5.4.2 DROUGHT

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the drought hazard in Burlington County.

2019 HMP UPDATE CHANGES

- The hazard profile has been significantly enhanced to include a detailed hazard description, location, extent, previous occurrences, probability of future occurrence, and potential change in climate and its impacts on the drought hazard is discussed.
- New and updated figures from federal and state agencies are incorporated. U.S. 2010 Census data was incorporated, where appropriate.
- Previous occurrences were updated with events that occurred between 2013 and 2017.
- A vulnerability assessment was conducted for the drought hazard that provides a qualitative analysis of exposure and potential losses to Burlington County.

5.4.2.1 PROFILE

Hazard Description

As defined by the National Weather Service (NWS), drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. Drought is a temporary aberration from normal climatic conditions and can vary significantly from one region to another. Human factors, such as water demand and water management, can exacerbate the impact that a drought has on a region. There are four different ways that drought can be defined or grouped:

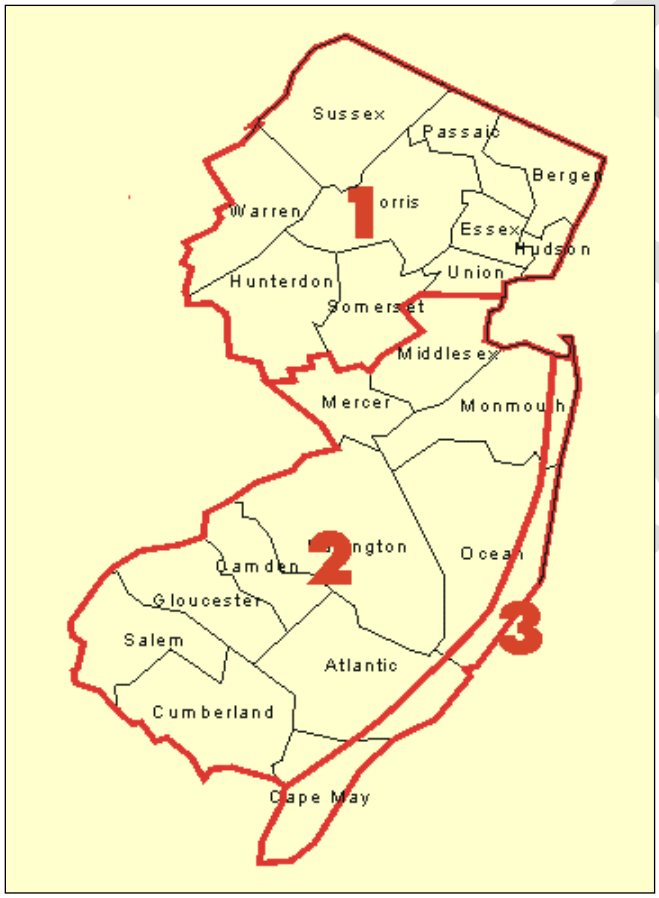
- Meteorological drought is a measure of departure of precipitation from normal. It is defined solely on the relative degree of dryness. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.
- Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced ground water or reservoir levels, and other parameters. It occurs when there is not enough water available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demands of plant life, primarily crops.
- Hydrological drought is associated with the effects of periods of precipitation shortfalls (including snowfall) on surface or subsurface water supply. It occurs when these water supplies are below normal. It is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Socioeconomic drought is associated with the supply and demand of an economic good with elements of meteorological, hydrological, and agricultural drought. This differs from the aforementioned types of drought because its occurrence depends on the time and space processes of supply and demand to identify or classify droughts. The supply of many economic goods depends on weather (for example water, forage, food grains, fish, and hydroelectric power). Socioeconomic drought occurs when the demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply (National Drought Mitigation Center 2012).

The National Weather Service Climate Prediction Center can provide seasonal outlooks for droughts that last for 3 month increments. To view the current seasonal outlook visit, http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale (NDMC Date Unknown).

Location

Climate divisions are regions within a state that are climatically homogenous. The National Oceanic and Atmospheric Administration (NOAA) has divided the U.S. into 344 climate divisions with New Jersey being made up of three climate divisions: Northern, Southern, and Coastal; Burlington County is located in the Southern Climate Division (NOAA NCEI, 2018) (Figure 5.4.2-1).

