
Community Risk Assessment

2020 Pre-Disaster Mitigation Plan Update - Bear River Region

CORNISH

SUMMARY

Analysis of natural hazards in the community of Cornish revealed that the greatest potential risks come from ***problem soils, steep slopes, liquefaction, landslide, faults, flood, and wildfire***. These hazards have varied potential to impact life, property, infrastructure, and other amenities within jurisdictional boundaries. Currently, *liquefaction and problem soils* have the greatest potential to impact the community based on potential loss values (see potential loss table on the following page). Other natural hazard types not mentioned here were found to have no potential impacts to Cornish, or there was no GIS data available to analyze the hazard. See the following potential loss table, hazard maps and accompanying text for more detailed descriptions of potential risks associated with each natural hazard. For hazards that have multiple datasets, only one collective risk assessment narrative has been provided.

Disclaimer: The maps in this risk assessment are for planning and informational purposes only and are not intended for legal, engineering, or surveying purposes. Users should consult with primary data sources for additional information or to obtain more accurate data, if available. BRAG shall not be held liable for any errors or inaccuracies that may occur. Neither do they accept liability for any consequences that may result from use of the data.

CORNISH TOWN - POTENTIAL LOSSES PER NATURAL HAZARD													
Category	Type	Units	Natural Hazard										
			Wildfire (FFSL)	Wildfire (USFS)	Flood (FEMA)	Flood (Valley Bottom)	Flood (Soils)	Faults	Landslide	Liquefaction	Steep Slopes	Problem Soils (No BSMT)	Problem Soils (BSMT)
Agricultural Resources	Farmland	Acres	10.5	7.4	155.8	161.9	207.0	286.5	24.0	2,150.6	1.8	445.7	2,022.1
	Grazing Allotments	Acres											
Homes	Home	Number/Value						2 @ \$753K		86 @ \$18.1M		5 @ \$1.4M	66 @ \$14.2M
Community Resources	Cemetery	Number						1				1	1
	Commercial Business	Number/Value								1 @ \$433K			
	Library	Number											
	Place of Worship	Number											
	University/College	Number											
	School	Number											
Government Facilities	Correctional Facility	Number											
	Military Facility	Number											
	Post Office	Number											
	Town Hall	Number								1			1
Recreation Amenities	Campground/Recreation Facility	Number											
	Golf Course	Number											
	Public Areas	Number											
	Historic Site	Number											
	Museum	Number											
	State Park	Number											
	Park	Number											
	Trail	Miles											
Emergency Services	Emergency Medical Service	Number											
	Emergency Operations Center/PSAP	Number											
	Fire Station	Number											
	Hospital/Health Care Facility	Number											
	National System Shelter Facility	Number											
	Law Enforcement Station	Number											
Energy Infrastructure	Substation/Regulator	Number											
	Natural Gas Pipeline	Miles											
	Crude Oil Pipeline	Miles											
	Oil and Gas Well	Number						1				1	1
	Petroleum Pipeline	Miles											
	Hydrogen Sulfide Pipeline	Miles											
	Power Generation Facility	Number											
	Transmission Line	Miles						3.7	0.8		0.2	3.1	3.1
Natural Infrastructure	Lake/Pond	Acres	0.8		7.1	9.4	9.2		0.2	11.3		0.5	1.2
	Reservoir	Acres											
	Playa	Acres											
	Riparian Area	Acres			9.6	20.0	9.3		3.1	30.5	3.9	0.6	2.0
	Spring/Seep	Number				1				1			
	Stream/River	Miles	0.3	0.3	2.6	3.5	2.8		0.3	3.6			
	Wetland	Acres	3.8	1.1	27.5	29.0	27.7		0.6	39.4	0.1		6.6
Other Infrastructure	Communication Towers	Number								1			1
	Microwave Service Towers	Number											
	Gas Station	Number											
	Sewer Pipeline	Miles/Value											
	Wastewater Facility	Number											
	Contaminated Land	Acres											
	Hazmat Material Storage	Number											
	Mines	Number											
	Broadband Anchors	Number								1			
	Solid Waste Facility	Number											
Transportation Infrastructure	Airport/Heliport	Number											
	Bridge/Culvert/Underpass	Number/Value								3			3
	Railroad	Miles/Value								4.0		0.4	3.1
	Emergency Outlet Roads	Miles								4.0		0.5	4.0
	Road	Miles/Value				0.1	0.2	1.8	0.3	10.5		2.3	9.6
Water Infrastructure	Canal	Miles			0.1	0.2	0.4	0.6	0.05	1.6	0.02	1.0	1.5
	Culinary Water Pipeline	Miles/Value											
	Culinary Water Source	Number											
	Water Tank	Number											
	Dam	Number											
	Groundwater Recharge	Acres			21.4	34.9	45.9	185.0	36.7	537.7	7.0	265.3	512.5
	Groundwater Protection and Transient NC Zones	Acres											
	Well	Number								1			1

