NATURAL HAZARDS ELEMENT

A natural disaster occurs when a natural hazard impacts people or property and creates adverse conditions within a community. In Morrow County, there are 8 identified natural hazards that can occur infrequently, but with disastrous impacts, or occur frequently, with often milder, but nevertheless significant impacts. Development standards can mitigate for some hazards, such as flooding and landslide hazard areas, but for other, more widespread or random hazards such as drought, wildfire, winter storm, or windstorms, effective mitigation must come in the form of public awareness, preparedness and participation. In association with the Federal Emergency Management Agency and the Oregon Emergency Management, the County has, as a guiding document for natural hazard mitigation, the Morrow County Natural Hazard Mitigation Plan, which was first adopted by the County in 2006. In this Plan, the eight natural hazards are:

- Drought
- Earthquake
- Flood
- Landslide
- Volcano
- Wildfire
- Windstorm
- Winter storm

DROUGHT

Drought is a normal, recurrent feature of the climate in eastern Oregon. The environment and economy of Morrow County is vulnerable to the impact drought can have when there is a deficiency of precipitation over an extended period of time, usually a season or more. Also, the impacts of drought are often exacerbated by the demand placed on the water supply in the region's aquifers, high temperatures, high winds and low humidity. These are all conditions that exist in Morrow County during the summer months. Drought in Morrow County has a serious effect on the local agricultural economy and the associated businesses that depend on the success of the local economy. During times of low regional snowpack in the mountains the resulting restrictions on water wells for irrigation cause losses to farmers who cannot irrigate their crops as usual, as well as for dryland wheat farmers who are coping with lack of local rainfall.

Regions of Drought Hazard:

Although the Climate Prediction Center gives one set of drought data for the region, drought has variable risks across the County:

South: The conifer forests of southern Morrow County suffer in drought conditions and become more vulnerable to pests and wildfire. Drought affects the recreation economy in that summertime visitors who come to the Off-Road Vehicle Park and other recreation facilities are restricted from full use of the facility due to fire bans.

North: Drought in this region of Morrow County has a clearly detrimental effect on agriculture, which must adjust to low water tables and irrigation restrictions or rely on government support programs and crop insurance. Ranges and pastures become stressed and often over grazed in drought conditions. The usual watering areas may disappear or be negatively affected. Wildfire risks are elevated and reservoir levels and aquifers diminish. During drought conditions the wildfire risk becomes elevated in the

agricultural lands set aside as conservation reserve areas, extensive pastures and ranges, undeveloped shrub-steppe, the Boardman Bombing Range and on the former Army Depot.

EARTHQUAKE

The earthquake hazard in Morrow County has been evaluated by the State and the USGS. There are no identified fault lines lying in the County but residents have felt shaking from nearby fault activity and new fault lines have been discovered not far away to the north in Washington State. Still, a major earthquake hazard event has been determined to have a small likelihood of occurrence in Morrow County.

The Pacific Northwest Seismograph Network records roughly 1,000 earthquakes per year in Washington and Oregon. Between one and two dozen of these cause enough ground shaking to be felt by residents. Most are located in the western side of the Cascade Mountains. This part of Oregon has experienced four historic earthquakes of significance that were centered in the eastern Oregon region: the 1893 Umatilla earthquake, the 1936 Milton-Freewater earthquake, the 1951 Hermiston earthquake, and the 1976 Deschutes Valley earthquake. All were shallow crustal earthquakes. There are also identified faults in the region that have been active in the last 20,000 years. The region has also been shaken historically by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered outside the area.

FLOOD

According to the National Oceanographic and Atmospheric Agency (NOAA), flash floods in the United States are responsible for more deaths than any other storm event phenomena. Flash flooding usually is the byproduct of very heavy rains in a short period of time over a small geographic area, all of which combine to cause small streams to turn violent. Flooding as a natural hazard is a long-recognized and historically significant event in parts of Morrow County. Flash flooding, which is the prevalent flooding event in Morrow County, can be poorly predicted by weather reports because most often the floods are a result of a microburst, which simply overwhelms both natural and constructed drainage systems. These failures can cause damage to downtowns and farms in the floodplain areas. Emergency services, transportation, power, water and wastewater services, business and hazardous materials storage may be substantially disrupted and can affect the population located in or near the flooded area.

