HERA Data Dictionary

Last Updated: January 30, 2023

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# HERA Data Dictionary

HERA data tables on the exposure of places to various hazards are downloaded from the HERA web application available at https://www.usgs.gov/apps/hera/.

## File Name

File names for downloaded tables are named to help the user identify what data were downloaded and when the data were downloaded.

The naming convention for downloaded data files varies for each HERA hazard:

* **Coastal Flooding—** The naming convention for downloaded files is hera \_Asset\_HazardType \_StormFrequency\_SeaLevelRise\_FloodHazardOption\_DateTime.
* **Coastal Groundwater—** The naming convention for downloaded files is hera\_Asset\_HazardType\_GroundwaterDepth\_SeaLevelRise\_GroundwaterGeology\_DateTime.
* **Shoreline Change—**The naming convention for downloaded files is hera\_Asset\_HazardType\_BeachNourishment\_ShorelineInfrastructure\_ExtremeStormErosion\_SeaLevelRise\_DateTime

For county data downloads, “\_county” follows “hera” in the file name but all other items stay the same.

Available options for each of these categories are listed below.

* Asset—the HERA asset for which hazard exposure is being tabulated. This attribute is applicable to all HERA data tables.
  + Res: Residents
  + Econ: Economy
  + LandType: Land Type
  + Infra: Infrastructure
  + CritFac: Critical Facilities
* BeachNourishment—the beach nourishment option in the Shoreline Change tool
  + BNN: None
  + BNC: Continued
* ExtremeStormErosion— the option of including or not including extreme storm erosion in the Shoreline Change tool
  + ESI: Extreme Storm Erosion Included
  + ESN: Extreme Storm Erosion Not included
* FloodHazardOption—the potential range in flood extent resulting from model uncertainty in the Coastal Flooding tool
  + MostLikely: Most Likely Flood Extent
  + Min: Minimum Flood Potential
  + Max: Maximum Flood Potential
* GroundwaterDepth—the groundwater depth selected in the Coastal Groundwater tool
  + Cumulative versus Discrete
    - Cumulative: this option includes the selected groundwater depth and any shallower bins
    - Discrete: this option only includes the selected range of groundwater depth.
  + Depths
    - D111: Marine inundation
    - D000: water table at surface
    - D001: shallow water table, 0 – 1 meters deep
    - D102: moderate water table, 1 – 2 meters deep
    - D205: deeper water table, 2 – 5 meters deep
* GroundwaterGeology – the permeability of the underlying geology selected in the Coastal Groundwater tool
  + All groundwater-hazard maps include the same three options for characterizing the permeability of the underlying geology (‘More Permeable, ’ ‘Moderate, ’ and ‘Less Permeable’). However, the modeling assumptions for these options vary based on the study area.
    - California groundwater-hazard maps were developed assuming a constant hydraulic conductivity value (“K value”) and constant aquifer thicknesses
    - For groundwater modeling for all other areas in the HERA Coastal Groundwater tool, K values and aquifer thicknesses vary spatially across a study area. Model input values are taken from Zell and Sanford (2020).
  + Options:
    - MorePerm: more permeable
      * California: This option assumes a K value of 10 m/day, which represents coarse sand and gravel.
      * All other places provided in HERA: This option assumes a K value 10 times larger than the ‘Moderate’ values in Zell and Sanford (2020).
    - Moderate: moderately permeable.
      * California: This option assumes that the underlying geology has a k value of 1.0 meter per day (m/day), which typically represents fine to medium grain sands.
      * All other places provided in HERA: This option uses hydraulic conductivity data calibrated using numerical models and summarized in Zell and Sanford (2020).
    - LessPerm: less permeable
      * California: This option assumes a K value of 0.1 m/day, which represents silt and very fine sands.
      * All other places provided in HERA: This option assumes a K value 10 times smaller than the ‘Moderate’ values in Zell and Sanford (2020).
* HazardType
  + FLD: Coastal Flooding
  + GW: Coastal Groundwater
  + SLC: Shoreline Change
* SeaLevelRise—the amount (in centimeters) of sea level rise for the scenario selected. This attribute is found in all HERA data downloads.
  + SLR0: 0
  + SLR25: 25
  + SLR50: 50
  + SLR100: 100
  + SLR150: 150
  + SLR200: 200
  + SLR300: 300
* ShorelineInfrastructure—the option of maintaining or not maintaining existing shoreline infrastructure in the Shoreline Change tool
  + SIM: Maintain Existing Shoreline Infrastructure
  + SINM: Not Maintain Existing Shoreline Infrastructure
* StormFrequency—the coastal storm choice relative to a given time interval in the Coastal Flooding tool.
  + CS0: Daily (no storm)
  + CS1: Annual
  + CS20: 20-Year
  + CS100: 100-Year
* DateTime—when the data were downloaded, broken up by date (first eight digits, as YYYYMMDD [20200925]) and time (last six digits, as HHMMSS [140003])