Earthquake/Faults

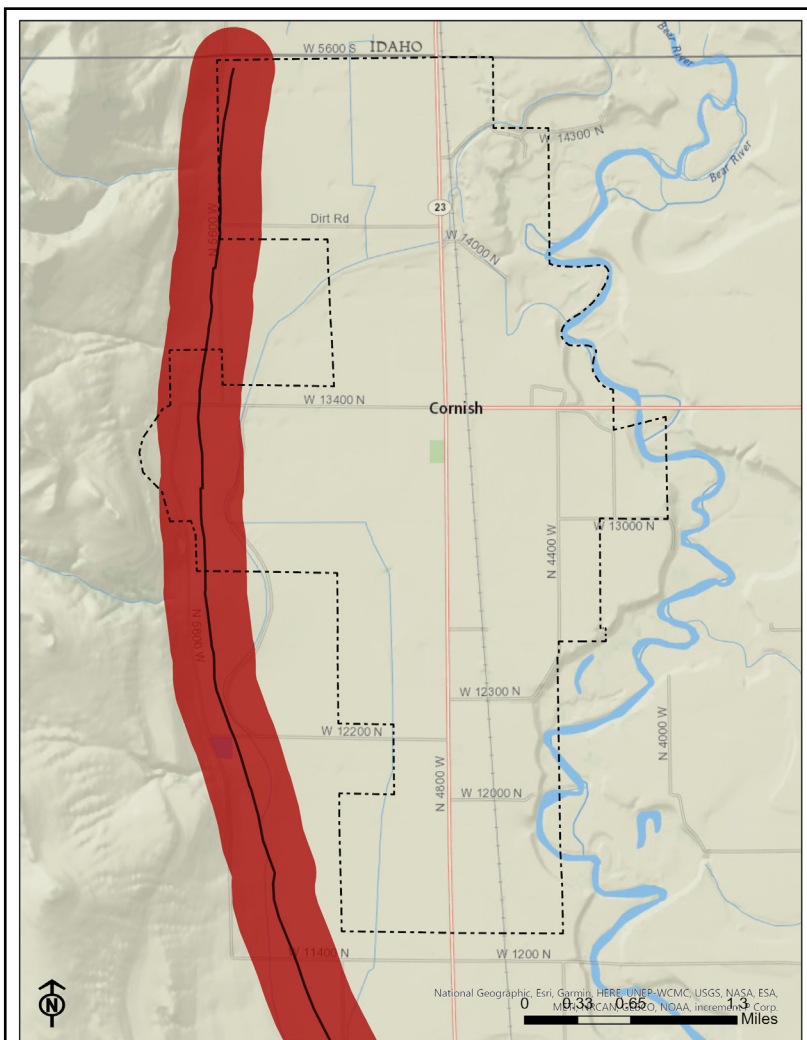
Hazard Description: Any sudden shaking of the ground caused by seismic waves through the Earth's rocks constitutes an earthquake. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes occur most often along geologic faults, narrow zones where rock masses move in relation to one another. The major fault lines of the world are located at the fringes of the huge tectonic plates that make up Earth's crust.

Certain saturated soft soil can take on the characteristics of a fluid when shaken by an earthquake, resulting in a state called liquefaction. Amplified shaking also results in areas of "soft soils" which includes fill, loose sand, waterfront, and lake bed clays.

Map Description: This map displays the earthquake damage zone (1,500 foot buffer on either side of the quaternary fault) as recommended by the Utah Geological Survey. For more information visit: <https://geology.utah.gov/apps/qfaults/index.html>

RISK:

An earthquake fault exists west of Cornish, and directly poses a moderate threat to the town and its residents. 2 homes are at risk, along with 3.7 miles of transmission lines, 1.8 miles of roads, and 0.6 miles of canals. However, groundshaking from an earthquake in Cache or Box Elder Counties could create indirect damages that could be much more substantial.



Legend

- Quaternary Fault
- Jurisdictional Boundary
- Earthquake Damage Zone

Data Source: Utah Geologic Survey (2019) Quaternary Faults

Flood - FEMA

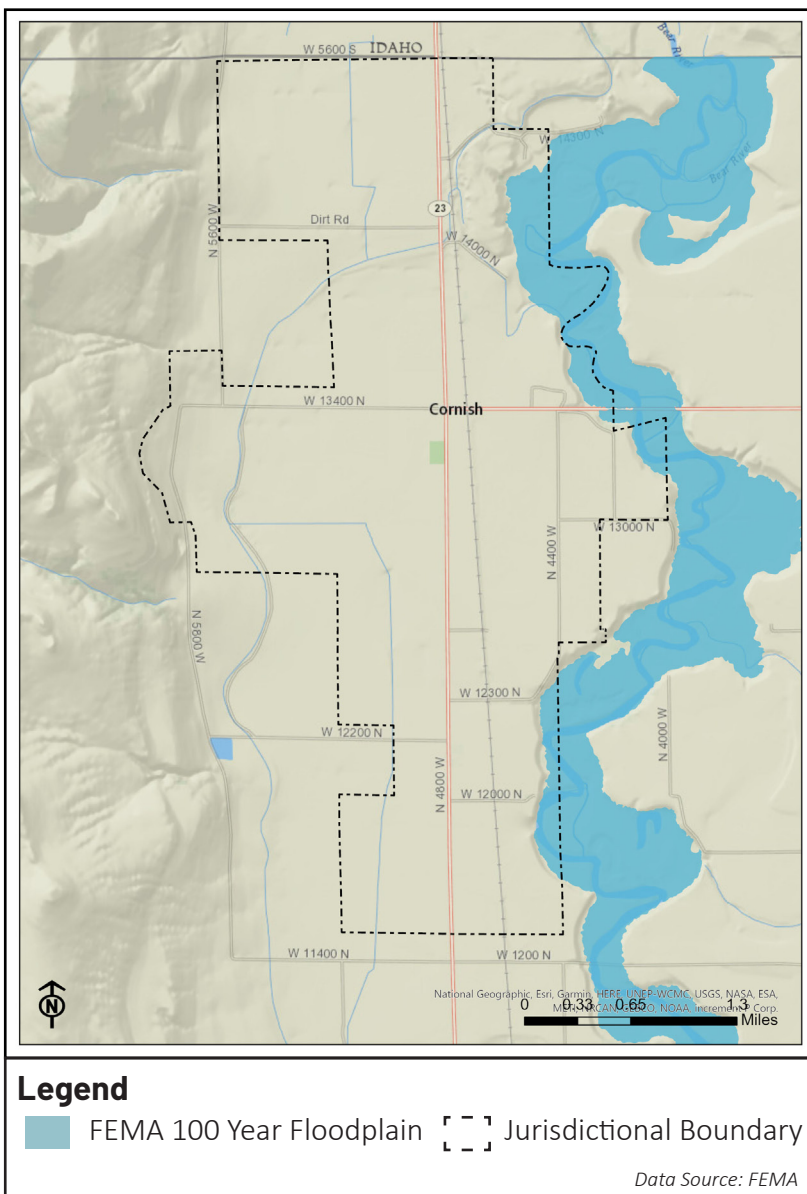
Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

A 1% Annual Chance Flood, or 100-year flood, is a flood that has a 1 percent chance or greater of occurring in any given year. Experiencing a 100-year flood does not decrease the chance of a second 100-year flood occurring that same year or any year that follows. A 100-year flood today, independent of future sea level rise and other climate change effects, has a 26 percent chance of occurring over the life of a 30-year mortgage. Similarly, a 100-year flood today has a 45 percent chance of occurring over the 60-year life of a power substation.