Figure 5.4.2-1. Climate Divisions of NJ



Source: Climate Prediction Center (CPC), 2005
Note: 1 = Northern Climate Division; 2 = Southern Climate Division; 3 = Coastal Climate Division

The New Jersey Department of Environmental Protection (NJDEP) divides the State of New Jersey into six drought regions - Northeast, Central, Northwest, Southwest, Coastal North and Coastal South. The drought regions generally follow natural watershed boundaries and account for regional similarities in climate and water supply sources, among other things. The drought regions allow the NJDEP to respond to changing conditions in one region without imposing constraints in areas not experiencing a water shortage. The drought regions also

align with municipal borders because the primary enforcement mechanism for water restrictions during a drought emergency is the local police department (NJDEP Division of Water Supply and Geoscience 2018).

Burlington County is located in two drought regions – the Southwest Drought Region and the Coastal South Drought Region. Other counties in the Southwest Drought region include Camden, Gloucester, Mercer, Monmouth, and Salem Counties. The Coastal South Drought Region also includes Atlantic, Camden, Cape May, Cumberland, Gloucester, Ocean, and Salem Counties (Hoffman and Domber 2003) (see Figure 5.4.2-2).

Figure 5.4.2-2. Drought Regions of New Jersey

Source: *NJHMP 2014*

Note: The red circle indicates the location of Burlington County. The County is located within the Southwest Drought Region and Coastal, South Drought Region of New Jersey.

Extent

According to the New Jersey HMP, counties most often affected by a drought are densely populated areas that rely on above-ground reservoirs for their water supply; however, this does not include Burlington County. As noted in the New Jersey HMP, all but five of the county's water suppliers use groundwater for drinking water supplies. This ultimately makes the county and its municipalities more resistant to drought conditions (NJ HMP, 2014). According to the NJDEP, available water supply sources for the Southwest Drought Region are the Delaware River Basin Reservoirs, unconfined ground water, and rivers. The Coastal South Drought Region is

unconfined groundwater, as well as a minor supply source of New Jersey reservoirs (NJDEP 2018).The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts (NOAA Date Unknown). In New Jersey, the NJDEP utilizes several drought indices to assess the severity of drought throughout the state.

The Division of Water Supply and Geoscience within the NJDEP, regularly monitors various water supply conditions within the state based on the different Water Supply Regions. The water supply conditions aid the Department in declaring the regions as being within one of the four stages of water supply drought, Normal, Drought Watch, Drought Warning, and Drought Emergency.

- A ***Drought Watch*** is an administrative designation made by the Department when drought or other factors begin to adversely affect water supply conditions. A Watch indicates that conditions are dry but not yet significantly so. During a drought Watch, the Department closely monitors drought indicators (including precipitation, stream flows and reservoir and ground water levels, and water demands) and consults with affected water suppliers.
- A ***Drought Warning*** represents a non-emergency phase of managing available water supplies during the developing stages of drought and falls between the Watch and Emergency levels of drought response. The aim of a Drought Watch is to avert a more serious water shortage that would necessitate declaration of a water emergency and the imposition of mandatory water use restrictions, bans on water use, or other potentially drastic measures.
- A ***Drought Emergency*** can only be declared by the governor. While drought warning actions focus on increasing or shifting the supply of water, efforts initiated under a water emergency focus on reducing water demands. During a water emergency, a phased approach to restricting water consumption is typically initiated. Phase I water use restrictions typically target non-essential, outdoor water use (NJDEP Division of Water Supply and Geoscience 2018).

Previous Occurrences and Losses

Many sources provided historical information regarding previous occurrences and losses associated with drought events throughout the State of New Jersey and Burlington County. With numerous sources reviewed for the purpose of this HMP, loss and impact information for events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during the HMP research.

Between 1954 and 2018, FEMA declared that the State of New Jersey experienced two drought-related disaster declarations: one major disaster (DR) and one emergency (EM); both were classified as water shortages. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations. Of those events, the New Jersey HMP, FEMA, and other sources indicate that Burlington County has been declared as a disaster area as a result of two drought-related events (FEMA, 2018). Table 5.4.2-1 provides information regarding FEMA declarations for Burlington County.