South Morrow County. The Willow Creek in southern portion of the County is famous in Oregon for the 1903 flash flood that caused the death of more than 200 people. It was a summer thunderstorm flood and was caused by a large amount of concentrated rainfall and a lack of vegetation in the watershed to slow it down. The City of Heppner, where the flood occurred, lies in a valley surrounded by steep slopes and sits at the confluence of four streams: Willow Creek, Hinton Creek, Balm Fork, and Shobe Creek. The steep slopes of the hills surrounding these creeks, along with the prevalence of severe thunderstorms in the area, contribute to the likelihood of flash flooding. According to the Heppner City Plan (1999), there was one flood per 4.6 years on average between 1883 and 1971. Due to this high incidence of flash flooding on the Willow Creek and other streams, the City of Heppner and the U.S. Army Corps of Engineers built the Willow Creek Dam across Willow Creek. This dam was completed in 1982 and the area subject to flooding was significantly reduced. However, since the Willow Creek Dam was constructed to intercept the waters from Willow Creek and Balm Fork only, the major flood hazard reduction occurred between the face of the dam and the confluence with Shobe Creek.

Below Shobe Creek, an extensive area of the valley floor is still considered by FEMA as a designated flood hazard area. The flooding that occurred in 1971 was documented to have originated in the Shobe Creek watershed. As a result of the 1971 Shobe Creek flood, extensive work was done to construct a series of diversions in the Shobe Creek drainage, along with the conversion of cropland to the Conservation Reserve Program (CRP) under a program sponsored by the Soil Conservation Service. Since the construction of the Willow Creek Dam and the work done on the Shobe Creek drainage, no significant flooding has been documented within the City of Heppner.

Lexington and Ione are also located on Willow Creek and experience localized flash flooding events. The U.S. Army Corps of Engineers has indicated that several of the tributaries of Willow Creek below the Willow Creek dam have the potential for flash floods and warrant consideration toward providing a degree of flood protection. The drainages are Blackhorse Creek at Lexington, Reitmann and Lorraine Canyons at Ione, and Rhea Creek at Ruggs.

North Morrow County. The Columbia River is not one of concern as far as extreme flood conditions because it is regulated by up-stream dams that it does not present a problem in Morrow County. There are, however, other flash flooding incidents in the northern portion of the County that do cause damage and disruption for the citizens and businesses of the County. The May 19, 2006 storm event is a good example of how a summer thunderstorm event can cause damage. The storm precipitated record-breaking hail and rain enough to wash out areas of local roads such as Bombing Range Road and portions of Highway 730.

LANDSLIDE

Landslides, including rock fall and other debris flow, as a natural hazard exist in every state in the U.S., and can be a serious geologic hazard. They sometimes present a threat to human life, but most often result in a disruption of everyday services, including emergency response capabilities. Landslides can and do block transportation routes, dam creeks and drainages and contaminate water supplies. When these hazards affect transportation routes they are frequently expensive to clean up and can have significant economic impact to the county. The Federal Emergency Management Agency (FEMA) describes debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, as common types of fast-moving landslides. These flows most frequently occur during or after periods of intense rainfall or rapid snow melt and have been linked to forest management practices, soil types and the underlying soil structure.

Morrow County Public Works Department clears the County roads from landslide debris in the rugged terrain of the south County areas. These landslides often occur after rain events and are generally not significant enough to block traffic, although along Rhea Creek and Willow Creek Roads landslide events have been most numerous and have been known to temporarily block traffic.

According to the Oregon Department of Geology and Mineral Industries (DOGAMI) map of the historic landslide areas in Morrow County, the landslide risk areas are in the southern portion of the County where the terrain is rugged and forested. DOGAMI has also mapped a large alluvial fan in the north-central portion of the County. This large alluvial fan is located in a farming area, but there are a few farm homes located on it.