Map Description: This map displays the FEMA identified 100 year floodplain. For more information visit: <https://msc.fema.gov/portal/home>

RISK:

Flooding in Cornish would likely have minimal impact on the town, mostly affecting local farmland and natural resources. 0.4 miles of canals and 0.2 miles of roads could also be impacted.

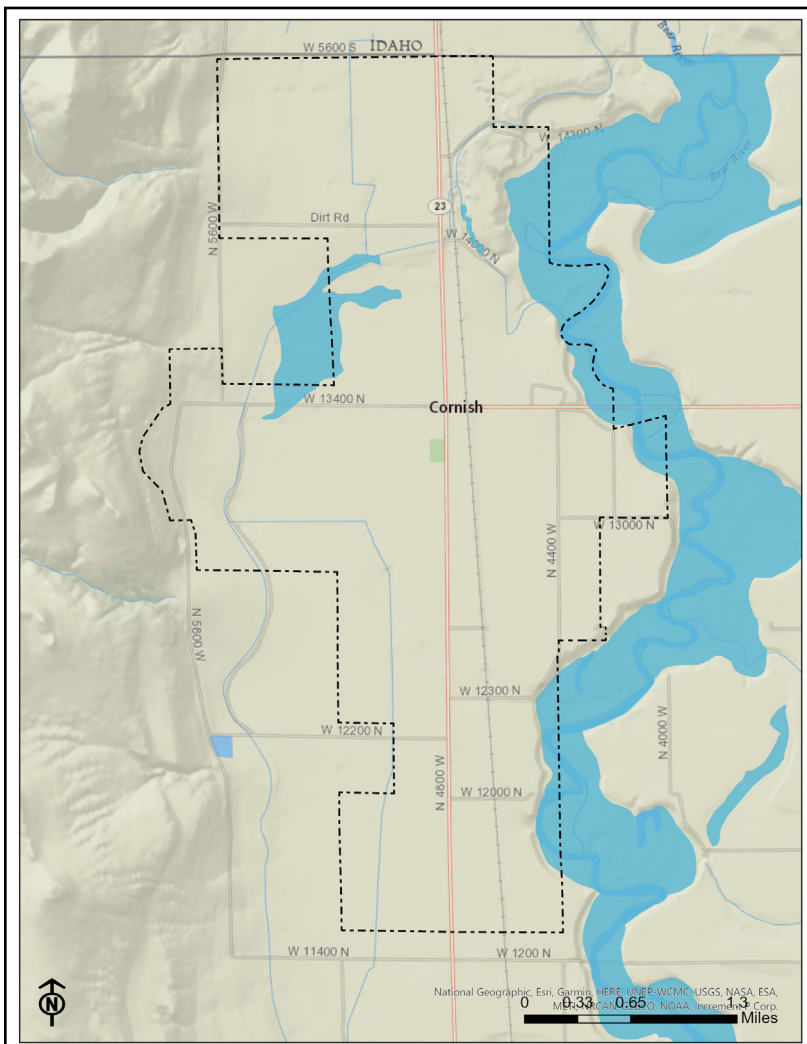


Flood - Soil

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

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Map Description: This map displays the 100 year floodplain based on NRCS soil survey data (<https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/>) and was identified based on research by Sangway and Merwade (<https://onlinelibrary.wiley.com/doi/abs/10.1111/1752-1688.12306>).