Table 5.4.2-1. FEMA Declarations for Drought Events in Burlington County

FEMA Disaster Number	Date(s) of Incident	Incident Type / Title	Declared Counties
DR-205	August 1965	Drought / Water Shortage	All 21 counties including Burlington County
EM-3083	October 1980	Drought / Water Shortage	All 21 counties including Burlington County

Source: FEMA 2018

Agriculture-related drought disasters are quite common. One-half to two-thirds of the counties in the U.S. have been designated as disaster areas in each of the past several years. The USDA Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county.

Between 2013 and 2017, Burlington County has been included in 4 USDA declarations that were a result of drought conditions (S3930 and S3932 in 2015 and S4071 and S4165 in 2016).

For this 2018 Plan update, known drought events, including FEMA and USDA disasters, that have impacted Burlington County between 2013 and 2018 are identified in Table 5.4.2-2. For events prior to 2013, refer to the 2013 Burlington County HMP. Please note that not all events that have occurred in the County are included due to the extent of documentation and the fact that not all sources may have been identified or researched. Loss and impact information could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP Update.

Table 5.4.2-2. Drought Events Impacting Burlington County, 2013 to 2017

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts
April – September 2015	Excessive Heat & Drought	N/A	N/A	Excessive Heat and Drought resulted in Crop Disaster (USDA Designation number S3930)
July – September 2015	Excessive Heat & Drought	N/A	N/A	Excessive Heat and Drought resulted in Crop Disaster (USDA Designation number S3932)
April – September 2016	Freeze, Excessive Heat, & Drought	N/A	N/A	Combined effects of freeze, excessive heat, and drought resulted in a Crop Disaster (USDA Designation number S4071)
May – December 2016	Drought	N/A	N/A	Drought resulted in Crop Disaster (USDA Designation number S4165)

Source(s): NOAA-NCEI, FEMA, Burlington County HMP

FEMA Federal Emergency Management Agency
HMP Hazard Mitigation Plan
N/A Not Applicable
NCEI National Centers for Environmental Information
NDMC National Drought Mitigation Center
NOAA National Oceanic and Atmospheric Administration
USDA U.S. Department of Agriculture

Probability of Future Occurrences

Based upon risk factors for and past occurrences, it is likely that droughts will occur across New Jersey and Burlington County in the future. According to the USGS Division of Water Resources, Burlington County and its jurisdictions fall within what is described as a "humid region" and is more likely to experience a short-term drought (Burlington County HMP, 2008, 2014). In addition, as temperatures increase (see climate change impacts), the probability for future droughts will likely increase as well. Therefore, it is likely that droughts will occur in New Jersey of varied severity in the future.

According to NOAA NCEI, FEMA, Northeast Regional Climate Center, and the Drought Impact Reporter, Burlington County experienced 45 drought events between 1950 and 2017. The table below shows these

statistics, as well as the annual average number of events and the percent chance of droughts occurring in Burlington County in future years.

Table 5.4.2-3. Probability of Future Occurrence of Drought Events

Hazard Type	Number of Occurrences Between 1950 and 2017	Rate of Occurrence or Annual Number of Events (average)	Recurrence Interval (in years) (# Years/Number of Events)	Probability of Event in any given year	% chance of occurrence in any given year
Drought	45	0.67	1.51	0.66	66.18

Source: FEMA 2018; NOAA-NCEI 2018; NRCC 2018

It is estimated that Burlington County will continue to experience direct and indirect impacts of drought and its impacts on occasion, with the secondary effects causing potential disruption or damage to agricultural activities and creating shortages in water supply within communities. The table below shows the probability of future drought events in the county.

In Section 5.3, the identified hazards of concern for Burlington County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Committee, the probability of occurrence for drought in the county is considered 'frequent' (likely to occur within 25 years, as presented in Table 5.3-3).

