperlink to left.

### Natural Hazard Risk Report for Lincoln County

The **Risk Report (DOGAMI, OFR-XX)** provides hazard analysis summary tables that identify populations and property within Lincoln County that are vulnerable to landslide. The Risk Report provides a distinct profile for Toledo.

The Risk Report provides an analysis of landslide susceptibility to identify the general level of susceptibility to landslide hazards, primarily shallow and deep landslides. The Risk Report performed an analysis of buildings, including critical facilities, to determine exposure for the City. According to the Risk Report the following resident population and property (public

and private) within the city may be impacted by the profiled landslide scenario (Table TA-10).

Approximately 79% of the City’s population (2,739 people) may be displaced by landslides. These people are expected to have mobility or access issues and/or may have their residences impacted by a landslide. It is important to note that impact from landslides may vary depending on the specific area that experiences landslides during an event. Properties that are most vulnerable to the landslide hazard are those that are developed in an area of, or at the base of, moderate to steep slopes. Approximately 78% of all buildings (1,528 buildings) within the City are exposed to the High or Very High landslide susceptibility zones (see Figure TA-12). The value of exposed buildings is just under \$114 million (about 40% of total building value). All seven identified critical facilities are vulnerable to landslide.

**Table TA-10 Potentially Displaced Residents and Exposed Buildings, Landslide**

Community Overview: Toledo						
Population		Buildings		Critical Facilities	Total Building Value (\$)	
3,465		1,954		7	288,238,000	
Exposure Analysis: Landslide High & Very High Susceptibility						
Potentially Displaced		Exposed Buildings			Exposed Building	
Number	Percent	Number	Percent	Critical Facilities	Value (\$)	Percent
2,739	79.0%	1,528	78.2%	7	113,948,000	39.5%

Source: IPRE. Data adapted from DOGAMI, 2020. Lincoln County Natural Hazard Risk Report. Table A-18.

Critical Facility Vulnerability<sup>24</sup>

- Toledo Fire and Rescue Station 41 (City)
- Toledo Police Department (City)
- Olalla Center for Children and Families (non-profit)
- Arcadia School: District Offices (Lincoln County School District)
- Toledo Elementary School (Lincoln County School District)
- Toledo Jr/Sr High School (Outside City) (Lincoln County School District)
- Port of Toledo (Port)
- Samaritan Toledo Clinic (Hospital)

**Severe Weather**

Severe wind events may occur throughout Oregon during all seasons. Often originating in the Pacific Ocean, westerly winds pummel the coast, slowing as they cross the Coastal mountain range and head into the inland valleys.<sup>25</sup> Similarly, severe winter storms consisting of rain, freezing rain, ice, snow, cold temperatures, and wind originate from troughs of low pressure offshore in the Gulf of Alaska or in the central Pacific Ocean that ride along the jet

<sup>24</sup> DOGAMI, Lincoln County Natural Hazard Risk Report (August 2020), Table A-19.

<sup>25</sup> US Department of Agriculture. <http://www.fsa.usda.gov/or/Notice/Flp104.pdf>.

stream during fall, winter, and early spring months.<sup>26</sup> In summer, the most common wind directions are from the west or northwest; in winter, they are from the south and east. Local topography, however, plays a major role in affecting wind direction.

### Future Climate Projections

Oregon and the Pacific Northwest experience a variety of extreme weather incidents ranging from severe winter storms and floods to drought and dust storms, often resulting in morbidity and mortality among people living in the impacted regions. According to the Oregon Climate Change Research Institute, climate change is expected to increase the frequency and intensity of some weather incidents.<sup>27</sup>

Climate change poses risks for increased injuries, illnesses and deaths from both direct and indirect effects. Incidents of extreme weather (such as floods, droughts, severe storms, heat waves and fires) can directly affect human health as well as cause serious environmental and economic impacts. Indirect impacts can occur when climate change alters or disrupts natural systems.

According to OCCRI report “*Future Climate Projections: Lincoln County*” (Appendix G) windstorm events are not expected to increase, however, air temperatures on the coldest day of the year will increase by about 5°F by the 2050s under the higher emissions scenario relative to historical baselines.

## Windstorm

The steering committee determined that the city’s probability for windstorm is **high** (the probability of tornado is **low**), meaning one severe incident is likely within the next 35-year period, and that their vulnerability to windstorm is **high**, meaning that more than 10% of the City’s population or property could be affected by a major windstorm event. The Steering Committee rated the County as having a “**low**” **vulnerability to a tornado hazard**, meaning that less than 1% of the City’s population or property could be affected by a major tornado event. *The windstorm ratings have not changed since the previous NHMP. The tornado ratings are new with this version of the NHMP.*

Volume I, Section 2 of Lincoln County’s NHMP adequately describes the causes and characteristics of windstorm hazards, as well as the history, location, extent, and probability of a potential event. Because coastal windstorms typically occur during winter months, ice, freezing rain, flooding, and very rarely, snow sometimes accompany them. More than likely, however, the coast’s winter will just be windy, cold, and wet.

## Vulnerability Assessment

Due to insufficient data and resources, Toledo is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. In Toledo, power outages are the greatest concern during windstorms. Building codes require new developments to place power lines below ground. Without power, communication is lost, and fuel and food stores

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<sup>26</sup> Interagency Hazard Mitigation Team. 2000. State Hazard Mitigation Plan. Salem, OR: Oregon Office of Emergency Management.

<sup>27</sup> Oregon Climate Change Research Institute <http://occri.net/wp-content/uploads/2011/04/chapter9ocar.pdf> Page 412.

shut down. Toledo experiences sporadic power failures all winter long, and trees frequently block roads. Typically, however, residents are prepared for power outages. The city's steering committee discussed the need for assisting residents with medical vulnerabilities during power-outages; Toledo's fastest growing age group is the elderly population, and medical isolation will continue to be an issue unless mitigated.