Legend

 Floodplain

 Jurisdictional Boundary

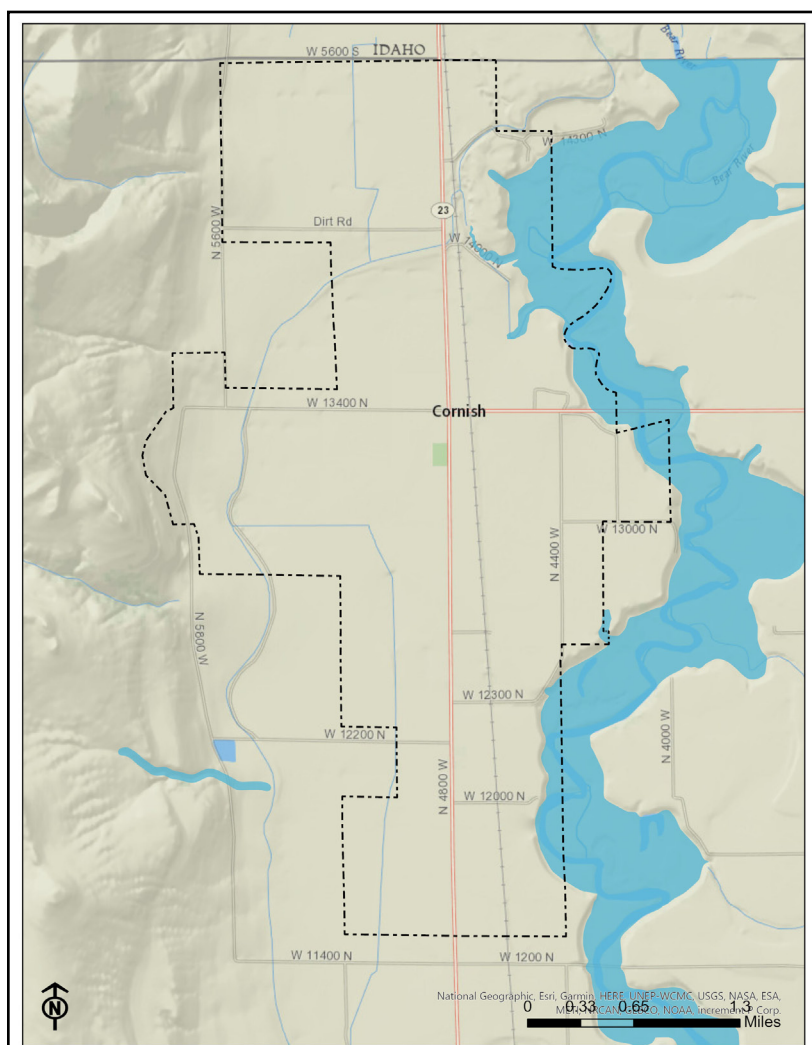
Data Source: FEMA

Flood - Valley Bottom

Hazard Description: A flood is an overflow of water from rivers, groundwater, or rainfall that submerges areas that are usually dry. The most common cause of flooding is due to rain or snowmelt that accumulates faster than soils can absorb it or rivers can carry it away. Flooding can also result from the failure of a water control structure, such as a levee or dam (see also Dam Failure).

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Map Description: The valley bottom map displays the potential flood plaining based on stream networks and elevation data (<https://databasin.org/datasets/95a24aef6a24996bf8082090fdbc831>).



Legend

 Floodplain

 Jurisdictional Boundary

Data Source: FEMA; Gilbert, Macfarlane & Wheaton, 2016; USDA, SSURGO

Landslide

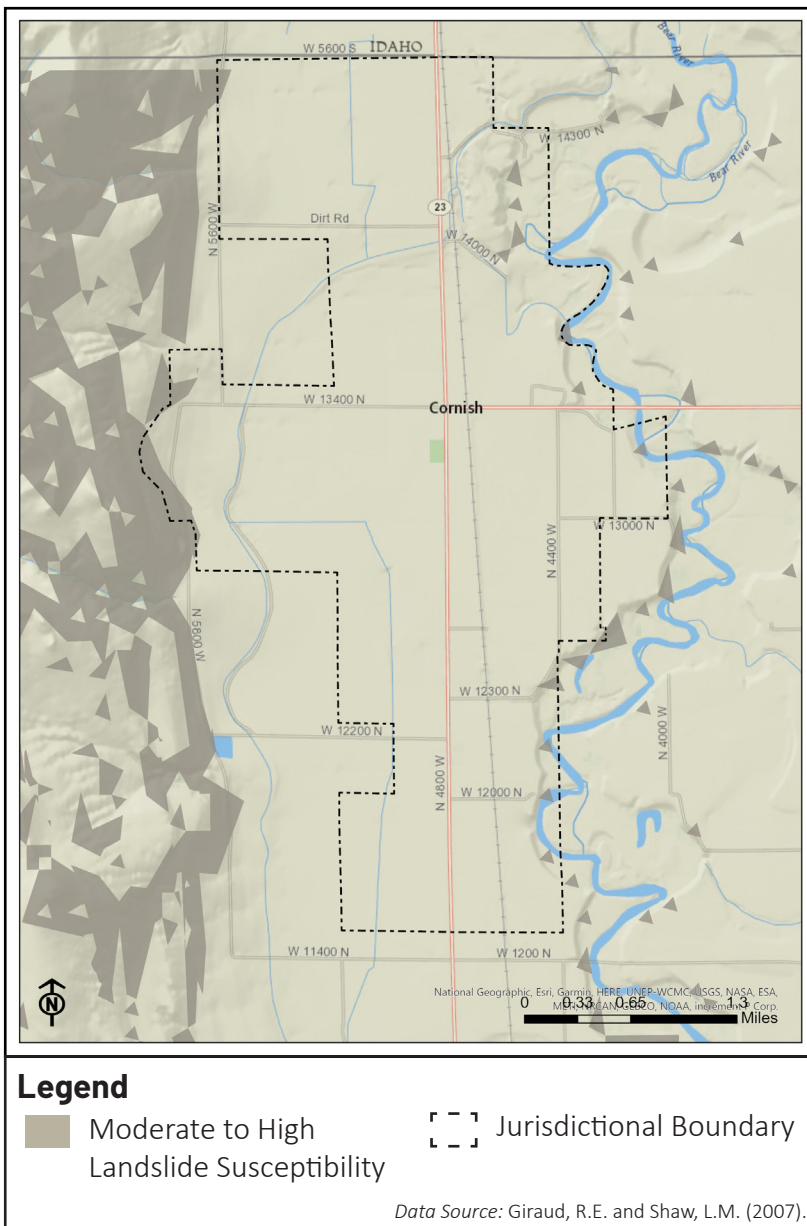
Hazard Description: A landslide is the movement of a mass of rock, debris, or earth down a slope by force of gravity. They flow rapidly, striking at avalanche speeds that can travel several miles, growing in size as they pick up trees, boulders, cars and other materials.

Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. However, landslides can occur with very little slope, sometimes classified as earth slumping or earth flow.

Hazard Description: This map displays moderate to high landslide susceptibility based on research completed by Utah Geological Survey geologists. For more information visit: <https://ugspub.nr.utah.gov/publications/maps/m-228/m-228.pdf>

RISK:

Landslides could impact 0.8 miles of transmission lines, 0.3 miles of roads, and other natural and agricultural resources, but are minimal in nature. However, care should be taken to limit development above or on the steep banks of the Bear River in the future to avoid potential losses.