Climate Change Impacts

The climate of New Jersey is already changing and will continue to change over the course of this century. From 1900 to 2014 annual average temperatures in New Jersey have increased approximately 3°F (NOAA NCEI, 2017). In terms of winter temperatures, the northeast region has seen an increase in the average temperature of 4°F since 1970 (Northeast Climate Impacts Assessment [NECIA] 2007). By the 2020s, the average annual temperature in New Jersey is projected to increase by 1.5°F to 3°F above the statewide baseline (1971 to 2000), which was 52.7°F. By 2050, the temperature is projected to increase 3°F to 5°F, and by 2080 projections show an increase of 4°F to 7.5°F (Sustainable Jersey Climate Change Adaptation Task Force 2015). With an overall increase in temperature, drought conditions may become more frequent.

The future drought potential that New Jersey is modeled to experience indicates the state will experience more frequent but not necessarily more severe droughts. While all droughts impose some level of stress on water supplies, some will have long term effects. If the projected more frequent droughts are spaced out over time, then New Jersey's water supply systems should be capable of recovering between droughts. However, more frequent droughts raise the potential for sequential droughts that do not allow for recovery of reservoir levels or aquifer storage, resulting in a scenario where moderate droughts could have aggregate results that severely test our water supply capabilities (NJ Climate Adaptation Alliance, 2016).

As temperatures rise, people and animals will need more water to maintain their health and to thrive. Many economic activities, such as hydropower, raising livestock, and growing foods, will also require water. The amount of water available for these activities may be reduced as temperatures rise and if competition for water resources increases. As shown in the paragraph above, these trends will certainly affect the probability and frequency of dryer conditions that could lead to drought events in Burlington County.

5.4.2.2 VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate its assets that are exposed or vulnerable to the identified hazard. Regarding the drought hazard, all of Burlington County is exposed. Therefore, all assets within the County (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 4), are potentially vulnerable to a drought. Areas at particular risk are areas used for agricultural purposes (farms and cropland), open/forested land vulnerable to the wildfire hazard, densely-populated areas where communities rely on surface water supplies (above ground reservoirs) for industrial, commercial, and domestic purposes, and certain areas where elderly, impoverished or otherwise vulnerable populations are located. The following text evaluates and estimates the potential impact of the drought hazard on the County. Refer to Section 5.2 for additional details on the methodology used to assess drought risk.

Impact on Life, Health and Safety

The entire population of Burlington County is vulnerable to drought events (population of 450,236 people, according to U.S. Census 2016 population estimates) (U.S. Census Bureau 2016). Drought conditions can cause a shortage of water for human consumption and reduce local fire-fighting capabilities.

The impacts on public health from drought can be severe which includes increase in heat-related illnesses, waterborne illnesses, recreational risks, limited food availability, and reduced living conditions. Those individuals who rely on water, such as farmers, may experience financial-related stress. Decreased amounts and quality of water during drought events have the potential to reduce the availability of electricity (hydropower, coal-burning and nuclear) (North Carolina State University 2013). Vulnerable populations could be particularly susceptible to the drought hazard and cascading impacts due to age, health conditions, and limited ability to mobilize to shelter, cooling and medical resources.

Drought conditions can affect people's health and safety including health problems related to low water flows and poor water quality; and health problems related to dust. Droughts also have the potential to lead to loss of human life (NDMC 202). Other possible impacts to health due to drought include increased recreational risks; effects on air quality; diminished living conditions related to energy, air quality, and sanitation and hygiene; compromised food and nutrition; and increased incidence of illness and disease. Health implications of drought are numerous. Some drought-related health effects are short-term while others can be long-term (CDC 2012).

According the USGS Water Science School, groundwater levels are dependent on recharge from infiltration of precipitation, so when a drought hits the land surface, it can impact the water levels below ground. When rainfall is less than normal for several weeks, months, or years, the flow of streams and rivers declines, water levels in lakes and reservoirs fall, and the depth to water in wells increases. If dry weather persists and water-supply problems develop, the dry period can become a drought.

The water level in the aquifer that supplies a well does not always stay the same. Droughts, seasonal variations in rainfall, and pumping affect the height of the groundwater levels. If a well is pumped at a faster rate than the aquifer feeding it is recharged by precipitation or other underground flow, then water levels in the well can be lowered. This can happen during drought, due to the extreme deficit of rain. The water level in a well can also be lowered if other wells near it are withdrawing too much water (USGS 2019).