## Winter Storm (Snow/ Ice)

The steering committee determined that the city's probability for winter storm is **high**, meaning at least one severe incident is likely within the next 35-year period, and that their vulnerability to winter storm is **moderate**, meaning that between 1% and 10% of the city's population or property could be affected by a major winter storm event. *These ratings have not changed since the previous NHMP.*

Volume I, Section 2 of Lincoln County's NHMP adequately describes the causes and characteristics of winter storm hazards, as well as the history, location, extent, and probability of a potential event. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the city typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March. More than likely, however, the coast's winter will just be windy, cold, and wet.

### Vulnerability Assessment

Due to insufficient data and resources, Toledo is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. Major winter storms can and have occurred in the Toledo area, and while they typically do not cause significant damage; they are frequent and have the potential to impact economic activity. Road closures on Highway 101, or the passes to the Willamette Valley (Hwy 18 and 20), due to winter weather are an uncommon occurrence, but can interrupt commuter and large truck traffic.

## Volcanic Event

The steering committee determined that the city's probability for volcanic event is **low**, meaning one incident is likely within the next 75 to 100-year period, and that their vulnerability to volcanic event is **low**, meaning that less than 1% of the city's population or property would be affected by a major volcanic event (ash/lahar). *These ratings have not changed since the previous NHMP.*

Volume I, Section 2 of Lincoln County's NHMP adequately describes the causes and characteristics of volcanic event hazards, as well as the history, location, extent, and probability of a potential event. Generally, an event that affects the county is likely to affect Toledo as well.

### Vulnerability Assessment

Due to insufficient data and resources, Toledo is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. Toledo is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in

1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages.

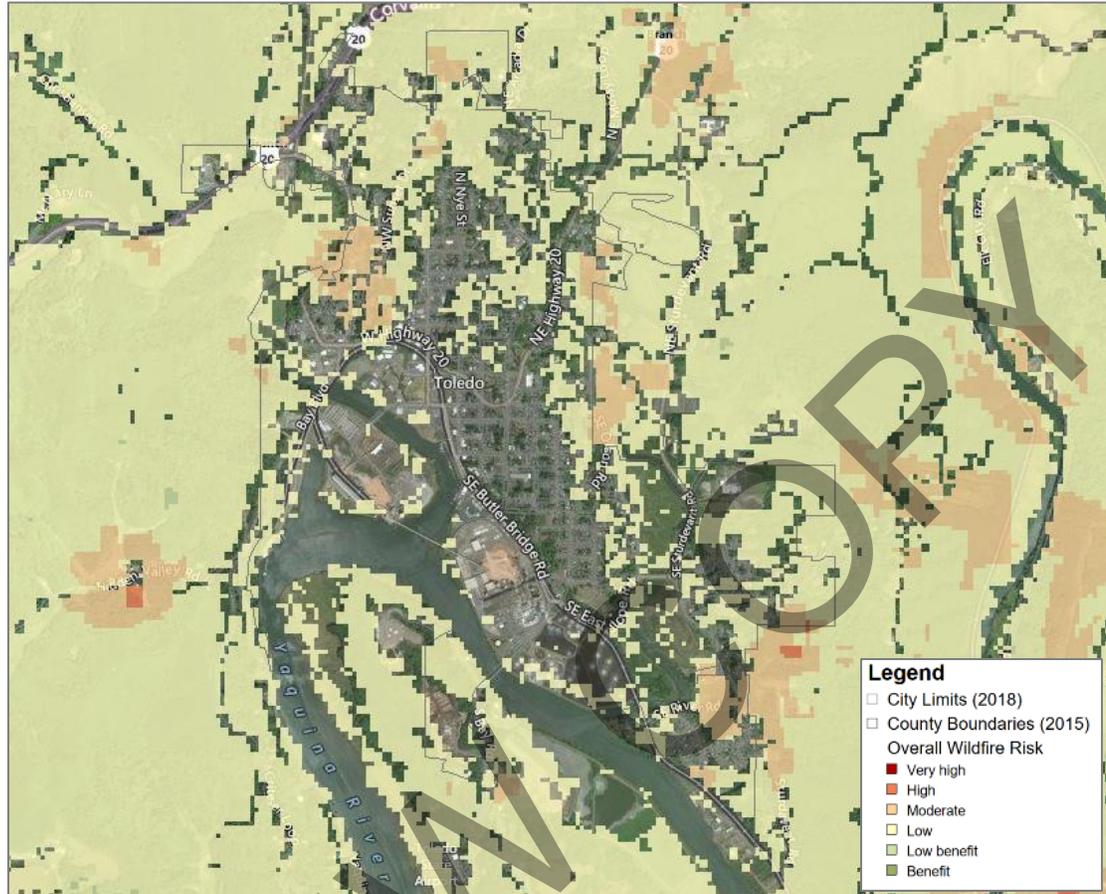
## Wildfire

The steering committee determined that the city's probability for wildfire is **moderate**, meaning one incident is likely within the next 35 to 75-year period, and that their vulnerability to wildfire is **moderate**, meaning that between 1% and 10% of the City's population or property could be affected by a major wildfire event. *The probability rating has decreased since the previous NHMP.*

The [Lincoln County Community Wildfire Protection Plan \(CWPP\)](#) was completed in 2010 and revised in 2018. CWPP is hereby incorporated into this NHMP addendum by reference, and it will serve to supplement the wildfire section in this addendum.

Volume I, Section 2 of Lincoln County's NHMP adequately describes the causes and characteristics of wildfire hazards, as well as the history, location, extent, and probability of a potential event. The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. Wildfires in 1849 and 1936 were particularly devastating in Lincoln County, but since then, there have been few large events. As shown in Figure TA-13 the City has mostly low, with some moderate, overall wildfire risk. Areas of concern include the eastern side of the city (where forestland borders development), and some of the open spaces within the city's limits. Due to the prevailing wind patterns (i.e., from the north or south). Power, natural gas, and phone lines run through the forest to the east of the city and would be affected in the event of a wildfire. Likewise, active commercial logging occurs just outside the city, and slash burns are a potential wildfire concern.

