



APPENDIX J. LOCAL HAZARD MITIGATION PLAN CAPABILITY AND RISK ASSESSMENTS

State of New Jersey All-Hazard Mitigation Plan Update

Local Plan Risk Analysis/Methods



County	Nature-based Hazards										
	Coastal Erosion and Sea Level Rise	Dam and Levee Failure	Drought	Earthquake	Flood	Geological Hazards	Hurricane and Tropical Storms	Nor'easters	Severe Weather	Severe Winter Weather	Wildfire
ATLANTIC	GIS analysis calculating the proportion of a parcel or census block lying within 200 feet of 'beach' or 'erodible' shoreline types to estimate population at risk and value of improvements at risk. Estimated average annual losses. GIS analysis using SLOSH model for storm surge to estimate exposure. Estimates average annual storm surge losses based on a distribution of NCEM average annual county-wide losses across the municipalities based on each community's proportional contribution to NFIP paid claims. To estimate risk to wave action - calculate the proportion of a parcel or census block lying within VE zones, and applying that same ratio to the census block population and parcel value to estimate population at risk and value of improvements at risk.	GIS analysis - Value of improvements and population at risk was estimated based on the proportion of parcel area within the estimated inundation area from a dam's EAP.	Statistical analysis using frequency and damages of past events, Agriculture Census crop exposure value, and percent of agriculture land per county to determine annual crop loss estimates by jurisdiction and estimated population at risk.	Expected peak ground accelerations (PGA) for various return period earthquakes by jurisdiction and qualitative description of expected damages. Hazus analysis estimated potential losses for 500, 1000, and 2500 year events countywide (pulled from NJ SHMP). Loss by jurisdiction by distributing the total county loss estimate among the municipalities according to their proportion of the total improved property value in the County.	GIS analysis - parcels intersecting with DFIRM flood maps to get improved value of parcels at risk (used percent of parcel in flood zone to pro-rate value). Estimates average annual flood losses based on a distribution of previous average annual countywide losses (NCEM data) and each community's proportional contribution to NFIP paid claims.		Qualitative description of impacts and potential losses.	Qualitative description of impacts and potential losses	Statistical analysis using damages and frequency of historic events, total value of improvements, and geographic areas impacted by hazard. Annualized expected property loss by jurisdiction and estimated population at risk. Qualitative description of impacts and potential losses.	Statistical analysis using damages and frequency of historic events, total value of improvements, and geographic areas impacted by hazard. Annualized expected property loss by jurisdiction and estimated population at risk.	GIS analysis - calculated the proportion of a parcel or census block located within areas of wildfire susceptibility and applying that same ratio to the census block population and parcel value to estimate population at risk and value of improvements at risk by jurisdiction.
BERGEN	Qualitative discussion of municipalities in Preliminary FIRMS V zone.	Qualitative discussion of dam failure in Bergen County.	Qualitative discussion of previous drought events and potential impacts.	PGA for seismic risk. Qualitative discussion of previous events and potential impacts.	Hazus analysis provided by FEMA. GIS analysis - Jurisdictions in 100 year riverine flood zone using 2014 Preliminary FIRMs.	GIS analysis of landslide susceptibility/incidence.	GIS analysis - Jurisdictions in 100 year coastal flood zone using 2014 Preliminary FIRMs. Qualitative discussion, jurisdictions at risk to coastal flooding from hurricanes and nor'easters based on FIRMs. Vulnerable housing from the 2007 New Jersey Hurricane Evacuation Study (HES). Potential tidal flooding from category 1-4 hurricanes using the NWS SLOSH model.	GIS analysis - Jurisdictions in 100 year coastal flood zone using 2014 Preliminary FIRMs. Qualitative discussion, jurisdictions at risk to coastal flooding from hurricanes and nor'easters based on FIRMs.	Qualitative discussion of previous events and potential impacts.	Qualitative discussion of previous events and potential impacts.	GIS analysis using wildfire fuel hazard risk levels.