Here are examples of downloaded tables for each of the HERA hazards:

1. Flood Hazard:
   1. “hera\_Infra\_FLD\_CS1\_SLR0\_MostLikely\_20200925140003” is the name for a HERA data table of infrastructure (“Infra”) exposure in the “most likely” flood hazard zone (“FLD” for flood and “MostLikely” for level of uncertainty) assuming an annual storm (“CS1”) and no sea level rise (“SLR0”), downloaded from the HERA website on September 25, 2020 (“20200925”) at 2:00:03 p.m. (“140003”).
2. Groundwater Hazard
   1. “hera\_Res\_GW\_Cumulative\_D205\_SLR100\_Moderate\_20220329163637” is the name for a HERA data table of residential (“Res”) exposure to groundwater (“GW”) that is within five meters of the land surface or shallower (“Cumulative” and “D205”) assuming 100 cm of sea level rise (“SLR100”) and moderate geology permeability (“Moderate”), downloaded from the HERA website on March 29, 2022 (“20220329”) at 4:36:37 pm.
   2. “hera\_Res\_GW\_Discrete\_D205\_SLR100\_Moderate\_20220329163709” is the name for a HERA data table of residential (“Res”) exposure to groundwater (“GW”) that is within two to five meters of the land surface (“Discrete” and “D205”) assuming 100 cm of sea level rise (“SLR100”) and moderate geology permeability (“Moderate”), downloaded from the HERA website on March 29, 2022 (“20220329”) at 4:37:09 pm.
3. Shoreline Change
   1. “hera\_Res\_SLC\_BNN\_SIM\_ESI\_SLR50\_20220329163709” is the name for a HERA data table of residential (“Res”) exposure to shoreline change hazards assuming 50 cm of sea level rise (“SLR50”), no beach nourishment (“BNN”), maintaining existing shoreline infrastructure (“SIM”) and including extreme storm erosion (“ESI”), downloaded from the HERA website on March 29, 2022 (“20220329”) at 4:37:09 pm.
   2. “hera\_Econ\_SLC\_BNC\_SINM\_ESN\_SLR100\_20220329163709” is the name for a HERA data table of economic (“Econ”) exposure to shoreline change hazards assuming 100 cm of sea level rise (“SLR100”), continued beach nourishment (“BNC”), not maintaining shoreline infrastructure (“SINM”), and not including extreme storm erosion (“ESN”), downloaded from the HERA website on March 29, 2022 (“20220329”) at 4:37:09 pm.

## Geographic Unit

“Geographic unit” represents the type of place the hazard exposure data are summarized by. In community-level data tables, this includes the community, the county, and the state. In county-level data tables, this includes only the county and the state.

##### Community

The community is the smallest geographic unit available for summarizing HERA data, defined using census blocks and place boundaries from the U.S. Census Bureau.

Source: U.S. Census Bureau (2020)

Data description: Community (for example, city, town, or Census designated place) name according to the 2020 Census; unincorporated county land is also identified at the community level by assigning blocks outside Census-defined community boundaries to the county they nest within

##### County

The county is the mid-level geographic unit available for summarizing HERA data, defined using census blocks and county boundaries from the U.S. Census Bureau.