**Figure TA-13 Overall Wildfire Risk**



Source: [Oregon Explorer: Map Viewer](#) – To explore and view map detail click hyperlink to left.

### Future Climate Projection:

According to OCCRI report “*Future Climate Projections: Lincoln County*” (Appendix G) wildfire risk is expected to increase as the frequency of higher fire danger days per year increases by 37% by the 2050s under the higher emissions scenario compared with the historical baseline.

### **Vulnerability Assessment**

Overall, the city, and its watershed, has low to moderate overall wildfire risk, however, the forested areas have the potential for large wildfires and a wildfire within the watershed could impact the city’s water supply and quality.

Property can be damaged or destroyed with one fire as structures, vegetation, and other flammables easily merge to become unpredictable, and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location, and to water, response time from the fire station, availability of personnel, and equipment, and weather (e.g., heat, low humidity, high winds, and drought).

Exposed infrastructure including wastewater main lines, major water lines, natural gas pipeline and fiber optic lines are buried, decreasing their vulnerability to damage from

wildfire hazards. However, wildfire conditions could potentially limit or delay access for the purposes of operation or repair.

Natural Hazard Risk Report for Lincoln County

The Risk Report (DOGAMI, OFR-XX) provides hazard analysis summary tables that identify populations and property within Lincoln County that are vulnerable to landslide. The Risk Report provides a distinct profile for Toledo.

The Risk Report provides an analysis of the West Wide Wildfire Risk Assessment’s Fire Risk Index (FRI) High Hazard category to identify the general level of susceptibility to the wildfire hazard. The Risk Report performed an analysis of buildings, including critical facilities, to determine exposure for the City. According to the Risk Report the following resident population and property (public and private) within the City may be impacted by the profiled wildfire scenario (Table TA-11).

Approximately five percent of the City’s population (169 people) may be displaced by wildfires. These people are expected to have mobility or access issues and/or may have their residences impacted by a wildfire (more people may also be impacted by smoke and traffic disruptions that are not accounted for within this analysis). It is important to note that impact from wildfires may vary depending on the specific area that experiences a wildfire. The value of exposed buildings (120 buildings) is just under \$9 million (about three percent of total building value).

**Table TA-II Potentially Displaced Residents and Exposed Buildings, Wildfire**

Community Overview: Toledo						
Population		Buildings		Critical Facilities	Total Building Value (\$)	
3,465		1,954		7	288,238,000	
Exposure Analysis: Wildfire High-Hazard						
Potentially Displaced		Exposed Buildings			Exposed Building	
Number	Percent	Number	Percent	Critical Facilities	Value (\$)	Percent
169	4.9%	120	6.1%	0	8,976,000	3.1%

Source: IPRE. Data adapted from DOGAMI. 2020. Lincoln County Natural Hazard Risk Report. Table A-18.

Critical Facility Vulnerability<sup>28</sup>

- There are no critical facilities exposed to the profiled wildfire scenario.

<sup>28</sup> DOGAMI, Lincoln County Natural Hazard Risk Report (August 2020), Table A-19.

# ATTACHMENT A: ACTION ITEM FORMS

Table TA-1 and Table TA-12 provide a summary list of actions for the city. Each high priority action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below.

**Table TA-12 Action Item Timelines, Status, High Priority and Related Hazards**

Action Item	Priority	Timeline	Status	Related Hazard								
				Coastal Erosion	Drought	Earthquake	Flood	Landslide	Tsunami	Volcano	Wildfire	Windstorm
Toledo #1		Ongoing	Ongoing	X	X	X	X	X	X	X	X	X
Toledo #2		Short	Ongoing			X	X					
Toledo #3	X	Long	Ongoing			X						
Toledo #4		Ongoing	Ongoing	X	X	X	X	X	X	X	X	X
Toledo #5		Ongoing	Ongoing				X					
Toledo #6	X	Short	Ongoing				X	X	X		X	
Toledo #7		Medium	Ongoing			X			X			
Toledo #8	X	Long	Ongoing					X				
Toledo #9		Long	Ongoing				X					
Toledo #10	X	Short	Ongoing				X		X			
Toledo #11	X	Long	New				X		X			

**Previous NHMP Actions Removed/Deleted:**

**Toledo #11 (2015):** “Implement actions identified by the Lincoln County School District that affect the community’s resilience to earthquake and tsunami” was removed since the activities are now incorporated into the School District’s addendum. See the Lincoln County School District addendum for more information.

## **ALIGNMENT WITH EXISTING PLANS/POLICIES**

The City NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the City. Existing programs and other resources that might be used to implement these action items are identified. The City addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvements plan, mandated standards and building codes. To the extent possible, the City will work to incorporate the recommended mitigation action items into existing programs and procedures. Each action item identifies related existing plans and policies.

## **RATIONALE FOR PROPOSED ACTION ITEM**

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from several sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in this addendum and within Volume I, Section 2. The worksheet provides information on the activities that have occurred since the previous plan for each action item.

## **IDEAS FOR IMPLEMENTATION**

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

## **COORDINATING (LEAD) ORGANIZATION:**

The coordinating organization is the public agency with the regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring and evaluation.

## **INTERNAL AND EXTERNAL PARTNERS:**

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project steering committee but not necessarily contacted during the development of the plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

Internal partner organizations are departments within the City or other participating jurisdiction that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

**PLAN GOALS ADDRESSED:**

The plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals, following implementation.

**TIMELINE:**

All broad scale action items have been determined to be ongoing, as opposed to short (1 to 4 years), medium (4-10 years), or long (10 or more years). This is because the action items are broad ideas, and although actions may be implemented to address the broad ideas, the efforts should be ongoing.

**POTENTIAL FUNDING SOURCE**

Where possible potential funding sources have been identified. Example funding sources may include: Federal Hazard Mitigation Assistance programs, state funding sources such as the Oregon Seismic Rehabilitation Grant Program, or local funding sources such as capital improvement or general funds. An action item may include several potential funding sources.