BURLINGTON	GIS analysis using Coastal Area Facilities Review Act (CAFRA) boundary to determine exposure. Projected sea level rise data from Jacques Cousteau National Estuarine Research Reserve used to project sea level rise through 2050.	Hazus analysis - preliminary DFIRM with the addition of the Advisory Base Flood Elevation V-zone were used to estimate exposure and potential losses. Estimated Burlington County's estimated potential losses at the Census block level using default building inventory.	Qualitative analysis using previous events and impacts.	Hazus analysis - A probabilistic assessment was conducted for the 100-, 500- and 2,500-year MRPs to analyze the earthquake hazard and provide a range of loss estimates for Burlington County. An annualized loss run was conducted in HAZUS 2.1 to estimate the annualized general building stock dollar losses for the County for 8 return periods.	Hazus analysis - preliminary DFIRM with the addition of the Advisory Base Flood Elevation V-zone were used to estimate exposure and potential losses. Estimated Burlington County's estimated potential losses at the Census block level using default building inventory.	GIS analysis using the Geology - Landslide Incidence and Susceptibility GIS layer from National Atlas. Susceptibility overlaid with Burlington County municipalities, 2010 Census population data, custom building inventory and Burlington County's critical facility inventory were used to estimate exposure.	Hazus probabilistic analysis for wind hazard from a hurricane for 100 and 500 year MRP - default demographic and building data and updated critical facility data were used. SLOSH model used to estimate exposure from storm surge from hurricanes.	Quantitative exposure analysis using previous occurrences, census population data, and Hazus building stock data.	Qualitative analysis using previous events and impacts.	Quantitative exposure analysis using previous occurrences, census population data, and Hazus building stock data.	GIS analysis - NJ Forest Fire Service Fuel hazard data overlaid with population, building stock and critical facilities.
CAMDEN	GIS analysis - census population/housing data that intersects with the Delaware Bay and Delaware River. Sea level rise GIS analysis - Preliminary FIRM Coastal Increased Inundation Areas for Cumberland and Salem counties data showing hypothetical sea level increase of 1, 2, and 3 feet using the inland extent of the 1% annual chance flood. Intersect parcels with FIRM data.	Dam failure - GIS analysis - count of housing units and population downstream of high hazard dams. Critical facilities GIS analysis - critical facilities identified within a 1.5 mile radius of each dam. Levee failure - quantitative analysis of structures protected by levees. GIS analysis - parcels within a 1,000 ft buffer around each levee. Critical facilities GIS analysis - critical facilities within a 1,000 ft buffer of each levee.	Quantitative analysis of agriculture impacts based on census of agriculture market value of products sold (by county) and agriculture land area by jurisdiction. Qualitative analysis based on previous events and impacts.	GIS analysis using census population and housing data and building permits.	GIS analysis using Preliminary Flood Insurance Rate Map (PFIRM) and NFIP data. Hazus analysis - average annual loss by census block. Sea level rise analysis - water surface elevation increase. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	GIS analysis using New Jersey Landslide Incidence and Susceptibility map - data was analyzed to determine the land area and population at risk.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Extreme temperature - quantitative analysis using population and household income data. High wind - quantitative analysis using previous events and damages and census population, building inventory data. Summer weather (hail and lightning) - quantitative analysis using previous occurrences and impacts. Impact to agriculture using agriculture census and percent land cover used for agriculture.	Statistical analysis using previous occurrences and impacts using building stock data.	GIS analysis using data from the New Jersey Forest Fire Service (NJFFS) and the United States Forest Service (USFS) to identify areas with a combination of the extreme fuel hazard and high and medium interface/intermix (WUI) and overlaid with Census population and housing data. Critical facilities GIS analysis - identify critical facilities potentially exposed to the wildfire hazard, land areas within the extreme wildfire fuel hazard risk or the High and Medium WUI.