Source: U.S. Census Bureau (2020)

Data description: County (for example, county, parish, or borough) name according to the 2020 Census

##### State

The state is the largest geographic unit available for summarizing HERA data, defined using state names in place and county data from the U.S. Census Bureau. HERA results are provided for individual census-designated places and the remaining unincorporated land within a county. These data can be aggregated to estimate state-level exposure; however, users should use discretion when doing so because the hazard zone coverage for a specific tool may not extend for the entire length of a state’s coastline.

Source: U.S. Census Bureau (2020)

Data description: State name according to the 2020 Census

## Residents

### Total Residents

##### Pop\_In

Total residents in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_001N

Data description: Total residential population

##### Pop\_Pct

Proportion of total residents in the hazard zone within a geographic unit in relation to the total residents in the geographic unit as a whole.

Calculation: *Pop\_In* divided by the total number of residents in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

### Ethnicity

##### Hisp\_In

Number of residents that self-report as Hispanic or Latino in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P2—Hispanic or Latino, and not Hispanic or Latino by race

Field identifiers: P2\_002N

Data description: Residents self-reporting as Hispanic or Latino

##### Hisp\_Pct

Proportion of residents that self-report as Hispanic or Latino in the hazard zone within a geographic unit in relation to the total residents that self-report as Hispanic or Latino in the geographic unit as a whole.

Calculation: *Hisp\_In* divided by the total population that self-report as Hispanic or Latino in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

### Race

##### White\_In

Number of residents that self-report as White, either alone or in combination with one or more other races, in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_003N + P1\_011N + P1\_012N + P1\_013N + P1\_014N + P1\_015N + P1\_027N + P1\_028N + P1\_029N + P1\_030N + P1\_031N + P1\_032N + P1\_033N + P1\_034N + P1\_035N + P1\_036N + P1\_048N + P1\_049N + P1\_050N + P1\_051N + P1\_052N + P1\_053N + P1\_054N + P1\_055N + P1\_056N + P1\_057N + P1\_064N + P1\_065N + P1\_066N + P1\_067N + P1\_068N + P1\_071N

Data description: Residents self-reporting as White alone or in combination with one or more other races, calculated by summing all individual columns where White is part of the race combination

##### White\_Pct

Proportion of residents that self-report as White, either alone or in combination with one or more other races, in the hazard zone within a geographic unit in relation to the total residents that self-report as White, either alone or in combination with one or more other races, in the geographic unit as a whole.

Calculation: *White\_In* divided by the total population that self-report as White, either alone or in combination with one or more other races, in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Black\_In

Number of residents that self-report as Black or African American, either alone or in combination with one or more other races, in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_004N + P1\_011N + P1\_016N + P1\_017N + P1\_018N + P1\_019N + P1\_027N + P1\_028N + P1\_029N + P1\_030N + P1\_037N + P1\_038N + P1\_039N + P1\_040N + P1\_041N + P1\_042N + P1\_048N + P1\_049N + P1\_050N + P1\_051N + P1\_052N + P1\_053N + P1\_058N + P1\_059N + P1\_060N + P1\_061N + P1\_064N + P1\_065N + P1\_066N + P1\_067N + P1\_069N + P1\_071N

Data description: Residents self-reporting as Black or African American alone or in combination with one or more other races, calculated by summing all individual columns where Black or African American is part of the race combination

##### Black\_Pct

Proportion of residents that self-report as Black or African American, either alone or in combination with one or more other races, in the hazard zone within a geographic unit in relation to the total residents that self-report as Black or African American, either alone or in combination with one or more other races, in the geographic unit as a whole.