**ESTIMATED COST**

A rough estimate of the cost for implementing each action item is included. Costs are shown in general categories showing low, medium, or high cost. The estimated cost for each category is outlined below:

Low - Less than \$50,000

Medium - \$50,000 – \$100,000

High - More than \$100,000

**STATUS**

The 2020 status of each action item is indicated: new actions were developed in 2020, ongoing actions are those carried over from the previous plan, and deferred actions are those that are carried over from the previous plan but had limited or no activity.

County level actions that the city is listed as a partner are shown in Table TA-13. These actions are led by the County; however, the City will incorporate elements of the action that are applicable to their jurisdiction.

**Table TA-13 County Specified Actions that the City is Partner**

Action Item (2015 NHMP)	City Partner	Action Item
MH #1	Yes	Consider Local Energy Assurance Planning for critical areas countywide
MH #2	Yes	Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of natural hazard dangers
MH #3	Yes	Develop and implement, or enhance strategies for debris management and/or removal after natural hazard events.
MH #4	Yes	Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting natural hazard mitigation opportunities.
MH #5		Encourage purchase of hazard insurance for business and homeowners by forming partnerships with the insurance and real estate industries.
MH #6	Yes	Integrate the NHMP into County and City comprehensive plans.
MH #7	Yes	Prepare long-term catastrophic recovery plan
MH #8		Review recommended mitigation strategies identified in DOGAMI reports (including O-19-06, O-20-03, O-20-xx) and make recommendations to BOC for consideration as long-term mitigation strategies.
CE #1		Improve knowledge of effects of climate change and understanding of vulnerability and risk to life and property in hazard prone areas.
CE #2		Evaluate revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping.
EQ #1	Yes	Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
EQ #2	Yes	Identify, inventory, and retrofit critical facilities for seismic and tsunami rehabilitation (consider both structural and non-structural retrofit options).
TS #1		Relocate county controlled critical/essential facilities and key resources, and encourage the relocation of other critical facilities and key resources that house vulnerable populations (e.g., hospitals, nursing homes, etc.) that are within the tsunami inundation zone and likely to be impacted by tsunami.
TS #2		Implement land use strategies and options to increase community resilience

Action Item (2015 NHMP)	City Partner	Action Item
EQ #3	Yes	Stay apprised of new earthquake and landslide data and perform mitigation of infrastructure where possible to increase resilience of critical transportation links to the valley and along the coast during earthquake events.
FL #1	Yes	Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS)
FL #2	Yes	Update the Lower Siletz Flood Mitigation Action Plan; develop flood mitigation action plan(s) for the lower Alsea and Salmon River, and Drift Creek and other areas.
FL #3	Yes	Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas
FL #4	Yes	Continue compliance with the National Flood Insurance Program (NFIP).
LS #1	Yes	Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
LS #2		Protect existing development in landslide-prone areas.
LS #3	Yes	Collaborate with the Oregon Department of Geology and Mineral Industries to work on landslide risk reduction.
SW #1	Yes	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during severe weather events (windstorms, tornados, and winter storms).
SW #2	Yes	Continue and enhance severe weather (windstorm, tornado, winter storm) resistant construction methods where possible to reduce damage to utilities and critical facilities from windstorms and winter storms (snow/ice). In part, this may be accomplished by encouraging electric utility providers to convert existing overhead lines to underground lines.
WF #1	Yes	Implement actions identified within the Lincoln County Community Wildfire Protection Plan (CWPP) and continue to participate with ongoing maintenance and updates.

Mitigation Action: Toledo #1 (What do we want to do?)	Alignment with Plan Goals:	High Priority Action Item?
Educate citizens about natural hazards preparedness.	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>In the event of a magnitude (M) 9 event, the city will likely be isolated from larger cities in the Willamette Valley, as well as coastal communities. Post-disaster self-reliance is essential.</p> <p>"To increase natural hazard mitigation and emergency preparedness in a community, "residents must be aware of the risk and know what they should do before and after the disaster occurs. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information." Source: Oregon Natural Hazards Workgroup. Lane County Natural Hazard Mitigation Plan (Draft). October 2005. Community Service Center, University of Oregon, Eugene, OR. p. 46.</p> <p>The Toledo Steering Committee expressed interest in developing strategies to assist residents that are in need of medical equipment during power outages.</p>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	
<p>Create public service advertisements.</p> <p>Distribute seasonal education &amp; outreach materials with residents' water bills.</p> <p>Teach children about emergency safety &amp; preparedness.</p> <p>Encourage residents to understand how to behave during windstorms. Educate residents about the hazards associated with high winds, and how to prevent harm during power outages.</p> <p>Host public meetings to discuss the earthquake and landslide hazards in Toledo.</p> <p>Educate residents about how to prepare for and mitigate damage caused by earthquakes.</p> <p>Place educational materials on display at the library.</p> <p>Create a neighbor assistance program to help residents in need of medical equipment during power outages. Provide information to residents about generator sharing programs and/or</p>	<p><u>2020 Update:</u></p> <p>The City of Toledo applied for a grant for Tsunami Evacuation Signage.</p> <p><u>2015 Update:</u></p> <p>The Toledo Fire Department provides ongoing education on natural hazard preparedness and mitigation.</p>	

purchasing opportunities.		
<b>Champion/ Responsible Organization:</b>	Fire Department (volunteers)	
<b>Internal Partners:</b>	<b>External Partners:</b>	
	FEMA, DOGAMI, Ready.gov, Oregon Emergency Management	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources	Low	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	Toledo Steering Committee, revised 2020	
<b>Action Item Status:</b>	Ongoing	