CAMDEN	GIS analysis - census population/housing data that intersects with the Delaware Bay and Delaware River. Sea level rise GIS analysis - Preliminary FIRM Coastal Increased Inundation Areas for Cumberland and Salem counties data showing hypothetical sea level increase of 1, 2, and 3 feet using the inland extent of the 1% annual chance flood. Intersect parcels with FIRM data.	Dam failure - GIS analysis - count of housing units and population downstream of high hazard dams. Critical facilities GIS analysis - critical facilities identified within a 1.5 mile radius of each dam. Levee failure - quantitative analysis of structures protected by levees. GIS analysis - parcels within a 1,000 ft buffer around each levee. Critical facilities GIS analysis - critical facilities within a 1,000 ft buffer of each levee.	Quantitative analysis of agriculture impacts based on census of agriculture market value of products sold (by county) and agriculture land area by jurisdiction. Qualitative analysis based on previous events and impacts.	GIS analysis using census population and housing data and building permits.	GIS analysis using Preliminary Flood Insurance Rate Map (PFIRM) and NFIP data. Hazus analysis - average annual loss by census block. Sea level rise analysis - water surface elevation increase. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	GIS analysis using New Jersey Landslide Incidence and Susceptibility map - data was analyzed to determine the land area and population at risk.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Extreme temperature - quantitative analysis using population and household income data. High wind - quantitative analysis using previous events and damages and census population, building inventory data. Summer weather (hail and lightning) - quantitative analysis using previous occurrences and impacts. Impact to agriculture using agriculture census and percent land cover used for agriculture.	Statistical analysis using previous occurrences and impacts using building stock data.	GIS analysis using data from the New Jersey Forest Fire Service (NJFFS) and the United States Forest Service (USFS) to identify areas with a combination of the extreme fuel hazard and high and medium interface/intermix (WUI) and overlaid with Census population and housing data. Critical facilities GIS analysis - identify critical facilities potentially exposed to the wildfire hazard, land areas within the extreme wildfire fuel hazard risk or the High and Medium WUI.

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CAPE MAY	Sea level rise - GIS analysis using NOAA's sea level rise inundation data to evaluate four slr scenarios. Coastal erosion - GIS analysis using shoreline erosion rates and population, buildings, and infrastructure data.				GIS analysis using DFIRM for exposure to the 1 and 0.2 percent annual chance floods. Hazus analysis to estimate potential losses using custom updated general building stock data and critical facilities.		Hazus analysis and exposure analysis for storm surge using SLOSH model.	Qualitative discussion of impacts and included in flood and hurricane Hazus analyses.	Qualitative assessment of previous occurrences and impacts.	Quantitative analysis of potential losses from building stock and qualitative analysis of previous occurrences and impacts.	GIS analysis - New Jersey Forest Fire Service (NJFFS) uses Wildfire Fuel Hazard data to assign wildfire fuel hazard rankings across the State - impact to jurisdictions and critical facilities.
CUMBERLAND	GIS analysis - census population/housing data that intersects with the Delaware Bay and Delaware River. Sea level rise GIS analysis - Preliminary FIRM Coastal Increased Inundation Areas for Cumberland and Salem counties data showing hypothetical sea level increase of 1, 2, and 3 feet using the inland extent of the 1% annual chance flood. Intersect parcels with FIRM data.	Dam failure - GIS analysis - count of housing units and population downstream of high hazard dams. Critical facilities GIS analysis - critical facilities identified within a 1.5 mile radius of each dam. Levee failure - quantitative analysis of structures protected by levees. GIS analysis - parcels within a 1,000 ft buffer around each levee. Critical facilities GIS analysis - critical facilities within a 1,000 ft buffer of each levee.	Quantitative analysis of agriculture impacts based on census of agriculture market value of products sold (by county) and agriculture land area by jurisdiction. Qualitative analysis based on previous events and impacts.	GIS analysis using census population and housing data and building permits.	GIS analysis using Preliminary Flood Insurance Rate Map (PFIRM) and NFIP data. Hazus analysis - average annual loss by census block. Sea level rise analysis - water surface elevation increase. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	GIS analysis using New Jersey Landslide Incidence and Susceptibility map - data was analyzed to determine the land area and population at risk.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Extreme temperature - quantitative analysis using population and household income data. High wind - quantitative analysis using previous events and damages and census population, building inventory data. Summer weather (hail and lightning) - quantitative analysis using previous occurrences and impacts. Impact to agriculture using agriculture census and percent land cover used for agriculture.	Statistical analysis using previous occurrences and impacts using building stock data.	GIS analysis using data from the New Jersey Forest Fire Service (NJFFS) and the United States Forest Service (USFS) to identify areas with a combination of the extreme fuel hazard and high and medium interface/intermix (WUI) and overlaid with Census population and housing data. Critical facilities GIS analysis - identify critical facilities potentially exposed to the wildfire hazard, land areas within the extreme wildfire fuel hazard risk or the High and Medium WUI.