Calculation: *Black\_In* divided by the total population that self-report as Black or African American, either alone or in combination with one or more other races, in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Indian\_In

Number of residents that self-report as American Indian or Alaska Native, either alone or in combination with one or more other races, in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_005N + P1\_012N + P1\_016N + P1\_020N + P1\_021N + P1\_022N + P1\_027N + P1\_031N + P1\_032N + P1\_033N + P1\_037N + P1\_038N + P1\_039N + P1\_043N + P1\_044N + P1\_045N + P1\_048N + P1\_049N + P1\_050N + P1\_054N + P1\_055N + P1\_056N + P1\_058N + P1\_059N + P1\_060N + P1\_062N + P1\_064N + P1\_065N + P1\_066N + P1\_068N + P1\_069N + P1\_071N

Data description: Residents self-reporting as American Indian and Alaska Native alone or in combination with one or more other races, calculated by summing all individual columns where American Indian and Alaska Native is part of the race combination

##### Indian\_Pct

Proportion of residents that self-report as American Indian or Alaska Native, either alone or in combination with one or more other races, in the hazard zone within a geographic unit in relation to the total residents that self-report as American Indian or Alaska Native, either alone or in combination with one or more other races, in the geographic unit as a whole.

Calculation: *Indian\_In* divided by the total population that self-report as American Indian or Alaska Native, either alone or in combination with one or more other races, in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Asian\_In

Number of residents that self-report as Asian, either alone or in combination with one or more other races, in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_006N + P1\_013N + P1\_017N + P1\_020N + P1\_023N + P1\_024N + P1\_028N + P1\_031N + P1\_034N + P1\_035N + P1\_037N + P1\_040N + P1\_041N + P1\_043N + P1\_044N + P1\_046N + P1\_048N + P1\_051N + P1\_052N + P1\_054N + P1\_055N + P1\_057N + P1\_058N + P1\_059N + P1\_061N + P1\_062N + P1\_064N + P1\_065N + P1\_067N + P1\_068N + P1\_069N + P1\_071N

Data description: Residents self-reporting as Asian alone or in combination with one or more other races, calculated by summing all individual columns where Asian is part of the race combination

##### Asian\_Pct

Proportion of residents that self-report as Asian, either alone or in combination with one or more other races, in the hazard zone within a geographic unit in relation to the total residents that self-report as Asian, either alone or in combination with one or more other races, in the geographic unit as a whole.

Calculation: *Asian\_In* divided by the total population that self-report as Asian, either alone or in combination with one or more other races, in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### PacIs\_In

Number of residents that self-report as Native Hawaiian or Other Pacific Islander, either alone or in combination with one or more other races, in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_007N + P1\_014N + P1\_018N + P1\_021N + P1\_023N + P1\_025N + P1\_029N + P1\_032N + P1\_034N + P1\_036N + P1\_038N + P1\_040N + P1\_042N + P1\_043N + P1\_045N + P1\_046N + P1\_049N + P1\_051N + P1\_053N + P1\_054N + P1\_056N + P1\_057N + P1\_058N + P1\_060N + P1\_061N + P1\_062N + P1\_064N + P1\_066N + P1\_067N + P1\_068N + P1\_069N + P1\_071N

Data description: Residents self-reporting as Native Hawaiian and Other Pacific Islander alone or in combination with one or more other races, calculated by summing all individual columns where Native Hawaiian and Other Pacific Islander is part of the race combination

##### PacIs\_Pct

Proportion of residents that self-report as Native Hawaiian or Other Pacific Islander, either alone or in combination with one or more other races, in the hazard zone within a geographic unit in relation to the total residents that self-report as Native Hawaiian or Other Pacific Islander, either alone or in combination with one or more other races, in the geographic unit as a whole.

Calculation: *PacIs\_In* divided by the total population that self-report as Native Hawaiian or Other Pacific Islander, either alone or in combination with one or more other races, in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Other\_In

Number of residents that self-report as some other race, either alone or in combination with one or more other races, in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: P1—Race

Field identifiers: P1\_008N + P1\_015N + P1\_019N + P1\_022N + P1\_024N + P1\_025N + P1\_030N + P1\_033N + P1\_035N + P1\_036N + P1\_039N + P1\_041N + P1\_042N + P1\_044N + P1\_045N + P1\_046N + P1\_050N + P1\_052N + P1\_053N + P1\_055N + P1\_056N + P1\_057N + P1\_059N + P1\_060N + P1\_061N + P1\_062N + P1\_065N + P1\_066N + P1\_067N + P1\_068N + P1\_069N + P1\_071N

Data description: Residents self-reporting as some other race alone or in combination with one or more other races, calculated by summing all individual columns where some other race is part of the race combination

##### Other\_Pct

Proportion of residents that self-report as some other race, either alone or in combination with one or more other races, in the hazard zone within a geographic unit in relation to the total residents that self-report as some other race, either alone or in combination with one or more other races, in the geographic unit as a whole.