Liquefaction

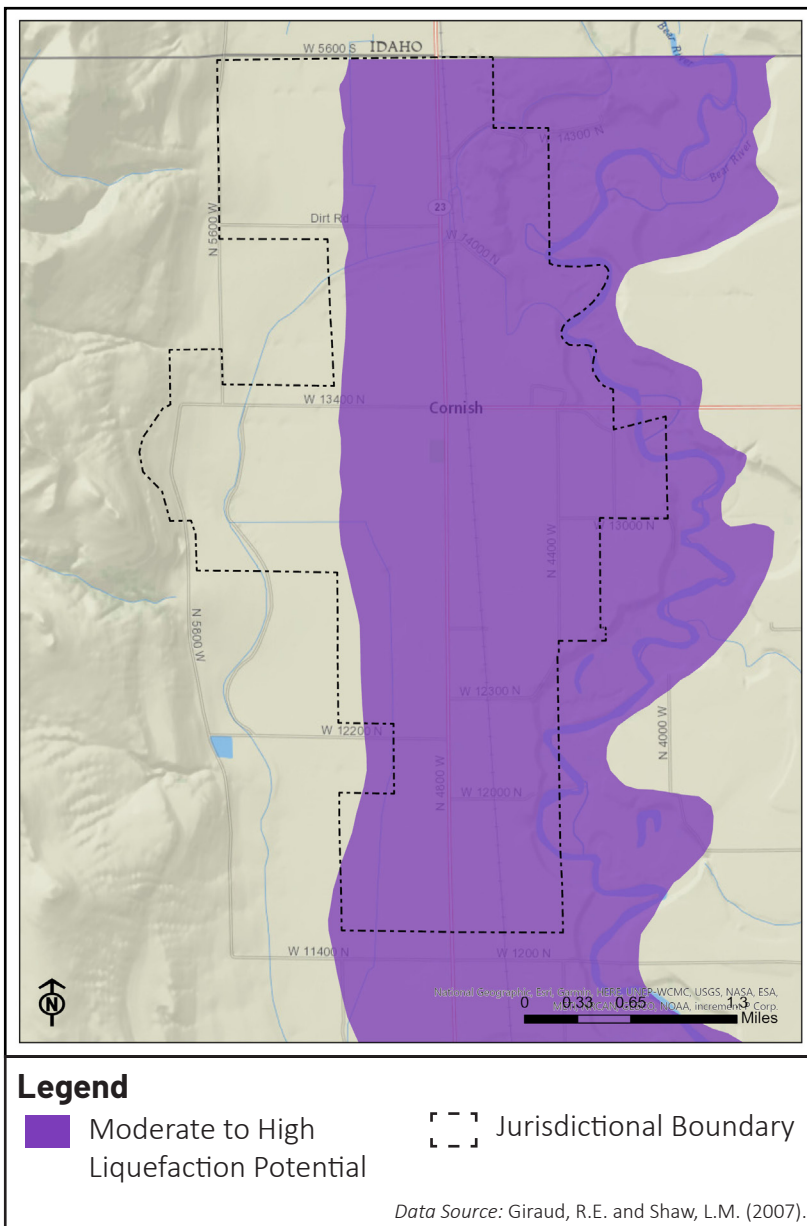
Hazard Description: Liquefaction occurs when soils that are saturated with water temporarily lose their ability to hold their structure, acting more like a viscous liquid than a solid. It mostly occurs during an earthquake and can damage anything on or in the ground, including buildings and other structures, roads, sewer and water lines, and other infrastructure.

Two conditions must be present in order for liquefaction to occur: 1) The soil must be susceptible to liquefaction, which are most often shallow (0-30 feet), and loose/sandy soils; and, 2) There must be ground shaking (such as during an earthquake) that is strong enough to loosen the soil structure.

Hazard Description: This map displays moderate to high liquefaction potential based on research completed by Utah Geological Survey geologists. For more information visit: <https://geology.utah.gov/hazards/earthquakes/liquefaction/>

RISK:

Like most communities in Cache Valley, liquefaction covers nearly the entire town of Cornish. Potential losses include 86 homes and 1 business, the town hall, 1 communication tower, 3 bridges/culverts, 4 miles of railroads, 10.5 miles of roads, 1.6 miles of canals, and other natural and agricultural amenities.



Steep Slope

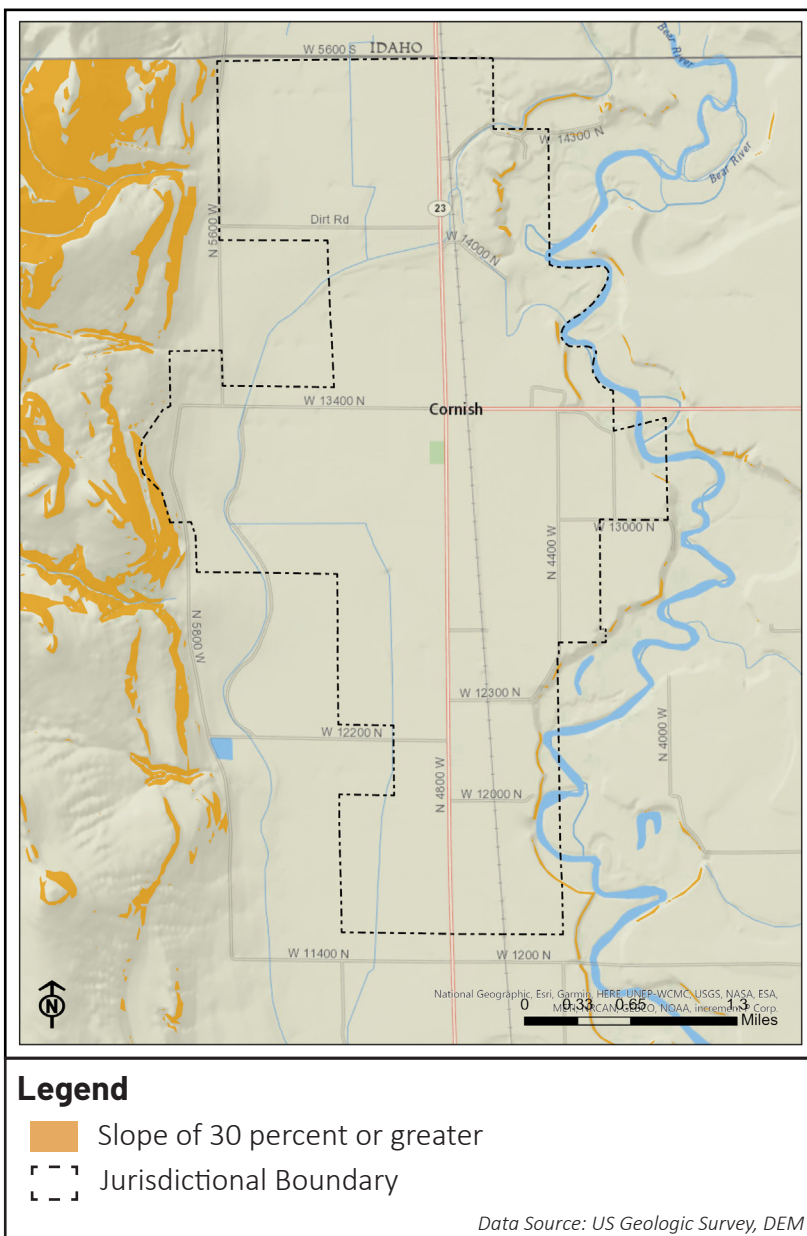
Hazard Description: A landslide is the movement of a mass of rock, debris, or earth down a slope by force of gravity. They flow rapidly, striking at avalanche speeds that can travel several miles, growing in size as they pick up trees, boulders, cars and other materials.