ESSEX	GIS analysis - population, buildings, and infrastructure along the shoreline.	Hazus analysis - estimated potential losses using custom building inventory for 1 and 0.2 percent annual chance flood (combined with flood profile).	Qualitative analysis based on previous occurrences and impacts. Impact on agriculture using agriculture census data.	Hazus analysis for 100-, 500- and 2,500-year MRPs using updated soil types for ground shaking. GIS analysis - exposure assessment conducted for population and buildings on liquefaction using susceptibility data.	Hazus analysis - estimated potential losses using custom building inventory for 1 and 0.2 percent annual chance flood.	GIS analysis using NJ geologic survey landslide susceptibility to estimate population, building stock, and critical facility exposure.	Hazus analysis for wind to determine annualized losses and the 100- and 500-year MRPs using default demographic data and updated building and critical facility data. SLOSH model for potential flooding from coastal storm.	Hazus analysis for wind to determine annualized losses and the 100- and 500-year MRPs using default demographic data and updated building and critical facility data. SLOSH model for potential flooding from coastal storm.	Quantitative analysis using previous occurrences, building stock, and population data. Qualitative analysis for extreme temperatures using previous occurrences and impacts.	Quantitative analysis using previous occurrences, building stock, and population data.	GIS analysis using wildfire fuel hazard data - determined vulnerability to jurisdictions and critical facilities.
GLOUCESTER	GIS analysis - census population/housing data that intersects with the Delaware Bay and Delaware River. Sea level rise GIS analysis - Preliminary FIRM Coastal Increased Inundation Areas for Cumberland and Salem counties data showing hypothetical sea level increase of 1, 2, and 3 feet using the inland extent of the 1% annual chance flood. Intersect parcels with FIRM data.	Dam failure - GIS analysis - count of housing units and population downstream of high hazard dams. Critical facilities GIS analysis - critical facilities identified within a 1.5 mile radius of each dam. Levee failure - quantitative analysis of structures protected by levees. GIS analysis - parcels within a 1,000 ft buffer around each levee. Critical facilities GIS analysis - critical facilities within a 1,000 ft buffer of each levee.	Quantitative analysis of agriculture impacts based on census of agriculture market value of products sold (by county) and agriculture land area by jurisdiction. Qualitative analysis based on previous events and impacts.	GIS analysis using census population and housing data and building permits.	GIS analysis using Preliminary Flood Insurance Rate Map (PFIRM) and NFIP data. Hazus analysis - average annual loss by census block. Sea level rise analysis - water surface elevation increase. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	GIS analysis using New Jersey Landslide Incidence and Susceptibility map - data was analyzed to determine the land area and population at risk.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Hazus analysis - average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Extreme temperature - quantitative analysis using population and household income data. High wind - quantitative analysis using previous events and damages and census population, building inventory data. Summer weather (hail and lightning) - quantitative analysis using previous occurrences and impacts. Impact to agriculture using agriculture census and percent land cover used for agriculture.	Statistical analysis using previous occurrences and impacts using building stock data.	GIS analysis using data from the New Jersey Forest Fire Service (NJFFS) and the United States Forest Service (USFS) to identify areas with a combination of the extreme fuel hazard and high and medium interface/intermix (WUI) and overlaid with Census population and housing data. Critical facilities GIS analysis - identify critical facilities potentially exposed to the wildfire hazard, land areas within the extreme wildfire fuel hazard risk or the High and Medium WUI.
HUNTERDON		Qualitative analysis using inundation information from EAPs from high hazard dams and potential impacts.	Quantitative analysis using previous occurrence and impacts, population served by groundwater, and county wide agriculture data from agriculture census.	Hazus analysis - probabilistic assessment for 100-, 500- and 2,500-year MRPs through a Level 2 analysis to analyze the earthquake hazard and provide a range of loss estimates.	GIS analysis - DFIRM used to evaluate exposure for the 1 and 2% annual chance floods and potential future losses for the 1-percent annual chance event. Hazus analysis to estimate potential losses at the structure level.	GIS analysis - landslide susceptibility using the Landslide Incidence and Susceptibility GIS layer from the National Atlas and New Jersey Geologic and Water Survey generated a carbonate formations GIS layer for sinkhole risk.	Hazus analysis for hurricane wind - a probabilistic scenario was run for annualized losses and the 100- and 500-year MRPs.	Hurricane hazus analysis and qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis using building stock exposure and estimated losses.	GIS analysis using wildfire fuel hazard data - determined vulnerability to jurisdictions and critical facilities.