Calculation: *Other\_In* divided by the total population that self-report as some other race, either alone or in combination with one or more other races, in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

### Household Type

##### HUtot\_In

Number of housing units in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: H1—Occupancy status

Field identifiers: H1\_001N

Data description: Number of housing units in the hazard zone

##### HUtot\_Pct

Proportion of housing units in the hazard zone in relation to the total housing units in the geographic unit as a whole.

Calculation: *HUtot\_In* divided by total housing units in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### HUocc\_In

Number of occupied housing units in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: H1—Occupancy status

Field identifiers: H1\_002N

Data description: Number of occupied housing units

##### HUocc\_Pct

Proportion of occupied housing units in the hazard zone in relation to the total occupied housing units in the geographic unit as a whole.

Calculation: *HUocc\_In* divided by the total number of occupied housing units in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### HUvac\_In

Number of vacant housing units in the hazard zone within a geographic unit.

Source: U.S. Census Bureau (2020)

Table name: H1—Occupancy status

Field identifiers: H1\_003N

Data description: Number of vacant housing units

##### HUvac\_Pct

Proportion of vacant housing units in the hazard zone in relation to the total vacant housing units in the geographic unit as a whole.

Calculation: *HUvac\_In* divided by the total number of vacant housing units in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

## Economy

### Employees

##### Emp\_In

Number of total employees in the hazard zone within a geographic unit.

Source: Infogroup (2020)

Data description: Total employees, all business sectors: government and critical facilities; manufacturing; services; natural resources; and trade

##### Emp\_Pct

Proportion of total employees in the hazard zone in relation to the total employees in the geographic unit as a whole.

Calculation: *Emp\_In* divided by the total number of employees in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### GovCr\_In

Number of government and critical facilities sector employees in the hazard zone within a geographic unit.

Source: Infogroup (2020)

Category field: NAICS code (eight digits; first two digits represent the business sector)

Category values: 22, 56, 61, 62, 92

Data description: Total government and critical facilities sector employees, which includes the following sectors: utilities (22); administration, support and waste management, and remediation (56); education (61); health and social services (62); and public administration (92)

##### GovCr\_Pct

Proportion of government and critical facilities sector employees in the hazard zone within a geographic unit in relation to the total government and critical facilities sector employees in the geographic unit as a whole.

Calculation: *GovCr\_In* divided by the total number of government and critical facilities sector employees in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Manct\_In

Number of manufacturing sector employees in the hazard zone within a geographic unit.

Source: Infogroup (2020)

Category field: NAICS code (eight digits; first two digits represent the business sector)

Category values: 23, 31-33, 48-49

Data description: Total manufacturing sector employees, which includes the following sectors: construction (23); manufacturing (31-33); and transportation and warehousing (48-49)

##### Manct\_Pct

Proportion of manufacturing sector employees in the hazard zone within a geographic unit in relation to the total manufacturing sector employees in the geographic unit as a whole.

Calculation: *Manct\_In* divided by the total number of manufacturing sector employees in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Serv\_In

Number of services sector employees in the hazard zone within a geographic unit.

Source: Infogroup (2020)

Category field: NAICS code (eight digits; first two digits represent the business sector)

Category values: 51, 52, 53, 54, 55, 71, 72, 81

Data description: Total services sector employees, which includes the following sectors: information (51); finance and insurance (52); real estate and rental and leasing (53); professional, scientific, and technical services (54); management of companies and enterprises (55); arts, entertainment, and recreation (71); accommodation and food (72); and other services (81)

##### Serv\_Pct

Proportion of services sector employees found in the hazard zone within a geographic unit in relation to the total services sector employees in the geographic unit as a whole.