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<b>Mitigation Action: Toledo #2</b> (What do we want to do?)	<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Evaluate the structural integrity of the Olalla Reservoir Dam (Georgia Pacific owned/operated) and the Mill Creek Reservoir Dam.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>Toledo is located in a high hazard area for earthquakes. The city's steering committee expressed concern that the Georgia Pacific/Olalla Reservoir Dam and/or the Mill Creek Reservoir Dam may breach in the event of a high magnitude earthquake and cause severe flooding within the city.</p> <p>If we can understand the risk from dam failure closer to reality, we can plan and use resources more appropriately to prepare against this hazard. <i>Source: DOGAMI</i></p>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	
<p>Create an Emergency Action Plan for dam failure. An EAP is a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed to reduce property damage and loss of life. An EAP specifies actions the dam owner should take to take care of problems at the dam. It also includes steps to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency.</p> <p>Evaluate the community's risk of flooding from dam failure. Determine whether recreational facilities, campgrounds, or residences are located below the dam.</p> <p>Contact the state or county emergency management agency to determine whether the Olalla Dam is a high-hazard or significant-hazard potential dam.</p> <p>Educate residents about what to do during a flood event. For example, if residents are instructed to evacuate, they should do the following:</p> <p>Secure your homes. If you have time, bring in outdoor furniture. Move essential items to an upper floor.</p>	<p><u>2020 Update:</u> Mill Creek continues to be inspected by the State.</p> <p><u>2015 Update:</u> Mill Creek is inspected by State; may have some issues (piping), concern is with a Cascadia Earthquake.</p>	

Turn off utilities at the main switches or valves if instructed to do so. Disconnect electrical appliances. Do not touch electrical equipment if you're wet or standing in water.		
<b>Champion/ Responsible Organization:</b>	Public Works	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Lincoln County	FEMA, OEM, Georgia Pacific	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources	Medium to High	<input type="checkbox"/> Ongoing <input checked="" type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	2015 Toledo Steering Committee, revised 2020	
<b>Action Item Status:</b>	Ongoing	

<b>Mitigation Action: Toledo #3</b> (What do we want to do?)	<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Seismically retrofit vulnerable facilities and infrastructure to increase their resiliency to seismic hazards. Consider both structural and non-structural retrofit options.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input checked="" type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>"For governments, less damage to government structures will mean continued services and normal processes or at least minimal interruptions. If government structures come through an earthquake with little or no damage, agencies will not have to relocate services, and public officials can respond to the immediate and long-term demands placed on them by the event. In short, seismic rehabilitation as a pre-event mitigation strategy actually will improve post-event response by lessening life loss, injury, damage, and disruption." Source: FEMA. Chapter 1: Why Seismic Rehabilitation?</p> <p>DOGAMI conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Table TA-4 lists the vulnerable buildings within Newport.</p> <p>In addition to the structures listed in Table TA-4, the city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, reservoirs, cell towers, and City Hall were identified by the steering committee as vulnerable assets. The city would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region wide.</p> <p>School District Priorities are included in their addendum. Below are facilities within Toledo that are listed as vulnerable to earthquake in the DOGAMI Risk Report, ownership is listed in parentheses.</p> <p>Priority projects include the following:</p> <ul style="list-style-type: none"> <li>• City Hall</li> <li>• Toledo Fire and Rescue Station 41 (City)</li> <li>• Toledo Police Department (City)</li> <li>• Olalla Center for Children and Families (non-profit)</li> <li>• Arcadia School: District Offices (Lincoln County School District)</li> <li>• Toledo Elementary School (Lincoln County School District)</li> <li>• Toledo Jr/Sr High School (Outside City) (Lincoln County School District) (Gym retrofitted per 2014 SRGP Grant)</li> <li>• Port of Toledo (Port)</li> </ul>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	

<p>Inventory community buildings and infrastructure: determine which structures may be particularly vulnerable to earthquake damage. Seek funding to retrofit and/or re-build structures.</p> <p>Create a local rehabilitation and retrofit program for existing buildings.</p> <p>Rehabilitate identified vulnerable schools, emergency facilities, infrastructure, and public buildings/lifelines.</p>		<p><u>2020 Update:</u></p> <p>The city is in the process of moving the police station to a seismically resilient structure.</p> <p><u>2015 Update:</u></p> <p>The city is in process of assessing municipal structures and commercial occupancies for collapse potential.</p> <p>In 2014 the school district was awarded a SRGP Grant to retrofit the Jr/ Sr High School. The retrofit was completed.</p>	
<b>Champion/ Responsible Organization:</b>		Public Works	
<b>Internal Partners:</b>		<b>External Partners:</b>	
Finance, City Manager, Community Development, Property Management		Oregon Emergency Management, DOGAMI, IFA, SHPO, School District	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Seismic Rehabilitation Grants (IFA), Local Funding Resources		High	<input type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input checked="" type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	Toledo Steering Committee, revised 2020		
<b>Action Item Status:</b>	Ongoing		

<b>Mitigation Action: Toledo #4</b> (What do we want to do?)	<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Implement specific hazard objectives identified in the city's Comprehensive Plan.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>Article 7 of Toledo's Comprehensive Plan lists the following primary goal:</p> <p>Prevent loss of life and property damage by requiring appropriate safeguards for all development of properties within known natural hazard areas. Natural hazards include: floods, tsunamis, earthquakes, landslide and slope hazards, weak foundation soils, high groundwater, wind/windthrow/winter storms, and wildfires.</p> <p><u>Overall objectives are as follows:</u></p> <ol style="list-style-type: none"> <li>1. Identify potential natural hazard areas where development may occur when appropriate safeguards can minimize the impact of hazards upon development and impacts of new development upon adjoining properties.</li> <li>2. Identify and preserve known natural hazard areas best retained for open space, yards, natural resource areas, wildlife habitats, recreation, or other non-structural uses.</li> <li>3. Maintain an inventory of areas subject to natural disasters and hazards. The inventory shall be used to determine the suitability of a location for development and, if necessary, be used to limit the development to a level consistent with the degree of hazard, the disaster potential and the environmental protection policies in the Comprehensive Plan.             <ol style="list-style-type: none"> <li>a. The city shall utilize the Soil Survey of Lincoln County Area, Oregon July, 1997 (and later editions), the Environmental Geology of Lincoln County Oregon - Bulletin 81 (Department of Geology and Mineral Industries, 1973), the Environmental Hazard Inventory Coastal Lincoln County (RNKR Associates, 1977), the All Hazard Mitigation Plan: Lane, Lincoln, and Linn Counties, Oregon (G &amp; E Engineering Systems, Inc.1998) and other appropriate materials as guides for developing policies and regulations to minimize damages from developing in hazardous areas.</li> </ol> </li> <li>4. Develop comprehensive and effective safeguards for developments within known natural hazard areas by requiring the use of special design and construction features to reduce potential risks/damages in accordance with state building codes, other state codes, federal regulations, and local codes.             <p>Specific hazard objectives are listed for floods, tsunamis, earthquakes, landslide and slope hazards, weak foundation soils, high groundwater, wind/windthrow/winter storms, and wildfires.</p> <p>The Disaster Mitigation Act of 2000 requires that plans include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate. [§201.6(c)(4)(ii)]</p> </li> </ol>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	