HUDSON	GIS analysis - entire shoreline was analyzed using erosion rate, buildings, population, and infrastructure.		Qualitative analysis using previous occurrences and impacts.	Hazus analysis - level 2 probabilistic scenario estimating annualized losses and 100-, 500- and 2,500-year MRP losses. NEHRP soils as well as liquefaction and landslide susceptibility spatial data created by the New Jersey Geologic and Water Survey were incorporated into Hazus. An annualized loss run was conducted in HAZUS 2.1 to estimate the annualized general building stock dollar losses for the County. The annualized loss methodology combines the estimated losses associated with ground shaking for eight return periods: 100, 250, 500, 750, 1000, 1500, 2000, 2500-year.	GIS analysis - Preliminary FIRMs used to evaluate exposure to the 1% annual chance flood. Hazus analysis - coastal flood model to estimate potential losses at the structure level.	GIS analysis for landslide susceptibility	Hazus analysis - wind losses from a hurricane - annualized losses and the 100- and 500-year MRPs were examined for the wind/severe storm hazard. Default demographic data and updated building and critical facility data were used. SLOSH model for storm surge exposure to population, general building stock, and critical facilities.	Hazus analysis - wind losses from a hurricane - annualized losses and the 100- and 500-year MRPs were examined for the wind/severe storm hazard. Default demographic data and updated building and critical facility data were used. SLOSH model for storm surge exposure to population, general building stock, and critical facilities.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis estimating losses using general building stock and population data.	GIS analysis using wildfire fuel hazard data - determine vulnerability to jurisdictions and critical facilities.

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MIDDLESEX	Qualitative analysis based on previous occurrences and impacts. Sea level rise GIS analysis for sea level rise estimates based on 100 yr flood plain.	GIS analysis using high hazard dam inundation maps and population/housing units exposed.	Quantitative analysis using agriculture census data for the county combined with percent agriculture land use in the county and estimated annual losses, and qualitative analysis based on previous occurrences and impacts.	GIS analysis using NEHRP soil classifications to estimate potential losses. Hazus analysis Level 1 probabilistic event - annual estimation was performed using ground motion predictions for eight return periods (100, 250, 500, 750, 1000, 1500, 2000, and 2500 years).	GIS analysis determining structures in 100 yr floodplain. Quantitative analysis using NFIP losses by jurisdiction/repetitive losses.	Qualitative discussion of previous occurrences and impacts.	SLOSH model for storm surge by jurisdiction – population and buildings exposed and estimated losses/annual losses. Hazus analysis for wind impacts – losses and annualized losses.	Qualitative discussion of previous occurrences and impacts.	Quantitative analysis using previous occurrences and impacts countywide, as well as projected future impacts (50-100yrs) for extreme temperatures. Quantitative and qualitative analysis based on previous occurrences/impacts and FEMA BCA software analysis for high winds, hail, and tornadoes.	Quantitative analysis using previous occurrences and impacts and estimated annualized losses.	GIS analysis analyzing WUI areas and population/housing data.
MONMOUTH	GIS analysis to determine population and buildings at risk to erosion and annual building damages. Hazus analysis for sea level rise projected to 2050 - estimated building damages/exposure. Wave action – GIS analysis estimating exposure of population/buildings in VE flood zone. Critical facility gis analysis.	GIS analysis, including critical facilities.	Statistical analysis using percent land that is agriculture data and previous occurrences and impacts.	Hazus analysis – 100, 500, 1000, and 2500 year frequency events and annual expected loss at the census tract level. Estimated potential losses for 500, 1000, and 2500 year events and annualized potential losses.	GIS analysis using FIRMs and population and building data to estimate exposure. Hazus analysis (level 2) for potential losses for a 0, 50, 100, 200, 500 year event and annualized losses. Critical facility GIS analysis.	GIS analysis estimating population and buildings exposed to high landslide susceptibility. Critical facilities GIS analysis.	Hazus analysis estimated exposure and losses for 50, 100, 200, 500, and 1000 year frequency events and annual expected loss at the census tract level. SLOSH model for storm surge exposure of population and buildings. Hazus analysis for potential losses/annualized losses. Critical facilities GIS analysis.	Hazus analysis for nor'easter winds to estimate exposure to population and buildings and estimated losses and annualized losses using local storm data from 2 nor'easters with readily available data.	Statistical analysis using previous occurrences and impacts estimate population, and building improvements at risk, as well as estimated annualized losses.	Statistical analysis using previous occurrences and impacts to population, building improvements at risk, and estimate annualized losses.	GIS analysis estimating population and buildings within areas of wildfire susceptibility. Critical facilities GIS analysis.