Landslides occur when the slope or soil stability changes from stable to unstable, which may be caused by earthquakes, storms, volcanic eruptions, erosion, fire, or additional human-induced activities. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. However, landslides can occur with very little slope, sometimes classified as earth slumping or earth flow.

Hazard Description: This map displays areas of steep slopes (30 percent slope or greater) and was developed using the U.S. Geologic Survey National Elevation Dataset. For more information visit: <https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map>

RISK:

Steep slopes could currently impact 0.2 miles of transmission lines, and a variety other natural and agricultural resources, but seem minimal.



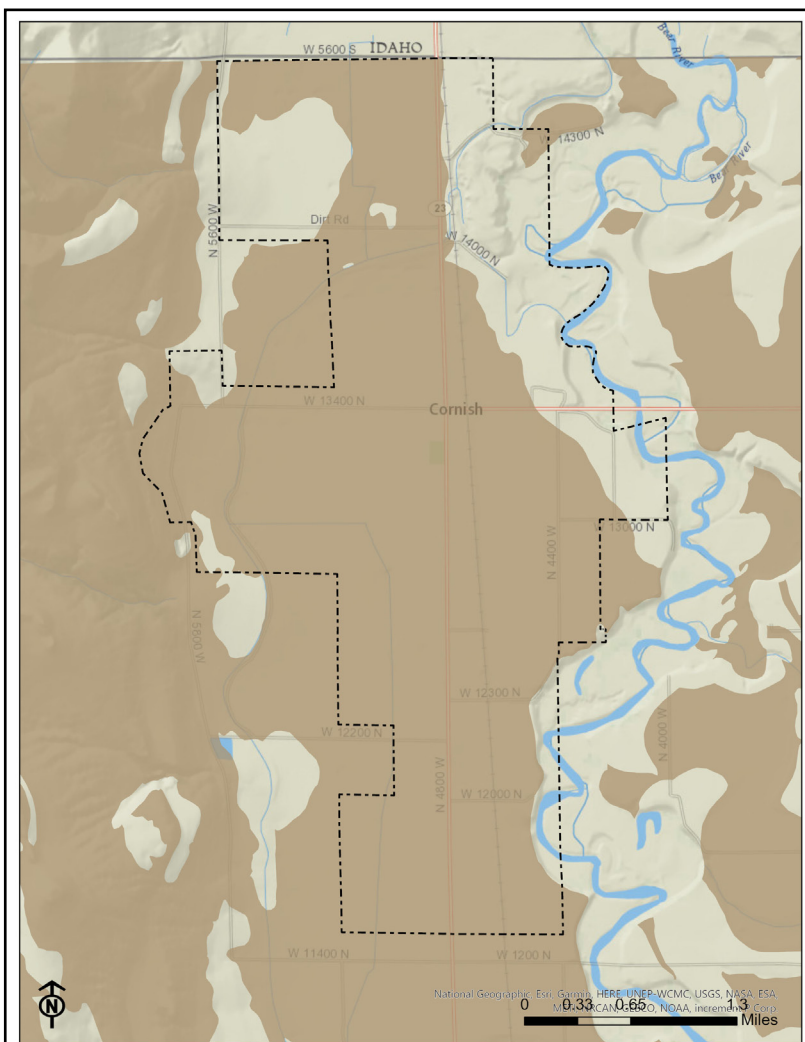
Problem Soils (with basements)

Hazard Description: Problem soils are a group of hazards related to the specific properties of soils, and can include:

- Collapsible soil: Soils that have considerable strength when in a dry, natural state, but significantly settle due to hydrocompaction (reduction of air space within the soil) when wetted;
- Expansive soil: Soil with high clay content that swells when wet and shrinks when dried; and
- Subsidence : Sinking of the ground caused by groundwater depletion and/or underground mine subsidence or collapse

Problem soils can cause extensive damage to structures and foundations, and may also damage pavements after construction. They have caused an undetermined, but very significant amount of infrastructure damage and resulting economic impact.

Map Description: This map displays soils not suitable for dwellings with basements based on soil parameters (see reference section USDA SSURGO 1. Soils Not Suitable for Dwellings with Basements for more information).



