1.0 INTRODUCTION

The effects from several natural and man-made hazards may directly impact the safety and wellbeing of residents of the Confederated Salish and Kootenai Tribes (CSKT) on the Flathead Reservation. Historically, CSKT residents have dealt with floods, wildfire, harsh winter storms with extreme cold and blizzards, severe summer storms with damaging thunderstorms and hazardous material incidents. While most hazards cannot be eliminated, the effects from them can be mitigated.

CSKT completed and adopted a Pre-Disaster Mitigation (PDM) Plan in 2005 to help guide and focus hazard mitigation activities. CSKT, working together with Risks & Rewards Management Group, LLC. Has prepared an update to their PDM Plan to satisfy the federal requirement that PDM Plans be updated every five years. The updated CSKT PDM Plan profiles significant hazards to the community and identifies mitigation projects that can reduce those impacts. The purpose of the updated PDM Plan is to promote sound public policy designed to protect residents, critical facilities, infrastructure, private property and the environment from natural and man-made hazards. The updated CSKT PDM Plan includes resources and information to assist residents, organizations, local government and others interested in participating in planning for natural and man-made hazards. This 2016 updated PDM Plan supersedes the 2005 PDM Plan.

1.1 AUTHORITY

The Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) provides an opportunity for States, local governments and sovereign nations to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). This new section emphasizes the need for State and local entities to closely coordinate mitigation planning and implementation efforts. To implement the DMA 2000 planning requirements, the Federal Emergency Management Agency (FEMA) published an Interim Final Rule in the Federal Register on February 26, 2002. This rule (44 CFR Part 201) established the mitigation planning requirements for States and local communities.

The CSKT PDM Plan update has been developed pursuant to the requirements in the Interim Final Rule for hazard mitigation planning and the guidance in the State and Local Plan Interim Criteria under DMA 2000. The Plan also meets guidance developed by FEMA in June of 2008 for Multi- Jurisdictional Mitigation Planning.

The CSKT Tribal Council has adopted this PDM Plan, which includes the **council districts of Dixon, Ronan, St. Ignatius, Arlee, Polson, Hot Springs and Elmo.** This governing body has the authority to promote sound public policy regarding natural and man-made hazards in their jurisdiction. Copies of the signed resolutions are included as **Appendix A** to this plan. The PDM Plan was adopted at the

regularly scheduled CSKT Council meetings, which were open to the public and advertised through the typical process the jurisdictions use for publicizing meetings.

CSKT Disaster Emergency Services will be responsible for submitting the adopted PDM Plan to FEMA for review. Upon accepted by FEMA, CSKT will remain eligible for mitigation project grants and post-disaster hazard mitigation grant projects.

1.2 ACKNOWLDGEMENTS

Many groups and individuals have contributed to development of the CSKT PDM Plan. The CSKT Disaster Emergency Services provided support for all aspects of plan development. The PDM Planning Team met on a regular basis to guide the project, identify the hazards most threatening to CSKT, develop and prioritize mitigation projects, review draft deliverables and attend the public meetings. The local communities participated in the planning process by attending public meetings and contributed to plan development by reviewing and commenting on the draft plan.

1.3 SCOPE AND PLAN ORGANIZATION

The process followed to prepare the CSKT PDM Plan update included the following:

- Review and prioritize disaster events that are most probable and destructive,
- Update and identify new critical facilities,
- Review and update areas within the community that are most vulnerable,
- Update and identify new goals for reducing the effects of a disaster event,
- Review and identify new projects to be implemented for each goal,
- Review and identify new procedures for monitoring progress and updating the PDM Plan,
- Review the draft PDM Plan and
- Adopt the updated PDM Plan.

The PDM Plan is organized into sections that describe the planning process (Section 2), community profile (Section 3), risk assessment (Section 4), mitigation strategies (Section 5), a capability assessment (Section 6), and plan maintenance (Section 7). Appendices containing supporting information are included at the end of the plan.

1.4 PLANNING ASSUMPTIONS

When preparing this update Risk and Rewards Management, LLC and the other contributors gathered information from a variety of sources. Many of these sources were government sponsored—like United States Census Data, Montana State Property Value Data and Montana State Cost Analysis Data,

among others. Where available the planning team used data gathered directly by CSKT. In many places throughout this plan data gathered by State and local governments is accepted, within a reasonable margin of error, for similar areas or populations on CSKT. For example, data collected for the incorporated communities of Polson, Ronan and St. Ignatius has been used to plan for Tribal Council Districts corresponding to roughly the same area and population. Data will be updated in the plan as more specific information becomes available.

Throughout the plan, references to CSKT include all Tribal Council Districts, their respective populations and all land within Flathead Reservation boundaries unless otherwise specified.

2.0 PLANNING PROCESS

The updated CSKT PDM Plan is the result of a collaborative effort between CSKT, Sanders County, Missoula County, Flathead County, Lake County, the incorporated communities of Polson, Ronan, and St. Ignatius, utilities, local agencies, non-profit organizations, businesses, and regional, state and federal agencies. The planning effort was facilitated by the contractor, Risks & Rewards Management Group, LLC. Public participation played a key role in development of goals and mitigation projects, as outlined below. For the purposes of this planning effort, the public is defined as residents of the Flathead Reservation, local departments, state and federal agencies that support activities on the Reservation, neighboring communities and local partners.

2.1 MITIGATION PLANNING TEAM

The CSKT Disaster Emergency Services Coordinator requested a committee of local leaders and interested members of the public to assist with development of the PDM Plan. These individuals are listed in **Appendix B**. Participants involved with the PDM Planning Team are presented in **Table 2.1-1.**

TABLE 2.1-1
AGENCIES REPRESENTED ON THE PDM PLANNING TEAM

Organization	Type of Organization
Confederated Salish & Kootenai Tribes Disaster & Emergency Services	Tribal Government
Sanders County Office of Emergency Management	County Government
Lake County Office of Emergency Management	County Government
CSKT Natural Resources Department Environment Protection	Tribal Government
CSKT Forestry Department	Tribal Government
Montana Disaster & Emergency Services, District 1 Rep.	State Government

Responsibilities of the Planning Team included attending meetings to discuss plan development, providing data for analysis in the risk assessment, attending public meetings, providing input and feedback on mitigation strategies, review of the draft plan document, and supporting the plan throughout the adoption process. The PDM Planning Team will assist the CSKT Disaster Emergency Services Coordinator in updating the plan in the future.

Draft materials were available to the Planning Team while the plan was being drafted. In advance of each public meeting, an agenda and/or materials to be discussed (i.e. example mitigation strategies, examples of project eligible for FEMA funding, etc.) were provided to meeting participants.

During the kick-off meeting and subsequent actions, the Planning Team reviewed and analyzed each section of the draft PDM plan, as described in **Table 2.1-2.**

TABLE 2.1-2 REVIEW AND ANALYSIS OF 2005 PDM PLAN	
2005 PDM Sections	**How Reviewed and Analyzed**
Section 1 - Introduction	Reviewed existing section through discussion at kick-off meeting. No analysis needed.
Section 2 - Planning Process	Reviewed and analyzed existing section through discussion at kick-off meeting. Planning process expanded by utilizing project website and scoring hazards using Calculated Priority Risk Index.
Section 3 – Hazard Evaluation and Risk Assessment	Reviewed and analyzed existing section through discussion during kick-off meeting and Planning Team conference calls. Reviewed and updated hazards, critical facilities and vulnerable populations. Updated section with recent hazard data.
Section 4 - Mitigation Strategy	Reviewed by Planning Team during the course of kick-off meeting and subsequent conference calls. New projects developed, existing projects re-worded and/or deleted, completed projects documented.
Section 5 - Plan Maintenance Procedures	Reviewed and analyzed existing section through discussion during kick-off meeting and Planning Team conference calls. Determined that plan maintenance procedures outlined in previous plan had not been implemented.

2.2 PROJECT STAKEHOLDERS

The planning process was initiated by preparing a stakeholders list of individuals whose input was needed to help prepare the PDM Plan. Planning partners on the stakeholders list received a variety of information during the project including meeting notices, documents for review and the draft mitigation strategy. **Appendix B** presents the stakeholders list for this project.

On the Tribal level, project stakeholders include each Tribal Councilperson and their Districts, along with the Culture Committees of the Salish and Kootenai Tribes. The existing Local Emergency Planning Committee (LEPC) and Tribal Emergency Response Committee (TERC) was a primary vehicle to reach key stakeholders.

On the County level, project stakeholders included representatives from: OEM, Planning Department, Planning Board, Public Health Department, Road Dept., Sheriff's office, Environmental Health, the Floodplain Administrator, and Geographic Information System (GIS) Coordinator. These entities participated in the planning process by either providing data, attending public meetings, and/or reviewing the draft PDM Plan.

Stakeholders from the districts of Polson and Ronan, and St. Ignatius included: Elected officials, City/Town Council member, Clerks, Volunteer Fire Departments, Police Departments, Building Departments, Water and Sewer Departments, and Street (Public Works) Departments. These entities participated in the planning process by either providing data, attending public meetings, and/or reviewing the draft PDM Plan.

Stakeholders from federal agencies included representatives from: the National Weather Service (NWS), and the Bureau of Indian Affairs (BIA) Safety of Dams and Fire Management. These entities participated in the planning process by either providing data, and/or reviewing the draft PDM Plan.

Stakeholders from state agencies included representatives from: the Montana Department of

Transportation, Montana Department of Natural Resources and Conservation (DNRC) and the Montana Disaster and Emergency Services (DES) District 1 Representative. These entities participated in the planning process by attending the public meetings and/or reviewing the draft PDM Plan.

Utilities invited to participate in the planning process included: Century Link, Mission Valley Power, and PPL Montana. These entities participated in the planning process by either providing data, attending the public meetings, and/or reviewing the draft PDM Plan.

Non-governmental stakeholders including non-profits and businesses consisted of representatives from the American Red Cross and local media. These entities attended the public meetings.

Planning partners from adjoining towns and counties included: the Flathead County Office of Emergency Services, Sanders County OEM, and the Confederated Salish and Kootenai Tribes Disaster and Emergency Services (DES). On the County level, these entities did not offer input on the PDM Plan update. CSKT provided data for analysis and attended the public meetings.

2.3 REVIEW OF EXISTING PLANS AND STUDIES

At the initiation of the PDM updating project, planning documents and studies completed for the project area were provided to the contractor to review in order to determine how mitigation could be integrated into this planning process and future local planning mechanisms and programs. Contributing plans/ordinances provided to the contractor included:

DAMS

- Emergency Action Plan, Black Lake Dam
- Emergency Action Plan, Jocko Dam
- Emergency Action Plan, Kerr Dam
- Emergency Action Plan, Kicking Horse Dam
- Emergency Action Plan, Lower Crow Dam
- Emergency Action Plan, McDonald Dam
- Emergency Action Plan, Mission Dam
- Emergency Action Plan, Ninepipe Dam
- Emergency Action Plan, Pablo Dam
- Emergency Action Plan, Tabor Dam
- Emergency Action Plan, Upper Dry Fork Dam (Sanders County)
- Emergency Action Plan, Lower Dry Fork Dam (Sanders County)
- Emergency Action Plan, Hungry Horse Dam (Flathead County)

EMERGENCY OPERATIONS

- CSKT Emergency Operations Plan, Hazard Specific Annexes

FLOODPLAIN STUDIES

- Flood Insurance Study, Lake County, 1987

GROWTH POLICIES, ORDINANCES & REGULATIONS

- CSKT Growth Policy, 2003
- CSKT Floodplain Regulations, 1991
- CSKT Subdivision Regulations, 2010
- Lakeshore Protection Regulations
- City of Polson Growth Policy, 2006
- City of Polson Subdivision Regulations, 2005
- City of Polson Development Code, 2010
- City of Polson Zoning Ordinance
- City of Ronan Growth Policy, 2008
- City of Ronan, Zoning Ordinance, 2008
- Town of St. Ignatius Growth Policy, 2001

HAZARD MITIGATION

- CSKT Pre-Disaster Mitigation Plan, 2005
- CSKT Community Wildfire Protection Plan, 2005

The data obtained from the plan and regulation review was incorporated into various sections of the PDM Plan. *Section 4.0* contains reference to the plans and ordinances affecting management of the hazard. *Section 7.3* includes a discussion on how mitigation can be implemented through existing programs.

2.5 PROJECT MEETINGS

The planning process begun in April of 2015 and lasted approximately 18 months to complete. The project had roughly 21 different public meetings from TERC/LEPC discussions to Tribal council presentations and then public outreach meetings in every council district on the reservation.

2.6 PLAN REVIEW

The public was provided at numerous opportunities for comment prior to adoption of the plan. The first opportunity was during the drafting process in all the district meetings. The draft PDM Plan was made available via the CSKT DES website. A hard copy of the PDM Plan was available for review at the CSKT DES office. An e-mail announcement was sent to the project stakeholders list announcing the availability of the draft PDM Plan for review with instructions on how to comment.

Reviewers were asked to submit their comments on the draft plan to the CSKT DES office or via email after a 30-day review period. The CSKT DES Director reviewed the comments and in consultation with the Planning Team submitted a consolidated list of comments. Comments

were incorporated into a final draft document and the PDM Plan was submitted to the State Hazard Mitigation Officer (SHMO) and FEMA for compliance with the Region 8 Crosswalk.

Comments received from the SHMO and the FEMA were addressed and the final plan was produced and posted to the project website. At this point a second opportunity was provided to the public to comment on the PDM Plan. The final plan was posted on the website and stakeholders were notified of its availability via an e-mail message and press release. Final comments were addressed in a second plan revision and the final plan was posted on the website and provided to the CSKT Council members. After adoption, final copies of the plan were submitted to the SHMO and FEMA.

Future comments on the PDM Plan should be addressed to:

CSKT Disaster Emergency Services
Addy

3.0 COMMUNITY PROFILE

3.1 PHYSICAL SETTING

Located in northwestern Montana, CSKT has a land area of 1,938 square miles and has land on four Montana counties: Lake, Sanders, Missoula and Flathead. The Flathead Reservation is home to the Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Nation. Pablo is the location of the main Tribal government buildings and Tribal Council Districts include: Arlee, St. Ignatius, Dixon, Ronan, Hot Springs, Polson and Elmo. Flathead Lake, the largest fresh water lake west of the Mississippi, is located within the boundaries of the Reservation. Kerr Dam is located on the southwestern tip of Flathead Lake on the Flathead River. The Flathead River flows into the Clark Fork River downstream from the dam. **Figure 1** presents a location map of the Flathead Reservation and relevant surrounding counties.

The eastern part of the Flathead Reservation is characterized by the steeply sloping west face of the Mission Mountains. The western reaches of the Reservation contain the Salish Range, which is lower in elevation, and also has steep slopes. The central portion of the Flathead Reservation is characterized by broad glaciated valleys with alluvial fans, stream terraces, rough badlands along the Flathead River and the west face of the Mission Mountains. Elevations on the Reservation range from approximately 2,900 feet to 9,800 feet above sea level. The city of Polson is located on the valley floor at about 2,900 feet above sea level. McDonald Peak, located approximately 10 miles straight-line distance northeast of St. Ignatius, is the tallest peak on the Reservation at approximately 9, 800 feet.

The Flathead Reservation is situated at the southern end of the Flathead Basin, a watershed that drains approximately six million acres of northwestern Montana and southeastern British Columbia. Waters from this basin flow into the Clark Fork River and eventually into the Columbia River. The most prominent surface water features on the Reservation are the southern two-thirds of Flathead Lake, the Flathead River, Mission Creek, Post Creek, the Jocko River and Lake Mary Ronan. Other sizeable lakes include McDonald, Loon, and St. Mary's Lakes. The Flathead Reservation also contains several large reservoirs, including Pablo, Kicking Horse, Lower Crow, Mission, Ninepipe and numerous small reservoirs which are important for wildlife and agriculture.

There are a number of large landowners within the reservation boundaries. The Tribes are the largest single landowner (30.4 percent), followed by the Federal Government (17.8 percent), the State of Montana (6.2 percent), and Plum Creek Timber (6 percent). The Forest Service owns large blocks of timberland along the west front of the Swan Range and the eastern side of the Missions off of the Reservation. Lakes and streams cover slightly more than 100,000 acres of CSKT, or roughly 9.4 percent of the total area. According to the 2010 census, CSKT has 19.3 persons per square mile compared to 6.8 for the State of Montana. **Figure 2** presents ownership and population density on the Flathead Reservation.

CLIMATE

Western Montana, like the remainder of the northwest U.S., is heavily influenced by the predominant mid-latitude westerly flow aloft. Storm systems embedded in this flow are most frequent and potent in the winter and spring months, and with convection increasing during the warm spring. May and June are typically the wettest months.

The complex terrain also plays a big role in amount and distribution of precipitation. Uplift over the terrain causes increased amounts in the mountains, while down slope drying can greatly reduce amounts in the valleys depending on the flow direction. Therefore, the mountains in western Montana generally receive in excess of 50 inches of water equivalent precipitation annually, while the major valleys get less than 20 inches a year. The Mission Mountains within the Reservation are particularly good orographic precipitation producers with annual amounts exceeding 80 inches.

Temperatures are relatively mild in western Montana compared to locations east of the Continental Divide. Arctic intrusions do occur from the north and east generally a few times every winter, but the cold air rarely lasts long due to the usually active flow from the west. During these arctic events, however, temperatures can drop well below zero. Summers can be hot in the valleys. While average highs are in the 80s in July and August, individual days often rise into the 90s and even low 100s. Flathead Lake does tend to moderate temperatures somewhat (a little warmer at night and cooler during the day), but the influence generally extends only a few miles from shore. **Table 3.2-1** presents a summary of top weather events in Polson.

TABLE 3.2-1
TOP WEATHER EVENTS, POLSON, LAKE COUNTY

Hottest Days		Coldest Days		Wettest Days	
104° F	7/19/1960	-30° F	1/31/1950	2.00 inches	5/30/1985
104° F	7/28/1934	-27° F	2/17/1936	2.50 inches	6/8/1964
104° F	7/16/1919	-27° F	2/16/1936	2.43 inches	6/20/1916
102° F	7/6/2007	-26° F	1/27/1957	2.30 inches	7/3/2000
		-26° F	1/26/1957		
Wettest Years		**Driest Years**		**Longest Dry Spells**	
21.61 inches	2010	10.17 inches	1931	50 days	1910
21.39 inches	1947	10.38 inches	1952	46 days	1926
20.94 inches	1916	10.55 inches	1939	44 days	1955
20.68 inches	1951	10.77 inches	1928	43 days	1922
20.31 inches	1915	11.01 inches	1960	42 days	1914

Source: National Weather Service, 2012

3.2 CRITICAL FACILITITES AND INFRASTRUCTURE

Critical facilities are of particular concern because they provide essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response and/or disaster recovery functions. Critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals and shelters and facilities that, if damaged, could cause serious secondary impacts (i.e., hazardous material facilities, communications facilities). Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include: buildings such as the jail, law enforcement center, public services buildings, senior centers, community corrections center, the courthouse and juvenile services building as well as other public facilities such as hospitals, nursing homes and schools.

Critical facilities in CSKT are identified in **Appendix C.** Replacement values were collected where readily available; however, time and resource constraints prohibited the collection of values for all structures. A GIS layer of the critical facilities was used in the hazard risk assessment. This GIS layer should be updated on a regular basis for use in future analysis. It should be noted that many of the municipal water sources are missing from the critical facility layer with the exception of the City of Ronan and Tribal facilities. This data should be collected for future updates of this plan. Further details on CSKT's critical facilities and infrastructure are presented below.

Water and Wastewater Services

According to the CSKT Growth Policy (2003), Polson, Ronan, and St. Ignatius have municipal water systems. Citizens of Charlo and Pablo have formed water districts to operate the existing water systems. The community of Arlee has formed water districts to finance water system improvements. Most of the rural residences in CSKT have individual wells, but some residents use surface water from Flathead Lake or local creeks as their water source. The CSKT Housing Authority operates 14 water systems in Reservation communities that serve both Tribal and non-Tribal members.

According to the CSKT Growth Policy (2003), Most of the rural residents on the Flathead Reservation use individual sewage disposal systems (septic tanks and drain fields) for sewage disposal. A number of municipal and public wastewater treatment systems exist in CSKT and more are in the planning stages. The City of Polson's topography requires that all sewage generated in Polson be pumped to the treatment system. The treatment plant consists of three aerated lagoons, a polishing pond, and a surface discharge of treated effluent to the Flathead River. The City of Ronan sewage treatment includes a three-cell aerated lagoon that is discharged into Crow Creek.

The Town of St. Ignatius has a single-cell aerated lagoon with a settling pond that is discharged into Matt Creek. The area north of Mission Creek is served by the town sewer system while the area south of Mission Creek is on a Tribal sewer system. The citizens of Arlee have formed a sewer district to construct facilities in that community. The Charlo Sewer District operates a three acre, single-cell aerated lagoon that discharges into Mission Creek. A number of tribal wastewater treatment systems are also present in CSKT (CSKT Growth Policy, 2003).

Utilities

Mission Valley Power (MVP), located in Pablo, is a federally-owned utility that is operated under contract by CSKT. MVP provides electricity to all of CSKT. The utility owns the power distribution network and relies on hydroelectric power sources including Kerr Dam, located on the Flathead River and operated by PPL Montana and the Boulder Creek Hydroelectric Project, built by the Tribes.

There is no natural gas service on the Reservation.

Public Safety

The Tribal Police Department is the primary public safety agency for CSKT members. The department is divided into patrol, investigative, and administrative units. The Lake County OEM runs a 911 call center with ten dispatch officers. The center fields calls from the entire county and routes them to appropriate state, city, and Tribal law enforcement agencies. The Polson Police Department also provide law enforcement services.

Twelve (12) volunteer fire protection districts (VFDs) provide fire protection throughout CSKT. The incorporated cities of Polson, Ronan and St. Ignatius provide fire protection within the corporate limits, as well as the surrounding rural districts. The Polson Fire District has a substation in Big Arm. Most of the districts have between 20 to 30 volunteers. The Polson Fire Chief/Marshall holds a full-time paid position. All of the fire districts and the wildland fire protection agencies belong to the Lake County Rural Fire Association.

The Polson Fire Department provides fire protection, public education, fire prevention, and code management to the citizens of Polson and the surrounding 129 square miles. The department operates out of two fire stations. St. Ignatius is served by three full time police officers, as well as county sheriff, tribal police and state highway patrol officers when the need arises.

3.3 POPULATION AND CITY EXPANSION TRENDS

According to the 2010 U.S. Census, Lake County, the primary county within the Flathead Reservation, is the 9th most populous county in Montana with a population of 28,746. The Reservation is more densely populated than Montana as a whole. The average population density of CSKT is 19.3 people per square mile, while the average population density of Montana is 6.8 people per square mile. **Table 3.4-1** illustrates the change in population in CSKT compared to the State of Montana and United States.

TABLE 3.4-1
COUNTY, STATE AND NATIONAL POPULATION TRENDS

Year	CSKT Population	% change from previous census	State of Montana Population	% change from previous census	United States Population	% change from previous census
2010	28,746	8%	989,415	9%	308,745,538	9%
2000	26,507	21%	902,190	11%	281,424,602	12%
1990	21,041	9%	799,065	2%	248,709,873	9%
1980	19,056	24%	786,690	12%	226,542,199	10%
1970	14,445	9%	694,409	3%	203,302,031	12%

Source: Montana Census and Economic Information Center, 2011

Approximately 25 percent of CSKT's population lives within the incorporated communities of Polson, Ronan and St. Ignatius and 75 percent lives in the unincorporated areas of Arlee, Charlo, Pablo, Elmo, Big Arm, Dayton, Finley Point and Ravalli. According to the 2010
U.S. Census, Polson is the State's 18th largest city, with a population of 4,488. **Table 3.4-2** presents population statistics for the incorporated communities within CSKT and the Census Designated Places (CDP).

TABLE 3.4-2
CSKTPOPULATION TRENDS – CITIES, TOWNS AND CENSUS DESIGNATED PLACES

City/Town or CDP	1970	1980	% Change Since Last Census	1990	% Change Since Last Census	2000	% Change Since Last Census	2010	% Change Since Last Census
Arlee CDP	-	-	-	489	-	602	18.8%	636	5.3%
Bear Dance CDP	-	-	-	-	-	-	-	275	
Big Arm CDP	-	-	-	-	-	131	-	177	26.0%
Charlo CDP	-	-	-	358	-	439	18.5%	379	-15.8%
Dayton CDP	-	-	-	-	-	95	-	84	-13.1%
Elmo CDP	-	-	-	-	-	143	-	180	20.6%
Finley Point CDP	-	-	-	395	-	493	19.9%	480	-2.7%
Jette CDP	-	-	-	-	-	267	-	253	-5.5%
Kerr CDP	-	-	-	-	-	17	-	251	93.2%
Kicking Horse CDP	-	-	-	281		80	-251.3%	286	72.0%
King's Point CDP	-	-	-	-	-	169	-	151	-11.9%
Lake Mary Ronan CDP	-	-	-	-	-	-	-	65	
Lindisfarne CDP	-	-	-	-	-	-	-	284	
Pablo CDP	-	-	-	1,298	-	1,814	28.4%	2,254	19.5%
Polson	2,464	2,798	11.9%	3,291	15.0%	4,041	18.6%	4,488	10.0%
Ravalli CDP	-	-	-	-	-	119	-	76	-56.6%

TABLE 3.4-2 CSKTPOPULATION TRENDS – CITIES, TOWNS AND CENSUS DESIGNATED PLACES									
City/Town or CDP	1970	1980	% Change Since Last Census	1990	% Change Since Last Census	2000	% Change Since Last Census	2010	% Change Since Last Census
Rocky Point CDP	-	-	-	-	-	107	-	97	-10.3%
Rollins CDP	-	-	-	-	-	183	-	209	12.4%
Ronan	1,347	1,530	12.0%	1,547	1.1%	1,812	14.6%	1,871	3.2%
St. Ignatius	925	877	-5.5%	778	-12.7%	788	1.3%	778	-1.3%
Swan Lake CDP	-	-	-	-	-	-	-	113	
Turtle Lake CDP	-	-	-	-	-	194	-	209	7.2%
Woods Bay CDP	-	-	-	-	-	748	-	661	-13.2%

Notes: CDP = Census Designated Place; -- = data not available; Changes in Place population between years may be due to population growth or decline, due to significant boundary changes, or a combination of factors.
Source: U.S. Census Bureau, 2011

In 1979, the Polson city boundaries encompassed 838 acres. By 1990, the city had expanded to cover 1,152 acres, a 37 percent increase over the previous ten-year period. Between 1990 and 2000, the city grew by 50 percent to encompass 1,733 acres. Between 1990 and 2000, the city extended its boundaries to the northeast along the lakeshore and along Highway 35. The city also expanded to the east, the southeast, and the west along the Flathead River (Polson Growth Policy, 2006).