Drought affects groundwater sources, but generally not as quickly as surface water supplies. Groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams also. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced

groundwater levels mean that even less water will enter streams when steam flows are lowest. Burlington County water supplies are primarily sourced from groundwater, while the remaining supply is soured from surface water. The following table provides the drinking water suppliers for Burlington County.

Table 5.4.2-4. Drinking Water Suppliers in Burlington County

Name	Population Served	Source Type
Albert C Wagner Youth Co	2,500	Ground water
Allenwood Estates, Llc	135	Ground water
Aqua Nj - California Village	300	Ground water
Aqua Nj - Hanover Mobile Village	285	Ground water
Aqua Nj - Spartan Village	471	Ground water
Blueberry Estates	75	Ground water
Bordentown Water Departm	15,821	Ground water
Burlington City Water De	9,835	Surface water
Burlington County Instit	500	Ground water
Burlington Twp W Dept	22,594	Surface water purchased
Buttonwood Mobile Home Park	55	Ground water
Cedar Grove Apartments	96	Ground water
Estaugh Corp T/A Medford Leas	450	Ground water
Evesham Mua	45,538	Surface water purchased
Fawn Lake Village	300	Ground water
Fenimore Trailer Park	88	Ground water
Fenimore Woods Mhp	40	Ground water
Fieldsboro Water Department	650	Ground water purchased
Florence Twp W Dept	11,214	Ground water
Hanover East Apartments	96	Ground water
Hilltop Mobile Village	200	Ground water
Jbmdl-Dix Main System	12,765	Surface water
Maple Shade Water Department	19,400	Surface water purchased
Maplewood Apartments	55	Ground water
Mcguire Afb	12,227	Ground water
Medford Twp Dept Of Muni	17,272	Ground water
Millstream South Apts	128	Ground water
Mobile Estates Of Southa	700	Ground water
Moorestown Water Dept	20,700	Surface water purchased
Mt Laurel Twp Mua	41,743	Surface water purchased
New Lisbon Development Ctr	2,014	Ground water
Nj American Water - Homestead	2,420	Ground water
Nj American Water - Mount Holly	47,427	Surface water purchased
Nj American Water - Sunbury	888	Ground water
Nj American Water - Vincentown	598	Ground water
Nj American Water - Western	264,586	Surface water
Oakview Leisure Village	250	Ground water

Table 5.4.2-4. Drinking Water Suppliers in Burlington County

Name	Population Served	Source Type
Pemberton Borough Water	1,610	Ground water
Pemberton Township Water - Lake Valley	3,500	Ground water
Pemberton Twp Dept Main	12,378	Ground water
Pemberton Twp Water Dept - Pemberton Hei	650	Ground water purchased
Pinefield Apartments	120	Ground water
Pinelands Water Co	4,926	Ground water
Pineview Terrace Incorporated	300	Ground water
Richards Mobile Home Cou	100	Ground water
Souths Mobile Home Park	110	Ground water
Wagon Wheel Estates	84	Ground water
Willingboro Mua	35,000	Ground water
Wrightstown Mua	748	Ground water

Source: EPA 2018

As previously stated, drought conditions can cause shortages in water for human consumption. Droughts can also lead to reduced local firefighting capabilities. The drought hazard is a concern for Burlington County because the county's water is supplied by both surface water and groundwater. Surface water supplies are affected more quickly during droughts than groundwater sources.

Impact on General Building Stock

No structures are anticipated to be directly affected by a drought event. However, droughts contribute to conditions conducive to wildfires and reduce fire-fighting capabilities. Approximately 35% of the County's land is forested. Due to Burlington County's largely undeveloped nature, fuel is plentiful for wildfires, particularly in the Pine Barrens. In Burlington County, fuel tends to be most plentiful in areas where development densities are lowest; this works to reduce possible property damages and loss of life (Burlington County HMP 2014). Risk to life and property is greatest in high to extreme wildfire risk areas and those areas where forested areas adjoin urbanized areas (high density residential, commercial and industrial) also known as the wildfire urban interface (WUI). Therefore, all assets in and adjacent to WUI zones, including population, structures, critical facilities, lifelines, and businesses, are considered vulnerable to wildfire. Refer Section 5.4.8 for the Wildfire risk assessment for County assets located within the high to extreme wildfire risk areas.