Legend

- Soils Not Suitable for Dwellings with Basements
- Jurisdictional Boundary

Data Source: SSURGO Database, National Resources Conservation Service (NRCS)

RISK:

Most of Cornish is covered by soils that could prove problematic to buildings and some infrastructure. However, very little damage has been seen to structures and infrastructure built on problematic soils in the Bear River Region in recent years, especially those that are in compliance with national and international building codes. The vast majority of the local governments in the State of Utah are utilizing one of these codes, which mitigates most impacts from these soils. It should be noted, however, that if structures or infrastructure are built on problematic soils that are also on steep slopes, previous landslides, saturated soils, or on other questionable areas, extensive damage may result.

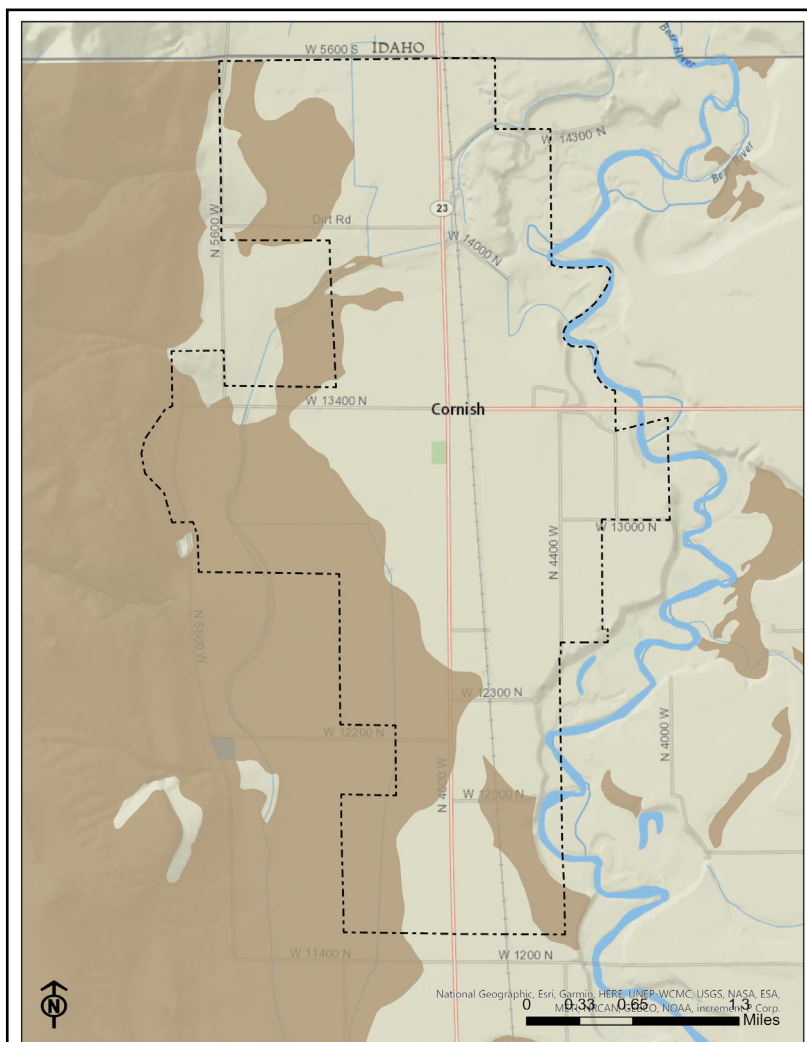
Problem Soils (without basements)

Hazard Description: Problem soils are a group of hazards related to the specific properties of soils, and can include:

- Collapsible soil: Soils that have considerable strength when in a dry, natural state, but significantly settle due to hydrocompaction (reduction of air space within the soil) when wetted;
- Expansive soil: Soil with high clay content that swells when wet and shrinks when dried; and
- Subsidence : Sinking of the ground caused by groundwater depletion and/or underground mine subsidence or collapse

Problem soils can cause extensive damage to structures and foundations, and may also damage pavements after construction. They have caused an undetermined, but very significant amount of infrastructure damage and resulting economic impact.

Map Description: This map displays soils not suitable for dwellings without basements based on soil parameters (see reference section USDA SSURGO 2. Soils Not Suitable for Dwellings without Basements for more information).



Legend

- Soils Not Suitable for Dwellings without Basements
- Jurisdictional Boundary

Data Source: SSURGO Database, National Resources Conservation Service (NRCS)

Wildfire - Utah FFSL

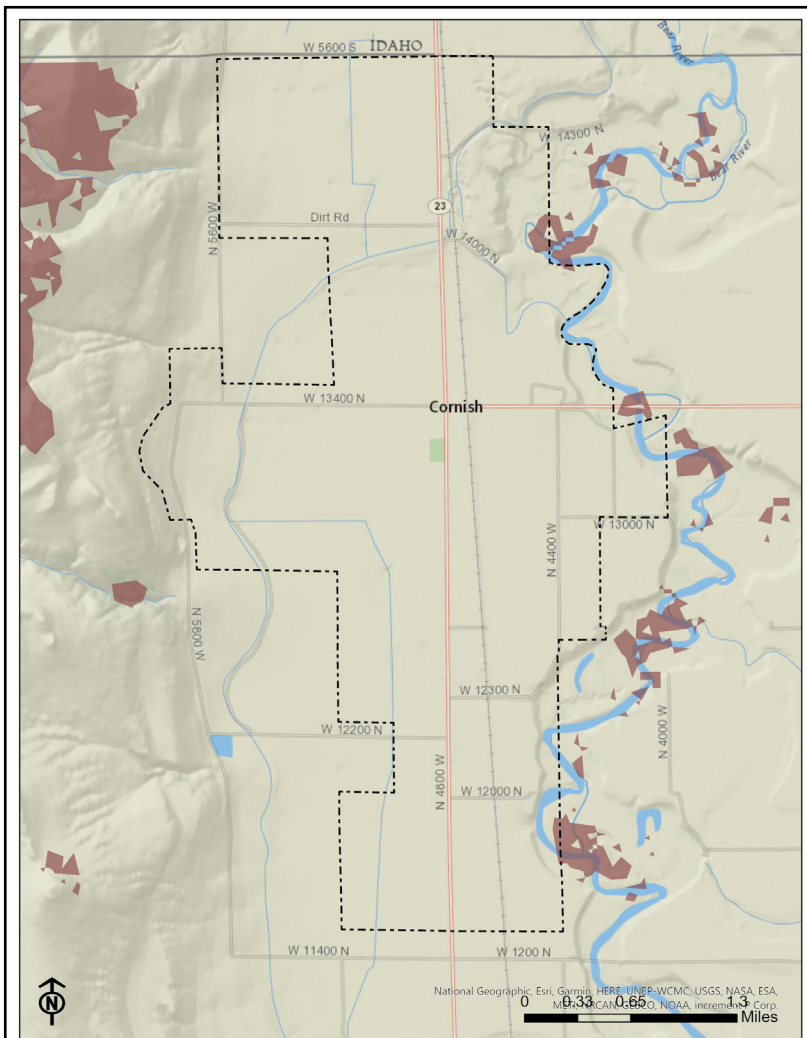
Hazard Description: A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on fuel, weather and topography. Wildfires can occur in the wildland or the wildland urban interface. A wildland is an area where development is almost nonexistent, except for roads, railroads, or power lines. Wildland urban interface is an area where structures and other human development meet or intermingle with wildland or vegetation fuels.

