



Highland Township Community Climate Profile

Brandywine Conservancy, July 2021

Introduction

According to 2017's Climate Science Special Report, **“sixteen of the warmest years on record for the globe occurred in the last 17 years (1998 was the exception).”** The historic scientific evidence clearly shows a change in climate for the Greater Philadelphia Region with a shift to concentrated extreme heat waves as well as heavy rain and snow events. While many might not consider climate change a “municipal issue,” municipalities bear the burden of needing to manage the impacts of flooding from heavy rainfall, clearing heavy snowfall, and dealing with extreme heat. Broadly, the Greater Philadelphia Region will see an increase in sea level, warmer conditions, more intense precipitation events, and longer periods of drought. It is difficult to respond to these slow, incremental changes in climate, but municipalities that plan considering future climate conditions will be better prepared to safely serve their community.

This report includes a high-level overview of the ways that Highland Township is already experiencing the impacts of climate change but is not a fully exhaustive report. This report intends to inform the Comprehensive Plan Update process by providing data points of historical conditions and modeled future conditions. These climate conditions should be considered for future planning of municipal actions. The Delaware Valley Regional Planning Commission (DVRPC) prepared a guide for municipalities entitled “Municipal Management in a Changing Climate” which advises that to prepare for climate change, municipalities need to adjust in the following ways:

- “Prepare municipal facilities for a changing climate, including both buildings and recreation facilities
- Maintain and upgrade stormwater systems to handle more intense rainfall
- Modify delivery of municipal services (e.g., refuse collection times) appropriately
- Assure employee contracts are suitable for conditions
- Maintain and expand tree cover with species appropriate for a changing climate
- Assure cooling centers are available for residents
- Update regulations to account for climate change”

Introduction

While weather and climate can often be thought of interchangeably, differentiating between the two concepts is important to better understanding and preparing for climate change.

“**Weather** is the state of the atmosphere at any given time and place. Most of the weather that affects people, agriculture, and ecosystems takes place in the lower layer of the atmosphere. Familiar aspects of weather include temperature, precipitation, clouds, and wind that people experience throughout the course of a day. Severe weather conditions include hurricanes, tornadoes, blizzards, and droughts.

Climate is the long-term average of the weather in a given place. While the weather can change in minutes or hours, a change in climate is something that develops over longer periods of decades to centuries. Climate is defined not only by average temperature and precipitation but also by the type, frequency, duration, and intensity of weather events such as heat waves, cold spells, storms, floods, and droughts.

The concepts of climate and weather are often confused, so it may be helpful to think about the difference between weather and climate with an analogy: weather influences what clothes you wear on a given day, while the climate where you live influences the entire wardrobe you buy.”

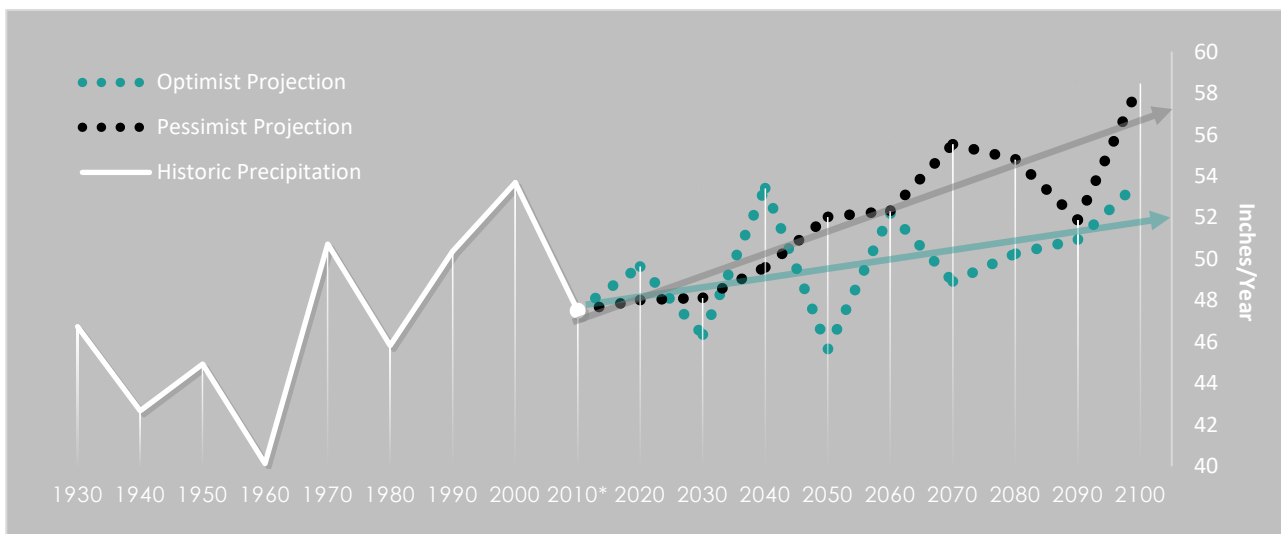
Source: EPA, <https://www.epa.gov/climate-indicators/weather-climate>