3.4 HOUSING STOCK

The U.S. Census estimates that in 2000, Lake County had 13,605 housing units. The median value of the occupied housing units was $17,200. A further breakdown of the housing units from the census is presented in **Table 3.5-1.**

TABLE 3.5-1 2000 U.S. CENSUS HOUSING DATA, LAKE COUNTY				
	Lake County	Polson	Ronan	St. Ignatius
Total Number of Housing Units	13,605	1,938	762	331
Median Value of Housing Units	$17,200	$88,100	$83,100	$75,600
Year Structure Built				
1999 to March 2000	426	43	5	7
1995 to 1998	1,315	164	53	4
1990 to 1994	1,408	223	50	13
1980 to 1989	2,408	308	119	61
1970 to 1979	3,156	390	163	54
1960 to 1969	1,642	255	77	64
1940 to 1959	1,579	279	158	73
1939 or earlier	1,671	276	137	55

3.5 ECONOMY AND SOCIOECONOMICS

According to the CSKT Growth Policy (2003), farming and ranching, forestry, local and tribal governments and tourism all figure significantly in the economy of CSKT. The three largest commerce centers are Polson, Ronan and St. Ignatius, all of which are bisected by Highway 93. **Table 3.6.1** presents the top private employers in CSKT in 2009 as well as other economic indicators.

TABLE 3.6-1
ECONOMIC & SOCIOECONOMIC DATA, LAKE COUNTY

Indicator	State of Montana (2009 data)	Lake County (2009 data)	Polson (2000 data)	Ronan (2000 data)	St. Ignatius (2000 data)
Per capita income	$22,881	$19,357	$13,777	$11,678	$12,336
Median household income	$42,222	$35,888	$21,870	$22,422	$25,682
Persons living below poverty level	15.0%	20.9%	19.8%	24.8%	19.5%
Number of private non-farm establishments (2008)	36,326	825	--	--	--
Top private employers in CSKT(including railroad and government) (2009 data)	St. Luke Community Hospital, Jore Corp., Mission Mountain Enterprises, St. Joseph Hospital, Super 1 Foods, Wal-Mart, Community Bank, Drs Technical Svc, McDonald's of Polson & Ronan, Mission Valley Power, S&K Electronics, Safeway				

Source: MT Dept. Labor, Research & Analysis Bureau & MT Dept. Commerce, Census and Economic Information Center

Major Polson employers currently include the area school districts, CSKT, various construction contractors, Mission Valley Power, the hospital, and city, county and Tribal governments. Some Polson residents work primarily out of their homes and travel only periodically to their place of business. However, the current local job market tends to be cyclical and seasonal in nature (City of Polson Growth Policy, 2006).

According to the Montana Department of Labor, the unemployment rate in CSKT was 8.4 percent in 2013. The State labor numbers show that out of Lake County's civilian workforce of 11,354, there were 10,395 individuals with jobs and 959 individuals were unemployed. The U.S. Census Bureau estimated that in 2013, 20.9 percent of the County population was living below the poverty level.

3.7 LAND USE AND FUTURE DEVELOPMENT

The majority of land on the Flathead Reservation has historically been, and continues to be, used for agricultural (crop and livestock production) and timber production. Croplands primarily produce small grains and hay. Native rangeland and planted pastures provide forage for livestock. Livestock obtain water from dugout impoundments, wells, and surface water. According to the CSKT Growth Policy, if commodity prices do not rise and stabilize in the coming years, CSKT is likely to see far fewer viable agricultural operations and more subdivisions and ranchettes.

While much of the commercial/industrial development is located within the limits of Polson and Ronan, development has crept north and south of both due to exposure along the highway. In general, retail businesses are located in the centers of the communities, while light manufacturing, mini storage, some

services and retail sales such as auto dealers are located at and beyond the edges of the communities. Due to the volume of recreational traffic using and passing through CSKT there are many gas and convenience-type stores located along U.S. Highway 93, particularly around Polson.

According to the CSKT Growth Policy (2003), recent development has been concentrated along the Highway 93 corridor from Arlee to Polson, on the east and west shores of Flathead Lake. From 1993-2002, more than 1,600 new lots were recorded in Lake County. Approximately 400 of these were created outside of the subdivision process.

3.7.1 Land Use Implementation Tools

CSKT currently employs a number of regulations and policies to provide for safe and sound development. Industrial, commercial and residential land use is managed with floodplain, subdivision, lakeshore protection, sanitation and zoning regulations in accordance with guidelines set forth in the county and city growth policies. Building codes also play an important role to ensure structures are constructed to safety standards.

CSKT does review development proposals on Tribal lands (land held in individual or tribal trust status). The Tribes have a planner who coordinates review with the tribal environmental and cultural programs and the Tribal Council.

Growth Policies

CSKT adopted a Growth Policy in 2003 to help address growth pressures. Growth policies were also completed to guide land use decisions in the Cities of Polson (2006) and Ronan (2008), and Town of St. Ignatius (2001). Details from these growth policies as they apply to hazard mitigation are summarized in the section below.

The **CSKT Growth Policy** has a goal and objective consistent with mitigation of the wildfire hazard:

Natural Resources Goal 8: Protect lives and property from damage caused by wildfire.

- Work with fire district personnel, land managers and the public to strengthen standards for residential development in the urban-wildland interface including requiring mitigation measures when appropriate.
- Compile and distribute best management practices to landowners.

The **City of Polson Growth Policy** identifies two goals and objectives consistent with mitigation of the landslide and transportation accident/hazardous material incident hazards.

Goal 2: Identify appropriate areas for outward expansion.

- Require engineered designs in areas with steep slope or erodible soil.

Goal 17: Address the community's need for a U.S. 93 bypass.

- Engage in community discussions to determine level of support for a U.S. 93 bypass.
- Consider appropriate development restrictions to preserve a potential U.S. 93 bypass corridor.

The **City of Ronan Growth Policy** identifies one goal and objective consistent with mitigation of the flood hazard.

Goal 20: Restore segments of Spring Creek as resources allow and map the 100-year floodplain.

- Seek to have the 100-year floodplain delineated to protect life and property as a part of the Highway 93 upgrade and/or through other measures.
- Ensure that proposed development along Spring Creek does not increase flood levels or result in loss of life and property.

Town of **St. Ignatius Growth Policy**

Goals & Objectives

- Protect and maintain the natural character and function of the Mission Creek floodplain by prohibiting development in established floodplain areas.
- Develop policies to protect life and property from hazards associated with characteristics of geology, soils, topography and groundwater based on current measureable technical parameters; maintain the natural characteristics of these areas to the avoidance of known hazards.

Policies - Surface Water

- To reduce risk of flood damage and to protect our streams and wetlands, new development shall be situated away from surface water and floodplains and shall incorporate measures to protect them.

Zoning Ordinances

Zoning is a tool used by local government to control and direct land use in communities, in order to protect the public health, safety and welfare. Development within areas of CSKT and the

incorporated communities of Polson, Ronan, and St. Ignatius are subject to municipal zoning regulations. Generally, the zoning regulations outline specific areas for residential, commercial, and industrial development. Details from these regulations, as appropriate, are presented in the hazard profiles in *Section 4.*

The CSKT Planning Department maintains 10 zoned areas in addition to the incorporated areas; seven of these areas are located on Flathead Lake. Other areas of the county are not zoned, except as outlined in the Polson Development Code. The City of Ronan's Growth Policy (2008) states that existing zoning codes lacks flexibility and is outdated. Zoning is referenced in the St. Ignatius Growth Policy as the tool used to prevent development in the floodplain and on steep slopes.

Subdivision Regulations

Landowners wishing to subdivide tracts of land in or out of incorporated cities must follow the subdivision regulation process outlined by the respective communities (Polson or Ronan) and the CSKT Subdivision Regulations. Details from these regulations are presented in the hazard profiles in *Section 4.* Lake County's regulations do not provide oversight on nontribal land in the unincorporated areas. Polson subdivision regulations are addressed in the City's Development Code. Up until recently, the Town of St. Ignatius has followed the CSKT Subdivision Regulations.

Building Codes

Building codes are also a tool to control future development. The main purpose of building codes are to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. They comprise a set of rules that specify the minimum acceptable level of safety for buildings and often contain requirements for snow and wind loads, roof construction, and seismic risk. Building codes are generally intended to be applied by architects and engineers, but are also used by building inspectors. Building codes have not been adopted by CSKT or the communities of Polson, Ronan, or St. Ignatius. The State of Montana's Building Codes are used in lieu of local codes.

Development Codes

The City of Polson adopted a Development Code in 2010 to promote the health, safety, and general welfare of the people of Polson and the County by implementing the applicable goals, objectives and policies of the Polson and CSKT Growth Policies. The Development Code establishes zoning districts in the city and surrounding county jurisdictional area; adopts an official zoning map; provides for permitted and special permit land uses; and includes specification and performance standards for each district. It also establishes the requirement for a permit for all

land development and building activity in the city and surrounding jurisdictional area; and establishes procedures for the administration of the zoning regulations. In addition, the Building Code establishes the rules, procedures and requirements for the subdivision of land. Subdivision regulations in the Polson Development Code are consistent with those in the CSKT Subdivision Regulations.

Floodplain Regulations

The CSKT Floodplain Regulations were adopted in 1991 in order to comply with the Montana Floodplain and Floodway Management Act. The regulations apply only to nontribal land held in fee status within the 100-year floodplain of any river or stream in the county that was recognized during the FEMA's 1987 flood insurance study. The regulations require a permit for development work within the floodplain and prohibit residential, commercial or industrial structures and development that is likely to increase a flood's velocity and volume. Details from these regulations are presented in the flooding profile in *Section 4.*

Lakeshore Protection Regulations

Lake County's Lakeshore Protection Regulations were designed to help protect the water quality of Swan Lake, Flathead Lake and Lake Mary Ronan by establishing a permit process that governs the type and extent of work that can take place in their immediate vicinity. On the Flathead Reservation, the regulations apply to the area from the high water mark of Flathead Lake to 20 feet landward. (The Tribes are responsible for the bed of the lake to the high water mark.) Off the Reservation, the Lakeshore Protection Regulations include the bed of lakes and cover the area 20 feet inland from the high water mark.

Commented [TA1]: Is the Tribe involved with this?

3.7.2 Future Development

As CSKT and the incorporated communities choose appropriate areas for future growth, factors to consider include the location and relative vulnerability of natural resources and current agricultural land uses. In addition to resource concerns, future growth may be shaped by the area's suitability for development in terms of slope and flood risk. Because Polson is bounded on the north by Flathead Lake, residential development will likely continue to spread to the west, southwest, south, southeast, and east of the city. Development could also expand to the northwest and northeast along the shoreline of Flathead Lake.

With continued revitalization efforts, the central Polson business district could strengthen and expand. The two commercial/industrial districts located in the city center and along the east bank of the Flathead River are logical areas for future development. Sites along U.S. 93 will likely continue to host future developments, especially tourism-related businesses. The City of Polson is working in

partnership with the CSKT to develop recreational opportunities at Salish Point featuring lake-based activities, picnic grounds, open space, and trail components.

According to the CSKT Environmental Health Department, the entire west shore of Flathead Lake, the area from Polson to Ronan, and the Finley Point area are receiving the most dramatic growth pressures outside of the incorporated areas. Infill development within the cities and towns on land already served by sewer and water along will likely occur in addition to outward expansion where no environmental constraints exist. Large agricultural or vacant parcels along U.S. Highway 93 and Montana Highway 35 may be suitable for future commercial and industrial development but land use conflicts could exist.

Plum Creek Timber owns and manages approximately 64,000 acres of timberlands in Lake County. Plum Creek's largest local holding is in the Swan Valley, which totals 40,000 acres of checkerboard lands. In the Lake Mary Ronan area, Plum Creek also has 24,000 acres. Plum Creek typically manages its holdings for long term timber production and permits the public to use them for recreation. It also assesses lands to determine the "highest and best use." In some cases, this assessment has shown that recreation and residential development are higher than the values for timber production. When this occurs, the company may sell land, as it recently did in the Swan Valley.

3.0 COMMUNITY PROFILE

3.1 PHYSICAL SETTING

Located in northwestern Montana, CSKT has a land area of 1,938 square miles and has land on four Montana counties: Lake, Sanders, Missoula and Flathead. The Flathead Reservation is home to the Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Nation. Pablo is the location of the main Tribal government buildings and Tribal Council Districts include: Arlee, St. Ignatius, Dixon, Ronan, Hot Springs, Polson and Elmo. Flathead Lake, the largest fresh water lake west of the Mississippi, is located within the boundaries of the Reservation. Kerr Dam is located on the southwestern tip of Flathead Lake on the Flathead River. The Flathead River flows into the Clark Fork River downstream from the dam. **Figure 1** presents a location map of the Flathead Reservation and relevant surrounding counties.

The eastern part of the Flathead Reservation is characterized by the steeply sloping west face of the Mission Mountains. The western reaches of the Reservation contain the Salish Range, which is lower in elevation, and also has steep slopes. The central portion of the Flathead Reservation is characterized by broad glaciated valleys with alluvial fans, stream terraces, rough badlands along the Flathead River and the west face of the Mission Mountains. Elevations on the Reservation range from approximately 2,900 feet to 9,800 feet above sea level. The city of Polson is located on the valley floor at about 2,900 feet above sea level. McDonald Peak, located approximately 10 miles straight-line distance northeast of St. Ignatius, is the tallest peak on the Reservation at approximately 9, 800 feet.

The Flathead Reservation is situated at the southern end of the Flathead Basin, a watershed that drains approximately six million acres of northwestern Montana and southeastern British Columbia. Waters from this basin flow into the Clark Fork River and eventually into the Columbia River. The most prominent surface water features on the Reservation are the southern two-thirds of Flathead Lake, the Flathead River, Mission Creek, Post Creek, the Jocko River and Lake Mary Ronan. Other sizeable lakes include McDonald, Loon, and St. Mary's Lakes. The Flathead Reservation also contains several large reservoirs, including Pablo, Kicking Horse, Lower Crow, Mission, Ninepipe and numerous small reservoirs which are important for wildlife and agriculture.

There are a number of large landowners within the reservation boundaries. The Tribes are the largest single landowner (30.4 percent), followed by the Federal Government (17.8 percent), the State of Montana (6.2 percent), and Plum Creek Timber (6 percent). The Forest Service owns large blocks of timberland along the west front of the Swan Range and the eastern side of the Missions off of the Reservation. Lakes and streams cover slightly more than 100,000 acres of CSKT, or roughly 9.4 percent of the total area. According to the 2010 census, CSKT has 19.3 persons per square mile compared to 6.8 for the State of Montana. **Figure 2** presents ownership and population density on the Flathead Reservation.

CLIMATE

Western Montana, like the remainder of the northwest U.S., is heavily influenced by the predominant mid-latitude westerly flow aloft. Storm systems embedded in this flow are most frequent and potent in the winter and spring months, and with convection increasing during the warm spring. May and June are typically the wettest months.

The complex terrain also plays a big role in amount and distribution of precipitation. Uplift over the terrain causes increased amounts in the mountains, while down slope drying can greatly reduce amounts in the valleys depending on the flow direction. Therefore, the mountains in western Montana generally receive in excess of 50 inches of water equivalent precipitation annually, while the major valleys get less than 20 inches a year. The Mission Mountains within the Reservation are particularly good orographic precipitation producers with annual amounts exceeding 80 inches.

Temperatures are relatively mild in western Montana compared to locations east of the Continental Divide. Arctic intrusions do occur from the north and east generally a few times every winter, but the cold air rarely lasts long due to the usually active flow from the west. During these arctic events, however, temperatures can drop well below zero. Summers can be hot in the valleys. While average highs are in the 80s in July and August, individual days often rise into the 90s and even low 100s. Flathead Lake does tend to moderate temperatures somewhat (a little warmer at night and cooler during the day), but the influence generally extends only a few miles from shore. **Table 3.2-1** presents a summary of top weather events in Polson.

TABLE 3.2-1
TOP WEATHER EVENTS, POLSON, LAKE COUNTY

Hottest Days		Coldest Days		Wettest Days	
104° F	7/19/1960	-30° F	1/31/1950	2.00 inches	5/30/1985
104° F	7/28/1934	-27° F	2/17/1936	2.50 inches	6/8/1964
104° F	7/16/1919	-27° F	2/16/1936	2.43 inches	6/20/1916
102° F	7/6/2007	-26° F	1/27/1957	2.30 inches	7/3/2000
		-26° F	1/26/1957		
Wettest Years		**Driest Years**		**Longest Dry Spells**	
21.61 inches	2010	10.17 inches	1931	50 days	1910
21.39 inches	1947	10.38 inches	1952	46 days	1926
20.94 inches	1916	10.55 inches	1939	44 days	1955
20.68 inches	1951	10.77 inches	1928	43 days	1922
20.31 inches	1915	11.01 inches	1960	42 days	1914

Source: National Weather Service, 2012

3.2 CRITICAL FACILITITES AND INFRASTRUCTURE

Critical facilities are of particular concern because they provide essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response and/or disaster recovery functions. Critical facilities include: 911 emergency call centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals and shelters and facilities that, if damaged, could cause serious secondary impacts (i.e., hazardous material facilities, communications facilities). Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include: buildings such as the jail, law enforcement center, public services buildings, senior centers, community corrections center, the courthouse and juvenile services building as well as other public facilities such as hospitals, nursing homes and schools.

Critical facilities in CSKT are identified in **Appendix C.** Replacement values were collected where readily available; however, time and resource constraints prohibited the collection of values for all structures. A GIS layer of the critical facilities was used in the hazard risk assessment. This GIS layer should be updated on a regular basis for use in future analysis. It should be noted that many of the municipal water sources are missing from the critical facility layer with the exception of the City of Ronan and Tribal facilities. This data should be collected for future updates of this plan. Further details on CSKT's critical facilities and infrastructure are presented below.

Water and Wastewater Services

According to the CSKT Growth Policy (2003), Polson, Ronan, and St. Ignatius have municipal water systems. Citizens of Charlo and Pablo have formed water districts to operate the existing water systems. The community of Arlee has formed water districts to finance water system improvements. Most of the rural residences in CSKT have individual wells, but some residents use surface water from Flathead Lake or local creeks as their water source. The CSKT Housing Authority operates 14 water systems in Reservation communities that serve both Tribal and non-Tribal members.

According to the CSKT Growth Policy (2003), Most of the rural residents on the Flathead Reservation use individual sewage disposal systems (septic tanks and drain fields) for sewage disposal. A number of municipal and public wastewater treatment systems exist in CSKT and more are in the planning stages. The City of Polson's topography requires that all sewage generated in Polson be pumped to the treatment system. The treatment plant consists of three aerated lagoons, a polishing pond, and a surface discharge of treated effluent to the Flathead River. The City of Ronan sewage treatment includes a three-cell aerated lagoon that is discharged into Crow Creek.

The Town of St. Ignatius has a single-cell aerated lagoon with a settling pond that is discharged into Matt Creek. The area north of Mission Creek is served by the town sewer system while the area south of Mission Creek is on a Tribal sewer system. The citizens of Arlee have formed a sewer district to construct facilities in that community. The Charlo Sewer District operates a three acre, single-cell aerated lagoon that discharges into Mission Creek. A number of tribal wastewater treatment systems are also present in CSKT (CSKT Growth Policy, 2003).

Utilities

Mission Valley Power (MVP), located in Pablo, is a federally-owned utility that is operated under contract by CSKT. MVP provides electricity to all of CSKT. The utility owns the power distribution network and relies on hydroelectric power sources including Kerr Dam, located on the Flathead River and operated by PPL Montana and the Boulder Creek Hydroelectric Project, built by the Tribes.

There is no natural gas service on the Reservation.

Public Safety

The Tribal Police Department is the primary public safety agency for CSKT members. The department is divided into patrol, investigative, and administrative units. The Lake County OEM runs a 911 call center with ten dispatch officers. The center fields calls from the entire county and routes them to appropriate state, city, and Tribal law enforcement agencies. The Polson Police Department also provide law enforcement services.

Twelve (12) volunteer fire protection districts (VFDs) provide fire protection throughout CSKT. The incorporated cities of Polson, Ronan and St. Ignatius provide fire protection within the corporate limits, as well as the surrounding rural districts. The Polson Fire District has a substation in Big Arm. Most of the districts have between 20 to 30 volunteers. The Polson Fire Chief/Marshall holds a full-time paid position. All of the fire districts and the wildland fire protection agencies belong to the Lake County Rural Fire Association.

The Polson Fire Department provides fire protection, public education, fire prevention, and code management to the citizens of Polson and the surrounding 129 square miles. The department operates out of two fire stations. St. Ignatius is served by three full time police officers, as well as county sheriff, tribal police and state highway patrol officers when the need arises.

3.3 POPULATION AND CITY EXPANSION TRENDS

According to the 2010 U.S. Census, Lake County, the primary county within the Flathead Reservation, is the 9th most populous county in Montana with a population of 28,746. The Reservation is more densely populated than Montana as a whole. The average population density of CSKT is 19.3 people per square mile, while the average population density of Montana is 6.8 people per square mile. **Table 3.4-1** illustrates the change in population in CSKT compared to the State of Montana and United States.

TABLE 3.4-1
COUNTY, STATE AND NATIONAL POPULATION TRENDS

Year	CSKT Population	% change from previous census	State of Montana Population	% change from previous census	United States Population	% change from previous census
2010	28,746	8%	989,415	9%	308,745,538	9%
2000	26,507	21%	902,190	11%	281,424,602	12%
1990	21,041	9%	799,065	2%	248,709,873	9%
1980	19,056	24%	786,690	12%	226,542,199	10%
1970	14,445	9%	694,409	3%	203,302,031	12%

Source: Montana Census and Economic Information Center, 2011

Approximately 25 percent of CSKT's population lives within the incorporated communities of Polson, Ronan and St. Ignatius and 75 percent lives in the unincorporated areas of Arlee, Charlo, Pablo, Elmo, Big Arm, Dayton, Finley Point and Ravalli. According to the 2010
U.S. Census, Polson is the State's 18th largest city, with a population of 4,488. **Table 3.4-2** presents population statistics for the incorporated communities within CSKT and the Census Designated Places (CDP).

TABLE 3.4-2
CSKTPOPULATION TRENDS – CITIES, TOWNS AND CENSUS DESIGNATED PLACES

City/Town or CDP	1970	1980	% Change Since Last Census	1990	% Change Since Last Census	2000	% Change Since Last Census	2010	% Change Since Last Census
Arlee CDP	-	-	-	489	-	602	18.8%	636	5.3%
Bear Dance CDP	-	-	-	-	-	-	-	275	
Big Arm CDP	-	-	-	-	-	131	-	177	26.0%
Charlo CDP	-	-	-	358	-	439	18.5%	379	-15.8%
Dayton CDP	-	-	-	-	-	95	-	84	-13.1%
Elmo CDP	-	-	-	-	-	143	-	180	20.6%
Finley Point CDP	-	-	-	395	-	493	19.9%	480	-2.7%
Jette CDP	-	-	-	-	-	267	-	253	-5.5%
Kerr CDP	-	-	-	-	-	17	-	251	93.2%
Kicking Horse CDP	-	-	-	281		80	-251.3%	286	72.0%
King's Point CDP	-	-	-	-	-	169	-	151	-11.9%
Lake Mary Ronan CDP	-	-	-	-	-	-	-	65	
Lindisfarne CDP	-	-	-	-	-	-	-	284	
Pablo CDP	-	-	-	1,298	-	1,814	28.4%	2,254	19.5%
Polson	2,464	2,798	11.9%	3,291	15.0%	4,041	18.6%	4,488	10.0%
Ravalli CDP	-	-	-	-	-	119	-	76	-56.6%

TABLE 3.4-2 CSKTPOPULATION TRENDS – CITIES, TOWNS AND CENSUS DESIGNATED PLACES									
City/Town or CDP	1970	1980	% Change Since Last Census	1990	% Change Since Last Census	2000	% Change Since Last Census	2010	% Change Since Last Census
Rocky Point CDP	-	-	-	-	-	107	-	97	-10.3%
Rollins CDP	-	-	-	-	-	183	-	209	12.4%
Ronan	1,347	1,530	12.0%	1,547	1.1%	1,812	14.6%	1,871	3.2%
St. Ignatius	925	877	-5.5%	778	-12.7%	788	1.3%	778	-1.3%
Swan Lake CDP	-	-	-	-	-	-	-	113	
Turtle Lake CDP	-	-	-	-	-	194	-	209	7.2%
Woods Bay CDP	-	-	-	-	-	748	-	661	-13.2%

Notes: CDP = Census Designated Place; -- = data not available; Changes in Place population between years may be due to population growth or decline, due to significant boundary changes, or a combination of factors.
Source: U.S. Census Bureau, 2011

In 1979, the Polson city boundaries encompassed 838 acres. By 1990, the city had expanded to cover 1,152 acres, a 37 percent increase over the previous ten-year period. Between 1990 and 2000, the city grew by 50 percent to encompass 1,733 acres. Between 1990 and 2000, the city extended its boundaries to the northeast along the lakeshore and along Highway 35. The city also expanded to the east, the southeast, and the west along the Flathead River (Polson Growth Policy, 2006).

3.4 HOUSING STOCK

The U.S. Census estimates that in 2000, Lake County had 13,605 housing units. The median value of the occupied housing units was $17,200. A further breakdown of the housing units from the census is presented in **Table 3.5-1.**

TABLE 3.5-1 2000 U.S. CENSUS HOUSING DATA, LAKE COUNTY				
	Lake County	Polson	Ronan	St. Ignatius
Total Number of Housing Units	13,605	1,938	762	331
Median Value of Housing Units	$17,200	$88,100	$83,100	$75,600
Year Structure Built				
1999 to March 2000	426	43	5	7
1995 to 1998	1,315	164	53	4
1990 to 1994	1,408	223	50	13
1980 to 1989	2,408	308	119	61
1970 to 1979	3,156	390	163	54
1960 to 1969	1,642	255	77	64
1940 to 1959	1,579	279	158	73
1939 or earlier	1,671	276	137	55

3.5 ECONOMY AND SOCIOECONOMICS

According to the CSKT Growth Policy (2003), farming and ranching, forestry, local and tribal governments and tourism all figure significantly in the economy of CSKT. The three largest commerce centers are Polson, Ronan and St. Ignatius, all of which are bisected by Highway 93. **Table 3.6.1** presents the top private employers in CSKT in 2009 as well as other economic indicators.