Fuels are anything that will burn and include vegetation and structures. The weather, such as high temperatures, low humidity and high winds increase the likelihood that a wildfire will spread. Topography affects speed at which a wildfire will spread. A fire will move more quickly uphill which causes hot gases to rise in front of it. These gases in turn, pre-heat and dry vegetation ahead of the wildfire causing it to catch fire more rapidly.

Hazard Description: This map displays areas of moderate to high wildfire threat developed by the Utah Division of Forestry, Fire and State Lands and historical wildfire occurrences from 1980-2016. For more information visit: <https://wildfirerisk.utah.gov/>

RISK:

Wildfire risk in Cornish is minimal, affecting mostly agricultural and natural amenities near the Bear River drainage.



Legend

- Moderate to High Wildfire Threat
- Jurisdictional Boundary

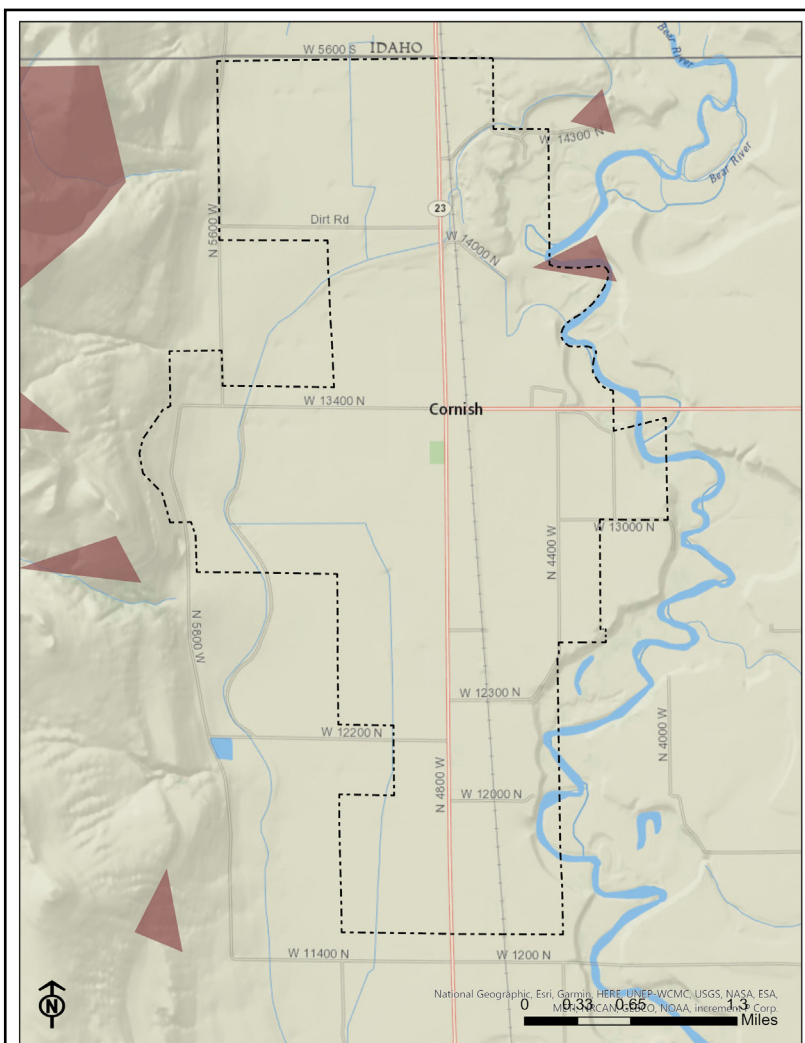
Data Source: Utah Division of Forestry, Fire & State Lands; US Geological Survey (2017)

Wildfire - US Forest Service

Hazard Description: A wildfire is any outdoor fire that is not controlled, supervised, or arranged. Wildfire probability depends on fuel, weather and topography. Wildfires can occur in the wildland or the wildland urban interface. A wildland is an area where development is almost nonexistent, except for roads, railroads, or power lines. Wildland urban interface is an area where structures and other human development meet or intermingle with wildland or vegetation fuels.

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Hazard Description: This map displays areas of moderate to high wildfire hazard potential developed by the U.S. Forest Service and historical wildfire occurrences from 1980-2016. For more information visit: <https://www.firelab.org/project/wildfire-hazard-potential>



Legend

- Moderate to High Wildfire Threat
- Jurisdictional Boundary

Data Source: Dillon, G.K., Menakis, J., and Fay, F. (2015); US Geologic Survey (2017)