Cloud to Street Hydrologist Assessment Data

The following files can be used for the Hydrologist Assessment and include the flood map, precipitation data, stream gauge discharge data, and FEMA flood zones for the area around Tulsa, Oklahoma.

May 2019 Flood map: This GeoTiff is a binary water map where the value 1 is water and 0 is not water. This map was generated using a CNN on Sentinel-2 data during May 2019. Download the file at
https://storage.cloud.google.com/hydrologist_assessment/flood_extent_sentinel2_hydroassessment.tif?authuser=0

FEMA FIRM Zones: We have provided two version of the FEMA FIRM zones in GeoJSON format, the only difference is that one has simplified geometries to make any computations smaller for your convenience. It does not matter to us which you use.

The full version with original geometries (161.5 MB) can be found at
https://storage.cloud.google.com/hydrologist_assessment/tulsaOK_flood_hazard_zones.geojson?authuser=0

The version of the flood zones with simplified geometries (18 MB) can be found at
https://storage.cloud.google.com/hydrologist_assessment/tulsaOK_flood_hazard_zones_simple.geojson?authuser=0

The flood zone code can be found in the property of each feature called “FLD_ZONE”. The flood zones use codes that represent different levels of flood risk. Go to the end of this document to see what each code represents.

Mean Daily Discharge: This data was downloaded from the USGS and contains mean daily river discharge in cubic feet per second from a stream gauge on the Arkansas River in Oklahoma near Haskell. This data contains a value for each day from 1972-06-01 to 2021-06-27. This data can be downloaded from
https://storage.cloud.google.com/hydrologist_assessment/river_discharge_daily_mean_1972-2021.txt?authuser=0

Hourly Discharge: This data was downloaded from the USGS and contains river discharge in cubic feet per second measure every hour from a stream gauge on the Arkansas River in Oklahoma near Haskell. This data contains a value for every hour from 1987-06-01 to 2021-06-27. This data can be downloaded from
https://storage.cloud.google.com/hydrologist_assessment/river_discharge_hourly_1987-2021.txt?authuser=0

Precipitation: Daily precipitation (mm/day) that fell on the study area. The data is calculated by the 95 percentile of values in the gridded CHIRPS Daily precipitation dataset in the study area. The CSV file has two columns, "date" which is the day in YYYYMMDD format and "precipitation" measured in mm/day. This data can be downloaded from https://storage.cloud.google.com/hydrologist_assessment/CHIRPS_daily_precip_TulsaOK.csv?authuser=0

Study Area: The geometry in GeoJSON format of the area that the flood extent and flood hazard maps are clipped to and the precipitation is calculated in. Download the data from https://storage.cloud.google.com/hydrologist_assessment/TulsaOK_2019_study_area.geojson?authuser=0

Fema Flood Zone Definitions : **(from: https://pw.lacounty.gov/wmd/floodzone/docs/FZD_Legend.pdf)** FEMA has created their Flood Insurance Rate Maps (FIRMs) to show the areas of high-risk, moderate-to-low risk, and areas where the risk is undetermined. These are the following.

- HIGH-RISK AREAS: ALSO KNOWN AS THE SPECIAL FLOOD HAZARD AREA: High-risk areas have at least a 1% annual chance of flooding. This flood is also referred to as the Base Flood. Flood insurance is required for structures in these high-risk areas if they have a federally-backed mortgage. These areas are shown on the flood maps as follows.

  ZONE A: Area inundated by the Base Flood with no Base Flood Elevations determined.
  ZONE AE: Area inundated by the Base Flood with Base Flood Elevations determined.
  ZONE AH: Area inundated by the Base Flood with flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
  ZONE AO: Area inundated by the Base Flood with flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities are also determined.
  ZONE V: Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
  ZONE VE: Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

- MODERATE-TO-LOW RISK AREAS: THESE ARE NON-SPECIAL FLOOD HAZARD AREAS: In moderate-to-low risk areas, the risk of being flooded is reduced, but not completely removed. These areas are outside the 1% annual chance floodplain, so flood insurance is not required. However, insurance can be obtained at a reduced cost for property owners and renters. These moderate-to-low risk areas are shown on the flood maps as follows.

ZONE X (0.2%) This zone designation is for multiple risks including areas of the 0.2% annual chance flood; areas of the 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood.

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

- UNDETERMINED-RISK AREAS: No flood-hazard analysis has been conducted in these areas, but a flood risk still exists. Flood insurance rates reflect the uncertainty of the flood risk. These areas are shown on the flood maps as follows.

  ZONE D Areas in which flood hazards are undetermined, but possible.