MORRIS		Qualitative assessment using previous occurrences and impacts.	Quantitative analysis using groundwater data and agriculture census countywide data, and qualitative analysis using previous occurrences and impacts.	Hazus level 2 analysis using a probabilistic scenario. Estimated annualized losses for building stock for 100-, 500- and 2,500-year MRP losses. NEHRP soil classification and liquefaction and landslides susceptibility data incorporated into Hazus.	GIS analysis – exposure to 1 and 0.2% annual chance flood using DFIRM. Hazus analysis for estimated losses using custom building inventory.	GIS analysis using landslide susceptibility data and NJGWS-created spatial data set identifying the location of carbonate bedrock throughout the state to identify potential hazard areas for subsidence and sinkholes. Estimated population, building stock, and critical facility exposure.	Hazus analysis for wind - 100- and 500-year mean return period to estimate annualized losses using custom building and critical facility inventory.	Hazus analysis for wind - 100- and 500-year mean return period to estimate annualized losses using custom building and critical facility inventory.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis estimating exposure and losses to building stock.	GIS analysis using NJFFS fuel data to identify areas and critical facilities at risk.
OCEAN	GIS analysis of parcels within 200 ft of erodible shoreline. Qualitative discussion of a GIS based analysis on beach-dune system erosion performed in 2006 by the Richard Stockton College of New Jersey. GIS analysis analyzing total community area and critical facilities inundated (and isolated for critical facilities only) by 1 and 3 feet of sea level rise.	Qualitative analysis using previous occurrences and impacts for jurisdictions near high and significant hazard dams.	Quantitative analysis of groundwater wells, and qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.	GIS analysis analyzing exposure of parcels and critical facilities in the 1% annual chance floodplain.		Quantitative analysis of mobile homes per jurisdiction, and qualitative analysis using previous occurrences and impacts.	Quantitative analysis of mobile homes per jurisdiction, and qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.	GIS analysis of critical facilities in wildfire hazard areas and hazard potential county wide.
PASSAIC	Hazus probabilistic analysis for wind - annualized losses and the 100- and 500-year mean return period using updated building and critical facility data. SLOSH model for storm surge – exposure of building, population, and critical facilities.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis using countywide census of agriculture data, and qualitative analysis using previous occurrences and impacts.	Hazus level 2 analysis using a probabilistic scenario to analyze losses and annualized losses and 100-, 500- and 2,500-year MRP losses. NEHRP soil classification and liquefaction and landslides susceptibility GIS data from NJGWS incorporated into Hazus. Annualized losses for general building stock dollar losses for 100-, 250-, 500-, 750-, 1000-, 1500-, 2000-, and 2500-year return periods.	GIS analysis using the 1% annual chance floodplain to evaluate risk and vulnerability. Hazus analysis to estimate potential losses.	GIS analysis using landslide susceptibility from the NJGWS. NJGWS carbonate bedrock GIS data to identify hazard areas for subsidence and sinkholes. Building stock, population, and critical facilities exposure analyzed.	Hazus probabilistic analysis for wind - annualized losses and the 100- and 500-year mean return period using updated building and critical facility data. SLOSH model for storm surge – exposure of building, population, and critical facilities.	Hazus probabilistic analysis for wind - annualized losses and the 100- and 500-year mean return period using updated building and critical facility data. SLOSH model for storm surge – exposure of building, population, and critical facilities.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis using building stock exposure to estimate potential losses.	GIS analysis using NJFFS fuel data to identify areas and critical facilities at risk.