Calculation: *Serv\_In* divided by the total number of services sector employees in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### NatRe\_In

Number of natural resources sector employees in the hazard zone within a geographic unit.

Source: Infogroup (2020)

Category field: NAICS code (eight digits; first two digits represent the business sector)

Category values: 11, 21

Data description: Total natural resources sector employees, which includes the following sectors: agriculture, forestry, fishing, and hunting (11); and mining, quarrying, and oil and gas extraction (21)

##### NatRe\_Pct

Proportion of natural resources sector employees in the hazard zone within a geographic unit in relation to the total natural resources sector employees in the geographic unit as a whole.

Calculation: *NatRe\_In* divided by the total number of natural resources sector employees in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Trade\_In

Number of trade sector employees in the hazard zone within a geographic unit.

Source: Infogroup (2020)

Category field: NAICS code (eight digits; first two digits represent the business sector)

Category values: 42, 44-45, 00, 99

Data description: Total trade sector employees, which includes the following sectors: wholesale trade (42); retail trade (44-45); and other unassigned business types (0 and 99)

##### Trade\_Pct

Proportion of trade sector employees in the hazard zone within a geographic unit in relation to the total trade sector employees in the geographic unit as a whole.

Calculation: *Trade\_In* divided by the total number of trade sector employees in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

### Parcel Values

##### Parcel\_In

Total of improved and land value, in dollars, for parcels in the hazard zone within a geographic unit.

Source: LightBox (2021)

Data description: Total of improved and land value for parcels, in dollars (2020, or dataset fiscal year, values)

##### Parcel\_Pct

Proportion of improved and land value for parcels in the hazard zone within a geographic unit in relation to the total improved and land value for parcels in the geographic unit as a whole.

Calculation: *Parcel\_In* divided by the total improved and land value for all parcels in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Land\_In

Total land value, in dollars, for parcels in the hazard zone within a geographic unit.

Source: LightBox (2021)

Data description: Total land value for parcels, in dollars (2020, or dataset fiscal year, values)

##### Land\_Pct

Proportion of land value for parcels in the hazard zone within a geographic unit in relation to the total land value for parcels in the geographic unit as a whole.

Calculation: *Land\_In* divided by the total land value for all parcels in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Improv\_In

Total improved value, in dollars, for parcels in the hazard zone within a geographic unit.

Source: LightBox (2021)

Data description: Total improved value for parcels, in dollars (2020, or dataset fiscal year, values)

##### Improv\_Pct

Proportion of improved value for parcels in the hazard zone within a geographic unit in relation to the total improved value for parcels in the geographic unit as a whole.

Calculation: *Improv\_In* divided by the total improved value for all parcels in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

## Land Cover

##### DevLnd\_In

Total square miles of developed land in the hazard zone within a geographic unit.

Source: Multi-Resolution Land Characteristics Consortium (2019)

Category field: Land cover class numeric code

Category values: 22, 23, 24

Data description: Amount of developed land (NLCD 2019 version), in square miles, for the following land cover classes: developed, low-intensity (22); developed, medium-intensity (23); and developed, high-intensity (24)

##### DevLnd\_Pct

Proportion of developed land in the hazard zone within a geographic unit in relation to the total developed land in the geographic unit as a whole.

Calculation: *DevLnd\_In* divided by the total developed land in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Crops\_In

Total square miles of pasture and crops land in the hazard zone within a geographic unit.

Source: Multi-Resolution Land Characteristics Consortium (2019)

Category field: Land cover class numeric code

Category values: 81, 82

Data description: Amount of pasture and crops land (NLCD 2019 version), in square miles, for the following land cover classes: pasture/hay (81); and cultivated crops (82)

##### Crops\_Pct

Proportion of pasture and crops land in the hazard zone within a geographic unit in relation to the total pasture and crops land in the geographic unit as a whole.

Calculation: *Crops\_In* divided by the total pasture and crops land in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Forest\_In

Total square miles of forest land in the hazard zone within a geographic unit.