Continue to implement & develop actions based on the objectives listed within the Comprehensive Plan.		<u>2020 Update:</u> The city updated the floodplain ordinance in compliance with the Federal Emergency Management Act. In addition, the city now has standard operating procedures and a new floodplain permit.  The city plans to apply for a technical assistance grant through DLCD to update the natural hazards chapter of the comprehensive plan.	
<b>Champion/ Responsible Organization:</b>	Community Planning and Development		
<b>Internal Partners:</b>		<b>External Partners:</b>	
		Lincoln County, DLCD	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources, DLCD technical assistance grant		Medium to High	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	Toledo Steering Committee, revised 2020		
<b>Action Item Status:</b>	Ongoing		

<b>Mitigation Action: Toledo #5</b> <b>(What do we want to do?)</b>	<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Continue compliance with the National Flood Insurance Program.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input checked="" type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance, provided that communities develop and enforce adequate floodplain management measures. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.</p> <p>The City estimates a high probability that flooding will occur in the future; see Table TA-7 for detail on current NFIP participation and the flood section of the city addendum and Volume II, Hazard Annex, for detail on city risk and vulnerability to the flood hazard.</p> <p>Everyone in a participating community of the National Flood Insurance Program (NFIP) can buy flood insurance. Increasing flood insurance coverage will allow the county to reduce vulnerability, and facilitate recovery.</p> <p>The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will diminish flood damage to new and existing buildings in communities while providing homeowners, renters, and business owners additional flood insurance protection.</p>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	
<p>Actively participate with DLCD and FEMA during Community Assistance Visits. The Community Assisted Visit (CAV) is a scheduled visit to a community participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.</p> <p>Assess Toledo floodplain ordinances to ensure they reflect current flood hazards.</p> <p>Explore the possibility of updating the city's FEMA</p>	<p><u>2020 Update:</u></p> <p>The city complies with the NFIP.</p> <p>The city updated the floodplain ordinance in 2019 to maintain compliance with the NFIP.</p> <p>The city requires floodplain permits and keeps copies of flood elevation certificates.</p>	

<b>Flood Insurance Rate Map.</b> Explore participation in the National Flood Insurance Program's Community Rating System (CRS). Educate residents in Toledo about flood issues and actions they can implement to mitigate the flood risk.		
<b>Champion/ Responsible Organization:</b>	Planning	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Public Works	FEMA, DLCD	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources	Low	<input checked="" type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	Toledo Steering Committee, revised 2020	
<b>Action Item Status:</b>	Ongoing	

Mitigation Action: Toledo #6 (What do we want to do?)	Alignment with Plan Goals:	High Priority Action Item?
Obtain lidar collection data from DOGAMI	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input checked="" type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
Lincoln County Risk Report (2015), <i>in process</i>		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>LIDAR (light detection and ranging) is a mapping tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. It can be used to study landforms and identify areas, especially landslide areas that may be susceptible to future occurrences. The Oregon Department of Geology and Mineral Industries (DOGAMI) has been working with communities to develop large-scale LIDAR maps of entire regions. DOGAMI has formed the Oregon LIDAR Consortium (OLC) to gather data in other Oregon regions, including Lincoln County. Entering into an agreement with the OLC, or obtaining lidar collection data from DOGAMI will assist in mapping areas of Western Lane County and landforms around Toledo.</p> <p>With lidar, you can quickly, cheaply, and accurately: find landslides, old cuts and grades; measure and estimate fills and cuts; find stream channels and measure gradients; measure the size and height of buildings, bridges; locate and measure every tree in the forest; characterize land cover; model floods, fire behavior; locate power lines and power poles; find archeological sites; map wetlands and impervious surfaces; define watersheds and viewsheds; model insolation and shaking; map road center and sidelines; find law enforcement targets; map landforms and soils; assess property remotely; inventory carbon; monitor quarries, find abandoned mines; enhance any project that requires a detailed and accurate 2-D or 3-D map.</p> <p>The City of Toledo has relatively steep topography, and landslides have frequently accompanied heavy rainstorms. Additionally, severe landslides are expected to occur in the event of a high-magnitude earthquake. Despite the city's topographical characteristics and vulnerabilities to landslides, Toledo does not have accurate information regarding the location and extent of potential landslides. With improved data via participation in the OLC, (or purchase of the OLC's data), Toledo would have a much greater understanding of its landslide risks.</p> <p>The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Obtaining lidar collection data from DOGAMI will help in understanding areas and landforms susceptible to landslide events to protect new and existing buildings, and infrastructure.</p>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	
DOGAMI's LIDAR website provides information about the OLC and LIDAR and is a starting point for entering into an agreement with DOGAMI. <a href="http://www.oregongeology.com/sub/projects/olc">http://www.oregongeology.com/sub/projects/olc</a>	<p><u>2020 Update:</u></p> <p>The city is working on updating its GIS webmap and may include landslide data in the future.</p> <p>DOGAMI published <a href="#">Open-File Report, O-16-02</a>,</p>	