SALEM	GIS analysis – census population/housing data that intersects with the Delaware Bay and Delaware River. Sea level rise GIS analysis – Preliminary FIRM Coastal Increased Inundation Areas for Cumberland and Salem counties data showing hypothetical sea level increase of 1, 2, and 3 feet using the inland extent of the 1% annual chance flood. Intersect parcels with FIRM data.	Dam failure - GIS analysis – count of housing units and population downstream of high hazard dams. Critical facilities GIS analysis – critical facilities identified within a 1.5 mile radius of each dam. Levee failure – quantitative analysis of structures protected by levees. GIS analysis – parcels within a 1,000 ft buffer around each levee. Critical facilities GIS analysis – critical facilities within a 1,000 ft buffer of each levee.	Quantitative analysis of agriculture impacts based on census of agriculture market value of products sold (by county) and agriculture land area by jurisdiction. Qualitative analysis based on previous events and impacts.	GIS analysis using census population and housing data and building permits.	GIS analysis using Preliminary Flood Insurance Rate Map (PFIRM) and NFIP data. Hazus analysis – average annual loss by census block. Sea level rise analysis – water surface elevation increase. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	GIS analysis using New Jersey Landslide Incidence and Susceptibility map - data was analyzed to determine the land area and population at risk.	Hazus analysis – average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Hazus analysis – average annual loss by census block. SLOSH storm surge analysis. Critical facility GIS analysis using preliminary FIRMs and storm surge inundation.	Extreme temperature - quantitative analysis using population and household income data. High wind – quantitative analysis using previous events and damages and census population, building inventory data. Summer weather (hail and lightning) – quantitative analysis using previous occurrences and impacts. Impact to agriculture using agriculture census and percent land cover used for agriculture.	Statistical analysis using previous occurrences and impacts using building stock data.	GIS analysis using data from the New Jersey Forest Fire Service (NJFFS) and the United States Forest Service (USFS) to identify areas with a combination of the extreme fuel hazard and high and medium interface/intermix (WUI) and overlaid with Census population and housing data. Critical facilities GIS analysis - identify critical facilities potentially exposed to the wildfire hazard, land areas within the extreme wildfire fuel hazard risk or the High and Medium WUI.

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Michael Baker INTERNATIONAL

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SOMERSET		GIS analysis - two-foot County-wide contours were used to generate a Digital Elevation Model (DEM), with the exception of a small portion of the County where 10-foot contours were used to create the 1 and 0.2% annual chance floodplain to use in Hazus. Hazus analysis to estimate potential losses at the structure level using custom building inventory. (same as flood profile)	Quantitative analysis using census of agriculture countywide data, and qualitative analysis using previous occurrences and impacts.	Hazus level 2 analysis using a probabilistic scenario to analyze annualized losses and 100-, 500- and 2,500-year mean return period [MRP] losses. Used NEHRP soil classes. Annualized loss run was conducted in Hazus to estimate the annualized general building stock dollar losses for the County for eight return periods: 100, 250, 500, 750, 1000, 1500, 2000, 2500-year.	GIS analysis - two-foot County-wide contours were used to generate a Digital Elevation Model (DEM), with the exception of a small portion of the County where 10-foot contours were used to create the 1 and 0.2% annual chance floodplain to use in Hazus. Hazus analysis to estimate potential losses at the structure level using custom building inventory.		Hazus analysis using probabilistic model for hurricane wind - annualized losses and the 100- and 500-year MRPs were examined for population and updated building and critical facility data.	Quantitative analysis estimating exposure and potential damages to building stock and snow removal costs.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis estimating exposure and potential damages to building stock and snow removal costs.	GIS analysis - The Wildfire Urban Interface (interface and intermix) obtained through the SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin-Madison was used to define the wildfire hazard areas and estimate exposure to population, building stock and critical facilities.
SUSSEX		Qualitative analysis using previous occurrences and impacts.	Quantitative analysis using census of agriculture countywide data, and qualitative analysis using previous occurrences and impacts/drinking water suppliers data.	Hazus level 2 analysis using a probabilistic scenario to analyze annualized losses and 100-, 500- and 2,500-year mean return period [MRP] losses. Used NEHRP soil classes. Annualized loss run was conducted in Hazus to estimate the annualized general buildi	GIS analysis - DFIRM used to estimate exposure and potential losses in 1 and 0.2% annual chance floodplain. Hazus analysis to estimate potential losses at the structure level using the County's custom building inventory.	GIS analysis - Landslide Incidence and Susceptibility GIS layer from the National Atlas was used to assess the vulnerability to landslides. New Jersey Geologic and Water Survey generated a Carbonate Formations GIS layer, which indicates areas in New Jersey with carbonate geological formations.	Hazus analysis for wind - 100- and 500-year mean return period were used to evaluate potential losses.	Hazus analysis outputs from hurricane profile, and qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.	Quantitative analysis using population and building stock data (1-10% damage loss estimates).	GIS analysis using NJFFS fuel data to identify areas and critical facilities at risk.