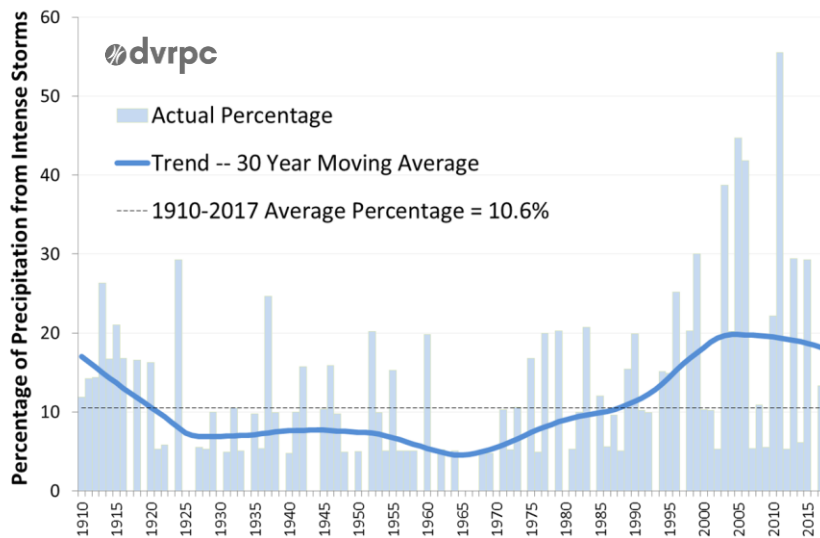
Precipitation

The following illustrates precipitation data, both measured and projected, for Highland Township. From 1970-1980, the Township experienced 51.2 inches per year (in/yr) of precipitation, on average. In an optimist scenario, projections show the Township experiencing 49.6 in/yr, on average, from 2010-2020 and 48 in/yr from 2090-2100. In a pessimist scenario, the Township experiences 53.8 in/yr, on average, from 2010-2020 and 58.5 in/yr from 2090-2100.

Average Precipitation



Intense Storms and Precipitation



Source: Source: DVRPC chart using data accessed 24 May 2018 from www.ncdc.noaa.gov/cag/.

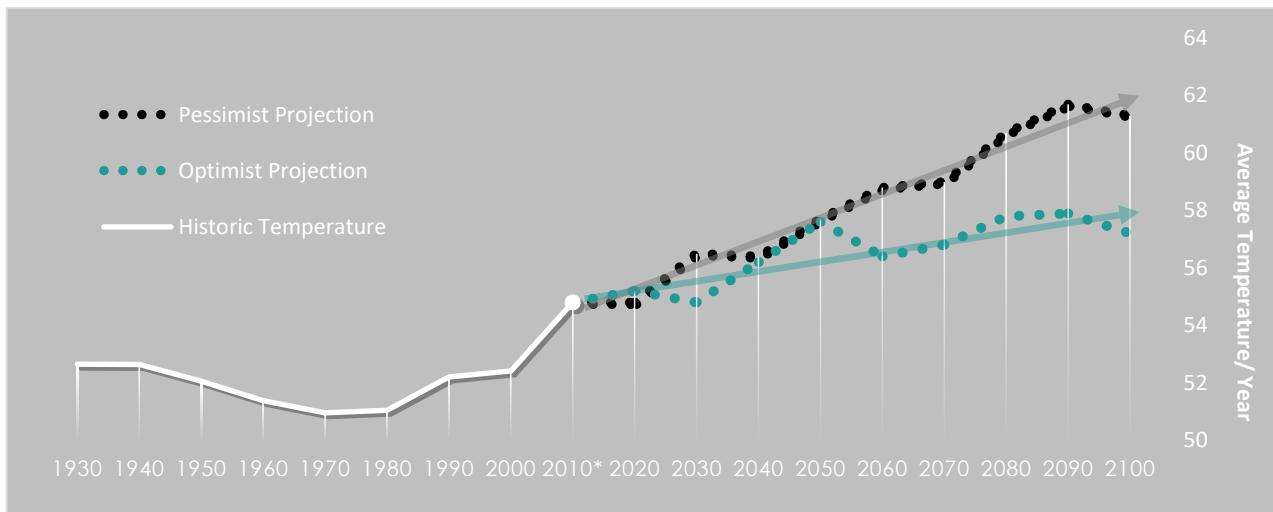
Data Sources: Historic precipitation from NOAA's national climate data center, Coatesville 1 SW & 2 W weather station. Projected precipitation data from National Center for Atmospheric Research (NCAR) Community Climate System Model (CCSM) projections compiled using the iTree tool developed by USDA Forest Service, Davey Tree Expert Co., National Arbor Day Foundation, Society of Municipal Arborists, International Society of Arboriculture and Casey Trees. Intense Storms and Precipitation graph from DVRPC.