TABLE 3.6-1
ECONOMIC & SOCIOECONOMIC DATA, LAKE COUNTY

Indicator	State of Montana (2009 data)	Lake County (2009 data)	Polson (2000 data)	Ronan (2000 data)	St. Ignatius (2000 data)
Per capita income	$22,881	$19,357	$13,777	$11,678	$12,336
Median household income	$42,222	$35,888	$21,870	$22,422	$25,682
Persons living below poverty level	15.0%	20.9%	19.8%	24.8%	19.5%
Number of private non-farm establishments (2008)	36,326	825	--	--	--
Top private employers in CSKT(including railroad and government) (2009 data)	St. Luke Community Hospital, Jore Corp., Mission Mountain Enterprises, St. Joseph Hospital, Super 1 Foods, Wal-Mart, Community Bank, Drs Technical Svc, McDonald's of Polson & Ronan, Mission Valley Power, S&K Electronics, Safeway				

Source: MT Dept. Labor, Research & Analysis Bureau & MT Dept. Commerce, Census and Economic Information Center

Major Polson employers currently include the area school districts, CSKT, various construction contractors, Mission Valley Power, the hospital, and city, county and Tribal governments. Some Polson residents work primarily out of their homes and travel only periodically to their place of business. However, the current local job market tends to be cyclical and seasonal in nature (City of Polson Growth Policy, 2006).

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The majority of land on the Flathead Reservation has historically been, and continues to be, used for agricultural (crop and livestock production) and timber production. Croplands primarily produce small grains and hay. Native rangeland and planted pastures provide forage for livestock. Livestock obtain water from dugout impoundments, wells, and surface water. According to the CSKT Growth Policy, if commodity prices do not rise and stabilize in the coming years, CSKT is likely to see far fewer viable agricultural operations and more subdivisions and ranchettes.

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The **City of Polson Growth Policy** identifies two goals and objectives consistent with mitigation of the landslide and transportation accident/hazardous material incident hazards.

Goal 2: Identify appropriate areas for outward expansion.

- Require engineered designs in areas with steep slope or erodible soil.

Goal 17: Address the community's need for a U.S. 93 bypass.

- Engage in community discussions to determine level of support for a U.S. 93 bypass.
- Consider appropriate development restrictions to preserve a potential U.S. 93 bypass corridor.

The **City of Ronan Growth Policy** identifies one goal and objective consistent with mitigation of the flood hazard.

Goal 20: Restore segments of Spring Creek as resources allow and map the 100-year floodplain.

- Seek to have the 100-year floodplain delineated to protect life and property as a part of the Highway 93 upgrade and/or through other measures.
- Ensure that proposed development along Spring Creek does not increase flood levels or result in loss of life and property.

Town of **St. Ignatius Growth Policy**

Goals & Objectives

- Protect and maintain the natural character and function of the Mission Creek floodplain by prohibiting development in established floodplain areas.
- Develop policies to protect life and property from hazards associated with characteristics of geology, soils, topography and groundwater based on current measureable technical parameters; maintain the natural characteristics of these areas to the avoidance of known hazards.

Policies - Surface Water

- To reduce risk of flood damage and to protect our streams and wetlands, new development shall be situated away from surface water and floodplains and shall incorporate measures to protect them.

Zoning Ordinances

Zoning is a tool used by local government to control and direct land use in communities, in order to protect the public health, safety and welfare. Development within areas of CSKT and the

incorporated communities of Polson, Ronan, and St. Ignatius are subject to municipal zoning regulations. Generally, the zoning regulations outline specific areas for residential, commercial, and industrial development. Details from these regulations, as appropriate, are presented in the hazard profiles in *Section 4.*

The CSKT Planning Department maintains 10 zoned areas in addition to the incorporated areas; seven of these areas are located on Flathead Lake. Other areas of the county are not zoned, except as outlined in the Polson Development Code. The City of Ronan's Growth Policy (2008) states that existing zoning codes lacks flexibility and is outdated. Zoning is referenced in the St. Ignatius Growth Policy as the tool used to prevent development in the floodplain and on steep slopes.

Subdivision Regulations

Landowners wishing to subdivide tracts of land in or out of incorporated cities must follow the subdivision regulation process outlined by the respective communities (Polson or Ronan) and the CSKT Subdivision Regulations. Details from these regulations are presented in the hazard profiles in *Section 4.* Lake County's regulations do not provide oversight on nontribal land in the unincorporated areas. Polson subdivision regulations are addressed in the City's Development Code. Up until recently, the Town of St. Ignatius has followed the CSKT Subdivision Regulations.

Building Codes

Building codes are also a tool to control future development. The main purpose of building codes are to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. They comprise a set of rules that specify the minimum acceptable level of safety for buildings and often contain requirements for snow and wind loads, roof construction, and seismic risk. Building codes are generally intended to be applied by architects and engineers, but are also used by building inspectors. Building codes have not been adopted by CSKT or the communities of Polson, Ronan, or St. Ignatius. The State of Montana's Building Codes are used in lieu of local codes.

Development Codes

The City of Polson adopted a Development Code in 2010 to promote the health, safety, and general welfare of the people of Polson and the County by implementing the applicable goals, objectives and policies of the Polson and CSKT Growth Policies. The Development Code establishes zoning districts in the city and surrounding county jurisdictional area; adopts an official zoning map; provides for permitted and special permit land uses; and includes specification and performance standards for each district. It also establishes the requirement for a permit for all

land development and building activity in the city and surrounding jurisdictional area; and establishes procedures for the administration of the zoning regulations. In addition, the Building Code establishes the rules, procedures and requirements for the subdivision of land. Subdivision regulations in the Polson Development Code are consistent with those in the CSKT Subdivision Regulations.

Floodplain Regulations

The CSKT Floodplain Regulations were adopted in 1991 in order to comply with the Montana Floodplain and Floodway Management Act. The regulations apply only to nontribal land held in fee status within the 100-year floodplain of any river or stream in the county that was recognized during the FEMA's 1987 flood insurance study. The regulations require a permit for development work within the floodplain and prohibit residential, commercial or industrial structures and development that is likely to increase a flood's velocity and volume. Details from these regulations are presented in the flooding profile in *Section 4.*

Lakeshore Protection Regulations

Lake County's Lakeshore Protection Regulations were designed to help protect the water quality of Swan Lake, Flathead Lake and Lake Mary Ronan by establishing a permit process that governs the type and extent of work that can take place in their immediate vicinity. On the Flathead Reservation, the regulations apply to the area from the high water mark of Flathead Lake to 20 feet landward. (The Tribes are responsible for the bed of the lake to the high water mark.) Off the Reservation, the Lakeshore Protection Regulations include the bed of lakes and cover the area 20 feet inland from the high water mark.

Commented [TA1]: Is the Tribe involved with this?

3.7.2 Future Development

As CSKT and the incorporated communities choose appropriate areas for future growth, factors to consider include the location and relative vulnerability of natural resources and current agricultural land uses. In addition to resource concerns, future growth may be shaped by the area's suitability for development in terms of slope and flood risk. Because Polson is bounded on the north by Flathead Lake, residential development will likely continue to spread to the west, southwest, south, southeast, and east of the city. Development could also expand to the northwest and northeast along the shoreline of Flathead Lake.

With continued revitalization efforts, the central Polson business district could strengthen and expand. The two commercial/industrial districts located in the city center and along the east bank of the Flathead River are logical areas for future development. Sites along U.S. 93 will likely continue to host future developments, especially tourism-related businesses. The City of Polson is working in

partnership with the CSKT to develop recreational opportunities at Salish Point featuring lake-based activities, picnic grounds, open space, and trail components.

According to the CSKT Environmental Health Department, the entire west shore of Flathead Lake, the area from Polson to Ronan, and the Finley Point area are receiving the most dramatic growth pressures outside of the incorporated areas. Infill development within the cities and towns on land already served by sewer and water along will likely occur in addition to outward expansion where no environmental constraints exist. Large agricultural or vacant parcels along U.S. Highway 93 and Montana Highway 35 may be suitable for future commercial and industrial development but land use conflicts could exist.

Plum Creek Timber owns and manages approximately 64,000 acres of timberlands in Lake County. Plum Creek's largest local holding is in the Swan Valley, which totals 40,000 acres of checkerboard lands. In the Lake Mary Ronan area, Plum Creek also has 24,000 acres. Plum Creek typically manages its holdings for long term timber production and permits the public to use them for recreation. It also assesses lands to determine the "highest and best use." In some cases, this assessment has shown that recreation and residential development are higher than the values for timber production. When this occurs, the company may sell land, as it recently did in the Swan Valley.

4.0 RISK ASSESSMENT AND VULNERABILITY ANALYSIS

CSKT is exposed to many hazards both natural and man-made. A risk assessment and vulnerability analysis was completed to help identify where mitigation measures could reduce loss of life or damage to property on the Reservation.

This section includes a description of the risk assessment methodology and a hazard profile for 10 hazards organized from high to low by Tribal priority: wildfire, transportation accidents (including hazardous material incidents), landslides, structure fire, severe winter weather, flooding, communicable disease, severe summer weather, earthquakes and dam failure. The section is concluded with a risk assessment summary and discussion on the location of future development projects. Supporting documentation is presented in **Appendix C**.

4.1 RISK ASSESSMENT METHODOLOGY

A risk assessment was conducted to address requirements of the DMA 2000 for evaluating the risk to CSKT from natural and man-made hazards. DMA 2000 requires measuring potential losses to critical facilities and property resulting from natural hazards by assessing the vulnerability of these facilities to natural hazards. In addition to the requirements of DMA 2000, the risk assessment approach taken in this study evaluated risks to vulnerable populations and also examined the risk presented by several man-made hazards. The goal of the risk assessment process is to determine which hazards present the greatest risk and what areas are the most vulnerable to hazards.

The risk assessment approach used for this plan entailed using geographic information system (GIS) software and data to develop vulnerability models for people, structures, critical facilities and evaluating those vulnerabilities in relation to hazard profiles that model where hazards exist. This type of approach to risk assessment is dependent on the detail and accuracy of the data used during the analysis. Additionally, some types of hazards are extremely difficult to model. Data limitations are described in *Section 4.1.7*.

4.1.1 Critical Facilities and Building Stock

Critical facilities were mapped using coordinates provided by CSKT and Lake County. Mapping of these facilities allowed for the comparison of their location to the hazard areas where such hazards are spatially recognized. Construction type of critical facilities (e.g. steel, wood, masonry, etc.) has not been compiled and was therefore, not considered in the analysis. This data should be collected for future updates of this plan.

Infrastructure, including bridges, water and wastewater facilities, and communication sites had digital mapping available and were therefore included in the analysis. Bridge data was obtained from the

Montana Natural Resource Information System (NRIS) transportation GIS layer while other data was obtained from the Tribe and the County. Replacement values of critical facilities were used in the risk assessment as this information was readily available from the county, cities, towns and school districts. Bridge replacement values were extrapolated using unit costs (developed by Lewis and Clark County) for span length and width. **Figure 3** presents the bridge locations on the reservation.

Building stock data was obtained from the Montana Department of Revenue's (MDOR) cadastral mapping program. This system spatially recognizes land parcels within the county with a distinction between residential and other properties. Appraised building values are available on the parcel level and were used to determine exposure. The "other" building type includes all properties not designated as residential and in this study and consists of commercial, agricultural and industrial properties. Data used for this analysis was from 2012. The analysis for this project only included "fee" land and therefore, did not include developments on the Flathead Reservation that are in trust to the CSKT.

4.1.2 Vulnerable Population

Data from the 2010 census was used in the analysis to determine vulnerable populations at risk in the hazard areas, as available. Census data was downloaded from the U. S. Census Bureau's website. Downloaded data included total population (by census block) and number of individuals under the age of 18 for the incorporated communities, the county, CDPs and Commissioner Districts. This data was then extrapolated for tribal council districts. Data for populations over the age of 65 and for individuals living below the poverty level were not yet available for Census 2010; therefore, this information should be included in the 2017 PDM Plan update.

4.1.3 Hazard Identification

The 2005 PDM Plan identified 11 hazards affecting CSKT (floods, winter storms, wildfire, rain- hail-wind, human-caused technological hazards (terrorism, hazardous material incidents), dam failure, drought, vector-borne diseases, food-borne diseases, earthquake and civil unrest. Hazards for the 2012 PDM update were identified by the Planning Team who reviewed a history of past events on the Reservation that were compiled from: internet research, available GIS data, public meeting input, past disaster declarations, the 2005 PDM Plan and the State of Montana Multi-Hazard Mitigation Plan.

Hazards included in the 2012 update generally included those profiled in the 2005 PDM Plan with the consolidation of vector-borne and food-borne diseases under the communicable disease hazard, hazardous material incidents under the transportation accident hazard, and the rain-hail-wind hazard under severe summer weather. It was determined that the drought and civil unrest hazards should not be carried forward in the 2012 PDM Plan because these hazards do not frequently impact CSKT residents and/or are managed at the State and Federal levels. Several additional hazards are profiled in the 2012 CSKT Plan including structure fire, transportation accidents and landslides. Hazards in the 2012 update were re-ranked using the Calculated Priority Ranking Index (CPRI) presented in Table 4.1.1 (see *Section 4.1.5*).

4.1.4 Hazard Profiles

Hazard profiles were prepared for each of the identified hazards and are presented within this section according to their prioritized rank (see *Section 4.1.6*). The level of detail for each hazard is generally limited by the amount of data available.

Each hazard profile contains a description of the hazard and the history of occurrence, the vulnerability and area of impact, the probability and magnitude of future events, and an evaluation of how future development is being managed to reduce risk. The methodology used to analyze each of these topics is further described below.

Description and History

A number of databases were used to describe and compile the history of hazard events profiled in this plan. This data was supplemented by input from the public, local officials, newspaper accounts, and internet research. The two primary databases used included the National Climatic Data Center (NCDC) Storm Events Database and Spatial Hazard Events and Losses Database for the United States (SHELDUS).

The NCDC Storm Events database receives Storm Data from the National Weather Service. The NWS service receives their information from a variety of sources, including county, state and federal emergency management officials, local law enforcement officials, sky-warn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage and/or disruption to commerce.

SHELDUS is a county-level hazard data set for the United States that records 18 different natural hazard event types. For each event the database includes the date, location, property losses, crop losses, injuries, and fatalities that affected each county. The database includes every loss causing and/or deadly event from 1960 to 1975 and from 1995 onward. Between 1976 and 1995, SHELDUS reflects only

events that caused at least one fatality or more than $50,000 in property or crop damages.

Vulnerability and Area of Impact

Vulnerabilities are described in terms of critical facilities, structures, population, and socioeconomic values that can be affected by the hazard event. Hazard impact areas describe the geographic extent a hazard can impact a jurisdiction and are uniquely defined on a hazard-by-hazard basis. Mapping of the hazards, where spatial differences exist, allows for hazard analysis by geographic location. Some hazards can have varying levels of risk based on location. Other hazards cover larger geographic areas and affect the area uniformly.

Probability and Magnitude

Probability of a hazard event occurring in the future was assessed based on hazard frequency over a 100 year period. Hazard frequency was based on the number of times the hazard event occurred divided by the period of record. If the hazard lacked a definitive historical record, the probability was assessed qualitatively based on regional history and other contributing factors. Probability was broken down as follows:

- Highly Likely – greater than 1 event per year (frequency greater than 1).
- Likely – less than 1 event per year but greater than 1 event every 10 years (frequency greater than 0.1 but less than 1).
- Possible – less than 1 event every 10 years but greater than 1 event every 100 years (frequency greater than 0. 01 but less than 0.1).
- Unlikely – less than 1 event every 100 years (frequency less than 0.01)

The magnitude or severity of potential hazard events was evaluated for each hazard. Magnitude is a measure of the strength of a hazard event and is usually determined using technical measures specific to the hazard. Magnitude was calculated for each hazard where property damage data was available. Magnitude is:

- (Property Damage / Number of Incidents) / $ of Building Stock Exposure = Magnitude expressed as a percentage.

Future Development

The impact to future development was assessed based on potential opportunities to limit or regulate development in hazardous areas such as zoning and subdivision regulations. The impacts were assessed through a narrative on how future development could be impacted by the hazard. Plans, ordinances and/or codes currently in place were identified that could be revised to better protect future development in the county from damage caused by natural and man-made hazards.

4.1.5 Hazard Ranking and Priorities

In ranking the hazards, the Planning Team completed a Calculated Priority Risk Index (CPRI) Work Sheet for each hazard. The CPRI examines four criteria for each hazard (probability, magnitude/severity, warning time, and duration); the risk index for each according to four levels, then applies a weighting factor (**Table 4.1-1**). The result is a score that has been used to rank the hazards. Each hazard profile presents its CPRI score with a cumulative score sheet included in **Appendix C**. **Table 4.1-2** presents the results of the CPRI scoring for all hazards.

TABLE 4.1-1
CALCULATED PRIORITY RISK INDEX

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	▪ Rare with no documented history of occurrences or events. ▪ Annual probability of less than 0.01.	1	45%
	Possibly	▪ Infrequent occurrences with at least one documented or anecdotal historic event. ▪ Annual probability that is between 0.1 and 0.01.	2	
	Likely	▪ Frequent occurrences with at least two or more documented historic events. ▪ Annual probability that is between 1 and 0.1.	3	
	Highly Likely	▪ Common events with a well documented history of occurrence. ▪ Annual probability that is greater than 1.	4	
Magnitude/ Severity	Negligible	▪ Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses are treatable with first aid and there are no deaths. ▪ Negligible quality of life lost. ▪ Shut down of critical facilities for less than 24 hours.	1	30%
	Limited	▪ Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses do not result in permanent disability and there are no deaths. ▪ Moderate quality of life lost. ▪ Shut down of critical facilities for more than 1 day and less than 1 week.	2	
	Critical	▪ Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and at least one death. ▪ Shut down of critical facilities for more than 1 week and less than 1 month.	3	
	Catastrophic	▪ Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). ▪ Injuries or illnesses result in permanent disability and multiple deaths. ▪ Shut down of critical facilities for more than 1 month.	4	
Warning Time	Less than 6 hours	Self explanatory.	4	15%
	6 to 12 hours	Self explanatory.	3	
	12 to 24 hours	Self explanatory.	2	
	More than 24 hours	Self explanatory.	1	
Duration	Less than 6 hours	Self explanatory.	1	10%
	Less than 24 hours	Self explanatory.	2	
	Less than one week	Self explanatory.	3	
	More than one week	Self explanatory.	4	

TABLE 4.1-2 CSKTCALCULATED PRIORITY RANKING INDEX SUMMARY					
Hazard	**Probability**	**Magnitude and/or Severity**	**Warning Time**	**Duration**	**CPRI Score**
Wildfires	Highly likely	Critical	< 6 hours	> 1 week	3.70
Highway Accident	Highly likely	Limited	< 6 hours	< 24 hours	3.20
Landslides	Likely	Limited	< 6 hours	> 1 week	2.95
Structure Fire	Likely	Limited	< 6 hours	< 24 hours	2.75
Severe Winter Weather	Highly likely	Limited	6-12 hours	< 1 week	2.70
Severe Summer Weather	Likely	Limited	6-12 hours	< 24 hours	2.60
Communicable Disease - Public Health	Possibly	Limited	< 6 hours	> 1 week	2.50
Earthquake	Likely	Negligible	< 6 hours	< 6 hours	2.35
Dam Failure	Unlikely	Critical	< 6 hours	> 1 week	2.35
Railroad Accident	Unlikely	Critical	< 6 hours	> 1 week	2.35
Hazardous Materials Incidents	Possibly	Limited	< 6 hours	< 24 hours	2.30
Volcanic Ash	Unlikely	Critical	6-12 hours	> 1 week	2.20
Flooding	Possibly	Negligible	> 24 hours	> 1 week	1.75
Aircraft Accident	Unlikely	Limited	< 6 hours	< 6 hours	1.75
Terrorism/Violence	Unlikely	Negligible	< 6 hours	< 1 week	1.65
Communicable Disease - Livestock/Ag	Unlikely	Limited	> 24 hours	> 1 week	1.60
Drought	Unlikely	Limited	> 24 hours	> 1 week	1.60

The Calculated Priority Risk Index scoring method has a range from 0 to 4. "0" being the least hazardous and "4" being the most hazardous situation.

The Planning Team determined that five hazards scored using the CPRI should be de-emphasized in the PDM Plan for the reasons cited below:

- Volcanic Ash – Hazard does not often occur and not likely to significantly impact CSKT.
- Aircraft Accidents – Hazard not likely to cause mass casualties when occurring in CSKT.
- Terrorism/Violence – Significant events are not likely to occur in CSKT.
- Communicable Disease-Livestock/Agriculture – Hazard not likely to impact CSKT.
- Drought – Mitigation of this hazard managed under State and Federal programs.

These hazards will not be further addressed in the body of this Plan.

The Planning Team felt that the CPRI ranking did not accurately represent CSKT's priorities; therefore, the list of hazards was re-prioritized as shown below. The remainder of this section contains the hazard profiles in this order:

1 – Wildfire (*Plan Section 4.2*)
2 – Transportation Accidents including Hazardous Material Incidents (*Plan Section 4.3*)
3 – Landslides (*Plan Section 4.4*)
4 – Structure Fire (*Plan Section 4.5*)
5 – Severe Weather (*Plan Section 4.6*)

6 – Flooding (*Plan Section 4.7*)
7 – Communicable Disease (*Plan Section 4.8*)
8 – Severe Summer Weather (*Plan Section 4.9*)
9 – Earthquakes (*Plan Section 4.10*)
10 – Dam Failure (*Plan Section 4.11*)

4.1.6 Assessing Vulnerability – Estimating Potential Losses

The methodology used in the vulnerability analysis presents a quantitative assessment of the building stock, population, and critical facility exposure to the individual hazards. Building stock data, available from the Montana Department of Revenue's cadastral mapping program was used in the analysis. This data spatially recognizes land parcels along with the appraised value of building stock. Using GIS, hazard risk areas were intersected with the building stock data to identify the number of structures and exposure due to each hazard. Using GIS, hazard risk areas were also intersected with critical facility data to determine the number and exposure of critical facilities to each hazard. Various infrastructures (e.g. water systems, wastewater systems) were analyzed as part of the critical facility vulnerability analysis. A separate analysis was completed for the Reservation's bridges.

Population exposure was computed using data from the 2010 census and the percentage of the census blocks located in each hazard area. Population exposure is reported according to total population living in the hazard area and a subset of this data, individuals under the age of 18 years. Using GIS, total population for the census blocks was intersected with the hazard maps to determine the population at risk. It should be noted that there are some inherent inaccuracies using this approach. Using a percentage of census block population to compute the number of individuals living in the hazard area may include more persons than actually reside in the hazard area where census blocks are large.

For hazards that are uniform across the jurisdiction (i.e. severe summer weather, structure fires and severe winter weather) the methodology presented below was used to determine annualized property loss.

- Exposure x Frequency x Magnitude

Where:

- Exposure = building stock, vulnerable population, or critical facilities at risk
- Frequency = annual number of events determined by calculating the number of hazard events / period of record
- Magnitude = percent of damage expected calculated by: (property damage/# incidents)/ building stock or critical facility exposure

For hazards that are not uniform across the jurisdiction and instead occur in specific areas (e.g.

flooding, wildfire, hazardous material incidents, dam failure, etc.) the hazard area factored into the loss estimation calculations.

For hazards without documented property damage, magnitude could not be calculated and therefore, only the exposure of the building stock or population was computed. Annualized loss estimates cannot be calculated without property damage using this risk assessment approach.

4.1.7 Data Limitations

Risk assessment results are only a general representation of potential vulnerabilities and there are many inherent inaccuracies with the risk assessment methodology used. Output is only as good as the data sources used and CSKT may wish to consider alternate data for future PDM Plan updates.

The remainder of this section presents hazard profiles organized by CSKT priority followed by a risk assessment summary. Loss estimates, where applicable, are summarized at the end of this section.

4.2 WILDFIRE

CPRI SCORE = 3.7

Description and History

A wildfire is an unplanned fire, a term which includes grass fires, forest fires and scrub fires, both man-caused and natural in origin. Severe wildfire conditions have historically represented a threat of potential destruction within the region. Negative impacts of wildfire include loss of life, property and resource damage or destruction, severe emotional crisis, widespread economic impact, disrupted and fiscally impacted government services and environmental degradation.

Wildfire risk is the potential for a wildfire to adversely affect things that residents value- lives, homes, or ecological functions and attributes. Wildfire risk in a particular area is a combination of the chance that a wildfire will start in or reach that area and the potential loss of human values if it does. Human activities, weather patterns, wildfire fuels, values potentially threatened by fire and the availability (or lack) of resources to suppress a fire all contribute to wildfire risk. Summer on the Flathead Reservation typically brings the fire season, the result of low rainfall, high temperatures, low humidity and thunderstorms with lightning. However, major wildfires can occur at any time of the year. Varied topography, semi-arid climate, and numerous human-related sources of ignition make this possible.

In the past 20 years, CSKT has had a number of wildfires that have destroyed property and affected wildlife habitat, scenic resources, and air quality. **Table 4.2-1** presents a summary of the wildfires on the Flathead Reservation (in Lake, Sanders, and Missoula Counties) over the past 38 years indicating a total of 4,043 fires that burned 174,281 acres. **Table 4.2-2** presents the wildfires in CSKT over 10 acres from 1980 to 2011 reported by the Montana DNRC indicating the number of structures burned and saved (where this data is available).

TABLE 4.2-1
CSKT REPORTED WILDFIRE STATISTICS: 1973 - 2011

Year	# of Fires	Total Acres	Year	# of Fires	Total Acres	Year	# of Fires	Total Acres
1973	98	1771.5	1986	64	2,105.8	1999	210	3,047.9
1974	88	985.8	1987	43	72.4	2000	152	24,415.5
1975	34	35.6	1988	57	163.6	1001	163	1,890.9
1976	45	105.4	1989	40	422.3	2002	204	2,557.8
1977	67	89.3	1990	73	169.6	2003	243	13,132.6
1978	20	9.7	1991	50	169.8	2004	93	7,982
1979	62	253.9	1992	53	1120.4	2005	85	14,728.2
1980	36	43.3	1993	42	32.4	2006	372	7,977.6
1981	82	336	1994	88	15,203.4	2007	156	43,846
1982	34	59.5	1995	50	732.7	2008	284	14,241.5
1983	23	42.8	1996	45	1,505.5	2009	194	2,170.3
1984	55	158.9	1997	84	800	2010	153	8,636
1985	36	450	1998	153	3,560	2011	214	265.3

Source: CSKT, 2012

TABLE 4.2-2
MONTANA DNRC REPORTED WILDFIRES OVER 10 ACRES ON CSKT, 1980-2010

Date	Name	Size in Acres	Homes & Outbuildings Lost	Homes Saved	Outbuildings Saved
8/27/1984	Red Owl	934	0	-	-
5/10/1987	Unit 10	19	0	-	-
8/17/1988	Squeezer Face	52	0	-	-
8/9/1994	Soupy Ridge	65	0	-	-
5/3/1998	Goat Creek	235	0	-	-
6/20/1999	Hog Heaven	12	0	-	-
11/11/2001	Salmon Prairie	17	0	-	-
7/13/2007	Indian Springs	17	0	1	5
5/12/2007	Salmon Prairie	18	0	1	2

Source: Montana Department of Natural Resources and Conservation, 2012

Wildfire disasters were declared in CSKT in 1994 and 2000. State-wide wildfire disasters have been declared in 1979, 1988, 1991, 1992, 1996, 1998, 1999 and 2003 (DMA, 2011).