UNION	Qualitative analysis using previous occurrences and impacts.	GIS analysis - census blocks intersecting 500ft wide stream buffer downstream of high hazard dams. Estimated exposure of land and population/housing.	Qualitative analysis using previous occurrences and impacts	GIS analysis using NEHRP soil classifications. Hazus analysis using probabilistic scenario for annualized direct building losses.	GIS exposure analysis of parcels in floodplain. Quantitative analysis using NFIP data/losses/RL and SRL.	GIS analysis using NEHRP soil classifications. Hazus analysis using probabilistic scenario for annualized direct building losses. Qualitative analysis using previous occurrences and impacts	Quantitative analysis using previous occurrences and impacts. Hazus analysis for max wind speed and structure exposure/annualized losses. Quantitative analysis using power loss data. GIS analysis using SLOSH model for storm surge.	Quantitative analysis using previous occurrences and impacts. Hazus analysis for max wind speed and structure exposure/annualized losses. Quantitative analysis using power loss data. GIS analysis using SLOSH model for storm surge.	Quantitative analysis using FEMA value of life for annual, 50 and 100 year risk for extreme temperatures. Quantitative analysis using previous occurrences and impacts to estimate annual, 50 and 100 year losses for lightning. Qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.	GIS analysis using WUI and wildfire potential data.
WARREN		Qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts/drinking water suppliers data.	Hazus level 2 probabilistic analysis for 100, 500 2500 year MRPs.	GIS analysis using FIRM for 1 and 0.2 percent annual chance flood. Hazus analysis for potential losses for 1 percent annual chance flood.	GIS analysis using Landslide Incidence and Susceptibility GIS layer from the National Atlas. GIS analysis using The New Jersey Geologic and Water Survey generated layers used to determine the vulnerability to the subsidence and sinkhole hazard. The Carbonate Formations GIS layer indicates areas in New Jersey with carbonate geological formations; additionally, a Sinkhole GIS layer provides the location of sinkholes, caves, abandoned mines, and abandoned and operating quarries.	Hazus analysis probabilistic scenario for 100 and 500 yr MRPs for wind.	Hazus analysis for potential losses for 1 percent annual chance flood and Hazus analysis probabilistic scenario for 100 and 500 yr MRPs for wind.	Qualitative analysis using previous occurrences and impacts. Hazus analysis for wind.	Quantitative analysis to estimate exposure and 1-10 percent building losses.	GIS analysis using NJFFS Fuel Hazard Area.

State of New Jersey All-Hazard Mitigation Plan Update

Local Plan Risk Analysis/Methods



County	Human-based										
	Animal Disease	Civil Unrest	Crop Failure	Cyber Attack	Economic Collapse	Fishing Failure	Hazardous Substances	Nuclear Hazards	Pandemic	Power Failure	Terrorism
ESSEX	Qualitative analysis based on previous occurrences and impacts.	Qualitative analysis based on previous occurrences and impacts.		Qualitative analysis based on previous occurrences and impacts.			Qualitative analysis based on previous occurrences and impacts.		Qualitative analysis based on previous occurrences and impacts.	Qualitative analysis based on previous occurrences and impacts.	Qualitative analysis based on previous occurrences and impacts.
HUNTERDON	Qualitative analysis based on previous occurrences and impacts.						Qualitative analysis based on previous occurrences and impacts.		Qualitative analysis based on previous occurrences and impacts.		
MIDDLESEX							Qualitative discussion of previous occurrences and impacts.			Quantitative analysis based on previous occurrences and impacts (from hurricanes Irene and Sandy) and estimated annual losses.	
MONMOUTH											
MORRIS	Qualitative analysis using previous occurrences and impacts.						Qualitative analysis using EPA data for previous occurrences and impacts.		Qualitative analysis using previous occurrences and impacts.		
OCEAN							GIS analysis analyzing parcels located within 1.5 miles of a hazmat facility and value of improvements.	Quantitative analysis using population and critical facilities within 10 miles epz of oyster creek nuclear power plant and parcels/improvement value.		Qualitative analysis using previous occurrences and impacts.	Qualitative analysis using previous occurrences and impacts.
PASSAIC	Qualitative analysis using previous occurrences and impacts.						Qualitative analysis using EPA data for previous occurrences and impacts.		Qualitative analysis using previous occurrences and impacts.		
SUSSEX							Qualitative analysis using EPA data.				
UNION							Qualitative analysis using USDOT, EPA data, previous occurrences, and impacts.				
WARREN							Qualitative analysis using EPA data.				