Impact on Critical Facilities

Water supply facilities may be affected by short supplies of water. As mentioned, drought events generally do not impact buildings; however, droughts have the potential to impact agriculture-related facilities and critical facilities that are associated with potable water supplies. This is particularly important to Burlington County due to its high amount of acreage devoted to farmland. Also, those critical facilities in and adjacent to the WUI zone are considered vulnerable to wildfire.

Impact on the Economy

Drought can produce a range of impacts that span many sectors of an economy and can reach beyond an area experiencing physical drought. This exists because water is integral to our ability to produce goods and provide services. Direct impacts of drought include reduced crop yield, increased fire hazard, reduced water levels, and

damage to wildlife and fish habitat. The consequences of these impacts illustrate indirect impacts that include: reduction in crop, rangeland, and forest productivity that may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues due to reduced expenditures, increased crime, foreclosures, migration, and disaster relief programs. The many impacts of drought can be listed as economic, environmental, or social.

Economic impacts occur in agriculture and related sectors because of the reliance of these sectors on surface and subsurface water supplies. Environmental impacts are the result of damage to plant and animal species, wildlife habitat, and air and water quality, forest and grass fires, degradation of landscape quality, loss of biodiversity, and soil erosion. Social impacts involve public safety, health, conflicts between water users, reduced quality of life, and inequities in the distribution of impacts and disaster relief. A summary of potential impacts associated with drought are identified in Table 5.4.2-5. This table includes only some of the potential impacts of drought.

Table 5.4.2-5. Economic, Environmental, and Social Impacts of Drought

Economic	Environmental	Social
Loss of national economic growth, slowing down of economic development	Increased desertification - damage to animal species	Food shortages
Loss of national economic growth, slowing down of economic development	Reduction and degradation of fish and wildlife habitat	Loss of human life from food shortages, heat, suicides, violence
Damage to crop quality, less food production	Lack of feed and drinking water	Mental and physical stress
Increase in food prices	Disease	Water user conflicts
Increased importation of food (higher costs)	Increased vulnerability to predation	Political conflicts
Insect infestation	Loss of wildlife in some areas and too many in others	Social unrest
Plant disease	Increased stress to endangered species	Public dissatisfaction with government regarding drought response
Loss from dairy and livestock production	Damage to plant species, loss of biodiversity	Inequity in the distribution of drought relief
Unavailability of water and feed for livestock which leads to high livestock mortality rates	Increased number and severity of fires	Loss of cultural sites
Disruption of reproduction cycles (breeding delays or unfilled pregnancies)	Wind and water erosion of soils	Reduced quality of life which leads to changes in lifestyle
Increased predation	Loss of wetlands	Increased poverty
Increased fire hazard - range fires and wildland fires	Increased groundwater depletion	Population migrations
Damage to fish habitat, loss from fishery production	Water quality effects	
Income loss for farmers and others affected	Increased number and severity of fires	
Unemployment from production declines	Air quality effects	
Loss to recreational and tourism industry		
Loss of hydroelectric power		
Loss of navigability of rivers and canals		

A prolonged drought can have a serious economic impact on a community. Increased demand for water and electricity may result in shortages and a higher cost for these resources (FEMA 2005). Industries that rely on water for business may be impacted the hardest (e.g., landscaping businesses). Even though most businesses will still be operational, they may be impacted aesthetically. These aesthetic impacts are most significant to the

recreation and tourism industry. In addition, droughts in another area could impact the food supply/price of food for residents in the county.

When drought conditions persist with little to no relief, water restrictions may be put into place by local or state governments. The agricultural industry is most at risk in terms of economic impact and damage. In exceptional drought conditions, watering of lawns and crops may not be an option. If crops are not able to receive water, farmland will dry out and crops will die. This can lead to crop shortages, which, in turn, increases the price of food (FEMA 1997).