In CSKT there are three wildland fire protection entities: the U.S. Forest Service (USFS), DNRC, and the Tribe Division of Fire. The Tribal Division of Fire, located in Ronan, has an agreement with the State to provide protection on forested fee land. The Tribal unit also provides training for local fire departments. These entities and coordination with the 13 Volunteer Fire Districts (VFDs) provides for efficient wildland fire protection in Lake County.

Vulnerability and Area of Impact

Fire suppression has changed the vegetation patterns, structure, and composition of forests. Therefore, the role that fire plays in these ecosystems has also been altered. The last decade on the Flathead Reservation has seen new homes and other structures built near and around national forests. Should fires occur, these structures within the wildland-urban interface (WUI) are very vulnerable. The WUI is defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. A WUI exists anywhere that structures are located close to natural vegetation and where a fire can spread from vegetation to structures, or vice versa. A WUI can vary from a large housing development adjacent to natural vegetation to a structure or structures surrounded by vegetation. As people, homes and structures continue to occupy the WUI and as hazard fuels continue to accumulate, a high risk and volatile situation needs to be addressed. Long periods of warm dry summer weather combined with lightning storms are often causes associated with wildfire. Risks associated with wildfire relate to fuels, slope, orientation, access, the availability of an adequate water supply, the availability of trained personnel and fire apparatus and resource values (i.e., natural resources and property).

Homes are often located at the forest edge or in the forest itself; built out of flammable materials (wood siding and other flammable materials); constructed near the end of gulches with only one escape route or on steep hillsides with narrow, winding roads; and built on lands without adequate water. While the site or building material may be chosen for its aesthetic merit, it often has few or none of the qualities essential for the safety of both the home and its occupants in the event of a fire.

Problems with wildfire occur when combined with the human environment. People and structures near wildfires are threatened unless adequately protected through evacuation or mitigation. Most structures are flammable, and therefore, are threatened when wildfire approaches. In addition, a significant loss of life could occur to residents, firefighters, and others who are in the wildfire area and do not evacuate. Infrastructure such as electric transmission lines, fuel tanks, and radio transmission towers are not often equipped to withstand the heat from a wildfire. Timber resources, animal habitats, and waterways can all be damaged leading to negative economic and environmental impacts.

There is a changing complexion in the ownership of private forest land holdings which could result in subdivisions and new housing developments in the WUI. The DNRC has started inventorying fire risk in the Swan Valley and in interface areas around Lake Mary Ronan, along the east shore of Flathead Lake and along the west shore of Flathead Lake, in the Rollins area. Recent actions along the Mission Front and in the Jette area to reduce the likelihood of catastrophic wildfire include fuel thinning and controlled burns.

CSKT has a non-regulatory Community Wildfire Protection Plan (CWPP) and diligent efforts are underway to reduce the wildfire hazard through education and fuel reduction projects. **Appendix E** contains a copy of the CSKT CWPP. Mitigation projects identified in this plan are incorporated herein by reference.

Probability and Magnitude

Property damage is difficult to obtain for wildfires since it is typically the forest resource that sustains the damage. DNRC has collected data on structure loss from wildfires since 2003 (**Table 4.2-2**). This source indicates that in the past 10 years, wildfire has not claimed any residential structures on the Flathead Reservation.

Table 4.2-3 presents the wildfire events in CSKT with reported property damages from the DES database of State and Federal disaster declarations.

TABLE 4.2-3
CSKTWILDFIRE EVENTS WITH DAMAGES

Date	Injuries	Fatalities	Property Damage	Remarks
1994	--	--	$340,245*	Presidential Declaration
2000	--	--	$1,831,472*	Presidential Declaration
TOTAL			$2,171,717	

* Prorated amount for multi-county Presidential Disaster Declaration adjusted for inflation.

Source: DES, 2011

Wildfire does not present a uniform risk across the reservation. **Figure 5** presents a wildfire risk map showing the WUI and the CSKT critical facilities. The WUI layer used for this analysis consists of the risk areas determined by the 2005 CSKT/CWPP, which were provided in digital format by the CSKT Planning Department.

To complete the vulnerability analysis for this project, GIS was used to intersect the resulting WUI layer with both the critical facility and MDOR cadastral parcel datasets. Estimates of vulnerable population were calculated by determining the percent exposure in each census block for the hazard area. Exposure values are presented in **Table 4.2-4 [update and re-format table to include tribal council districts]**. Annualized loss estimates were calculated by applying frequency and magnitude to building stock exposure, and are presented on the Risk Assessment Summary tables in *Section 4.12* (**Tables 4.12-1 through 4.12-4**). Building exposure reflects only the monetary structure value and does not account for improvements or personal effects that may be lost to wildfire. The *Wildfire Section* in **Appendix C** presents supporting documentation from the risk assessment including a list of critical facilities in the WUI.

GIS analysis of the wildfire risk to the Flathead Reservation indicates that over 213,864 acres are within the WUI. According to the vulnerability analysis, 6,265 residences, 927 commercial, industrial and agricultural buildings, and 21 critical facilities are located in the WUI. Digital data on construction type for the facilities is not available but will be considered in future PDM updates.

The history of wildfires and terrain has prompted CSKT to identify wildfire as a significant hazard. Smoke from fires both within and outside of the Reservation can create poor air quality. Sensitive groups, such as the elderly and asthmatics, can be affected. Wildfires can also have a significant impact on the regional economy with the loss of timber, natural resources, recreational opportunities, or tourism. Although the primary concern is to structures and the interface residents, most of the costs associated with fires, come from firefighting efforts. As past events have also shown, infrastructure such as power transmission lines can also be threatened.

Wildfires generally occur more than once per year on the Reservation and therefore, the probability of future events are rated as “highly likely”.

TABLE 4.2-4
CSKT VULNERABILITY ANALYSIS – WILDFIRE

JURISDICTION	RESIDENTIAL PROPERTY EXPOSURE $	# RESIDENCES AT RISK	COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTY EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRICULTUAL PROPERTIES AT RISK	CRITICAL FACILITIES EXPOSURE RISK $	# CRITICAL FACILITIES AT RISK	BRIDGE EXPOSURE $	# BRIDGES AT RISK	PERSONS AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County										
Polson	$0	0	$0	0	$0	0	$0	0	0	0
Ronan	$989,415	7	$0	0	$0	0	$0	0	27	12
St. Ignatius	$0	0	$0	0	$0	0	$0	0	0	0
Remainder of County	$1,239,691,127	6,265	$71,969,078	927	$69,358,669	21	$3,787,396	35	14,024	3,507
CENSUS Designated Places										
Arlee CDP	$15,385,873	151	$9,733,532	65	$5,578,791	5	$240,184	2	636	187
Bear Dance CDP	$66,399,442	244	$1,948,114	25	$0	0	$0	0	275	54
Big Arm CDP	$22,369,725	126	$4,629,812	43	$ not available	2	$0	0	177	39
Charlo CDP	$0	0	$0	0	$0	0	$0	0	0	0
Dayton CDP	$0	0	$0	0	$0	0	$0	0	0	0
Elmo CDP	$0	0	$0	0	$0	0	$0	0	68	16
Finley Point CDP	$231,936,697	909	$2,679,845	104	$0	0	$0	0	480	76
Jette CDP	$0	0	$0	0	$0	0	$0	0	0	0
Kerr CDP	$0	0	$0	0	$0	0	$0	0	0	0
Kicking Horse CDP	$2,046,669	15	$23,780	3	$ not available	1	$26,840	1	286	71
King's Point CDP	$48,709,003	276	$105,948	15	$0	0	$0	0	136	24
Lake Mary Ronan CDP	$10,572,670	77	$1,457,076	15	$0	0	$0	0	65	5
Lindisfarne CDP	$77,983,856	443	$1,148,242	54	$0	0	$0	0	284	56
Pablo CDP	$32,898,978	340	$9,782,087	101	$62,567,543	6	$0	0	2074	695
Ravalli CDP	$4,172,219	52	$1,303,480	25	$0	0	$0	0	76	12
Rocky Point CDP	$0	0	$0	0	$0	0	$0	0	0	0
Rollins CDP	$51,820,088	274	$1,741,158	38	$ not available	1	$0	0	209	38
Swan Lake CDP	$24,312,788	139	$1,007,539	26	$62,567,543	1	$102,400	4	113	15
Turtle Lake CDP	$746,239	6	$0	0	$0	0	$0	0	209	88
Woods Bay CDP	$101,436,397	452	$9,502,827	67	$0	0	$34,400	1	661	128
County Commissioner Districts										
District 1	$1,011,880,374	4,646	$35,239,540	612	$243,360	6	$1,919,412	10	5,629	1,048
District 2	$120,112,532	793	$25,654,228	164	$5,588,791	7	$1,536,368	18	4,090	1,225
District 3	$108,687,636	833	$11,075,310	151	$63,526,518	8	$331,616	7	4,332	1,246

Future Development

The CSKT Subdivision Regulations contain standards designed to minimize the risk of destructive fire to life and residential property. They address design and improvement standards for new subdivisions in WUI areas in order to: improve access to developments, homes and other property; minimize the potential spread of fire from wildland areas to structures and from structure fires to wildland areas; permit efficient suppression of fires; insure that new subdivisions in the WUI provide water supply systems with suitable access for firefighting crews and apparatus; and educate property owners, residents, and people that they have a responsibility for prevention of wildland fire on their own property.

All subdivisions must be planned, designed, constructed and maintained so as to minimize the risk of fire and to permit the effective and efficient suppression of fires in order to protect persons, property and forested areas including: the placement of structures so as to minimize the potential for flame spread and to permit adequate access for firefighting equipment; the presence of adequate firefighting facilities either on site or in the vicinity of the subdivision, including an adequate water supply and distribution system; and, the availability, through a fire protection district or other means, of fire protection services adequate to respond to fires that may occur within a subdivision.

For unincorporated areas of the Reservation, a Fire Risk Rating Form must accompany the submission of any application for preliminary plat approval. The risk rating determines access requirements, minimum lot sizes, building spacing, water supply requirements and vegetative treatments. The subdivider must also provide a Fire Prevention and Control Plan to provide a strategy for reducing fire potential and provides safe working areas for emergency responders fighting fire.

4.3 TRANSPORTATION ACCIDENTS (INCLUDING HIGHWAY & RAILROAD ACCIDENTS AND HAZARDOUS MATERIAL INCIDENTS)

CPRI SCORES:
HIGHWAY ACCIDENTS = 3.2
RAILROAD ACCIDENTS = 2.3
HAZARDOUS MATERIAL INCIDENTS = 2.3

Description and History

CSKT maintains a total of 1,153 miles of roads that range from highways to local access type roadways. Paved surfaces account for about 230 miles while the remaining 923 miles are gravel surfaced. CSKT also maintains approximately 100 bridges. Montana Rail Link traverses the south portion of the Reservation for 15 miles. Rail service along a spur line running from Dixon to Polson was discontinued in 2011.

No interstate highways traverse the Reservation. U.S. Highway 93, a north-south route extending the entire length of the Reservation, is part of the National Highway System and is classified as a principal arterial. U.S. Highway 93 between Hamilton and Polson is the most heavily traveled non-interstate corridor in Montana. The highway carries a mix of traffic including passenger automobiles, commercial vehicles, logging trucks, recreational vehicles and agricultural vehicles. On the Reservation there is substantial visitor traffic in the summer between Missoula and Kalispell/Glacier Park. Montana Highway 35, on the east side of Flathead Lake, and Highway 83, through the Swan Valley, are part of Montana's primary highway system and act as minor arterials.

The source and location of highway accidents vary but the response is typically the same. Response is focused on determining the presence of hazardous materials and then assisting the injured. Statistics on highway accidents in the reservation over the past 9 years were provided by the Montana Highway Patrol, and are presented in **Table 4.3-1**. Information is not available on whether these incidents involved a hazardous material response.

TABLE 4.3-1
CSKT HIGHWAY ACCIDENT STATISTICS; 1/2002 to 12/2010

Number of Accidents	Fatalities	Injuries	# Involving Property Damage	Total Property Damage
3,933	101	2,340	768	>$426,750

Sources: Montana Highway Patrol, 2012

A hazardous material release is the contamination of the environment (i.e. air, water, soil) by any material that, because of its quantity, concentration, or physical or chemical characteristics threatens human health, the environment or property. Hazardous materials, including petroleum products and agricultural chemicals, are commonly stored and used on the Reservation and are regularly transported via the regions roadways, railroads, and pipelines. A release of hazardous materials from both fixed and transportation incidents pose possible threats to CSKT. Hazards range from small spills on roadways to major transportation releases on railways. Records of hazardous material events in Lake County, available from the National Response Center database, are summarized in **Table 4.3-2**

TABLE 4.3-2
LAKE COUNTY HAZARDOUS MATERIAL INCIDENTS

Incident Date	Type Of Incident	Incident Cause	Location	Nearest City	Suspected Responsible Company	Medium Affected	Material Name
6/28/1991	Unknown Sheen	Unknown	Flathead Lake Dayton Yacht Harbor	Polson		Water	Unknown Oil
6/12/1992	Mobile	Operator Error	Highway 35	Polson	Columbia Falls Alum Co	Land	Sodium Cyanide
10/10/1996	Mobile	Accident	Hwy 93, MM: 38	St. Ignatius	Wilbert Ellis	Land	Unknown Material
2/25/1997	Fixed	Other	Hwy 93	Ronan	Ford Motor Co.	Water	Waste Oil; Ethylene Glycol
2/25/1997	Fixed	Unknown	#5 Third Ave. NW Ronan, Mt.	Ronan	Don Aadsen	Water	Oil, Fuel: No. 2-D; Waste Oil
9/22/1997	Unknown Sheen	Unknown	Hwy 93 North MM:17	Missoula		Water	Unknown Oil
8/1/2000	Fixed	Dumping	Flathead River	Polson	City Of Polson Water Dept	Water	Raw Sewage
5/27/2001	Vessel	Dumping	Woods Bay Marina Area			Water	Oil, Misc: Motor; Oil, Fuel: No. 2-D
9/25/2001	Fixed	Unknown	Unknown	Pablo		Air	Tires
5/22/2003	Storage Tank	Equipment Failure	305 5th Ave. E.	Pablo		Land	Oil, Fuel: No. 2
1/24/2004	Mobile	Accident	Off Hwy 83 Into Swan Lake		Eagle Express Lines	Water	Motor Oil
3/23/2004	Storage Tank	Unknown	Courville Trail	Polson		Land	Drug Residue; Unknown Oil
4/13/2004	Mobile	Accident	I-93, MM 45N	Ronan	N.A.Van Lines	Land	Diesel
4/19/2004	Mobile	Accident	MM 90 Near Rollins	Rollins		Water	Motor Oil
8/19/2004	Mobile	Operator Error	Flathead Lake			Water	Motor Oil
10/21/2004	Storage Tank	Equipment Failure	Pacific Pride	Polson	CHS Transport	Other	Unleaded Gasoline
1/26/2006	Storage Tank	Other	111 5th Avenue W.	Polson		Water	Home Heating Oil
7/4/2006	Mobile	Other	Hwy 35, MM 17.3	Big Fork		Water	Unleaded Gasoline
7/11/2006	Mobile	Equipment Failure	Polson Bridge On Hwy 93	Polson	Rocky Mountain Veterinary Service	Water	Diesel
10/19/2006	Storage Tank	Operator Error	Polson Co-Op 808 Main St.	Polson	Cenex Harvest States	Land	Oil, Fuel: No. 1-D
1/29/2007	Fixed	Equipment Failure	Kerr Dam	Polson	American Hydro	Water	Mobile Heavy Turbine Oil
3/13/2008	Fixed	Dumping	Alco Auto Sales 57730 Hwy 93 North	Pablo		Land	Oil, Misc: Motor; Ethylene Glycol
4/2/2008	Mobile	Unknown	Montana Hwy 35 MM 5.5	Polson	Keller Transport Inc.	Soil	Unleaded Gasoline
3/23/2009	Storage Tank	Other	316 First St. East	Polson		Soil	Oil: Diesel
10/3/2009	Vessel	Vessel Sinking	Off Rocky Point Flat Head Lake	Polson		Water	Unleaded Gasoline
8/16/2010	Fixed	Equipment Failure	49708 US Hwy 93	Polson	Kwataqnuk	Water	Unleaded Gasoline
10/25/2010	Fixed	Dumping	Hwy 93 South, 16 Mi. NW of Polson	Big Arm		Water	Raw Sewage
4/1/2010	Fixed	Other	52469 Camp Tuffit Rd	Proctor	Camp Tuffit LLC	Water	Sewage; Unleaded Gasoline

Source: National Response Center, 2011

Major toxic spills into Flathead Lake in recent years include the 2001 sinking of a barge on the lake that resulted in the spill of a significant amount of diesel fuel at Woods Bay, and the 2008 crash of a tanker truck on Highway 35 that spilled 6,400 gallons of gasoline on the East Shore south of Finley Point. After the 2008 spill, a local group encouraged the Montana Department of Transportation (MDT) to undertake a comprehensive analysis of highway conditions and use (including the amount and kinds of hazardous materials transported), impacts and costs of the spill, documentation of previous spills, and a thorough evaluation of various alternative remedies (including potential highway improvements, limiting speeds in areas in proximity to the lake, prohibiting "pup" trailers, limiting hazardous materials transport, and increasing enforcement of regulations). The MDT conducted a limited analysis and made some changes, including expanding "no passing zones". The PDM Planning Team indicated that the 2008 tanker truck spill caused over $10 million in damages.

Another hazardous material incident reported by the PDM Planning Team was a 1996 crash between an agricultural tanker and car in the Post Creek area. Products mixed together and resulted in closure of S. Highway 93 for 24 hours.

Locations of chemical/petroleum storage in CSKT with regulatory reporting requirements include:

- AT&T, Ravalli and Polson
- Polson Propane, Polson
- Northern Energy, Polson
- CHS Inc. – Mountain West Cooperative, Polson
- CHS Inc. – Energy Partners, Ronan and Polson
- Century Link, Polson

Vulnerability and Area of Impact

Transportation accidents are of primary concern on the Flathead Reservation. U.S. Highway 93 is a heavily traveled corridor that presents safety problems due to increased traffic and outdated design (in some areas). Although mass casualty events with busses have not occurred, several car crashes have resulted in four or more being killed.

Several kinds of hazardous materials are regularly transported through the Flathead Reservation. Thirty rail cars, each containing 33,000 gallons of gasoline, pass through the county daily along the 15 miles of railroad track. A problem with even one rail car filled with gasoline could cause a significant spill affecting the Jocko and/or Clark Fork Rivers in the Arlee and Ravalli areas. In addition, semi-trucks loaded with agricultural herbicides and pesticides travel the local highways. CSKT has an agreement with the haz-mat Team in Missoula County to assist in the event of any major incidents. The Tribes also have individuals trained in dealing with hazardous materials (CSKT Growth Policy).

Both the Emergency Planning and Community Right-to-Know Act (EPCRA) were enacted in 1986 to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires the EPA and the states to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory (TRI). In 1990 Congress passed the Pollution Prevention Act, which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed. There are no TRI facilities on the Reservation.

To model the spatial distribution of hazardous material incident risk a GIS data layer of transportation arteries was used, which included highways, major roadways and railroads. Facilities in the Reservation with hazardous materials or petroleum reporting requirements were added to this layer and it was then buffered by 0.25 miles. Building exposure was calculated by intersecting the hazardous material buffer with the MDOR parcel and critical facility GIS layers. Population exposure was calculated by intersecting the hazardous material buffer with census block data. **Figures 6A through 6E** present the hazardous material buffer for the Reservation and the tribal council districts of Polson, Ronan, St. Ignatius, and Pablo, respectively, and indicate the vulnerability of critical facilities to hazardous material incidents. **Table 4.3-3** presents the exposure risk in these hazard areas.

The GIS analysis indicates that there are 81,543,000 acres within the Reservation boundaries. Within the hazardous material buffer there are 5,847 residences, 1,848 commercial, industrial and agricultural buildings, and 57 critical facilities. The *Hazardous Material Incident Section* in **Appendix C** lists the critical facilities within the hazardous material buffer and presents other supporting documentation from the risk assessment.

Probability and Magnitude

The Reservation is vulnerable to all types of transportation emergencies. The two major effects of transportation accidents are human injury and hazardous materials releases. There have been no Presidential Disaster Declarations or State emergency declarations associated with the Transportation Accident hazard on the Reservation and the likelihood of a significant event resulting in a disaster declaration is considered low.

Transportation accidents have caused well over $400,000 dollars in property damage over the past nine years and resulted in 101 fatalities and over 2,340 injuries. There have been 28 hazardous material incidents over the past 21 years on the Reservation with one accident resulting in over $10 million in damages. Since transportation accident/hazardous material incident hazard occurs more than once per

year, the probability of future events is rated as "highly likely". The PDM Planning Team rated the hazardous material incident hazard as "possible" using the Calculated Priority Risk Index.

Future Development

CSKT does not have any ordinances or regulations requiring special considerations to mitigate the effects of transportation accidents. There are no land use regulations that restrict building around industrial facilities or along transportation routes or in the vicinity of facilities that store large quantities of hazardous materials/petroleum products.

The Polson Development Code states that any development that generates, handles, stores, or disposes of hazardous materials shall demonstrate continuing compliance with state or federal requirements for such activities, and, within the city limits, with the applicable requirements of the city's fire and building codes. In addition, all applications for permits for such uses shall be accompanied by an initial list of hazardous chemicals, or the materials safety data sheets for such chemicals, proposed to be on the site. No permit shall be approved until the fire department has reviewed this list and indicated that it has the capability to effectively respond to an emergency at the proposed development. No development to which the fire department cannot effectively respond shall be approved.

The Polson Development Code also includes a goal to address the community's need for a U.S. Highway 93 bypass that could require that hazardous material transport bypass the main business district.

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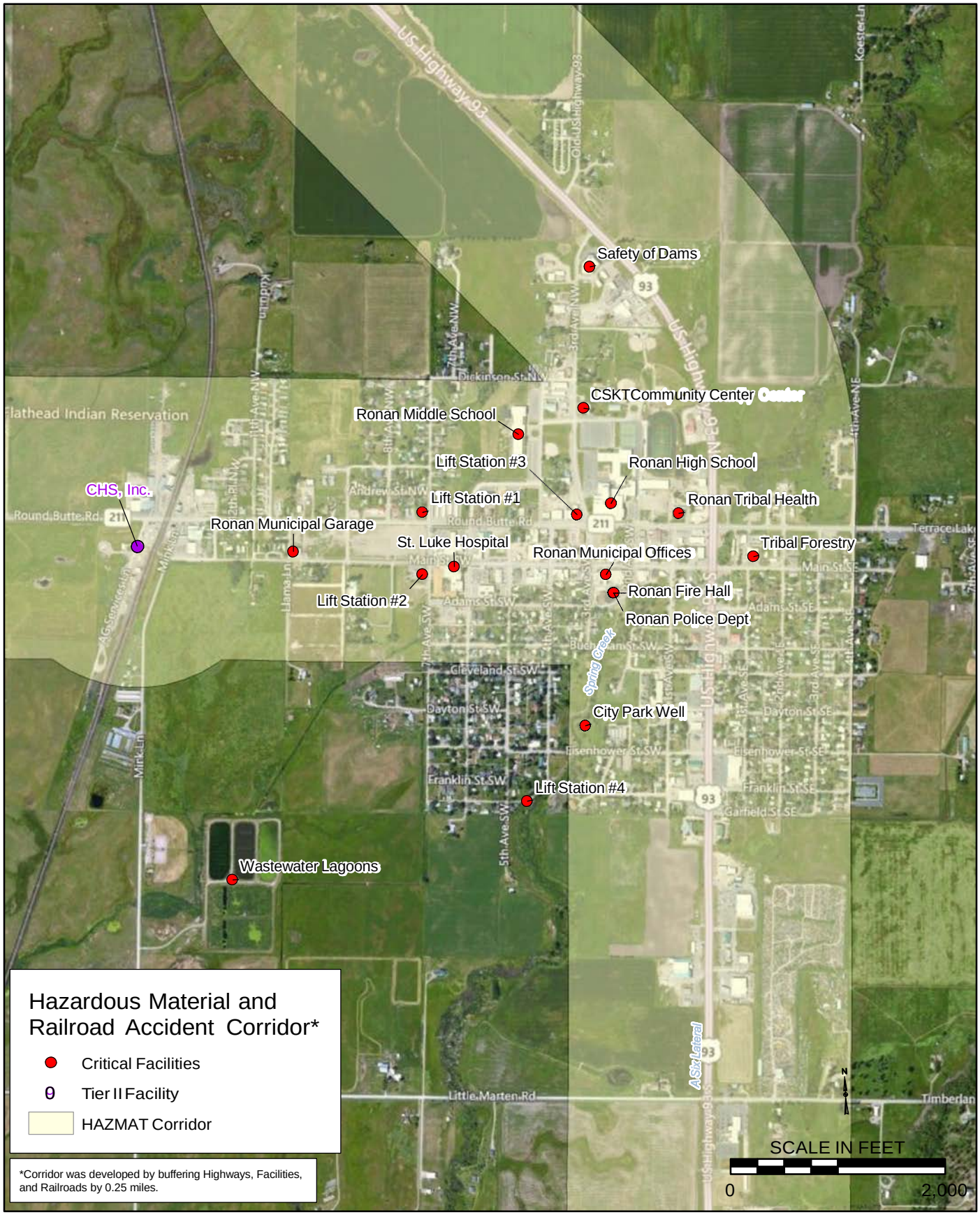
May 2012

Figure 68

Polson - Hazardous Material and Railroad Accident Buffer

CSKT

Pre-Disaster Mitigation Plan



May 2012

Figure 6C

Ronan - Hazardous Material and Railroad Accident Buffer

CSKT

Pre-Disaster Mitigation Plan

May 2012

Figure 60

Saint Ignatius - Hazardous Material and Railroad Accident Buffer

CSKT

Pre-Disaster Mitigation Plan

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May 2012

Figure 6E

Pablo - Hazardous Material and Railroad Accident Buffer

CSKT

Pre-Disaster Mitigation Plan

TABLE 4.3-3
CSKT VULNERABILITY ANALYSIS – TRANSPORTATION ACCIDENTS/HAZARDOUS MATERIAL INCIDENTS

JURISDICTION	RESIDENTIAL PROPERTY EXPOSURE $	# RESIDENCES AT RISK	COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTY EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRICULTUAL PROPERTIES AT RISK	CRITICAL FACILITIES EXPOSURE RISK $	# CRITICAL FACILITIES AT RISK	BRIDGE EXPOSURE $	# BRIDGES AT RISK	PERSONS AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County										
Polson	$90,923,471	890	$149,850,759	517	$31,062,173	11	$3,277,204	1	2,721	611
Ronan	$50,690,419	683	$110,298,707	420	$57,042,214	12	$0	0	1,617	432
St. Ignatius	$11,038,483	122	$4,050,397	34	$0	0	$0	0	315	76
Remainder of County	$878,162,473	5,847	$354,779,480	1,848	$163,529,316	57	$6,828,276	32	17,342	4,371
CENSUS Designated Places										
Arlee CDP	$11,301,631	119	$9,727,230	62	$5,578,791	5	$240,184	2	588	169
Bear Dance CDP	$64,855,885	235	$1,863,070	21	$0	0	$0	0	275	54
Big Arm CDP	$21,426,322	122	$4,615,489	40	$ not available	2	$0	0	175	39
Charlo CDP	$13,566,621	168	$3,485,537	53	$53,611	4	$0	0	377	105
Dayton CDP	$9,690,596	66	$29,244,973	125	$ not available	1	$0	0	65	7
Elmo CDP	$6,886,918	43	$646,874	35	$ not available	1	$0	0	180	44
Finley Point CDP	$37,854,239	142	$758,545	17	$0	0	$0	0	224	35
Jette CDP	$7,428,780	49	$155,470	2	$0	0	$0	0	165	27
Kerr CDP	$14,904,728	77	$22,277	2	$0	0	$44,400	1	241	67
Kicking Horse CDP	$0	0	$0	0	$0	0	$0	0	6	1
King's Point CDP	$0	0	$0	0	$0	0	$0	0	0	0
Lake Mary Ronan CDP	$0	0	$0	0	$0	0	$0	0	20	3
Lindisfarne CDP	$21,804,345	116	$490,667	13	$0	0	$0	0	146	31
Pablo CDP	$16,863,540	180	$6,437,841	53	$29,867,535	5	$0	0	1,484	510
Ravalli CDP	$4,172,219	52	$1,303,480	25	$0	0	$0	0	76	12
Rocky Point CDP	$0	0	$0	0	$0	0	$0	0	0	0
Rollins CDP	$25,993,657	138	$1,214,145	21	$ not available	1	$0	0	181	28
Swan Lake CDP	$22,070,857	125	$1,007,539	26	$0	0	$102,400	4	113	15
Turtle Lake CDP	$0	0	$0	0	$0	0	$0	0	0	0
Woods Bay CDP	$40,918,594	242	$8,511,823	41	$0	0	$0	0	581	116
County Commissioner Districts										
District 1	$629,359,599	3,330	$164,070,441	836	$33,836,171	19	$4,918,964	13	7,335	1,443
District 2	$138,265,585	1,343	$79,404,466	385	$13,566,148	13	$1,556,640	13	5,492	1,485
District 3	$136,143,433	1,275	$149,217,367	677	$90,146,956	24	$352,672	6	5,934	1,698

4.2 Landslide

CPRI SCORE = 2.95

Description and History

A landslide is the movement of a soil and/or rock mass down a slope. Any area composed of very weak or fractured materials resting on a steep slope can and likely will experience landslides. Landslides or debris flows are often difficult to distinguish from flash floods and possess similar destructive potential and rapid onset. Debris flows generally occur during periods of intense rainfall or rapid snowmelt. They usually start on steep hillsides as shallow slides that liquefy and accelerate. The consistency of debris flows range from watery mud to thick, rocky mud that can carry large items such as boulders, trees and cars. When the flow reaches flatter ground, debris can spread over a broad area, sometimes accumulating in thick deposits. Any given mass movement is triggered by a single event. The two most common triggers are earthquakes and heavy rainfall.