Source: Multi-Resolution Land Characteristics Consortium (2019)

Category field: Land cover class numeric code

Category values: 41, 42, 43

Data description: Amount of forest land (NLCD 2019 version), in square miles, for the following land cover classes: deciduous forest (41); evergreen forest (42); and mixed forest (43)

##### Forest\_Pct

Proportion of forest land in the hazard zone within a geographic unit in relation to the total forest land in the geographic unit as a whole.

Calculation: *Forest\_In* divided by the total forest land in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Shrub\_In

Total square miles of shrub and grass land in the hazard zone within a geographic unit.

Source: Multi-Resolution Land Characteristics Consortium (2019)

Category field: Land cover class numeric code

Category values: 52, 71

Data description: Amount of shrub and grass land (NLCD 2019 version), in square miles, for the following land cover classes: shrub/scrub (52); and grassland/herbaceous (71)

##### Shrub\_Pct

Proportion of shrub and grass land in the hazard zone within a geographic unit in relation to the total shrub and grass land in the geographic unit as a whole.

Calculation: *Shrub\_In* divided by the total shrub and grass land in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Wetlnd\_In

Total square miles of wetlands in the hazard zone within a geographic unit.

Source: Multi-Resolution Land Characteristics Consortium (2019)

Category field: Land cover class numeric code

Category values: 90, 95

Data description: Amount of wetlands (NLCD 2019 version), in square miles, for the following land cover classes: woody wetlands (90); and emergent herbaceous wetlands (95)

##### Wetlnd\_Pct

Proportion of wetlands in the hazard zone within a geographic unit in relation to the total wetlands in the geographic unit as a whole.

Calculation: *Wetlnd\_In* divided by the total wetlands in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Barren\_In

Total square miles of barren land in the hazard zone within a geographic unit.

Source: Multi-Resolution Land Characteristics Consortium (2019)

Category field: Land cover class numeric code

Category values: 21, 31

Data description: Amount of barren land (NLCD 2019 version), in square miles, for the following land cover classes: developed, open space (21); and barren land (rock/sand/clay) (31)

##### Barren\_Pct

Proportion of barren land in the hazard zone within a geographic unit in relation to the total barren land in the geographic unit as a whole.

Calculation: *Barren\_In* divided by the total barren land in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

## Infrastructure

### Roads

##### Roads\_In

Total length in miles of all roads in the hazard zone within a geographic unit.

Source: HERE (2021)

Data description: Length of all roads (highways, secondary streets, and surface streets), in miles

##### Roads\_Pct

Proportion of all road length in the hazard zone within a geographic unit in relation to the total road length in the geographic unit as a whole.

Calculation: *Roads\_In* divided by total road length in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Highwy\_In

Total length in miles of highways in the hazard zone within a geographic unit.

Source: HERE (2021)

Category field: Roadway function class numeric code

Category values: 1, 2

Data description: Length of all highways, in miles

##### Highwy\_Pct

Proportion of highway length in the hazard zone within a geographic unit in relation to the total highway length in the geographic unit as a whole.

Calculation: *Highwy\_In* divided by the total highway length in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Second\_In

Total length in miles of secondary streets in the hazard zone within a geographic unit.

Source: HERE (2021)

Category field: Roadway function class numeric code

Category values: 3, 4

Data description: Length of all secondary streets, in miles

##### Second\_Pct

Proportion of secondary street length in the hazard zone within a geographic unit in relation to the total secondary street length in the geographic unit as a whole.

Calculation: *Second\_In* divided by the total secondary street length in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Surfac\_In

Total length in miles of surface streets in the hazard zone within a geographic unit.

Source: HERE (2021)

Category field: Roadway function class numeric code

Category values: 5

Data description: Length of all surface streets, in miles

##### Surfac\_Pct

Proportion of surface street length in the hazard zone within a geographic unit in relation to the total surface street length in the geographic unit as a whole.

Calculation: *Surfac\_In* divided by the total surface street length in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

### Railroads

##### Rail\_In

Total length in miles of railroads in the hazard zone within a geographic unit.