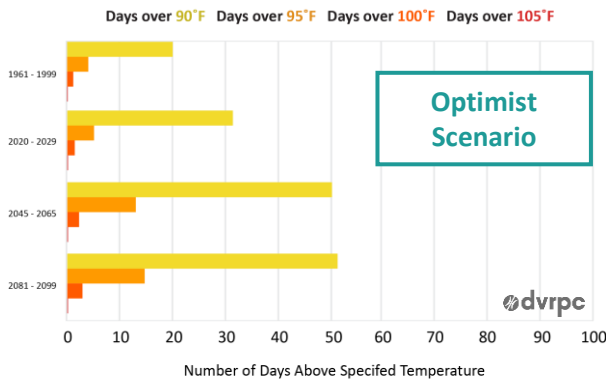
Temperature

The following illustrates temperature data, both measured and projected, for Highland Township. From 1970-1980, the Township experienced a temperature of 50.95°F on average, annually. In an optimist scenario, projections show the Township experiencing temperatures of 55.2°F on average, from 2010-2020 and 57.2°F from 2090-2100. In a pessimist scenario, the Township experiences temperatures of 55.2°F on average, from 2010-2020 and 61.3°F from 2090-2100.

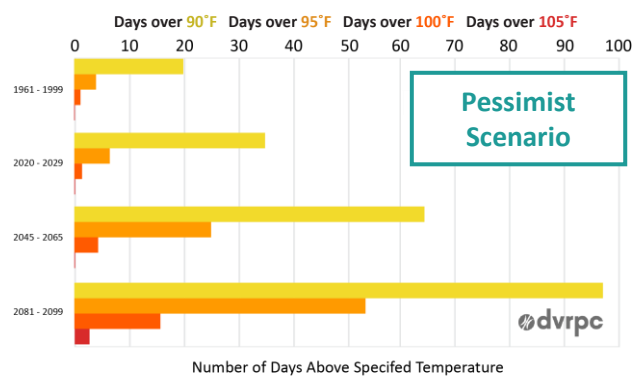
Average Temperature



Days Over Specified Temperatures



Source: DVRPC chart using data provided by ICF.



Source: DVRPC chart using data provided by ICF.

Data Sources: Historic temperature from NOAA's national climate data center, Coatesville 1 SW & 2 W weather station. Projected temperature data from National Center for Atmospheric Research (NCAR) Community Climate System Model (CCSM) projections compiled using the iTree tool developed by USDA Forest Service, Davey Tree Expert Co., National Arbor Day Foundation, Society of Municipal Arborists, International Society of Arboriculture and Casey Trees. Days over specified temperatures graphs from DVRPC.

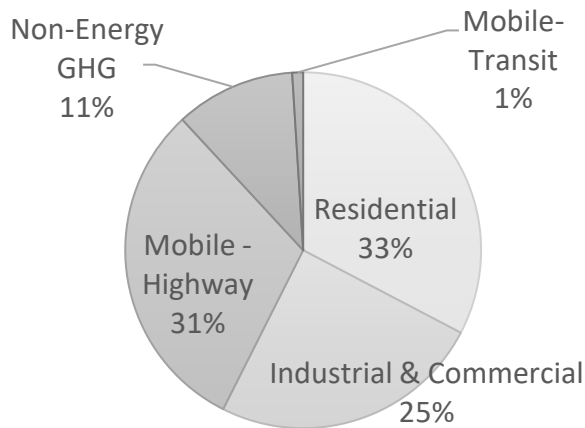


Emissions

The following information illustrates greenhouse gas emissions (GHG) within Highland Township, according to the 2015 Energy and Emissions Profile for Highland Township, developed by the Delaware Valley Regional Planning Commission (DVRPC). Overall emissions are illustrated as well as emissions within the Township attributed to different sectors.