Slope failure occurs when the gravitational force of slope materials exceed resisting forces due to strength, friction and cohesion of the supporting materials. Slope properties, such as steepness, layering, fracturing of materials or lack of vegetation, can make them inherently susceptible to failure. Factors such as moisture, overloading and undercutting, can make matters worse. These factors can occur naturally or induced by development activity. Slope failures are distinguished by five types: falls or free drops from steep cliffs; slides or movement of unconsolidated materials along slip surfaces of shear failure; slumps or movements of consolidated materials along the surface of shear failures; flows; and the slow or rapid fluid-like movement of soils and other unconsolidated materials. Very slow down-slope flow of soil is referred as creep. The average flow rate of materials can range from a fraction of an inch to 4 to 5 inches a week. Factors that influence creep include growing vegetation, freezing and thawing, and burrowing animals. Lateral spreads may occur on flat or gently sloping land due to liquefaction of underlying materials.

Vulnerability and Area of Impact

CSKT has many areas where slopes are too steep for development. These areas occur along the slopes of the Mission, Swan and Salish Ranges and along some parts of the shore of Flathead Lake. Steep slopes, including stretches of Montana Highway 35 along the east side of Flathead Lake, are prone to falling rock.

Landslides appear to have a stronger association with faulting than with any specific geologic unit; however, some slides are most common where the underlying bedrock is sedimentary or volcanic. Volcanic-derived soils contain significant amounts of clay that can be susceptible to failure when wet or disturbed. Small slides and slumps can also occur along the steeper slopes of gullies and drainages. Steep slopes may be most vulnerable to debris flow, especially if the area were to burn.

According to the CSKT Growth Policy, slopes up to 8 percent are generally the most suited for development. Slopes between 25-35 percent have extensive engineering limitations. Slopes over 35 percent are generally not suitable for development. Building on steep slopes must factor in soil erosion rates, falling rock and slope instability. Rain or ice on steep slopes presents additional safety concerns, particularly where emergency access is concerned.

The PDM Planning Team indicated that Kerr Dam was impacted by a landslide in the past and in 2011, a landslide occurred on the East Shore of Flathead Lake causing road damage.

Probability and Magnitude

Landslide risk was determined by using GIS data provided in the Montana State Hazard Mitigation Plan (Montana DES, 2010). Shape files used for the GIS layer included areas of mapped historic landslides, available from the Montana Bureau of Mines and Geology (MBMG) and slopes greater than 55 degrees, based on methodology developed by the USFS for a delineation of landslide-prone areas in the Clearwater-Nez Perce National Forest (**Figure 7A**). Landslide-prone areas along Montana Highway 35 (**Figure 7B**) were also digitized and added to the analysis area. The landslide-prone areas were intersected with the critical facility and MDOR parcel datasets to determine exposure. Population exposure was calculated by the percent of the landslide-prone area in each census block. **Table 4.4-1** presents the results of the landslide vulnerability analysis.

The GIS analysis indicates that there are 50,840 acres prone to landslides in the Reservation including 384 residences and 71 commercial, industrial, and/or agricultural buildings, and 1 critical facility. The *Landslide Section* in **Appendix C** presents supporting documentation from the vulnerability analysis.

Based on the frequency of small landslide/slope failure events on the Flathead Reservation, the probability for a more significant event in the future is rated as “possible”. Using the Calculated Priority Risk Index, the PDM Planning team rated the landslide probability as “likely”.

Future Development

It is the responsibility of those who wish to develop their property to assess the degree of hazard in their selection of development sites. Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land-use management standards can reduce landslide hazards.

The Lake County Subdivision Regulations have development standards for subdivisions containing areas of steep slopes, in areas containing sustained slopes of 100 feet or longer that average 20 percent. The developer must demonstrate that the proposed subdivision will not have adverse impact on conditions that relate to the public health and safety including rock falls or landslides, unstable soils or steep slopes. In areas where there is potential for landslides or slope instability, an erosion and sedimentation control plan, prepared by a registered engineer, is required with the preliminary plan application. The plan must include a description of protection measures for long-term slope stability.

4.5 STRUCTURE FIRE

CPRI SCORE = 2.75

Description and History

Structure fires are usually individual disasters and not community-wide events; however, the potential exists for widespread structure fires that displace several businesses or families. Urban blocks, commercial structures, and apartment buildings are especially vulnerable. Statistics from the structure fires on the Flathead Reservation over the past 11 years are presented in **Table 4.5-1.**

TABLE 4.5-1
CSKT STRUCTURE FIRE STATISTICS; 1/1/2001 to 12/31/2011

Property Type	Fires	Fire Fighter Deaths	Fire Fighter Injuries	Civilian Deaths	Civilian Injuries	Property Loss
Residential	292	0	1	3	1	$4,155,300
Commercial	27	0	0	0	6	$696,200
Industrial	56	0	0	0	0	$692,150
TOTAL	375	0	1	3	7	$5,543,650

Sources: State Fire Marshal, 2012

Below are accounts of two recent structure fires in Lake County.

January 18, 2012 – When firefighters showed up at a structure fire at 806 14th Ave. E. in Polson, there was smoke coming out of the basement. "We believe the cause was electrical in nature, but so much damage was done to the basement, we can't pinpoint a specific cause," Polson VFD public information officer Karen Sargeant reported. Damages to the building are $30,000 to $40,000, Sargeant estimated with at least an extra $20,000 for contents. (*Structure Fire Damages Polson Home*, Valley Journal [Berl Tiskus], January 18, 2012).

March, 1, 2012 - A mountain home near Pablo burned to the ground late Sunday afternoon. The fire started around 4:45 p.m. and by the time crews responded to the blaze on Snyder Hill Lane at the base of the Mission Mountains, the house was completely engulfed in flames. "It was a total loss," Ronan Fire Chief Mark Clary said. "When we arrived, there were flames wall to wall." The Ronan Fire Department had four engines, a heavy rescue vehicle and a water tender on the scene and received mutual aid from the Polson Fire Department, which brought two engines and a water tender. (*Structure Fire Destroys Home*, Lake County Leader [Dylan Kitzan], March 1, 2012).

Structure fire protection services are provided by several entities on the Flathead Reservation. These organizations include 13 Volunteer Fire Districts (VFDs) throughout the Reservation. The incorporated cities of Polson, Ronan and St. Ignatius provide fire protection within their corporate limits, as well as the surrounding rural districts. Mutual-aid agreements have been developed between fire protection entities. The agreements have proven essential to increasing the level of service provided to the constituents of the area. The mutual-aid structure provides for assistance among fire departments, thus expanding the equipment and personnel resources available to respond to an incident. This mechanism allows for increased utilization of the expensive capital equipment that is necessary for fire protection service and achieves a higher level of service in the county than could be achieved by any one fire protection entity.

Vulnerability and Area of Impact

Based on review of historic structure fire data and consultation with the State Fire Marshal, the entire project area has been classified with a uniform risk for structure fire since vulnerable structures are not restricted to a specific area within the reservation. Structure fires have resulted in over $5.5 million dollars in property loss over the past 11 years. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.12* (**Tables 4.12-1 through 4.12-4**).

According to the CSKT, a number of challenges make residential firefighting difficult for the VFDs. Construction in the wildland urban interface does not typically have adequate fire provisions. Such provisions include a defensible space around homes, fire resistant roof materials, and private roads wide enough for fire trucks to be used to access structures and maneuver effectively and safely. Another challenge has been a limited water supply. However, with the addition of two new wells in Polson and the six dry hydrants that have recently been installed throughout Lake County, there should be significant improvement in this area. Other tribal council districts still need to explore ways in improve fire provisions in the WUI.

Probability and Hazard Magnitude

History has shown that structure fires are a serious concern for CSKT. The losses, primarily covered by insurance, have not resulted in a Presidential Disaster Declaration, but have resulted in other negative impacts such as economic losses for the area.

With over 375 structure fires in the 11 period of record, the probability of this hazard occurring in the future is rated as “highly likely”.

Future Development

CSKT is considering adopting the IFC code. The IFC is a comprehensive code that includes regulations governing the safeguarding of life and property from all types of fire and explosions hazards. Topics include general precautions against fire, emergency planning and preparedness, fire department access, fire hydrants, automatic sprinkler systems, fire alarm systems, hazardous materials storage and use, and fire safety requirements for new and existing buildings and premises.

4.6 SEVERE WEATHER

CPRI SCORE = 2.7

The winter weather hazard profiled below includes several weather conditions that generally occur from November through April. Snow, blizzards, extended cold and high winds frequently occur together but also independent of one another during these months.

Description and History

Winter Weather

Winter storms and blizzards follow a seasonal pattern that begins in late fall and lasts until early spring. These storms have the potential to destroy property, and kill livestock and people. Winter storms may be categorized as sleet, ice storms or freezing rain, heavy snowfall or blizzards, and low temperatures. Blizzards are most commonly connected with blowing snow and low visibility. Winter also brings sustained straight-line winds that can be well over 50 mph.

A severe winter storm is generally a prolonged event involving snow or ice and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes.

A combination of temperatures below zero and high winds can close roads, threaten disruption of utilities, limit access to rural homes, impede emergency services delivery and close businesses. Such storms also create hazardous travel conditions, which can lead to increased vehicular accidents and threaten air traffic. Additionally, motorists stranded due to closed roads and highways may present a shelter problem.

The National Weather Service provides short-term forecasts of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including blizzards and wind chill. Warning and Advisory Criteria for winter weather is presented in **Table 4.6-1**.

TABLE 4.6-1
WARNING AND ADVISORY CRITERIA FOR WINTER WEATHER

Winter Weather	Winter Weather Advisory	Winter Storm/Blizzard Warning
Snow	2-5 inches of snow in 12 hours	6 inches or more in 12 hours, or 8 inches in 24 hours
Blizzard	(see blowing snow)	Sustained winds or frequent gusts to 35 mph with visibility below a ¼ mile for three hours or more
Blowing Snow	Visibility at or less than a ½ mile.	Visibility at or less than a ½ mile in combination with snowfall at or greater than 6 inches and/or freezing precipitation

TABLE 4.6-1 WARNING AND ADVISORY CRITERIA FOR WINTER WEATHER		
Ice/Sleet	(see freezing rain/drizzle)	Accumulations of ¼ inch or more of ice.
Freezing Rain/Drizzle	Light precipitation and ice forming on exposed surfaces.	None
Wind Chill	Wind chills of -20 to -39 degrees with a 10 mph wind in combination with precipitation	Wind chills -40 degrees or colder with a 10 mph wind in combination with precipitation.

Source: National Weather Service (NWS, 2011)

Snowstorms and bitterly cold temperatures are common occurrences throughout the Flathead Reservation and generally do not cause any problems as residents are used to winter weather and are prepared for it. Sometimes, however, blizzards can occur and overwhelm the ability to keep roads passable. Heavy snow and ice events also have the potential to bring down power lines and trees. Extreme wind chill temperatures may harm residents if unprotected outdoors or if heating mechanisms are disrupted.

Table 4.6-2 presents winter weather events with reported damages from the SHELDUS and NCDC databases. The dataset used to populate SHELDUS typically includes every loss causing and/or deadly event between 1960 through 1975 and from 1995 onward. Between 1976 and 1995, SHELDUS reflects only events that caused at least one fatality or more than $50,000 in property or crop damages. The NCDC data contains sporadic damage figures, which were added to the dataset when they represented a unique damaging event.

TABLE 4.6-2
CSKT SEVERE WINTER WEATHER EVENTS WITH DAMAGES (~NOVEMBER - APRIL)

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
5/4/1961	0	0	$4,127	$0	Heavy Snow
2/22/1962	0	0	$73	$0	High Wind, Snow, Blowing Snow, and Cold
11/19/1962	0.07	0	$6,516	$0	High Winds
12/15/1964	0	0	$65,163	$0	High Wind, Blowing Snow, Severe Cold
1/15/1967	0	0	$6,082	$0	High Wind
4/30/1968	1	0	$36,111	$0	High Wind
1/1/1969	0	0	$537	$0	Cold And Snow
4/23/1969	0	0	$30,588	$0	Wind
5/10/1970	0	0	$14,444	$0	Heavy, Wet Snow and Strong Wind
3/3/1971	0	0	$912	$0	Wind, Snow
11/25/1971	0.37	0	$1,014	$0	Hoarfrost, Ice
12/5/1971	0	0	$27,368	$0	Heavy Snow
1/9/1972	0	0	$4,801	$0	Strong Winds
1/16/1972	0	0	$9,123	$0	Strong Winds
2/16/1972	0	0	$944	$0	High Wind
3/5/1972	0	0	$912	$0	High Winds
1/29/1974	0	0	$4,037	$0	Wind
12/26/1974	0	0	$780	$0	High Winds
10/21/1975	0	0	$2,080,000	$20,800	Snow
2/3/1976	0	0	$200,000	$0	Wind

1/18/1978	0	0	$173,333	$0	Heavy Snow

TABLE 4.6-2
CSKTSEVERE WINTER WEATHER EVENTS WITH DAMAGES (~NOVEMBER - APRIL)

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
11/4/1978	0	0	$0	$0	Strong Winds
11/9/1985	1	0	$53,061	$0	Wind
2/3/1986	3	1	$2,080	$0	Ice Storm
12/13/1988	0	0	$24,074	$0	Wind
1/31/1989	0	0	$27,645	$276	Blizzard
2/1/1989	0	0	$160,049	$160	Severe Cold
1/29/1990	0	0	$9,630	$0	Snow
4/27/1990	0	0	$2,796	$0	Winter Storm
11/22/1990	0	0	$23,423	$0	High Winds
11/23/1990	0	0	$9,630	$0	High Winds
12/18/1990	0	0	$5,778	$5,778	Blizzard, Heavy Snow
12/27/1990	0	0	$21,667	$0	Blizzard
10/16/1991	0	0	$21,667	$0	Wind
8/22/1992	0	0	$353	$35,326	Winter Storm
8/25/1992	0	0	$0	$1,425	Frost/Freeze
10/7/1993	0	0	$7,879	$0	Winter Storm
11/3/1993	0	0	$788	$7,879	High Winds
2/23/1994	0	0	$13,416	$0	Winter Storm
4/25/1994	0	0	$6,373	$0	Heavy Snow, Winter Storm
11/16/1994	0	0	$6,373	$0	Heavy Snow
11/25/1994	0	0	$10,924	$0	Heavy Snow
3/24/1995	0	0	$74,286	$0	Winter Storm
2/1/1996	0	0	$6,741	$0	Extreme Cold
11/18/1996	0.09	0.18	$0	$0	Winter Storm
2/15/2001	0.25	0.13	$0	$0	
6/3/2001	0	0	$974,936.44	$0	Heavy Snow
12/15/2006	0	0	$11,860	$0	High Wind
11/12/2007	2	0	$721,297	$0	High Wind
1/13/2008	0	0	$81	$0	Avalanche
6/10/2008	0	0	$1,052	$0	Heavy Snow
12/12/2008	0	0.25	$1,327	$0	Blizzard
1/1/2009	0	0	$1,387	$0	Winter Storm
TOTAL	**7.78**	**1.56**	**$4,867,438**	**$71,645**	

Source: SHELDUS, 2011 (adjusted to 2011 dollars); NCDC, 2011 (adjusted to 2012 dollars).

Note: Often casualties and damage information are listed without sufficient spatial reference. In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses were divided by the number of counties affected from this event.

The table above indicates that winter storms, high winds and heavy snow have caused property loss in CSKT. Planning Team members reported big snow years and cold in 1996 and 2002.

No Presidential Disaster Declarations have been granted for winter storms on the Flathead Reservation. State-wide winter storm disasters were declared in 1978, 1989 and 1996 (DMA, 2011).

Summer Weather

Severe summer weather includes thunderstorms, wind, hail, lightning, tornadoes and microbursts that typically occur between May and October of each year on the Flathead Reservation.

Description and History

A severe thunderstorm is defined by the National Weather Service as a thunderstorm that produces wind gusts at or greater than 58 mph (50 knots), hail 1-inch or larger, and/or tornadoes. Although not considered "severe", lightning and heavy rain can also accompany thunderstorms. Thunderstorms can produce intense downburst and microburst wind. In addition, strong winds, defined below, can occur outside of thunderstorms when the overall weather conditions are favorable.

Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating wind and strong vertical motion, which possess remarkable strength and can cause widespread damage. The most violent tornadoes are capable of tremendous destruction with wind speeds of 300 mph or more. Maximum wind speeds in tornadoes are confined to small areas and vary over short distances. Tornadoes are most common in the Great Plains, and are more infrequent and generally small west of the Rockies. Thunderstorms can produce deadly and damaging tornadoes.

A microburst is a very localized column of sinking air, producing damaging divergent and straight-line winds at the surface that are similar to, but distinguishable from, tornadoes. The scale and suddenness of a microburst makes it a great danger to aircraft due to the low-level wind shear caused by its gust front, with several fatal crashes having been attributed to the phenomenon over the past several decades. Microbursts in forested regions have flattened acres of standing timber. According to FEMA's wind zone classifications the entire county is in Zone I (130 mph Design Wind Speeds).

The National Weather Service provides short-term forecasts and warnings of severe summer weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including tornado warnings, as listed below.

- *Severe Thunderstorm Warning*: Any thunderstorm wind gust equal to or greater than 58 mph; any hail size 1-inch or larger.
- *High Wind*: Sustained winds of 40 mph for an hour or any gust to 58 mph (non-convective winds).
- *Tornado Warning:* A violently, rotating column of air extending from the base of a thunderstorm to the ground.

Since the 2005 CSKT PDM Plan was completed, several incidents of severe summer weather have affected CSKT. **Table 4.9-1** presents severe summer storm events from the NCDC database indicating the magnitude of these events.

TABLE 4.9-1 CSKT SEVERE SUMMER WEATHER REPORTS (~MAY-OCTOBER)							
Date	**Location**	**Event**	**Magnitude**	**Date**	**Location**	**Event**	**Magnitude**
5/26/1961	Lake County	Tstm Wind	0 kts.	3/14/2003	Ronan	Tstm Wind	53 kts.
7/5/1962	Lake County	Hail	1.25 in.	5/25/2003	Arlee	Tstm Wind	61 kts.
8/20/1982	Lake County	Tstm Wind	0 kts.	6/10/2003	Arlee	Tstm Wind	63 kts.
8/27/1985	Lake County	Hail	1.00 in.	6/10/2003	Pablo	Tstm Wind	52 kts.
6/15/1987	Lake County	Tstm Wind	65 kts.	6/10/2003	Ronan	Hail	0.88 in.
6/17/1988	Lake County	Tstm Wind	70 kts.	8/5/2003	Arlee	Tstm Wind	52 kts.
8/17/1988	Lake County	Tstm Wind	65 kts.	8/3/2004	Arlee	Hail	1.00 in.
7/15/1989	Lake County	Hail	0.75 in.	8/6/2004	Polson	Tstm Wind	53 kts.
7/16/1989	Lake County	Hail	1.75 in.	8/19/2004	Proctor	Hail	0.75 in.
8/12/1989	Lake County	Tstm Wind	0 kts.	8/20/2004	Big Arm	Hail	0.75 in.
3/3/1991	Lake County	Tornado	F0	8/10/2005	Polson	Tstm Wind	50 kts.
5/31/1993	Swan Lake	Tstm Wind	0 kts.	4/5/2006	St. Ignatius	Heavy Rain	N/A
5/15/1994	Swan Lake	Tstm Wind	0 kts.	6/12/2006	St. Ignatius, Charlo, Ronan	Hail	1.00 in.
8/22/1994	Lake County	High Winds	60 kts.	6/13/2006	Polson, Ronan	Hail	1.00 in.
4/16/1996	St. Ignatius	Tstm Wind/Hail	60 kts.	3/13/2006	Moiese	Tstm Wind	60 kts.
6/15/1996	Arlee, Ronan, St. Ignatius	Tstm Wind	52 kts.	6/13/2006	Polson	Hail	0.75 in.
6/16/1996	Ronan	Hail	1.75 in.	6/16/2006	Ronan	Flood	N/A
7/2/1996	Finley Point	Hail	1.00 in.	8/8/2006	Ronan	Tstm Wind	60 kts.
6/16/1997	Ronan	Funnel Cloud	N/A	8/10/2006	Ronan	Tstm Wind	60 kts.
8/7/1997	Polson, St. Ignatius	Hail	0.75 in.	6/5/2007	St. Ignatius	Tstm Wind, Hail	63 kts.;1 in.
8/20/1997	St. Ignatius	Lightning	N/A	6/20/2007	St. Ignatius	Hail	0.75 in.
7/3/1998	St. Ignatius	Tstm Wind	52 kts.	6/29/2007	Polson, Ronan	Tstm Wind	52 kts.
7/4/1998	Big Arm	Hail	0.75 in.	7/17/2007	Ravalli	Tstm Wind	50 kts.
7/10/1998	Arlee	Tstm Wind	61 kts.	7/18/2007	Pablo	Tornado	
8/22/1998	Arlee	Tstm Wind	50 kts.	7/18/2007	Pablo	Tstm Wind	78 kts.
6/24/1999	Round Butte	Hail	0.75 in.	7/4/2008	Charlo, Ronan	Hail	0.88 in.
6/1/2001	Ronan Airport	Tstm Wind	50 kts.	7/4/2008	Swan Lake	Tstm Wind	52 kts.
6/27/2002	Charlo	Hail	1.75 in.	5/25/2009	Polson	Hail	0.88 in.
7/13/2002	Arlee	Tstm Wind	54 kts.	5/3/2010		High Wind	62 kts.
7/23/2002	Arlee	Hail	1.50 in.	7/22/2010	Elmo, Swan Lake	Tstm Wind	50 kts.
8/16/2002	Lake County	High Winds	69 kts.	7/31/2010	Charlo	Hail	1.75 in.

Source: National Weather Service (NCDC, 2010)
Notes: Tstm = Thunderstorm; kts. = knots; in. = inches

The PDM Planning Team indicated that there have been several microbursts on the reservation, including one on Melita Island which was reported as a tornado.

There have been no Presidential Disaster Declarations or State Disasters issued for the severe summer weather on the reservation. **Table 4.9-2** presents severe summer weather events on the reservation with reported damages since 1960.