/default.htm		<p>Landslide Susceptibility Overview Map of Oregon which maps existing landslide data for Lincoln Co and Toledo.</p> <p><u>2015 Update:</u></p> <p>DOGAMI, FEMA, and DLCD and currently updating hazard data in Lincoln County and utilizing Lidar data to enhance risk information for coastal erosion, earthquake, flood, landslide, and tsunami hazards (among others). The report and data will be available for the city to utilize when completed in 2015.</p>	
<b>Champion/ Responsible Organization:</b>	Planning		
<b>Internal Partners:</b>		<b>External Partners:</b>	
Public Works, City Council		DOGAMI, DLCD, FEMA	
<b>Potential Funding Sources:</b>		<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources, FEMA, DLCD		Low	<input type="checkbox"/> Ongoing <input checked="" type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	Toledo Steering Committee, revised 2020		
<b>Action Item Status:</b>	Ongoing		

<b>Mitigation Action: Toledo #7</b> (What do we want to do?)		<b>Alignment with Plan Goals:</b>		<b>High Priority Action Item?</b>						
Identify and address community's vulnerability to a natural gas explosion following a seismic event.		<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> Yes
		<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11						
<b>Alignment with Existing Plans/Policies:</b>										
<b>Rationale for Proposal (Why is this important?):</b>										
Risk of a gas explosion, as a result of a seismic event, could occur. This will affect emergency services and response to an area. Areas within the community which are served with natural gas should be identified.										
<b>Ideas for Implementation (How will it get done?):</b>					<b>Action Status Report</b>					
Coordinate with NW Natural to identify service areas within the city to assist with emergency management planning.					<u>2020 Update:</u> Ongoing					
<b>Champion/ Responsible Organization:</b>			Public Works							
<b>Internal Partners:</b>					<b>External Partners:</b>					
Planning					NW Natural					
<b>Potential Funding Sources:</b>					<b>Estimated cost:</b>			<b>Timeline:</b>		
Local Funding Resources					Low			<input type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input checked="" type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)		
<b>Form Submitted by:</b>		2015 Toledo Steering Committee, revised 2020								
<b>Action Item Status:</b>		Ongoing								

Mitigation Action: Toledo #8 (What do we want to do?)	Alignment with Plan Goals:				High Priority Action Item?
Evaluate and implement mitigation projects for areas of the city that are at risk of landslide.	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> Yes
	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input checked="" type="checkbox"/> 8	
	<input type="checkbox"/> 9	<input checked="" type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Alignment with Existing Plans/Policies:</b>					
Lincoln County Risk Report (2015), draft					
<b>Rationale for Proposal (Why is this important?):</b>					
The city's probability and vulnerability to landslide is high.					
<b>Ideas for Implementation (How will it get done?):</b>			<b>Action Status Report</b>		
<p>Use lidar data to map existing landslides. Model future landslide susceptibility. Perform landslide risk analysis. Use the new information to prioritize risk reduction actions. Perform risk reduction.</p> <p>Create modern landslide inventory and susceptibility maps and use in planning and regulations for future development.</p> <p>Control storm water in landslide-prone areas.</p> <p>Monitor ground movement in high susceptibility areas.</p> <p>Implement grading codes, especially in high susceptibility areas.</p>			<p><u>2020 Update:</u></p> <p>DOGAMI published <a href="#">Open-File Report, O-16-02, Landslide Susceptibility Overview Map of Oregon</a> which maps existing landslide data for Lincoln Co and Toledo.</p>		
<b>Champion/ Responsible Organization:</b>		Public Works			
<b>Internal Partners:</b>			<b>External Partners:</b>		
Planning, County Emergency Management			DOGAMI, DLCD		
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>
Local Funding Resources			Medium to High		<input type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input checked="" type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>		2015 Toledo Steering Committee, revised 2020			

<b>Action Item Status:</b>	Ongoing
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<b>Mitigation Action: Toledo #9</b> <b>(What do we want to do?)</b>	<b>Alignment with Plan Goals:</b>	<b>High Priority Action Item?</b>
Work with the owners of repetitive flood loss buildings in the city (particularly along Yaquina Bay road, Business Hwy 20, and in the A Street area) to identify cost effective mitigation strategies including consideration of relocation, elevation, or buy-out.	<input checked="" type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
Toledo Flood Ordinance, Comprehensive Plan, FEMA Flood Insurance Study, Flood Insurance Rate Maps, Lincoln County Risk Report		
<b>Rationale for Proposal (Why is this important?):</b>		
<p>The City estimates a high probability that flooding will occur in the future; see Table TA-7 for detail on current NFIP participation and the flood section of the city addendum and Volume II, Hazard Annex, for detail on city risk and vulnerability to the flood hazard.</p> <p>Concentrations of pre-FIRM structures in areas subject to flooding are present in several areas along the County's major rivers. Experience with the floods of the late 1990s showed that properly elevated structures in the flood plain performed well during major flood events, most suffering minimal if any, damage. Especially in areas that may be subject to damage during relatively high frequency flood events, elevating structures in conformance with the County's flood hazard area codes (lowest floor at least one foot above the base flood level) is a cost-effective way to reduce risk.</p> <p>The area around A street is of concern and includes approximately 60 houses, the police station, the city library, and the local Head Start program within the special flood hazard area.</p> <p>The NFIP identifies no Repetitive Loss or Severe Repetitive Loss Properties in Toledo.</p>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	
<p>Assess individual properties for possible mitigation measures (elevation, acquisition, relocation) to reduce or prevent future flood losses.</p> <p>Relocate or elevate vulnerable structures above the estimated base flood elevation. In some cases, communities can use FEMA's property acquisition or "buyout" program to remove structures that have repeatedly flooded in the past.  <a href="https://www.fema.gov/media-library-data/20130726-1507-20490-4551/fema_317.pdf">https://www.fema.gov/media-library-data/20130726-1507-20490-4551/fema_317.pdf</a>.</p> <p>Implement mitigation measures (elevation, acquisition, relocation) for properties within the floodplain.</p> <p>Evaluate and implement flood mitigation projects</p>	<p><u>2020 Update:</u></p> <p>No structures were mitigated. No properties are identified as repetitive loss.</p>	

for flood prone properties along A street. Evaluate and implement flood mitigation projects for the Yaquina Bay Road area		
<b>Champion/ Responsible Organization:</b>	Planning/ Floodplain Manager	
<b>Internal Partners:</b>	<b>External Partners:</b>	
Public works, building	DLCD, OEM, DOGAMI, FEMA	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
Local Funding Resources, FEMA PDM, HMGP, FMA	High	<input type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input checked="" type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>	2015 Toledo Steering Committee, revised 2020	
<b>Action Item Status:</b>	Ongoing	