Township Greenhouse Gas Emissions

Overall



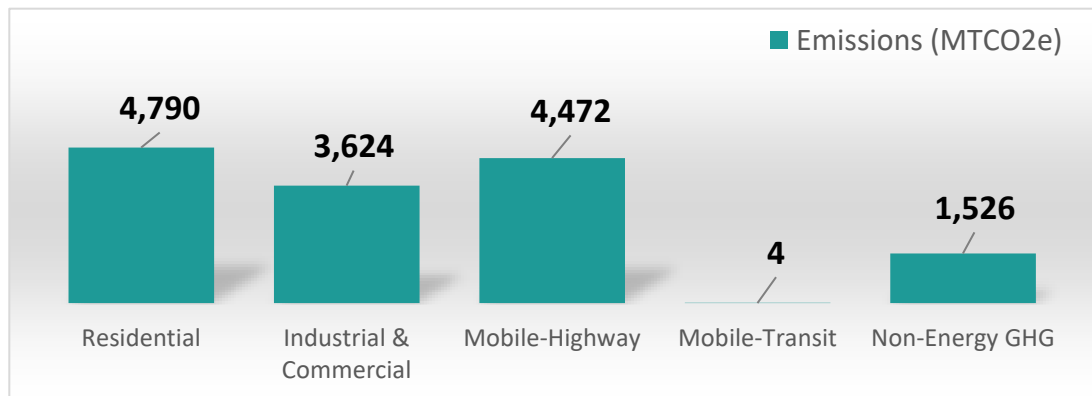
Total Township Emissions

14,416 MTCO₂e

% of County Emissions

0.2%

By Sector



Carbon Sequestration



Absorbing and storing atmospheric carbon dioxide is called “carbon sequestration.” According to the University of California, Davis, “Biological carbon sequestration is the storage of carbon dioxide in vegetation such as grasslands or forests, as well as in soils and oceans.”



Air Quality

Climate change can impact air quality and air quality can also impact climate change. Pollutants such as cars and trucks (mobile sources) and power plants and factories (non-mobile sources) impact air quality. According to the CDC, higher temperatures may increase allergens and air pollutants. Higher temperatures will also increase ground level ozone. Air quality metrics are complicated and interrelated; the infographics below seek to give a summary of the interrelationships.

Air Quality Impacts Related to Increased Temperatures



Particulate Matter

Airborne particles such as **smoke, dust, dirt, soot, and salt**. The sources of these particles are numerous-including vehicles, factories, fires, and any other natural or human activity resulting in the addition of particulates into the air.

Ground Level Ozone

Ground level ozone is not directly emitted into the air, but forms when **nitrogen oxides (NOx)** emissions react with other **volatile organic compounds (VOCs)** in the presence of heat and sunlight.

Air Pollution



Emissions from industrial facilities and electric utilities, motor vehicle exhaust, and chemical solvents are some of the major sources of NOx and VOCs.



weather.gov/airquality

Health Impacts + Air Quality



Increased Allergen Levels

More

- Cases of allergies
- Asthma episodes

Increased Ground-Level Ozone

More

- Respiratory illnesses
- Premature deaths

Data Sources

Data sources used in this profile include the following:

1. Wuebbles, D.J., et al., 2017: Executive summary. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I (“CSSR”) [Wuebbles, D.J., et al.(eds.)]. U.S. Global Change Research Program, Washington, DC, USA, p. 13, doi:10.7930/J0DJ5CTG.
2. Delaware Valley Regional Planning Commission’s (DVRPC) “Municipal Management in a Changing Climate” Municipal Implementation Tool #31
<https://www.dvrpc.org/Reports/MIT031.pdf>
3. US EPA’s Climate Indicators Page <https://www.epa.gov/climate-indicators/weather-climate>
4. University of California, Davis <https://climatechange.ucdavis.edu/science/carbon-sequestration/biological/>
5. Pennsylvania Climate Impacts Assessment, 2021
<https://www.dep.pa.gov/Citizens/climate/Pages/impacts.aspx>
6. i-Tree Landscape v4.3.1 (n.d.). Retrieved May, 2021
from <https://landscape.itreetools.org/>
7. National Centers for Environmental Information: National Oceanic and Atmospheric Administration retrieved from <https://www.ncdc.noaa.gov/cdo-web/search>
8. DVRPC Energy and Emissions Profile for Highland Township, Chester County, PA
<https://www.dvrpc.org/webmaps/MunicipalEnergy/mcdDetail.aspx?mcdcode=4202934448>
9. Climate Nexus <https://climatenexus.org/climate-change-issues/>
10. Center for Disease Control (CDC) Climate and Health fact sheet:
https://www.cdc.gov/climateandhealth/pubs/AIR-QUALITY-Final_508.pdf
11. US EPA’s Ozone Pollution Page <https://www.epa.gov/ozone-pollution-and-your-patients-health/course-outline-and-key-points-ozone#health%20effects>
12. PA DEP’s Air Quality Partnerships Page
<https://www.ahs.dep.pa.gov/AQPartnersHTML/health.htm>