TABLE 4.9-2
CSKT SEVERE SUMMER WEATHER EVENTS WITH DAMAGES (~MAY-OCTOBER)

Date	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
5/26/1961	0	0	$18,571	$186	Thunderstorm and Gusty Wind
6/6/1964	0	1.2	$0	$0	Heavy Rain
6/30/1965	0	0	$1,955	$195,489	Funnel Cloud, Hail
7/19/1968	0	0	$1,121	$0	High Wind, Thunderstorms
1/26/1969	0	0	$5	$0	Lightning
9/12/1970	0	0	$144,444	$0	Strong Winds
9/19/1971	0	0	$1,610	$0	Wind
9/12/1973	0	0	$16	$0	Wind Storm
7/26/1974	0	0	$754	$0	High Winds
6/1/1977	0.17	0	$30,952	$0	Wind
6/30/1978	0	1	$0	$0	Lightning
5/21/1980	0	0	$22,807	$0	Rain
9/13/1980	0	0	$136,842	$0	Wind
5/21/1981	0	0	$825,397	$0	Heavy Rains
6/20/1985	0.02	0	$2,468	$2,468	Hail/Wind
6/4/1986	0	0	$5,200	$520,000	Hail
7/18/1987	0	0	$0	$50,000	Heavy Rain
3/31/1991	0	0	$41,560	$0	Tornado
10/16/1991	0	0	$171,165	$0	Wind
5/31/1993	0	0	$783,464	$0	Swan Lake; Thunderstorm Winds
5/15/1994	0	0	$853,892	$0	Thunderstorm Winds
9/9/2000	2	0.25	$0	$0	Dust Storm
3/14/2003	0	0	$24,762	$0	Severe Storm/Thunderstorm, Wind
7/18/2007	0	0	$41,497	$0	Pablo: Tornado
7/4/2008	0	0	$19,236	$0	Hail
10/7/2008	0	0	$3,020	$0	Strong Wind
10/3/2009	0	0	$17,687	$0	High Wind
5/3/2010	0	0	$13,000	$0	Wind
7/22/2010	0	0	$6,240	$0	Severe Storm/Thunderstorm, Wind
7/31/2010	0	0	$6,240	$0	Hail
TOTAL	**2.19**	**2.45**	**$3,173,905**	**$768,142**	

Source: SHELDUS, 2011 (adjusted to 2011 dollars); NCDC, 2011 (adjusted to 2012 dollars)

Note: Often casualties and damage information are listed without sufficient spatial reference. In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses were divided by the number of counties affected from this event.

Vulnerability and Area of Impact Winter Weather

The reservation is equally exposed to effects of extended cold and winter storms during the winter months. During this time, winter storm events may affect the higher regions with more snowfall. But because the population is concentrated in the lower elevations, the hazard risk area for winter storms is considered uniform for the entire Reservation. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.12* (**Tables 4.12-1 through 4.12-4**). The Severe *Winter Weather Section* in **Appendix C** presents supporting documentation from the risk assessment.

Vulnerability and Area of Impact Summer Weather

On review of historic weather data, the entire project area has been classified with a uniform risk for severe summer weather events. Structures, utilities and vehicles are most at risk from the wind component of these storms, with crops and livestock being additionally threatened by hail. Mostly likely, though, only isolated areas would be affected by these types of storms rather than encompassing the entire Reservation. Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.12* (**Tables 4.12-1 through 4.12-4**). The *Severe Summer Weather Section* in **Appendix C** presents additional information from the risk assessment.

Probability and Magnitude Winter Weather

Severe winter storms and extended periods of extreme cold occur on the reservation multiple times each year. Therefore, the probability of a severe winter storm event occurring in the future is rated as "highly likely". Using the Calculated Priority Risk Index, the PDM Planning Team scored the probability of the severe winter weather hazard as "likely".

Snow generally does not cause the communities to shut down or disrupt activities. Occasionally, though, extreme winter weather conditions can cause problems. The most common incidents in these conditions are motor vehicle accidents due to poor road conditions. Such incidents normally involve passenger vehicles; however, an incident involving a commercial vehicle transporting hazardous materials or a vulnerable population such as a school bus is also possible.

Since winter storms and cold spells typically do not cause major structural damage, the greatest threat to the population is the potential for utility failure during a cold spell. Although cold temperatures and snow are normal on the reservation, handling the extremes can go beyond the capabilities of the community. Should the temperatures drop below -15 for over 30 days or several feet of snow fall in a short period of time, the magnitude of frozen water pipes and sewer lines or impassable streets could result in disastrous conditions for many people. If power lines were to fail due to snow/ice load, winds, or any other complicating factor, the situation would be compounded. In the event power or other utilities were disrupted, many homes could be without heat. With temperatures frequently dropping below zero in a typical winter, an event where heating systems failed could send many

residents to shelters for protection. Other residents may try to heat their homes through alternative measures and increase the chance for structure fires or carbon monoxide poisoning.

Sheltering of community members could present significant logistical problems when maintained over a period of more than a day. Transportation, communication, energy (electric, natural gas, and vehicle fuels), shelter supplies, medical care, food availability and preparation, and sanitation issues all become exceedingly difficult to manage in extreme weather conditions. Local government resources could be quickly overwhelmed. Mutual aid and state aid might be hard to receive due to the regional impact of this kind of event.

Probability and Hazard Magnitude Summer Weather

Windstorms and microbursts affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines. Severe hailstorms can also cause considerable damage to buildings and automobiles, but rarely result in loss of life. Nationally, hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons.

The history of thunderstorm, wind, hail and microburst events on the reservation indicate that they occur more than once per year. Therefore, the probability of this hazard occurring in the future is rated as “highly likely”.

Future Development

The State of Montana has adopted the 2009 International Building Codes (IBC) and these codes are recognized by CSKT as the standards for construction. The IBC includes a provision that buildings must be constructed to withstand a wind load of 75 mph constant velocity and three second gusts of 90 mph. Buildings must be designed to withstand a snow load of 30 pounds per square foot minimum. Only the incorporated cities of Polson and Ronan require structural building permits at this time.

4.7 FLOODING

CPRI SCORE = 1.75

Description and History

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential (short duration) rain or cloudburst on a relatively small drainage area. Ice jam flooding occurs when pieces of floating ice carried by the streams current accumulate at an obstruction to the stream. The water held back can cause flooding upstream, and if the obstruction suddenly breaks, flash flooding can then occur downstream as well.

Hundreds of floods occur each year, making it one of the most common hazards in all 50 states. Floods kill an average of 150 people a year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage to the structure and systems of a building.

The National Weather Service provides short-term forecasts and warnings of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and flooding. A "watch" is issued when conditions are favorable for severe weather in or near the watch area. A "warning" is issued when the severe weather event is imminent or occurring in the warned area. Warning and Advisory Criteria for flooding is presented below.

- *Flash Flood Warning:* Flooding is imminent, water levels rise rapidly with inundation occurring in less than 6 hours.
- *Flood Warning:* Flooding is expected to occur more than 6 hours after the causative event.

Typically, the most severe flooding on the Flathead Reservation occurs in the spring and early summer as a result of snowmelt and/or runoff from heavy rains. Occasionally, a long sustained rainfall will cause localized flooding. On rare occasions ice jams and log jams will cause localized flooding. This is especially true of the Swan River (FEMA, 1987).

Since 1922 there have been five large flood peaks recorded on the Swan River at Bigfork. These floods occurred in 1928, 1933, 1948, 1964, and 1974. The largest of these events occurred on June 20, 1974. The recorded discharge was 8,890 cubic feet per second (FEMA, 1987).

The flood documented most extensively was the 1964 event. The peak flow of the Swan River during the 1964 flood was four percent less than the previous record at the gaging station near Bigfork in 1948. Upstream at Strom's Store, near Condon, the 1948 peak discharge was exceeded by about 20 percent (FEMA, 1987).

In the Jocko River Valley, U.S. Highway 93, south of Arlee, was flooded in two places by Agency Creek during the 1964 flood. Many small bridges on county roads were damaged, washed out, or sustained approach damage. Nearly 300 feet of the Northern Pacific Railway track was washed out by the Jocko River near the Jocko Cabin Camp. A local resident reported he had never seen flooding of this magnitude in the Jocko River Valley since 1915. Polson residents awoke to find an overnight rainstorm of 2½ inches had caused flooded basements and curb-high waters at intersections (FEMA, 1987).

There have been no Presidential disasters due to flooding on the reservation; however, statewide flood disasters were declared in 1978, 1981, 1984, 1986, 1997, 1998, 2003, and 2011. CSKT received a State emergency declaration due to flooding in 1995 and for Ronan in 2005 (DMA, 2011).

Vulnerability and Area of Impact

The Natural Resource Conservation Service identifies four categories of flooding frequency: none, rare, occasional and frequent. Areas designated as occasional flood hazard have a 5 to 50 percent probability of flooding in any given year. Areas with occasional flooding on the reservation include of East Bay on Flathead Lake, Post Creek, Crow Creek, Dry Creek and White Earth Creek. Areas with frequent flooding, defined as a 50 percent or greater chance of flooding in any year, include low lands along the Flathead River, Mission Creek at St. Ignatius and Moiese, the Jocko River at Ravalli and in the Jocko Valley north and south of Arlee and Dayton Creek. The Flathead River and Flathead Lake are controlled so flooding has historically been limited to minor seasonal flooding of some tributaries with little or no property damage (Lake County, 2003).

According to the City of Ronan's Growth Policy the condition of Spring Creek and its floodplain needs to be addressed. The floodplain has not been mapped and could pose danger to life and property if a large scale flood were to occur. Spring Creek flows from the northeast to the southwest under U.S. Highway 93 and Community Bank and emerges in Bockman Park. The stream appears to have been straightened and does not include many natural stream features that support fish and wildlife including meanders, substantial riparian vegetation and fallen woody debris.

Flood Protection Measures

The Flood Insurance Study of CSKT and Incorporated Areas (FEMA, 1987) presents the following discussion on flood protection measures.

There are minimal flood protection works along the Swan River on the Reservation. Swan Lake provides some flood storage and flood peak attenuation capability; however, it is a natural lake and therefore not intended to reduce downstream flooding. Upstream of Swan Lake there are no reservoirs to control downstream discharges.

There are a number of reservoirs, ditches and diversion canals on the Flathead Reservation; however, they provide little flood protection. Mud Creek flows into Lower Crow Reservoir, but there are no upstream flood control structures. Crow Creek also flows into Lower Crow Reservoir. Upstream there is a diversion into Kicking Horse Reservoir, which has little effect on flooding.

Post Creek is controlled by McDonald Reservoir. The usable capacity of the reservoir is 8,220 acre-feet and is operated for water storage. There are several canals (Pablo Feeder and Kicking Horse) which divert water from Post Creek, but they have little effect on flood flows.

Mission Creek is controlled by Mission Reservoir and St. Mary's (Tabor) Lake on Dry Creek, which is a direct tributary to Mission Creek. Both of these reservoirs were designed for water conservation and have little flood control storage. The Pablo Feeder Canal diverts water from Mission Creek.

There are several canals that divert water from the Jocko River into Mission Reservoir and St. Mary's Lake; however, the amount of flood protection provided by the diversions in minimal.

Floodplain and Floodway Management

Preliminary Digital Flood Insurance Rate Maps (DFIRMs) are available for portions of CSKT and were used in the PDM analysis. The maps distinguish floodplains, floodways and floodway fringes. The floodway is the highest risk area consisting of stream channels and banks where most damage and destruction occurs. Residential and commercial development, mobile homes and septic systems are prohibited in this area. The DFIRMS are an update of the Flood Insurance Rate Maps (FIRMs) prepared in the late 1980s.

The National Flood Insurance Program (NFIP) encourages local governments to adopt "sound" floodplain management programs to reduce private and public property losses due to floods. CSKT and the communities of Libby and Eureka are part of the NFIP under emergency provisions. **Table 4.7-1** presents statistics on flood insurance policies and losses. The City of Polson participates in the NFIP but doesn't have any policies in affect.

There are no repetitive loss properties or significant repetitive loss properties on the reservation. A repetitive loss property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period, since 1978. Severe repetitive loss properties have had at least four NFIP claim payments over $5,000 each and the cumulative amount exceeding $20,000; or,

where at least two separate claim payments have been made with the cumulative amount exceeding the market value of the building.

TABLE 4.7-1
NATIONAL FLOOD INSURANCE PROGRAM STATISTICS (THROUGH 8/31/2011)

Jurisdictions	Policies in Force	Insurance in Force	Number of Losses	Total Payments
Lake County	123	$28,997,500	17	$53,318
City of Ronan	3	$234,200	0	--
Town of St. Ignatius	2	$630,000	0	--

Source: http://bsa.nfipstat.com/reports/1011.htm#MTT; http://bsa.nfipstat.com/reports/1040.htm#30

The NFIP's Community Rating System (CRS) recognizes community efforts (beyond minimum standards) by reducing flood insurance premiums for the community's property owners. CRS discounts on flood insurance premiums range from 5 percent up to 45 percent. Those discounts provide an incentive for new flood protection activities that can help save lives and property in the event of a flood. To participate in the CRS, a community can choose to undertake some of the 18 public information and floodplain management activities. Based on the total number of points a community earns, the CRS assigns you to one of ten classes. Your discount on flood insurance premiums is based on your class. Neither CSKT nor the incorporated communities currently participate in the CRS.

Probability and Magnitude

Flood listings with associated property damage from the SHELDUS database and Montana DES database of State and Federal disaster declarations are presented in **Table 4.7-2.**

TABLE 4.7-2
CSKT FLOOD EVENTS WITH DAMAGES

Date	Injuries	Fatalities	Property Damage	Crop Damage
3/17/1969	0	0	$5,366	$0
2/24/1986	0.04	0.04	$0	$144,444
11/24/1990	0	0	$41,600	$0
5/13/1991	0	0	$21,667	$0
5/18/1991	0	0	$20,968	$0
2/7/1996	0	0	$41,935	$0
5/1/1997	0	0	$151,337	$0
5/26/1998	0	0	$293,858	$0
6/2/2005	0	0	$260,282	$0
TOTAL	**0.04**	**0.04**	**$837,013**	**$144,444**

*Threshold amount of damage for Presidential Disaster Declaration
Source: SHELDUS, 2011 (adjusted to 2011 dollars); National Weather Service (NCDC, 2011)
Note: Often casualties and damage information are listed without sufficient spatial reference. In order to assign the damage amount to a specific area, the fatalities, injuries and dollar losses were divided by the number of counties affected from the event.

Preliminary DFIRM maps exist for the reservation and were used to create a flood hazard layer in GIS, as shown on **Figures 8A through 8D** for the Reservation, and the Tribal council districts of Polson, Ronan and St. Ignatius, respectively. The flood hazard area was intersected with the critical facility and MDOR parcel datasets using GIS **(Table 4.7-3).** Vulnerable population was calculated based on the percentage of flood risk area in each census block.

Annualized loss estimates are presented in the Risk Assessment Summary Tables in *Section 4.12* (**Tables 4.12-1 through 4.12-4**). The *Flooding Section* in **Appendix C** presents supporting documentation from the risk assessment.

The GIS analysis indicates that 111,033 acres on the reservation are located in the 100-year flood hazard area including 2,389 residences, 287 commercial, industrial and agricultural buildings, and no critical facilities.

Based on the frequency of past events, the probability of flooding on the reservation is rated as "likely"; an event that may occur more than once per decade but not every year. The PDM Planning Team rated flooding as "possible" using the Calculated Priority Risk Index.

Future Development

CSKT adopted floodplain development regulations in 1991 which limit the development that can take place in the designated 100-year floodplains and floodway fringe areas of fee lands. The regulations provide guidance for development in flood-prone areas by restricting uses that are dangerous to public health, safety and property. Uses are delineated as to which uses are permitted, permitted conditionally or prohibited, as outlined in the current floodplain regulations.

The CSKT and City of Polson Subdivision Regulations restrict subdivision of land for building or residential purposes if it is located in the floodway of a 100-year flood event or other land determined to be subject to flooding. If any portion of a proposed subdivision is within 2,000 horizontal feet and 20 vertical feet of a live stream draining an area of 25 square miles or more, and no official floodway delineation or floodway studies of the stream have been made, the subdivider shall provide to the Montana DNRC a flood hazard evaluation, including the calculated 100 year frequency water surface elevations and the 100 year floodplain boundaries. This detailed evaluation must be performed by a licensed professional engineer.

TABLE 4.7-3
CSKT VULNERABILITY ANALYSIS – FLOODING

JURISDICTION	RESIDENTIAL PROPERTY EXPOSURE $	# RESIDENCES AT RISK	COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTY EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRICULTUAL PROPERTIES AT RISK	CRITICAL FACILITIES EXPOSURE RISK $	# CRITICAL FACILITIES AT RISK	BRIDGE EXPOSURE $	# BRIDGES AT RISK	PERSONS AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County										
Polson	$10,314,441	49	$1,322,741	11	$0	0	$3,277,204	1	337	33
Ronan	$615,416	7	$14,259,884	16	$0	0	$0	0	94	26
St. Ignatius	$4,604,999	41	$181,280	7	$0	0	$40,232	1	251	71
Remainder of County	$608,995,285	2,389	$24,472,893	287	$0	0	$7,076,280	27	7,659	1,800
CENSUS Designated Places										
Arlee CDP	$2,327,944	24	$438,868	5	$0	0	$126,800	1	261	68
Bear Dance CDP	$30,114,942	83	$855,087	6	$0	0	$0	0	102	17
Big Arm CDP	$2,623,311	14	$194,951	6	$0	0	$0	0	76	12
Charlo CDP	$1,121,491	8	$0	0	$0	0	$0	0	118	33
Dayton CDP	$2,243,866	20	$1,170,056	8	$0	0	$78,028	1	32	0
Elmo CDP	$2,106,475	11	$93,200	11	$0	0	$0	0	68	16
Finley Point CDP	$125,650,735	582	$595,542	57	$0	0	$0	0	245	27
Jette CDP	$1,380,312	11	$70,671	2	$0	0	$0	0	56	5
Kerr CDP	$1,656,606	5	$61,891	2	$0	0	$0	0	41	11
Kicking Horse CDP	$152,593	2	$553	1	$0	0	$0	0	71	26
King's Point CDP	$21,712,875	106	$25,149	7	$0	0	$0	0	110	17
Lake Mary Ronan CDP	$1,849,467	18	$592,164	2	$0	0	$0	0	38	4
Lindisfarne CDP	$23,987,580	129	$227,603	7	$0	0	$0	0	141	20
Pablo CDP	$1,310,237	11	$6,391	1	$0	0	$0	0	597	189
Ravalli CDP	$725,543	7	$0	0	$0	0	$0	0	14	0
Rocky Point CDP	$3,394,002	14	$27,433	2	$0	0	$0	0	44	8
Rollins CDP	$25,591,195	108	$227,837	12	$0	0	$0	0	65	7
Swan Lake CDP	$15,904,601	86	$281,621	8	$0	0	$0	0	55	11
Turtle Lake CDP	$0	0	$0	0	$0	0	$0	0	0	0
Woods Bay CDP	$16,129,057	67	$2,186,447	19	$0	0	$34,400	1	141	22
County Commissioner Districts										
District 1	$552,168,830	2,063	$19,996,843	243	$0	0	$5,470,944	13	3,008	434
District 2	$59,957,984	352	$3,419,853	55	$0	0	$1,618,748	14	3,601	1,001
District 3	$12,403,327	71	$16,820,102	23	$0	0	$26,820	1	1,732	495

4.8 PUBLIC HEALTH

CPRI SCORE = 2.5

Description and History

Public health encompasses all health and medical hazards posed to the population on the CSKT reservation. It is commonly comprised of two components, Communicable diseases and social health crises such as illicit drug and alcohol abuse. Communicable diseases are illnesses caused by organisms such as bacteria, viruses, fungi and parasites. Sometimes the illness is not due to the organism itself, but rather a toxin that the organism produces after it has been introduced into a human host. Communicable disease may be transmitted (spread) either by: one infected person to another, from an animal to a human, from an animal to an animal, or from some inanimate object (doorknobs, table tops, etc.) to an individual. A pandemic is a global disease outbreak. Human diseases, particularly epidemics, are possible throughout the nation and CSKT is not immune to this hazard. In addition, livestock and animal disease could have a devastating effect on the economy and food supply on the reservation and beyond. Highly contagious diseases are the most threatening to both populations. Communicable disease or biological agents could be devastating to the population or economy of CSKT. Human diseases when on an epidemic scale, can lead to high infection rates in the population causing isolation, quarantines and potential mass fatalities. Diseases that have been eliminated from the U.S. population, such as smallpox, could be used in bioterrorism.

The following list gives examples of biological agents or diseases that could occur naturally or be used by terrorists as identified by the Centers for Disease Control and Prevention (2011).

Category A

Definition - The U.S. public health system and primary healthcare providers must be prepared to address various biological agents, including pathogens that are rarely seen in the United States. High-priority agents include organisms that pose a risk to national security because they:

- Can be easily disseminated or transmitted from person to person;
- Result in high mortality rates and have the potential for major public health impact;
- Might cause public panic and social disruption; and
- Require special action for public health preparedness.

Agents/Diseases

- Anthrax (*Bacillus anthracis*)
- Botulism (*Clostridium botulinum* toxin)
- Plague (*Yersinia pestis*)
- Smallpox (*variola major*)

- Tularemia (*Francisella tularensis*)
- Viral hemorrhagic fevers (*filoviruses* [e.g., Ebola, Marburg] and *arenaviruses* [e.g., Lassa, Machupo])

Category B

Definition - Second highest priority agents include those that:

- Are moderately easy to disseminate;
- Result in moderate morbidity rates and low mortality rates; and
- Require specific enhancements of Centers for Disease Control and Prevention's diagnostic capacity and enhanced disease surveillance.

Agents/Diseases

- Brucellosis (*Brucella* species)
- Epsilon toxin of *Clostridium perfringens*
- Food safety threats (e.g., *Salmonella* species, *Escherichia coli* O157:H7, *Shigella*)
- Glanders (*Burkholderia mallei*)
- Melioidosis (*Burkholderia pseudomallei*)
- Psittacosis (*Chlamydia psittaci*)
- Q fever (*Coxiella burnetii*)
- Ricin toxin from *Ricinus communis* (castor beans)
- Staphylococcal enterotoxin B
- Typhus fever (*Rickettsia prowazekii*)
- Viral encephalitis (alphaviruses [e.g., Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis])
- Water safety threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*)

Category C

Definition - Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of:

- Availability;
- Ease of production and dissemination; and
- Potential for high morbidity and mortality rates and major health impact.

Agents

- Emerging infectious diseases such as Westnile virus and hantavirus

These diseases/bioterrorism agents can infect populations rapidly, particularly through groups of people in close proximity such as schools, assisted living facilities, and workplaces.

Historically, the Spanish influenza outbreak after World War I in 1918-1919 caused 9.9 deaths per 1,000 people in the State of Montana (Brainerd and Siegler, 2002). Historical records from newspapers show that the influenza outbreak was so bad in 1918 that residents were quarantined from November 30 to December 17 after 18 people died and 53 new cases were discovered. In 1979 and again in late 2003, a flu epidemic hit the U.S. infecting hundreds of people. The swine flu (H1N1) pandemic of 2009 caused a number of fatalities in the country.

The Montana Department of Public Health and Human Services (DPHHS) manages a database of reportable communicable disease occurrences. The communicable disease summary for CSKT between 1997 and 2009 is presented in **Table 4.8-1**.

TABLE 4.8-1
COMMUNICABLE DISEASE SUMMARY FOR CSKT

Disease	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Vaccine Preventable Diseases										
Hepatitis A	-	2	-	-	-	-	-	-		-
Pertussis	-	-	-	1	1	4	1	-	34	-
Tuberculosis	-	-	-	-	1	1	2	1	-	-
Varicella	-	-	-	-	-	-	-	-	-	1
Enteric Diseases										
Campylobacter	3	5	6	6	7	1	5	4	8	3
E Coli	1		1	-	-	-	1	-	-	-
Giardia	3	3	4	5	2	5	7	3	4	7
Salmonella	1	5	2	5	48	7	7	6	1	3
Other Communicable Diseases										
West Nile Virus	-	-	-	-	-	-	1	-	1	1
Lyme	-	-	-	-	-	-	-	-	2	-
Sexually Transmitted Disease	62	108	144	109	107	138	138	147	161	136
TOTAL	**70**	**123**	**157**	**126**	**166**	**156**	**162**	**161**	**211**	**151**

Source: Montana Department of Public Health and Human Services, 2015

A 2008 DPHHS report *on Foodborne, Waterborne, and Institutional Outbreaks* indicates that CSKT experienced two significant Norovirus outbreaks; 220 cases at the Arlee School and 14 cases at the Ronan Long Term Care Facility.

The PDM Planning Team recalled several instances where communicable disease has affected CSKT residents: there was a Salmonella outbreak at an Amish community near St. Ignatius which was caused by raw eggs in ice cream; and, contamination of the St. Ignatius water system required temporary chlorination.

Prior to the mid-1980s, Polson relied primarily on surface water from Hell Roaring Creek for the public water supply. Discoveries of Giardia *lamblia* cysts in the Hell Roaring Creek supply in 1985 led to temporary abandonment of the supply. The City of Polson began developing additional groundwater supplies to replace the surface water system and a shift to groundwater for the Polson public water

supply eliminated the contamination problem (Lake County, 2005).

Vulnerability and Area of Impact

Diseases threaten the population of the reservation as opposed to structures. The entire population is at risk for contracting disease. The more urban nature of the population centers makes them more vulnerable to rapidly spreading and highly contagious diseases than other more rural parts of the Reservation and Montana. Another contributing factor is that CSKT has a higher percentage of persons over 65 years old than many other communities in Montana. Approximately 16.8 percent of the population is over 65, compared to 14.8 percent for the State of Montana. The number of fatalities on the reservation would depend on the mortality (disease/agent attack) rate and the percentage of the population affected. The ability to control the spread of disease will be dependent on the contagiousness of the disease and movement of the population. Given the uncertain nature of diseases, CSKT is assumed to have the same communicable disease risk county-wide.

Probability and Magnitude

The probability of an epidemic on the reservation is difficult to assess based on history and current data. Given the rural nature of most of the Reservation, the probability of rapid infection is somewhat less than in urban areas. Individual infectious diseases will likely be reported on an annual basis giving this hazard a probability rating of “highly likely”.

The magnitude of a communicable disease outbreak varies from common viral outbreaks to widespread bacterial infection. During the 1918 influenza pandemic, infection rates approached 28 percent in the United States (Billings, 1997). Other pandemics produced infection rates as high as 35 percent of the total population (World Health Organization, 2009). Such a pandemic affecting CSKT represents a severe magnitude event. Almost any communicable disease that enters the regional population could overwhelm local health resources as would any rapidly spreading bioterrorism event for which there is no available vaccine or containment capability.

Future Development

There are no land use regulations for future development that could impact the communicable disease hazard. New residents and population add to the number of people threatened on the reservation but the location of such population increases would not increase their vulnerability to the hazard.

4.9 Climate Change

CPRI SCORE = 3.20

Climate change includes changes in flora, fauna, cultural practices and general physical change within the terrain due to increasing and changing weather and temperature patterns. CSKT climate Change committee planning efforts have been congruent with mitigation planning. The following is excerpted from the science, data and process of the joint planning efforts.