Source: California—Federal Rail Administration (2021)

North Carolina—Federal Rail Administration (2021)

South Carolina—Federal Rail Administration (2021)

Washington—Washington State Department of Transportation (2021)

Data description: Length of all railroads, in miles

##### Rail\_Pct

Proportion of railroad length in the hazard zone within a geographic unit in relation to the total railroad length in the geographic unit as a whole.

Calculation: *Rail\_In* divided by total railroad length in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

### Water and Waste Management

##### DWater\_In

Total number of drinking water treatment plants in the hazard zone within a geographic unit.

Source: U.S. Environmental Protection Agency Office of Water (2016)

Data description: Total number of drinking water treatment plants

##### DWater\_Pct

Proportion of drinking water treatment plants in the hazard zone within a geographic unit in relation to the total number of drinking water treatment plants in the geographic unit as a whole.

Calculation: *DWater\_In* divided by the total number of drinking water treatment plants in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### WWater\_In

Total number of wastewater treatment plants in the hazard zone within a geographic unit.

Source: U.S. Environmental Protection Agency (2022)

Data description: Total number of wastewater treatment plants

##### WWater\_Pct

Proportion of wastewater treatment plants in the hazard zone within a geographic unit in relation to the total number of wastewater treatment plants in the geographic unit as a whole.

Calculation: *WWater\_In* divided by the total number of wastewater treatment plants in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### LFill\_In

Total number of solid waste landfills in the hazard zone within a geographic unit.

Source: Oak Ridge National Laboratory (2020)

Data description: Total number of solid waste landfills

##### LFill\_Pct

Proportion of solid waste landfills in the hazard zone within a geographic unit in relation to the total number of solid waste landfills in the geographic unit as a whole.

Calculation: *LFill\_In* divided by the total number of solid waste landfills in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

## Critical Facilities

##### Police\_In

Total number of police stations in the hazard zone within a geographic unit.

Source: Oak Ridge National Laboratory and National Geospatial-Intelligence Agency Homeland Security Infrastructure Program Team (2021)

Data description: Total number of police stations

##### Police\_Pct

Proportion of police stations in the hazard zone within a geographic unit in relation to the total number of police stations in the geographic unit as a whole.

Calculation: *Police\_In* divided by the total number of police stations in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Fire\_In

Total number of fire stations in the hazard zone within a geographic unit.

Source: U.S. Geological Survey (2022)

Data description: Total number of fire stations

##### Fire\_Pct

Proportion of fire stations in the hazard zone within a geographic unit in relation to the total number of fire stations in the geographic unit as a whole.

Calculation: *Fire\_In* divided by the total number of fire stations in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### School\_In

Total number of schools in the hazard zone within a geographic unit.

Source: California—California Department of Education (2022a; 2022b)

North Carolina—North Carolina Department of Public Instruction (2018); North Carolina Division of Non-Public Education (2017)

South Carolina—Oak Ridge National Laboratory (2021a; 2021b)

Washington—Washington Office of Superintendent of Public Instruction (2021); Washington State Board of Education (2021)

Data description: Total number of public and private schools

##### School\_Pct

Proportion of schools in the hazard zone within a geographic unit in relation to the total number of schools in the geographic unit as a whole.

Calculation: *School\_In* divided by the total number of schools in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

##### Hospit\_In

Total number of hospitals in the hazard zone within a geographic unit.

Source: California—California Department of Public Health (2022)

North Carolina—North Carolina Division of Public Health (2020)

South Carolina—South Carolina Bureau of Health Facilities Licensing (2020)

Washington—Washington State Department of Health (2021)

Data description: Total number of hospitals, which includes the following health care facilities: acute psychiatric hospital; chemical dependency recovery hospital; correctional treatment center; and general acute care hospital

##### Hospit\_Pct

Proportion of hospitals in the hazard zone within a geographic unit in relation to the total number of hospitals in the geographic unit as a whole.

Calculation: *Hospit\_In* divided by the total number of hospitals in the geographic unit; values range between 0 and 1 and should be multiplied by 100 to convert to a percentage

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