VOLCANO

The western boundary of the Cascade Range is within 150 miles of Morrow County. The

Cascade Range has been an active volcanic area for about 36 million years as a result of the convergence between the North American and Juan de Fuca crustal plates. According to most interpretations, volcanism in the Cascades has been discontinuous in time and space, with the most recent episode of activity beginning about 5 million years ago and resulting in more than 3,000 vents. This activity is observable today as scientists monitor closely ongoing activity at Mount. St. Helens in Washington, the South Sister in Oregon and other locations.

As evidenced by all of the basalt that underlies Morrow County, this region has been mightily influenced by volcanic activity. Despite the scary image of liquid basalt flowing over the central basin area, there has been no such activity since more than 15 million years ago. Today, any risk to Morrow County is perceived as coming from the volcanic Cascade Range to the west. There is no history of volcanic impacts in Morrow County, although volcanic history in the wider region, notably the Mt. St. Helens eruption in 1980, does show that a volcano could affect the County if a volcano in the Cascade Range were to erupt.

WILDFIRE

Morrow County, along with much of eastern Oregon has had experience with wildfires throughout time. The prevailing easterly wind and the drought conditions, which exist off and on throughout the western U.S., have exacerbated wildfires in this region. The number of fires in Morrow County, from 1984 to 2003, ranged from 13 in 1993 to 105 in 1999 with a total of 873 fires during this time period burning more than 213,000 acres. Twenty-nine fires burned 300 acres or more during that period and of those, six were 5,000 acres or more. In July and August of 2000 the Governor signed a Determination of Emergency Conflagration Act Due to Fire in Morrow County. The fire that occurred at this time was the "Willow Creek Fire" which started at the junction of Eight Mile Road and Four Mile Canyon in Gilliam County and spread out of control to Morrow County.

Wildfire Impacts in Morrow County Regions

The southern one-third of the County is forested with the southeast corner of the County within the Umatilla National Forest. The topography of this part of the County is rugged as it is a part of a northwest spur of the Blue Mountains. The precipitation over this higher portion of the County does support conifer forests. These conifer stands, which cover some 205,000 acres, form an almost solid cover over the ridges and slopes of this area. About one thousand acres is juniper or scrub timber. The major species of conifers are ponderosa pine, Douglas-fir and western larch. The fire protection officials in this area characterize the fuel for wildfire potential in this region as very high. There are residential developments in the forested zone, which are the Blake Ranch area and the residential development around Penland Lake and around Cutsforth Park. The potential for life and property loss is high in the event of a fire due to lack of proximity to any rural fire protection district. Increasingly, people are using this area for recreational use at the County run Off-Highway-Vehicle Park and more people spend holiday time during weekends and vacation periods here. The residents and visitors to these areas are often inadequately educated or prepared for the inferno that could sweep through the brush and timber, affecting safety and destroying property in minutes.

In the middle third of the County, precipitation is too low for tree growth without the support of irrigation. Nevertheless, the fire protection districts respond to fires in this area more than in the forested southern region. The middle region of the County is mostly dryland ranges for the pasture of cattle and dryland wheat. The fire protection districts respond to wildfires in this location as a result of lightning strike (70 percent) and human caused (30 percent) fires. The fires generally burn range land, Conservation Reserve Program (CRP) fields, and pastures. Heppner, Lexington and Ione are located within this area.

The northern third of the County contains most of the County's economic infrastructure to include the Boardman Coal-fire plant, Finley Buttes Regional Landfill, the Port of Morrow with its associated industries, Bonneville Power Administration power lines, natural gas pipelines, to name a few. The potential for wildfire in this portion of the County is less than the rest of the County for the following reasons. The farms and fields are irrigated, which means that water is available to keep the crops green and to lessen the ability of wildfire to spread and the area is more populated and contains two fire protection districts to respond to fires in the undeveloped shrub-steppe regions of the County. The ability of firefighters to protect this portion of the County is hampered, however, by the limited transportation network, which does not allow for quick coverage of the undeveloped areas of this portion of the County.