Description and History

Traditional Ecological Knowledge and Elders

The Tribes "understand that there is a direct relationship among everything in the natural environment. As such, Traditional Ecological Knowledge is not only incorporating Tribal traditions and culture, but it is applying Salish, Pend d'Oreille, and Kootenai world views into decision-making." TEK informed the plan in several ways. By taking TEK into account when identifying management priorities, the project team ensured that the Tribes' values are represented by the plan. Additionally, by including tribal elders and TEK holders in the project team, the CSKT is acting to effectively integrate TEK throughout future climate change planning. Finally, interviews conducted with tribal elders gave valuable insight into how climate change has already impacted the ecology of the CSKT homelands.

Local Climate Impacts

In order to better understand how climate will impact the Tribes, the project team drew on existing research of national, regional and local climate impacts. A major asset for the Tribes was the recently completed Missoula County Climate Action: Creating a Resilient and Sustainable Community Report, which provides detailed models and information for climate impacts to the local and adjacent Missoula County. Drawing from this data, several impacts were identified. Amongst them were changes to temperature and precipitation, changes in storm event intensity, reduction in snowpack, hydrological changes including increasing water temperatures, change to forest species composition, reduced air quality, increased wildfire activity, and increased stress to fish and wildlife populations.

Impacts and Vulnerability

The plan organizes the vulnerability assessment into nine categories which reflect tribal management priorities. Climate impacts to each category are discussed in the plan, based on the climate data discussed above. The project team used a vulnerability matrix to place categories into one of three vulnerability rankings (low, medium or high), based on the level of risk to climate impacts and the adaptive capacity of each category. Brief descriptions of both the expected impacts to each category and the vulnerability of the category to climate changes are provided below.

Forestry

The Tribe identified wildfire's effects on forest and rangeland landscapes as a major climate impact to consider. By analyzing existing fire regimes and using climate modeling across CSKT lands, the project team identified how fire regimes are likely to change in the near future. Projections show several impacts to forest ecosystems, including: fire regimes disturbing forest ecology, spread of invasive species, a decrease in water-holding capacities, and increased timber mortality from insects. These impacts will occur across four fire regimes (areas categorized by general patterns of natural fires over time in an ecosystem): non-lethal, mixed, lethal and timberline. Lethal fire regimes are an area of high vulnerability because drought is expected to increase the severity of this fire regime. Conversely, non-lethal fire regimes have a much lower vulnerability, in part because this ecosystem type is more

drought resistant. The differences in vulnerability—based on which fire regime is being discussed—demonstrate fine-scale climate impact data will help the CSKT to adapt and mitigate climate impacts on forests.

Land
Both short and long-term climate impacts to ecosystem composition and function are a concern for the Tribes. A diverse set of ecosystems, including intermountain grasslands, riparian, prairies and croplands, make up CSKT lands, and each ecosystem has unique vulnerabilities. Of particular concern are vulnerabilities to native plants and ecosystems from by noxious weeds and agriculture which are projected to be magnified by climate impacts.

Fish
Fish habitat and health are expected to be impacted by climate in the short term (in the next ten years). Fish are highly vulnerable to climate impacts, and the CSKT has identified fish habitat and species as having low adaptive capacity. Given that the impacts facing fish are slated to occur soon, this area is a high priority for the Tribes moving forward. Some effects on fish may be mitigated by restoring and improving the resiliency of fish habitat.

Wildlife
Major impacts facing wildlife center on habitats becoming drier. Wetlands are expected to experience desiccation (extreme dryness) more frequently, while alpine and grasslands ecosystems are also projected to become drier. These impacts are already becoming evident in CSKT lands. Because of the wide range of ecosystem and species types in CSKT lands, vulnerability is highly variable. Some ecosystems and associated species, such as wetlands and wetland dependent species, are highly vulnerable to climate impacts because of their sensitivity to changes in moisture. Conversely, more resilient ecosystems such as prairies have a medium vulnerability to the climate impacts identified above. In all instances, the plan identifies a trend in which impacts to wildlife will begin slowly and increase over time.

Water
Both water quality and water quantity will be impacted by climate change. Major concerns include decreases to snowpack and increases to water temperatures that may lead certain species to lose habitat. The plan notes that the water resources important to the Tribes extend beyond reservation boundaries and that water impacts are therefore a regional as well as local issue. Water quality faces a high vulnerability to climate change impacts. This is in part because of existing stresses to the water supply from extensive agricultural production, and from urban water uses such as storm and wastewater runoff. Climate impacts including changes in seasonality and amount of rainfall will add further stress to water systems. Because of these vulnerabilities, risk to water quality is high; this has serious implications for aquatic species, human health and agriculture in the area. Water quantity faces a low vulnerability. While precipitation will change in seasonality, annual precipitation is not expected to dramatically decrease. Because of extensive existing infrastructure and the high priority that water quantity has in the community, the adaptive capacity of water quantity is high.

Air Quality
Due to increased drought and wildfire events, air quality is projected to decrease in CSKT lands relatively soon (in 11-16 years). Both dust from dry topsoil and wildfire particulate pose human health risks. While higher particulate data has already been observed at monitoring stations, due to the adaptive capacity of the surrounding communities, who already employ dust mitigation techniques, the project team identified the air quality sector as medium vulnerability. The high adaptive capacity of

local communities means that impacts to the air quality sector may be felt, but not as severely as they otherwise would be.

Infrastructure

The Tribes also studied climate impacts to power and housing, including tribally owned housing. There are no projected impacts to power; it is expected that electricity supply for the community will be unaffected. There is no data available on potential impacts to housing.

People

Several issues affecting tribal members, including social services, safety and tribal health and human resources are expected to be impacted by climate change. Social services include emergency welfare services to impoverished tribal members. Given their fragile economic position, these vulnerable tribal members will need extra care in facing climate impacts. Safety is a concern with regards to storms and floods potentially harming tribal employees and tribal members. Health and human resources address the impacts that climate change may have on providing support and healthcare to tribal members. Increased health risks and the potential for storms to disrupt transportation are possible impacts. These categories have highly variable vulnerability, as each subsection has several factors to consider. Some notable concerns include the high vulnerability of foster children and elderly people to climate impacts and a high vulnerability of people to increased pollution-related and heat-related diseases.

Culture

The culture of the Tribes—the Salish, Pend d'Oreille and Kootenai people—may be impacted by climate in several ways. Investigating how climate change will impact the Tribes' culture has two purposes, 1) to understand how climate impacts will affect the cultural survival of the Tribes, and 2) to provide explanations for climate change and adaptation using the Tribes' culture and worldview. Additionally, discussing climate change impacts to culture draws a critical eye to the mindset that enabled climate change; the CSKT hopes that their peoples' perspectives can demonstrate alternative viewpoints to current beliefs and practices about the natural world and human stewardship. Culture has a high likelihood of being impacted and is highly vulnerable to many climate impacts. The adaptive capacity of cultural practices is variable and in many cases uncertain. Given the importance of cultural practices to the identity, well-being and sovereignty of American Indian peoples, this category is an important priority for the Tribes.

4.10 EARTHQUAKE

CPRI SCORE = 2.2

Description and History

An earthquake is ground shaking and radiated seismic energy caused most commonly by a sudden slip on a fault, volcanic or magmatic activity or other sudden stress changes in the earth. An earthquake of magnitude 8 or larger on the Richter Scale is termed a great earthquake. Fortunately, Montana has not experienced a great earthquake in recorded history. A great earthquake is not likely in Montana but a major earthquake (magnitude 7.0-7.9) occurred near Hebgen Lake in 1959 and dozens of active faults have generated magnitude 6.5-7.5 earthquakes during recent geologic time.

Earthquakes are measured by two variables, magnitude and intensity. The magnitude of an earthquake, as measured on the Richter scale, reflects the energy release of an earthquake. The intensity of an earthquake is gauged by the perceptions and reactions of observers as well as the types and amount of damage. The intensity of an earthquake is rated by the Modified Mercalli Scale. This scale ranks the intensity from I to XII. An earthquake rated as a I, would not be felt except by very few people under especially favorable circumstances. An intensity rating of XII on the other hand would result in total destruction.

A belt of seismicity known as the Intermountain Seismic Belt extends through western Montana, from the Flathead Lake region to the Yellowstone National Park region where the borders of Montana, Idaho, and Wyoming meet. The Intermountain Seismic Belt continues southward through Yellowstone Park, along the Idaho-Wyoming border, through Utah, and into southern Nevada. In western Montana, the Intermountain Seismic Belt is up to 100 km wide. The Flathead Reservation is located within this belt. The map below shows the occurrence and magnitude of earthquakes within the northern portion of the Intermountain Seismic Belt. (Source: MBMG, 2010)

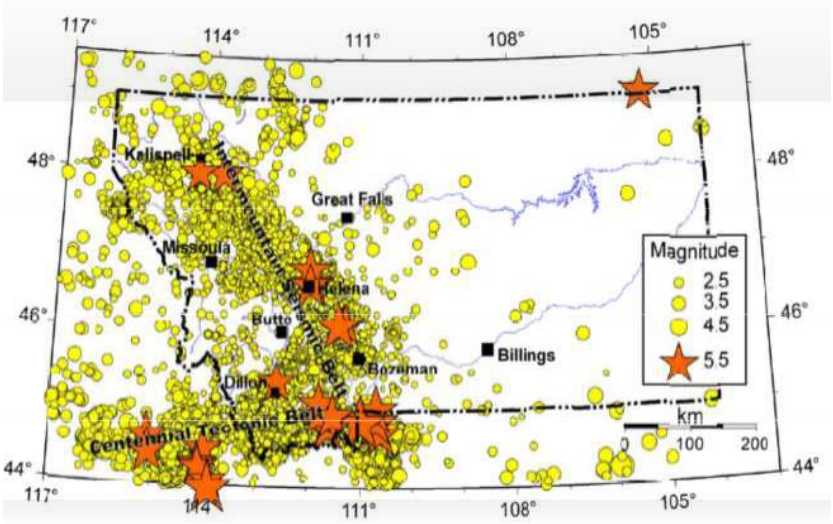


Table 4.10-1 shows the historic earthquakes that have occurred in Montana and the surrounding region since 1900 with a magnitude of 5.5 or greater. Although one significant earthquake occurred in eastern Montana in 1909, the majority have occurred along the Intermountain Seismic Belt and Centennial Tectonic Belt in western Montana.

TABLE 4.10-1
HISTORIC EARTHQUAKES OF MONTANA AND SURROUNDING REGIONS
WITH MAGNITUDES OF 5.5 OR GREATER SINCE 1900

Date	Magnitude	Approximate Location	Date	Magnitude	Approximate Location
05/16/1909	5.5	Northeast Montana	08/18/1959	6.0	Hebgen Lake
06/28/1925	6.6	Clarkston Valley, MT	08/18/1959	5.6	Hebgen Lake
02/16/1929	5.6	Clarkston Valley, MT	08/18/1959	6.3	Hebgen Lake
10/12/1935	5.9	Helena	08/19/1959	6.0	Hebgen Lake
10/19/1935	6.3	Helena	10/21/1964	5.6	Hebgen Lake
10/31/1935	6.0	Helena	06/30/1975	5.9	Yellowstone Park
07/12/1944	6.1	Central Idaho	12/08/1976	5.5	Yellowstone Park
02/14/1945	6.0	Central Idaho	10/28/1983	7.3	Challis, ID
09/23/1945	5.5	Flathead Valley	10/29/1983	5.5	Challis, ID
11/23/1947	6.1	Virginia City	10/29/1983	5.5	Challis, ID
04/01/1952	5.7	Swan Range	08/22/1984	5.6	Challis, ID
08/18/1959	7.5	Hebgen Lake	07/26/2005	5.6	Beaverhead County
08/18/1959	6.5	Hebgen Lake			

Source: Stickney and others, 2000

Major earthquakes are not common on the Flathead Reservation, although a number have been felt since the earliest historical occupation of the region. **Table 4.10-2 shows** earthquakes near CSKT which have occurred in the past 20 years.

TABLE 4.10-2
HISTORIC EARTHQUAKES IN CSKTIN THE PAST 20 YEARS

Date	Magnitude	Depth	Miles from Polson	Date	Magnitude	Depth	Miles from Polson
4/1/1992	4.0	3.1 mi.	24 mi.	4/15/1998	4.0	4.1 mi	30 mi
5/2/1995	4.5	5.6 mi	38 mi	12/22/1998	4.7	7.6 mi	55 mi
6/29/1995	4.1	3.1 mi	37 mi	6/28/2000	4.5	6.1 mi.	76 mi.

Source: http://www.city-data.com/county/Lake_County-MT.html

Vulnerability and Area of Impact

The reservation lies at the north end of the Intermountain Seismic Belt. Small earthquakes (up to 3.5 on the Richter Scale) are common locally and are prevalent in the Arlee and Polson areas. Earthquakes of this magnitude may be felt, but are not serious enough to cause damage.

In the early 1990s the Mission Fault was discovered. This fault runs along the Mission Front from St. Mary's Lake (southeast of St. Ignatius) to around the Pablo latitude. Trenches were excavated across the fault by the U.S. Bureau of Reclamation to determine the time when the fault last moved. Radio carbon and other dating techniques determined that this occurred approximately 7,000 years ago with an event

the magnitude of 7.5 on the Richter Scale. Most of the interseismic period for that fault, estimated to be between 5,000 and 8,000 years, has passed and a return event could occur. There is also a fault scarp along the Jocko Front, named the Jocko Fault. This fault is believed to be relatively young. No trenches have been dug to determine the seismic intervals, but this is another potentially active fault (CSKT Growth Policy, 2003).

The Big Arm area experienced earthquakes of a 4.9 magnitude in 1969 and 1971. Some structural damage, although not widespread, resulted from these quakes. The Montana Bureau of Mines and Geology (MBMG), which monitors seismic activity in Montana and beyond, reports a poor correlation between earthquake epicenters and known faults. Most of the quake activity is not associated with known faults. **Figure 9** indicates the general location of faults on the reservation.

The U.S. Geologic Survey's (USGS) National Seismic Hazard Mapping Project has created peak ground acceleration maps. The maps show the strength of seismic shaking that has a 2 percent probability of being exceeded in a 50-year period. The strength of the shaking is measured as a percent of the acceleration of gravity (%g). **Figure 9** shows peak ground acceleration zones and the location of CSKT's critical facilities.

Peak ground acceleration increases across the reservation from northwest to southeast indicating that portions of the Reservation from Polson south to Ronan, around Rollins, and along the East Shore of Flathead Lake could experience seismic shaking between 40 and 50%g; enough to cause considerable damage and partial collapse in ordinary buildings. According to Qamar (2008), at 9.2%g the earthquake is felt by all with many frightened. Some heavy furniture is moved with a few instances of fallen plaster. Damage is considered slight. At 18%g, damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, and considerable in poorly-built or badly designed structures. Some chimneys may be broken, and the shaking is noticed by people driving cars. At 34%g, damage is slight in specially designed structures, considerable in ordinary substantial buildings with partial collapse, and great in poorly built structures. Chimneys and walls may fall and heavy furniture is overturned.

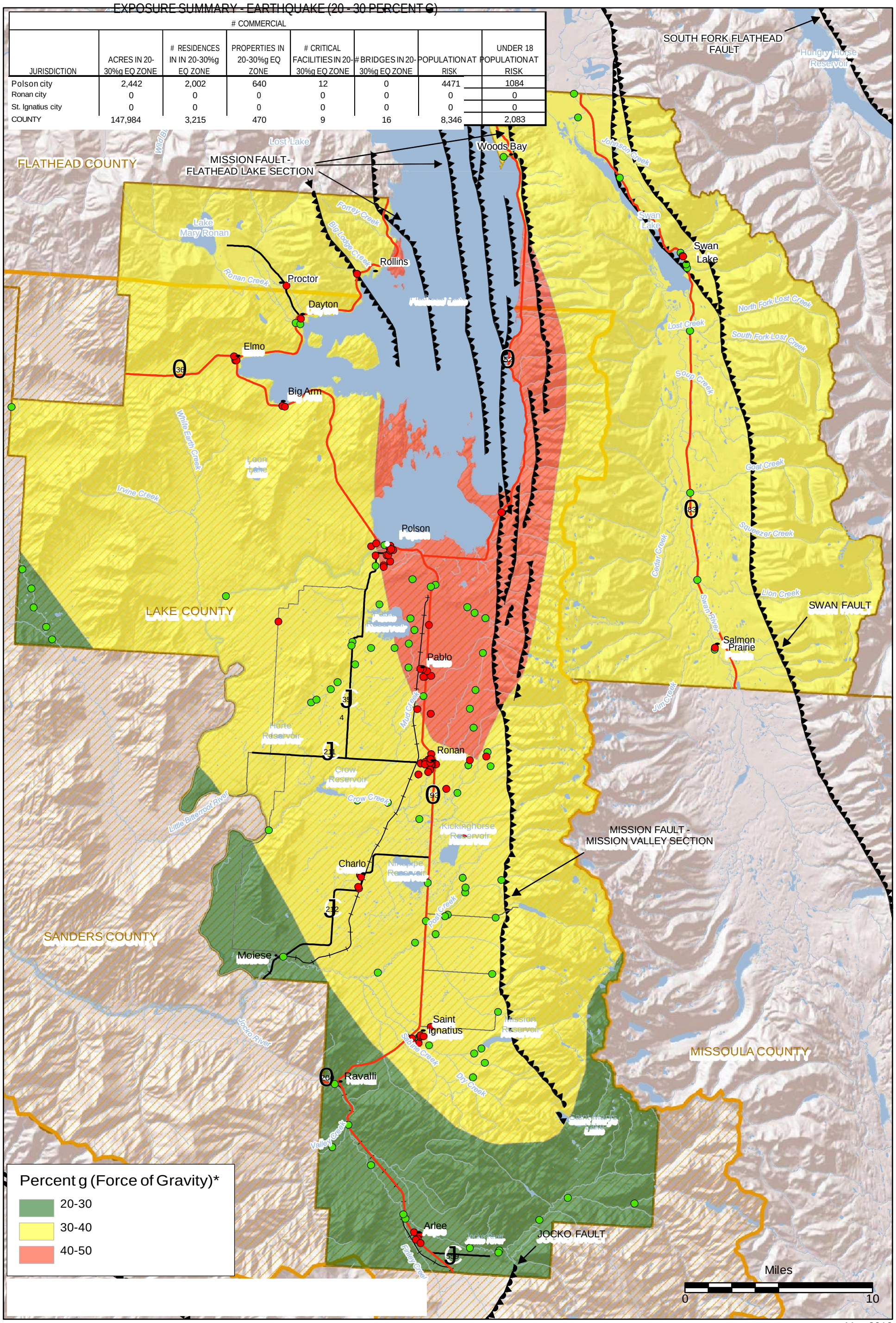
Many structures, including critical facilities within CSKT, have not been seismically assessed. Many of the existing homes, businesses, and critical facilities may not be structured to withstand seismic shaking.

Probability and Hazard Magnitude

The population would have little and mostly likely no warning prior to an earthquake, so the impact to that population could be considered high with little time to take protective actions.

EXPOSURE SUMMARY - EARTHQUAKE (20 - 30 PERCENT G)

JURISDICTION	ACRES IN 20-30%g EQ ZONE	# RESIDENCES IN IN 20-30%g EQ ZONE	PROPERTIES IN 20-30%g EQ ZONE	# CRITICAL FACILITIES IN 20-30%g EQ ZONE	# BRIDGES IN 20-30%g EQ ZONE	POPULATION AT RISK	# COMMERCIAL	UNDER 18 POPULATION AT RISK
Polson city	2,442	2,002	640	12	0	4471		1084
Ronan city	0	0	0	0	0	0		0
St. Ignatius city	0	0	0	0	0	0		0
COUNTY	147,984	3,215	470	9	16	8,346		2,083



Critical Facilities
Bridges
County Seat
Place Names
County
Flathead Reservation
Rivers
Lake/Reservoir
Primary Route
Secondary Route
Other Route
Railroad

May 2012

Figure 9

Earthquake Risk - Intensity of Ground Shaking

CSKT

Pre-Disaster Mitigation Plan

TABLE 4.10-3
CSKT VULNERABILITY ANALYSIS – EARTHQUAKE (40 - 50% g PEAK GROUND ACCELERATION)

JURISDICTION	RESIDENTIAL PROPERTY EXPOSURE $	# RESIDENCES AT RISK	COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTY EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRICULTUAL PROPERTIES AT RISK	CRITICAL FACILITIES EXPOSURE RISK $	# CRITICAL FACILITIES AT RISK	BRIDGE EXPOSURE $	# BRIDGES AT RISK	PERSONS AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County										
Polson	$262,630,066	2,002	$186,321,779	640	$79,827,069	14	$3,277,204	1	4,471	1,084
Ronan	$0	0	$0	0	$0	0	$0	0	0	0
St. Ignatius	$0	0	$0	0	$0	0	$0	0	0	0
Remainder of County	$623,671,365	3,215	$40,303,575	470	$63,186,190	9	$4,003,148	16	8,346	2,083
CENSUS Designated Places										
Arlee CDP	$0	0	$0	0	$0	0	$0	0	0	0
Bear Dance CDP	$66,399,442	244	$1,948,114	25	$0	0	$0	0	275	54
Big Arm CDP	$0	0	$0	0	$0	0	$0	0	0	0
Charlo CDP	$0	0	$0	0	$0	0	$0	0	0	0
Dayton CDP	$0	0	$0	0	$0	0	$0	0	0	0
Elmo CDP	$0	0	$0	0	$0	0	$0	0	0	0
Finley Point CDP	$139,101,581	568	$2,204,591	71	$0	0	$0	0	480	76
Jette CDP	$0	0	$0	0	$0	0	$0	0	0	0
Kerr CDP	$0	0	$0	0	$0	0	$0	0	0	0
Kicking Horse CDP	$0	0	$0	0	$0	0	$0	0	0	0
King's Point CDP	$55,981,199	311	$109,662	19	$0	0	$0	0	151	24
Lake Mary Ronan CDP	$0	0	$0	0	$0	0	$0	0	0	0
Lindisfarne CDP	$32,886,119	156	$548,197	23	$0	0	$0	0	100	19
Pablo CDP	$37,391,847	388	$10,588,590	120	$62,567,543	6	$0	0	2,254	744
Ravalli CDP	$0	0	$0	0	$0	0	$0	0	0	0
Rocky Point CDP	$9,224,677	46	$58,498	6	$0	0	$0	0	88	17
Rollins CDP	$18,428,761	62	$65,623	4	$0	0	$0	0	116	23
Swan Lake CDP	$0	0	$0	0	$0	0	$0	0	0	0
Turtle Lake CDP	$746,239	6	$0	0	$0	0	$0	0	209	88
Woods Bay CDP	$0	0	$0	0	$0	0	$0	0	0	0
County Commissioner Districts										
District 1	$601,166,910	2,866	$109,160,373	517	$30,345,025	8	$3,277,204	1	4,466	831
District 2	$0	0	$0	0	$0	0	$0	0	0	0
District 3	$285,134,521	2,351	$117,464,981	593	$112,668,234	15	$725,944	15	8,351	2,336

To complete the vulnerability analysis for the earthquake hazard, GIS was used to intersect the USGS peak ground acceleration maps with both the critical facility and MDOR cadastral parcel datasets. Estimates of vulnerable population were calculated by determining the percent exposure in each census block for the hazard area. Exposure values are presented in **Table 4.10-3.** The *Earthquake Section* in **Appendix C** presents supporting documentation from the risk assessment including a list of critical facilities in the various seismic zones.

GIS analysis of the earthquake risk to the reservation indicates that over 147,984 acres are within the 40- 50%g zone of peak horizontal acceleration. According to the vulnerability analysis, 3,215 residences, 470 commercial, industrial and agricultural buildings, and 9 critical facilities are located in the 40-50%g zone. Digital data on construction type for the facilities is not available but will be considered in future PDM updates.

Hazard probability was assessed based on hazard frequency over a 10-year period. Since the earthquake hazard does not occur with an intensity to cause significant property damage or loss of life more than once every 10 years it was given a "possibly" probability rating. The PDM Planning Team rated this hazard as "likely" using the Calculated Priority Risk Index.

Future Development

Seismic risk is not addressed in policies outlined in the CSKT. Subdivision regulations also do not address seismic risk.

New construction must adhere to seismic provisions in the 2009 International Building Code (IBC) for commercial buildings and the 2006 International Residential Code (IRC) for residential dwellings, as adopted by the State of Montana. Only the incorporated cities of Polson and Ronan require structural building permits at this time.

4.11 DAM FAILURE

CPRI SCORE = 1.6

Description and History

Dams have been placed around Montana for many reasons including recreation, flood control, irrigation, water supply, hydroelectricity and mining. Dams are built and owned by a variety of entities such as private individuals, utilities and the government. Dams come in all shapes and sizes from small earthen dams to large concrete structures. The structural integrity of a dam depends on its design, maintenance and weather/drainage situation. Problems arise when a dam fails and people and/or property lie in its inundation area. Dams can fail for a variety of reasons including seismic activity, poor maintenance, overwhelming weather and flow conditions, or by an intentional act. Dam failure can be compared to riverine or flash flooding in the area downstream from the dam, and sometimes for long distances from the dam, depending on the amount of water retained and the drainage area. Others may be located in areas that result in little if any damages during a failure.

The U.S. Army Corps of Engineers, National Inventory of Dams (NID) website keeps a record of dams across the country. Montana DES also keeps an extensive library of Emergency Action Plans (EAPs) for the state's high hazard dams. Hazard ratings are also given to those dams for emergency management planning purposes. These ratings, high, significant and low, are based on the potential for loss of life and property damage from the failure of the dam, not the condition or probability of the dam failing, as described below.

Low Hazard Potential: Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Significant Hazard Potential: Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

High Hazard Potential: Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

Lake County, including area within the Flathead Reservation, has 10 high hazard dams and several significant or low hazard dams. There are also three dams in adjoining Flathead and Sanders Counties with the potential to impact human lives on the Flathead Reservation if a failure were to occur. **Figures 10A through 10C** shows the high hazard dam locations and their inundation areas on the reservation, Polson and St. Ignatius, respectively. These dams are described in **Table 4.11-1,** below. No inundation areas would impact the City of Ronan.

Most of the dams on the reservation were constructed for irrigation purposes many years ago. The average age of the dams on the reservation is over 80 years. The flagship dam on the reservation is Kerr Dam, which controls the outflows of Flathead Lake. Ownership of the Kerr hydroelectric facility is PPL Montana. The Tribes are co-license holders with the utility on Kerr Dam with an option to assume operations of the dam in the year 2015.

According to the CSKT Growth Policy, the Bureau of Reclamation, in cooperation with the Tribes and the BIA, prioritized the dams on the Flathead Reservation based on risk. Excluding Kerr Dam, which is under the jurisdiction of Federal Energy Regulatory Commission and was not included in the risk analysis, the dams in the county are not considered to be "high risk". The Tribes have installed an early warning system at each dam, which is monitored remotely 24 hours a day. According to the PDM Planning Team, several dams on the reservation have restrictions because of maintenance issues. Pablo Dam was on the list for three years and Lower Crow Dam has a broken outtake works.