A drought directly or indirectly impacts all people in affected areas. A drought can result in farmers not being able to plant crops or the failure of already planted crops. This results in loss of work for farm workers and those in related food processing jobs. Based on the 2012 Census of Agriculture, there were 838 farms in Burlington County, with 95,899 acres of total land in farms. The average farm size was 114 acres. Burlington County farms had a total market value of products sold of $100.8 million; approximately $96.2 million in crop sales and $4.7 million in livestock sales, averaging $120,390 per farm. The Census indicated that 473 of farm operators reported farming as their primary occupation (USDA 2012). Table 5.4.2-6 shows the acreage of agricultural land exposed to the drought hazard.

Table 5.4.2-6. Agricultural Land in Burlington County in 2012

Number of Farms	Land in Farms (acres)	Total Cropland (acres)	Harvested Cropland (acres)	Irrigated Land (acres)
838	95,899	52,286	48,795	13,123

Source: USDA 2012

The 2012 Census of Agriculture for Burlington County indicated that the top crop items, by acres, in the county are soybeans for beans (19,288 acres); corn for grain (7,557 acres); vegetables for sale (5,071 acres); forage-land used for all hay and haylage, grass silage, and greenchop (4,663 acres); and wheat for grain (2,664 acres) (USDA 2012).

Impact on the Environment

A common effect of drought is fish and wildlife mortality. Burlington County is largely rural has diverse populations of fish and wildlife. Its wetlands, scrub pine and oak woodlands, and Atlantic white cedar forests shelter a wide variety of wildlife, while abundant creeks, estuaries and aquifers provide essential water resources. Nine different threatened and endangered species reside in Burlington County. The New Jersey Pinelands, which cover approximately 64 percent of the county's land area, is the largest pine barrens complex in the world. It supports globally rare communities and species and is an area of national significance, supporting: five federally listed threatened and endangered species, 17 federal candidate species and species of concern, and 54 state listed threatened and endangered species. Because so much of the land area in Burlington County is undeveloped, fish and wildlife habitats are high and therefore losses to fish and wildlife could likely be high (Burlington County HMP 2014).

Future Growth and Development

As discussed in Section 4, areas targeted for future growth and development have been identified across Burlington County. Future growth could impact the amount of potable water available due to a drain on the available water resources. Other areas that could be impacted include agriculture and recreational facilities such as golf courses, farms, and nurseries. Areas targeted for potential future growth and development in the next five years have been identified across the county at the municipal level. Refer to the jurisdictional annexes in Volume II of this HMP for a list of new developments in each municipality.

Effect of Climate Change on Vulnerability

Nearly every region in the country is facing some increased risk of seasonal drought. Climate change can significantly affect the sustainability of water supplies in the future. As parts of the United States get drier, the amount and quality of water available will likely decrease, impacting people's health and food supplies. Western United States have already been experiencing water shortages due to severe dry-spells. With climate change, the entire country will likely face some level of drought. A report by the Natural Resources Defense Council (NRDC) found that 1,100 counties (one-third of all counties in the contiguous 48 states) face higher risks of water shortages by mid-century as a result of climate change. More than 400 of these counties will face extremely high risks of water shortages.

An increased incidence of drought may impact availability of water supplies, primarily placing an increased stress on the population. It is unlikely that structure exposure and vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, may increase and threaten structures. If a wildfire were to occur during a drought, emergency services may face complications from a water shortage depending on their water source. Critical water-related service sectors may need to adjust management practices and actively manage resources. Increased incidence of drought may also increase the potential for impacts on the local economy including the production of agricultural products.

Change of Vulnerability Since 2014 HMP

When examining the change in the county's vulnerability to drought events from the 2014 HMP to this update, it is important to look at each entity that is exposed and vulnerable. The total population across the county has continued to increase over the past few years, which will place a greater stress on the water supply during a drought event. In terms of the agricultural industry for Burlington County, since the 2007 Census of Agriculture there has been an 9.1-percent decrease in the total number of farms, while an 11.1-percent increase in total farmland area; the average size of a farm has also increased by 11.8-percent (USDA 2012).