WIND STORM

Morrow County is subject to often intense gusts of high winds and windstorms. Typically the greatest damage caused by severe windstorms, thunderstorms and tornadoes in Morrow County are damages to structures of light construction such as manufactured homes, road blockages and other damage due to downed trees, flooding in low areas, and blowing debris. Although not usually life-threatening, high winds can disrupt daily activities and increase the potential of other hazards. Some areas with little or no ground cover such as open agricultural fields experience blinding gusts of dust and road debris, including tumbleweeds, which become a hazard for travelers and an occasional disruption of local services. High winds sometimes cause severe transportation disruptions due to localized roadways blocked with debris, downed trees over roadways, and low areas completely filled with windblown tumbleweeds. Wildfires can be accelerated and made unpredictable by windstorms, which can cause grave danger to firefighters, emergency response personnel and residences or other structures that happen to be in the path of a wayward wildfire. Effects of the windstorms may be seen in damage to agricultural systems such as circle irrigation units, to structures such as roof damage and cracked windows, and damage to trees and landscaping. Power outages due to downed or damaged power supply lines have the potential to disrupt emergency response during and after a destructive windstorm.

WINTER STORM

Morrow County is vulnerable to the whims of winter storms and the associated problems. Roads can become temporarily impassable due to snow accumulation, although primary roads such as Interstate 84 are rarely closed due to snow and ice accumulation.

The most common impacts of winter storms are temporary road closures and flooding due to storm events, to include mud flowing across a road from nearby agricultural fields, ice storms and tumbleweeds blocking roadways. In addition to actual stormy conditions in the winter, dense, freezing fog can be a real hazard, especially on roadways and bridges.

NATURAL HAZARD FINDINGS

The following are the Goals from the Natural Hazard Mitigation Plan as recommended by the Advisory Committee and adopted by Resolution by the Morrow County Court. In the context of the Comprehensive Plan these could also be called Findings.

1. Protection of Property. Lessen impact from natural disaster on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards;

2. Outreach and Education. Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts;

3. Prevention. Reduce the threat of loss of life and property from natural hazards by making hazard mitigation planning a priority in land use policies and decisions, including Natural Hazard Mitigation Plan implementation.

4. Partnership and Coordination. Identify mitigation or risk reduction measures that address multiple areas (i.e. environment, transportation, telecommunications); Coordinate public/private sector participation in planning and implementing mitigation projects throughout the County; seek funding and resource partnerships for future mitigation efforts; and strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry.

5. Structural Projects. When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

6. Natural Resources. Preserve and rehabilitate and enhance natural systems to serve natural hazard mitigation functions (i.e. floodplains, wetlands, watersheds and urban interface areas; and balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.

7. Emergency Services. Minimize life safety issues by promoting, strengthening and coordinating emergency response plans; and coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

NATURAL HAZARD POLICIES

1. Flood risk will be managed by limiting or regulating development in areas identified by the Federal Emergency Management Agency Flood Insurance Rate Maps or in areas identified by the County to be at risk to life or property due to flooding. County regulations will be compliant with National Flood Insurance Program requirements for development in flood prone areas.

2. County land use regulations will assure proposed developments will receive a review of potential natural hazards and that sufficient authority exists to modify or deny applications where such hazards exist. Such provisions shall, at a minimum, require specific information clearly determining the degree of hazard present from applicants who seek approval to develop residential, commercial, or industrial uses within known areas of natural disasters and hazards.

3. It shall be recognized that problem areas or hazards do not necessitate disapproval of development, but that higher development standards can be expected in order to mitigate potential natural disasters.

4. Incorporate land use and development considerations into the planning and building

phase for development in the forest use zone in order to minimize the impacts of wild fires. Consideration should go beyond defensible space requirements by including transportation and location issues, topographical features, site location and design, fire history, weather conditions, forest health, and adjacent land uses.

5. Use data provided by Oregon Department of Geology and Mineral Resources for parcel-specific information to provide support to limit or restrict development of unstable sites due to landslide risk. Abate landslide risk by using strict enforcement of grading and building codes.

6. Support the Natural Resources Conservation Service in their efforts to mitigate soil erosion and drought impacts through their drought resiliency and other conservation programs.