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Mitigation Action: Toledo #10 (What do we want to do?)	Alignment with Plan Goals:				High Priority Action Item?
Relocate Police Station out of tsunami inundation zone and establish a police communications system safe from disasters.	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> Yes
	<input checked="" type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	
	<input type="checkbox"/> 9	<input type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Alignment with Existing Plans/Policies:</b>					
<b>Rationale for Proposal (Why is this important?):</b>					
<p>The Toledo Police Department (250 W Hwy 20) is located within the floodplain and a tsunami inundation area. DOGAMI finalized the remapping of the distant and local tsunami zones providing public, private and citizens with a clearly defined map of hazard areas. However, there was little to be done for the relocation of public safety buildings out of the inundation areas.</p> <p>A significant tsunami event has the potential to cause disruption of power, contamination of water supplies, loss of essential communication systems, a large amount of debris, and traffic congestion. A tsunami has the potential to damage critical buildings and infrastructure in the tsunami inundation zone. Mitigating the effects that a tsunami has on city assets is a high priority.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Assessing and evaluating needed mitigation for critical assets in the tsunami inundation zone, can assist the City in determining what further actions are needed to help mitigate the city's risk to tsunami.</p>					
<b>Ideas for Implementation (How will it get done?):</b>			<b>Action Status Report</b>		
Investigate relocation alternatives for critical facilities in the tsunami inundation zone.			<u>2020 Update:</u> The city is working on this action and it has strong support from the City Council. However, funding is not available. If not accomplished before funding may be more available when the General Obligation bonds for the Fire Station are paid off. Bonds could be issued for the Police Station at that time.		
<b>Champion/ Responsible Organization:</b>	Police				
<b>Internal Partners:</b>			<b>External Partners:</b>		
Planning, Building			DLCD, OEM, FEMA, DOGAMI, Business Oregon		
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>	<b>Timeline:</b>	
Local Funding Resources			High	<input type="checkbox"/> Ongoing <input checked="" type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)	

<b>Form Submitted by:</b>	2014 Risk MAP Resilience Workshop, revised 2020
<b>Action Item Status:</b>	Ongoing

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<b>Mitigation Action: Toledo # 11</b> (What do we want to do?)		<b>Alignment with Plan Goals:</b>			<b>High Priority Action Item?</b>	
Relocate Public Works out of the floodplain and the tsunami inundation zone.		<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> Yes
		<input checked="" type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	
		<input type="checkbox"/> 9	<input type="checkbox"/> 10	<input type="checkbox"/> 11		
<b>Alignment with Existing Plans/Policies:</b>						
<b>Rationale for Proposal (Why is this important?):</b>						
<p>Toledo Public Works is located within the floodplain and a tsunami inundation area. DOGAMI finalized the remapping of the distant and local tsunami zones providing public, private and citizens with a clearly defined map of hazard areas. However, there was little to be done for the relocation of critical facilities out of the inundation areas.</p> <p>A significant tsunami event has the potential to cause disruption of power, contamination of water supplies, loss of essential communication systems, a large amount of debris, and traffic congestion. A tsunami has the potential to damage critical buildings and infrastructure in the tsunami inundation zone. Mitigating the effects that a tsunami has on city assets is a high priority.</p> <p>The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Assessing and evaluating needed mitigation for critical assets in the tsunami inundation zone, can assist the City in determining what further actions are needed to help mitigate the city's risk to tsunami.</p>						
<b>Ideas for Implementation (How will it get done?):</b>			<b>Action Status Report</b>			
Identify property outside the floodplain and tsunami inundation zone			New in 2020			
<b>Champion/ Responsible Organization:</b>		Public Works				
<b>Internal Partners:</b>			<b>External Partners:</b>			
Community Development and Finance						
<b>Potential Funding Sources:</b>			<b>Estimated cost:</b>		<b>Timeline:</b>	
Local Funding Resources			High		<input type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input checked="" type="checkbox"/> Long-Term (10+ years)	
<b>Form Submitted by:</b>		2020 NHMP Steering Committee				
<b>Action Item Status:</b>		New in 2020				

## ATTACHMENT B: PUBLIC INVOLVEMENT SUMMARY

Members of the steering committee provided edits and updates to the NHMP prior to the public review period as reflected in the final document.

To provide the public information regarding the draft NHMP addendum, and provide an opportunity for comment, an announcement (see text below) was announced on the city's website and an email contact was provided for public comment.

During the public review period there were **no** comments provided.

**To be updated after review.**

## ATTACHMENT C: ACTION ITEM FORM TEMPLATE

Mitigation Action: Toledo # (What do we want to do?)	Alignment with Plan Goals:	High Priority Action Item?
	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11	<input type="checkbox"/> Yes
<b>Alignment with Existing Plans/Policies:</b>		
<b>Rationale for Proposal (Why is this important?):</b>		
<b>Ideas for Implementation (How will it get done?):</b>	<b>Action Status Report</b>	
<b>Champion/ Responsible Organization:</b>		
<b>Internal Partners:</b>	<b>External Partners:</b>	
<b>Potential Funding Sources:</b>	<b>Estimated cost:</b>	<b>Timeline:</b>
		<input type="checkbox"/> Ongoing <input type="checkbox"/> Short Term (1-4 years) <input type="checkbox"/> Medium Term (4-10 years) <input type="checkbox"/> Long-Term (10+ years)
<b>Form Submitted by:</b>		
<b>Action Item Status:</b>		