There is no record of failure of a high hazard dam on the reservation.

TABLE 4.11-1
HIGH HAZARD DAMS IN AND WITH THE POTENTIAL TO IMPACT CSKT

Dam Name	Drainage	Height (feet)	Maximum Storage (acre-ft)	Drainage Area (sq mi)	Year Completed	Purpose	Owner
Kerr	Flathead River	186	1,960,000	7,096	1939	Hydroelectric	PPL Montana & CSKT
Tabor	Dry Creek	53	23,300	12	1930	Irrigation	CSKT
Mission	Mission Creek	71	8,200	14	1935	Irrigation	CSKT
McDonald	Post Creek	40	8,220	21	1920	Irrigation	CSKT
Ninepipe	Dublin Gulch	38	15,150	8	1923	Irrigation	CSKT
Pablo	Pablo Canal	43	29,600	4	1914	Irrigation	CSKT
Lower Crow	Crow Creek	98	10,350	177	1933	Irrigation	CSKT
Kicking Horse	Dublin Gulch	27	8,350	2	1930	Irrigation	CSKT
Black Lake	Middle Fork Jocko River	60	5,200	4	1967	Irrigation	CSKT
Jocko	Middle Fork Jocko River	20	9,000	5	1937	Recreation	CSKT
Hubbart (Sanders County)	Little Bitterroot River	87	15,840	117	1923	Irrigation	CSKT
Lower Dry Fork (Sanders County)	Dry Fork Creek	26	4,270	19	1921	Irrigation	CSKT
Hungry Horse (Flathead County)	South Fork Flathead River	524	3,588,000	1,640	1953	Hydroelectric	DOI, BuRec

CSKT = Confederated Salish and Kootenai Tribe; DOI = U.S. Department of Interior; BuRec = Bureau of Reclamation

2

Figure 108

Critical Facilities Inundation Zone

Vulnerability and Area of Impact

Dams that could have the greatest impact to life and property demonstrated by their NID hazard rating are the high hazard dams. Those areas directly downstream from these high hazard dams would be the areas most at risk for loss of life and structural damage. CSKT PDM has Emergency Action Plans for the high hazard dams that could affect CSKT.

To model the exposure from a breach of the high hazard dams on the reservation, a GIS data layer was created for this project and figures created showing the dam failure hazard (**Figures 10A through 10C**). Inundation areas were digitized from the EAPs and intersected with critical facility and MDOR parcel datasets to determine building exposures. Vulnerable populations were calculated based on the percent census block in the inundation areas. Exposure values are presented in **Table 4.11-2.**

GIS analysis of the dam failure risk to CSKT indicates that over 118,836 acres are within the inundation areas of the high hazard dams, including 2,832 residences, 574 commercial, industrial and agricultural buildings, and 7 critical facilities. The *Dam Failure Section* in **Appendix C** presents supporting documentation from the risk assessment including a list of critical facilities in the inundation areas.

Probability and Magnitude

The probability of a significant dam breach on the reservation was ranked as “unlikely” by the Planning Team.

Future Development

The CSKT regulations do not address new construction in dam inundation areas.

TABLE 4.11-2
CSKT VULNERABILITY ANALYSIS – DAM FAILURE

JURISDICTION	RESIDENTIAL PROPERTY EXPOSURE $	# RESIDENCES AT RISK	COMMERCIAL, INDUSTRIAL & AGRICULTURAL PROPERTY EXPOSURE $	# COMMERCIAL, INDUSTRIAL & AGRICULTUAL PROPERTIES AT RISK	CRITICAL FACILITIES EXPOSURE RISK $	# CRITICAL FACILITIES AT RISK	BRIDGE EXPOSURE $	# BRIDGES AT RISK	PERSONS AT RISK	PERSONS UNDER 18 AT RISK
Incorporated Communities & County										
Polson	$27,392,343	139	$31,785,452	74	$0	0	$3,277,204	1	543	71
Ronan	$0	0	$0	0	$0	0	$0	0	0	0
St. Ignatius	$4,577,891	35	$480,338	11	$0	0	$40,232	1	149	43
Remainder of County	$603,058,548	2,832	$58,782,990	574	$29,867,535	7	$6,408,838	30	7,422	1,847
CENSUS Designated Places										
Arlee CDP	$4,086,587	18	$394,668	4	$0	0	$126,800	1	203	64
Bear Dance CDP	$43,146,186	102	$881,450	8	$0	0	$0	0	102	17
Big Arm CDP	$10,332,194	64	$2,999,894	22	$0	0	$0	0	49	5
Charlo CDP	$8,638,650	103	$816,760	23	$ not available	1	$0	0	280	75
Dayton CDP	$16,904,379	128	$29,745,843	151	$ not available	1	$78,028	1	83	11
Elmo CDP	$6,632,461	42	$646,874	35	$0	0	$0	0	138	34
Finley Point CDP	$193,168,628	711	$995,192	67	$0	0	$0	0	346	50
Jette CDP	$9,150,542	55	$166,620	6	$0	0	$0	0	79	7
Kerr CDP	$4,369,129	13	$61,891	2	$0	0	$0	0	48	12
Kicking Horse CDP	$0	0	$0	0	$0	0	$0	0	6	1
King's Point CDP	$38,764,343	187	$29,672	13	$0	0	$0	0	110	17
Lake Mary Ronan CDP	$0	0	$0	0	$0	0	$0	0	0	0
Lindisfarne CDP	$48,498,948	235	$478,624	20	$0	0	$0	0	196	30
Pablo CDP	$24,177,458	283	$9,681,452	106	$29,867,535	5	$0	0	2,071	683
Ravalli CDP	$1,137,479	12	$0	0	$0	0	$0	0	14	0
Rocky Point CDP	$9,702,350	38	$29,064	4	$0	0	$0	0	88	17
Rollins CDP	$35,571,906	160	$274,013	16	$0	0	$0	0	132	18
Swan Lake CDP	$0	0	$0	0	$0	0	$0	0	0	0
Turtle Lake CDP	$0	0	$0	0	$0	0	$0	0	60	12
Woods Bay CDP	$0	0	$0	0	$0	0	$0	0	0	0
County Commissioner Districts										
District 1	$541,023,628	2,242	$69,802,534	471	$ not available	1	$4,484,202	9	2,518	383
District 2	$58,732,720	414	$3,949,993	62	$29,867,535	5	$1,891,048	20	2,506	648
District 3	$35,272,434	350	$17,296,253	126	$ not available	1	$73,820	2	3,090	930

4.2 RISK ASSESSMENT SUMMARY

This section summarizes the results of the individual risk assessments presented under the hazard profiles. There have been no repetitive loss properties due to flooding within the Flathead Reservation. CSKT does not have repetitive loss properties associated with other hazards. Annual loss estimates are presented for each hazard where damage data is available. Future development projects on the reservation are discussed as they relate to the hazard areas.

Vulnerability Analysis - Loss Estimation Summary

Estimating potential losses and calculating risk requires evaluating where hazard areas and vulnerabilities to them coincide, how frequently the hazards occur, and then estimating the magnitude of damage resulting from a hazard event. Annualized loss was computed for the hazards where damage data was available. *Section 4.1* presents the methodology for loss estimation calculations. **Tables 4.12-1 through 4.12-4.** Present annual loss for the various hazards for residential, commercial (including industrial and agricultural buildings), and critical facilities in the county and incorporated communities. **Appendix C** contains supporting information.

Figures 11A through 11D present the composite of hazard prone areas on the reservation. These figures show future development projects identified during the planning process and/or can be used to help locate future projects outside hazard-prone areas. **Table 4.12-5** presents a matrix of each identified future development project, showing which hazards they will be exposed to. Data on proposed construction method and estimated cost were not available.

TABLE 4.12-1
HAZARD VULNERABILITY SUMMARY; CSKT

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Persons in Hazard Area	Under 18 in Hazard Area
Wildfire	$1,239,691,127	6,265	$55,614	$71,969,078	927	$3,229	$69,358,669	21	$3,112	14,024	3,507
Transportation Accidents/Hazardous Material Incidents	$852,497,082	5,619	NA	$349,089,825	1,767	NA	$163,529,316	57	NA	17,342	4,371
Landslides	$65,526,956	384	NA	$10,389,748	71	NA	$ not available	1	NA	2,266	448
Structure Fire	$1,900,032,008	10,026	$351,686	$152,796,089	1,713	$28,282	$72,839,343	37	$13,482	21,545	5,424
Severe Winter Weather	$1,900,032,008	10,026	$7,905	$152,796,089	1,713	$636	$72,839,343	37	$303	21,545	5,424
Flooding	$608,995,285	2,389	$5,122	$24,472,893	287	$206	$0	0	NA	7,659	1,800
Severe Summer Weather	$1,900,032,008	10,026	$42,215	$152,796,089	1,713	$3,395	$72,839,343	37	$1,618	21,545	5,424
Earthquakes	$623,671,365	3,215	NA	$40,303,575	470	NA	$63,186,190	9	NA	8,346	2,083
Dam Failure	$603,058,548	2,832	NA	$58,782,990	574	NA	$29,867,535	7	NA	7,422	1,847

NA = Not Available. Annual loss cannot be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Flooding exposure is presented for the 100-year event.
Earthquake exposure is presented for 40-50 %g peak ground acceleration
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area. More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.12-2
HAZARD VULNERABILITY SUMMARY; CITY OF POLSON

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Persons in Hazard Area	Under 18 in Hazard Area
Wildfire	$0	0	NA	$0	0	NA	$0	0	NA	0	0
Transportation Accidents/Hazardous Material Incidents	$90,923,471	890	NA	$149,850,759	517	NA	$31,062,173	11	NA	2,721	611
Landslides	$0	0	NA	$0	0	NA	$0	0	NA	0	0
Structure Fire	$264,253,693	2,014	$48,912	$186,643,179	641	$34,547	$80,471,317	14	$14,895	4,488	1,085
Severe Winter Weather	$264,253,693	2,014	$1,099	$186,643,179	641	$776	$80,471,317	14	$335	4,488	1,085
Flooding	$10,314,441	49	$87	$1,322,741	11	$11	$0	0	NA	337	33
Severe Summer Weather	$264,253,693	2,014	$5,871	$186,643,179	641	$4,147	$80,471,317	14	$1,788	4,488	1,085
Earthquakes	$262,630,066	2,002	NA	$186,321,779	640	NA	$79,827,069	14	NA	4,471	1,084
Dam Failure	$27,392,343	139	NA	$31,785,452	74	NA	$0	0	NA	543	71

NA = Not Available. Annual loss cannot be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Flooding exposure is presented for the 100-year event.
Earthquake exposure is presented for 40-50 %g peak ground acceleration
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area. More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.12-3
HAZARD VULNERABILITY SUMMARY; CITY OF RONAN

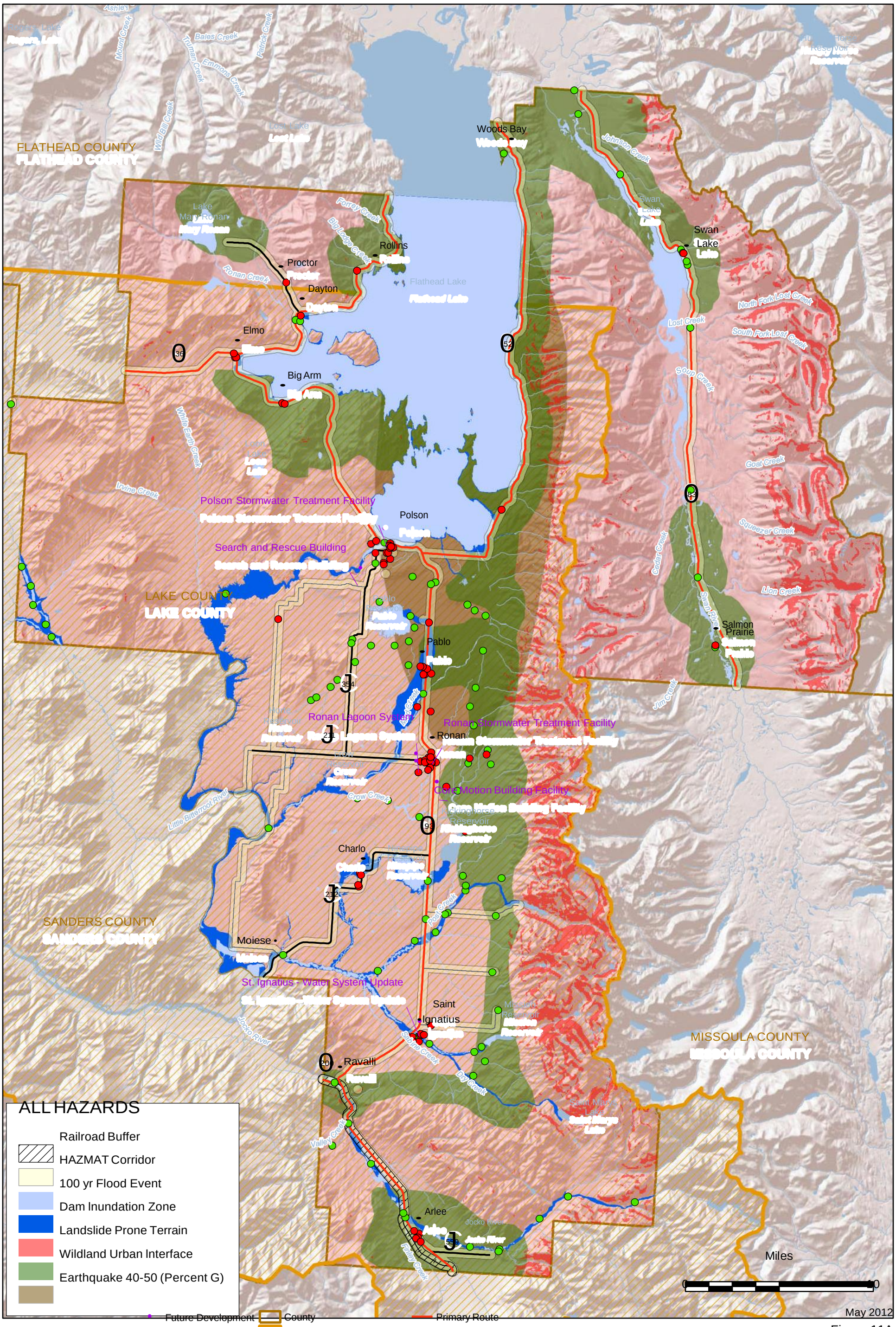
Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Persons in Hazard Area	Under 18 in Hazard Area
Wildfire	$989,415	7	$44	$0	0	$0	$0	0	$0	27	12
Transportation Accidents/Hazardous Material Incidents	$50,690,419	683	NA	$110,298,707	420	NA	$57,042,214	12	NA	1,617	432
Landslides	$0	0	NA	$0	0	NA	$0	0	NA	0	0
Structure Fire	$68,159,449	869	$12,616	$111,261,523	428	$20,594	$59,905,388	16	$11,088	1,871	518
Severe Winter Weather	$68,159,449	869	$284	$111,261,523	428	$463	$59,905,388	16	$249	1,871	518
Flooding	$615,416	7	$5	$14,259,884	16	$120	$0	0	$0	94	26
Severe Summer Weather	$68,159,449	869	$1,514	$111,261,523	428	$2,472	$59,905,388	16	$1,331	1,871	518
Earthquakes	$0	0	NA	$0	0	NA	$0	0	NA	0	0
Dam Failure	$0	0	NA	$0	0	NA	$0	0	NA	0	0

NA = Not Available. Annual loss cannot be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Flooding exposure is presented for the 100-year event.
Earthquake exposure is presented for 40-50 %g peak ground acceleration
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area. More persons than actually reside in the hazard area where census blocks are large.

TABLE 4.12-4
HAZARD VULNERABILITY SUMMARY; TOWN OF ST. IGNATIUS

Hazard	Residential Building Stock $ Exposure in Hazard Area	# Residential Structures in Hazard Area	Residential Building Stock $ Annual Loss	Commercial, Industrial & Agricultural Building Stock $ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock $ Annual Loss	Critical Facility $ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Critical Facilities $ Annualized Loss	Persons in Hazard Area	Under 18 in Hazard Area
Wildfire	$0	0	$0	$0	0	$0	$0	0	$0	0	0
Transportation Accidents/Hazardous Material Incidents	$11,038,483	122	NA	$4,050,397	34	NA	$0	0	NA	315	76
Landslides	$0	0	$0	$0	0	$0	$0	0	$0	0	0
Structure Fire	$28,062,140	323	$5,194	$11,480,359	98	$2,125	$10,134,008	7	$1,876	842	254
Severe Winter Weather	$28,062,140	323	$117	$11,480,359	98	$48	$10,134,008	7	$42	842	254
Flooding	$4,604,999	41	$39	$181,280	7	$2	$0	0	$0	251	71
Severe Summer Weather	$28,062,140	323	$623	$11,480,359	98	$255	$10,134,008	7	$225	842	254
Earthquakes	$0	0	$0	$0	0	$0	$0	0	$0	0	0
Dam Failure	$4,577,891	35	NA	$480,338	11	NA	$0	0	NA	149	43

NA = Not Available. Annual loss cannot be computed due to the absence of historic property damage figures that are required to calculate magnitude. See Section 4.1 on page 4-1 which describes risk assessment methodology for additional information.
Flooding exposure is presented for the 100-year event.
Earthquake exposure is presented for 40-50 %g peak ground acceleration
It should be noted that there are some inherent inaccuracies using a percentage of census block population to compute the number of individuals living in the hazard area. More persons than actually reside in the hazard area where census blocks are large.



May 2012

Figure 11A

Future Development and Hazard Composite

CSKT

Pre-Disaster Mitigation Plan

TABLE 4.12-5
FUTURE DEVELOPMENT SUMMARY

Proposed Project	Hazard Areas									
	Wildfire	Transportation Accidents/Hazardous Material Incidents	Landslides	Structure Fire	Severe Winter Weather	Flooding	Communicable Disease	Severe Summer Weather	Earthquake (40-50%g)	Dam Failure
Ronan Lagoon System	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No
Ronan Stormwater Treatment Facility	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No
Core Motion Building Facility	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No
St. Ignatius – Water System Update	No	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Polson Stormwater Treatment Facility	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Search and Rescue Building	No	Yes	No	Yes	Yes	No	Yes	Yes	No	No

7.0 PLAN MAINTENANCE PROCEDURES

The plan maintenance section of this document details the formal process that will ensure that the CSKT PDM Plan remains an active and relevant document. The maintenance process includes a schedule for monitoring and evaluating the plan and producing a plan revision every five years. The plan can be revised more frequently than five years if the conditions under which it was developed change significantly (e.g. a major disaster occurs and projects are accomplished and/or new projects need to be identified or funding availability changes). This section also describes how the Tribe will monitor the progress of mitigation activities and be incorporated into existing planning mechanisms. The final section describes how CSKT will integrate public participation throughout the plan maintenance process.

7.1 MONITORING, EVALUATING AND UPDATING THE PLAN

7.1.1 2005 PDM Plan

The 2005 PDM Plan was neither monitored nor evaluated since it was developed and adopted. Mitigation projects were completed during this period (as discussed in Section 7.2.1, below); however, the plan was not discussed for relevance since its inception. CSKT submitted a planning grant to State DES and FEMA in 2014 to update their PDM Plan and this funding was approved.

7.1.2 2016 PDM Plan

The PDM Plan should be reviewed annually at meetings of the TERC/LEPC. These reviews may be more or less frequent, as deemed necessary by the CSKT DES Director, but there will be a minimum of one review per year. The review should determine whether a plan update is needed prior to the required five-year update. The plan review should consider any new hazards and vulnerabilities as well as document completed mitigation projects, identify new mitigation projects and evaluate mitigation priorities.

The CSKT DES Director will be responsible for ensuring the PDM Plan review is on the agenda at the TERC/LEPC meetings so that applicability of the plan can be evaluated. The DES Director should prepare a status report summarizing the outcome of the plan review and the minutes should be made available to interested stakeholders and kept in a permanent file designated for the next (2021) PDM Plan update.

Three years after adoption of the plan, the CSKT DES Director may apply for a planning grant through FEMA to start the updating of the PDM Plan. Upon receipt of funding, CSKT may solicit bids in accordance with applicable contracting procedures and hire a contractor to assist with the project. The proposed schedule for completion of the plan update is one year from award of a contract, to coincide with the five-year adoption date of the original PDM Plan.

The CSKT DES Director will be responsible for the plan update. Before the end of the five-year period, the updated plan will be submitted to FEMA for approval. When concurrence is received that the updated plan complies with FEMA requirements**,** it will be submitted to the Tribal Council for adoption. The DES Director will send an e-mail to individuals and organizations on the stakeholder list to inform them that the updated plan is available on the County website.

7.2 MONITORING PROGRESS OF MITIGATION ACTIVITIES

7.2.1 2005 PDM Plan

Since development of the 2005 PDM Plan, mitigation projects have not been identified or completed on the reservation.

7.2.2 2016 PDM Plan

The process for monitoring and evaluating mitigation projects will be the responsibility of the TERC/LEPC. This group is comprised of dedicated individuals from county, city and tribal departments, emergency response entities, local businesses and non-profit organizations to engage in all aspects of emergency management. This group has accepted the responsibility for implementing mitigation projects on behalf of their jurisdiction and annual meetings will provide a venue for reporting and accountability. Minutes should be prepared from these meeting and should be distributed to interested stakeholders as well as kept in a permanent file for the next PDM Plan update (2021). Agencies and organizations "assigned" responsibility for various aspects of the mitigation strategy will have the opportunity to coordinate with other team members on challenges, success and opportunities.

Individual projects will be monitored by the department implementing the project or the grant. Generally, HMGP and PDMC projects will be monitored by the DES Director and any National Fire Plan projects or Community Assessment Agreements will be monitored by the U.S. Forest Service and/or DNRC. Each organization will track projects through a central database and issue quarterly reports to federal agencies.

7.3 IMPLEMENTATION THROUGH EXISTING PROGRAMS

CSKT will have the opportunity to implement hazard mitigation projects through existing programs and procedures through plan revisions or amendments. The PDM Plan will be incorporated into the plans, regulations and ordinances as they are updated in the future or when new plans are developed. **Table 7.3-1** presents a summary of existing plans and ordinances and how integration of mitigation projects will occur.

TABLE 7.3-1 IMPLEMENTATION OF MITIGATION INTO EXISTING PLANS AND CODES		
Type	**Name**	**Integration Technique**
Plans		
Emergency Operations	CSKT Emergency Operations Plan	Integrated by reference in PDM Plan.
	Emergency Action Plan, Black Lake Dam	Dam safety projects addressed in EAPs. Integration through reference in PDM Plan.
	Emergency Action Plan, Jocko Dam	
	Emergency Action Plan, CSKT Energy Keepers Dam	
	Emergency Action Plan, Kicking Horse Dam	
	Emergency Action Plan, Lower Crow Dam	
	Emergency Action Plan, McDonald Dam	
	Emergency Action Plan, Mission Dam	
	Emergency Action Plan, Ninepipe Dam	

TABLE 7.3-1 IMPLEMENTATION OF MITIGATION INTO EXISTING PLANS AND CODES		
Type	**Name**	**Integration Technique**
Plans		
Emergency Operations	Emergency Action Plan, Pablo Dam	Dam safety projects addressed in EAPs. Integration through reference in PDM Plan.
	Emergency Action Plan, Tabor Dam	
	Emergency Action Plan, Upper Dry Fork Dam (Sanders County)	
	Emergency Action Plan, Lower Dry Fork Dam (Sanders County)	
	Emergency Action Plan, Hungry Horse Dam (Flathead County)	
Growth Policies, Lake County	Growth Policy, 2003	Integration may occur when these plans are revised.
	City of Polson Growth Policy, 2006	
	City of Ronan Growth Policy, 2008	
	St. Ignatius Growth Policy, 2001	
Wildfire Mitigation	CSKT DNR wildfire policy	Integration will occur when revised. Wildfire mitigation projects from PDM will be incorporated into mitigation strategy.
Codes, Regulations & Ordinances (Lake County)		
Zoning	City of Polson Zoning Ordinance	Integration will occur through revision. Hazard areas identified in PDM will be considered when these regulations are revised.
	City of Ronan Zoning Ordinance	
	St. Ignatius Zoning Ordinance	
Development	City of Polson Development Code	
Building	State of Montana Building Codes	
Subdivisions	CSKT Subdivision Regulations	
	City of Polson Subdivision Regulations	
	City of Ronan Subdivision Regulations	
Floodplain	Floodplain Regulations	
Lakeshore	Lakeshore Protection Regulations	

Lake County, the Cities of Polson and Ronan, and the Town of St. Ignatius all use a Growth Policy to guide development. Typically, a Growth Policy will address hazards; specifically, that life and property be protected from natural disasters and man-caused hazards. Mitigation goals in the PDM Plan will be recommended for incorporation into future revisions of these growth policies to ensure that high- hazard areas are being considered for low risk uses.

To ensure that the requirements of the PDM Plan are incorporated into other planning mechanisms and remain an on-going concern for CSKT, various staff will be included to have a mitigation component. Participation in this group will provide an awareness of new and on-going mitigation initiatives for the purpose that they be integrated into plans, codes and regulations during revision. The CSKT GIS Manager will include responsibilities for management and update of the spatial data compiled for the hazard analysis including coordinates of critical facilities and digital floodplain, inundation and wildfire layers so this data can be integrated into other planning efforts. The job description of the DES Director will include responsibilities for implementing outreach activities for risk reduction on the reservation, coordinating with the Tribal Council to secure funding for mitigation projects, ensure mitigation projects are implemented, and updating the PDM Plan. The DES Director will also be responsible for maintaining a permanent master file for the PDM planning

process, which will include damage figures from hazard events, records of mitigation projects and notes/minutes from relevant meetings.

Meetings of the Tribal Council Districts will provide an opportunity for the DES Director to report back on the progress made on the integration of mitigation planning elements into CSKT planning documents and procedures.

7.4 CONTINUED PUBLIC INVOLVEMENT

CSKT is dedicated to involving the public directly in review and updates of the PDM Plan. The public will have many opportunities to provide feedback about the plan. Hard copies of the plan will be kept at appropriate CSKT offices. An electronic copy of the plan will be available on the CSKT website. The existence and location of plan hard copies will be publicized on the CSKT website. *Section 2.0* includes the address and the phone number of the DES Director who will be responsible for keeping track of public comments on the plan.

The public will be invited to meetings of the TERC/LEPC when the PDM Plan is discussed. The meetings will provide the public a forum for which they can express concerns, opinions, or ideas about the plan. The DES Director will be responsible for using county resources to publicize the public meetings and maintain public involvement through the newspapers, radio and Internet.

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