



**ANN ARBOR**  
Charter Township  
First Climate Report

October 21, 2024

# ACKNOWLEDGEMENTS

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- Rena Basch – Clerk
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# INTRODUCTION AND OVERVIEW

The Ann Arbor Charter Township Climate Report represents the next phase in the Township's long history of leadership in protecting its natural resources and environment. The Township developed a Master Plan that recognizes the value of natural resources, such as woodlands, wetlands, and waterbodies (including the Huron River and the major tributaries of Traver and Fleming Creeks and Swift Run Drain) and includes goals and strategies to preserve these features. Along with the Master Plan, the Township implemented ordinances designed to protect and preserve the environment including Wetland Protection, Natural Features Setbacks, Stormwater Management, Tree and Woodland Resource Preservation, Open Space Preservation, and Agricultural Preservation.

Today, climate change is our most challenging environmental issue as our community experiences its effects through more intense rain events, increased frequency of high temperatures, changes in the frost date, and measurable changes in plant and wildlife communities. In 2019, the Washtenaw County Board of Commissioners adopted a climate emergency resolution and approved the development of a climate action plan to achieve the goals presented in the resolution.<sup>1</sup> As a result, Washtenaw County adopted Resilient Washtenaw, the first county-wide climate action plan in Michigan that sets aggressive and ambitious goals to reduce carbon emissions from County operations to zero by 2030 and county-wide emissions to zero by 2035.<sup>2</sup> Resilient Washtenaw charts a course for all of the county's municipalities to reduce and eliminate carbon emissions.

Following the actions of the county, in June of 2021, the Ann Arbor Charter Township Board of Trustees adopted a Resolution Declaring Ann Arbor Charter Township Policy to Mitigate Climate Change.<sup>3</sup> This policy resolves that:

- Ann Arbor Charter Township acknowledges that climate change imminently threatens our Township, region, state, nation, civilization, humanity and the natural world;
- Ann Arbor Charter Township commits to an urgent effort, which, with appropriate financial, technical, and regulatory assistance from State and Federal authorities, seeks to end Township-wide greenhouse gas emissions as quickly as possible;
- Ann Arbor Charter Township will evaluate Township buildings, vehicles, utilities, and other municipal operations to plan for the most cost effective and rapid conversion of those operations to be carbon neutral;
- Ann Arbor Charter Township commits to accelerating strategies to adapt to intensifying climate impacts and improve the Township's resilience to climate change;
- Ann Arbor Charter Township commits to educating our residents about the need for urgent climate change actions and mobilizing in concert with regional, state, and national entities to provide maximum protection for our residents and natural environment; and
- The Ann Arbor Charter Township Climate Resilience Committee is charged with developing plans and priorities for these above urgent actions and making recommendations to the Township Board of Trustees.

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<sup>1</sup> "Resolution Endorsing The Declaration Of A Climate Emergency And Requesting Regional Collaboration On An Immediate Just Transition And Emergency Mobilization Effort To Restore A Safe Climate Washtenaw County Board Of Commissioners" Adopted September 18, 2019. Full text available at:

<https://www.washtenaw.org/AgendaCenter/ViewFile/Item/5343?fileID=7844>

<sup>2</sup> For more information on Resilient Washtenaw, please visit

<https://www.washtenaw.org/DocumentCenter/View/29331/Resilient-Washtenaw---Final>.

<sup>3</sup> Ann Arbor Charter Township BofT Minutes 06-21-2021 Item H. available at <https://annarbortwpmi.documents-on-demand.com/Document/a04de9f7-38ea-eb11-a345-000c29a59557/boa-min-06212021.pdf>

This document, which was prepared by the Climate Resilience Committee, is the first step toward guiding and integrating Township operations, services, planning, policies, ordinances, and investments to ensure the most sustainable, inclusive, greenhouse gas (GHG) emission reduction options are implemented. This document includes the following:

- A 2019 community profile to ground truth and normalize emissions by relative activity levels.<sup>4</sup>
- Climate information of the Township: history, current conditions, evolving trends.
- A 2019 base year GHG inventory of Township operations and community wide activities for the following emission sectors:
  - Township Operations: Facilities
  - Township Operations: Vehicle Fleet
  - Community-Wide: Buildings
  - Community-Wide: Transportation
  - Community-Wide: Materials and Waste Management
- Proposed metrics to evaluate progress.
- Appendices
  - Summary of Resilient Washtenaw Priority Climate Actions
  - Net Zero Analysis
  - Community Engagement Summary

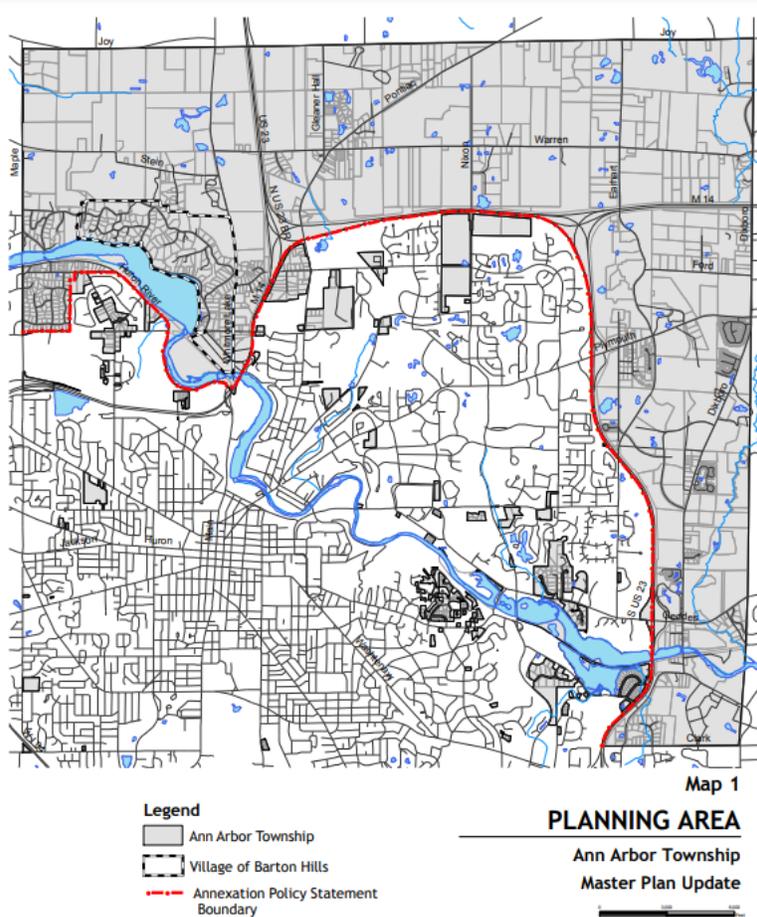
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<sup>4</sup>Note, the base year for data was set to 2019, as the global Covid-19 pandemic caused 2020 and 2021 to be outliers in terms of emissions and not representative of future trends. This is consistent with the base year emissions inventory conducted for Resilient Washtenaw.

# COMMUNITY PROFILE

The character of the Township is an important context when exploring the community’s GHG footprint and contextualizing it amongst neighboring jurisdictions and communities of similar size and characteristics. The data below is adapted from the American Community Survey (ACS), a U.S. Census Bureau data product, accessed via Census Reporter<sup>5</sup> and the Census Data Explorer.<sup>6</sup> The ACS is an annual demographics survey program conducted by the U.S. Census Bureau. Conveniently, Ann Arbor Charter Township is somewhat unique in that it is represented by a single Census Tract (4060).

Figure 1: Township Planning Area



Ann Arbor Charter Township is located north and east of the City of Ann Arbor - covering an area of 16.88 square miles.<sup>7</sup>

The Township is divided into a more urbanized section with water and sewer service in the southeast corner defined by Clark Road on the south, N. Dixboro Road on the east, US-23 on the west, and M-14 to the north. The remainder of the Township is largely rural with significant acreage protected as agricultural land or natural areas. There are several isolated sections contained inside the City of Ann Arbor limits. These “Township Islands” are gradually being annexed by the City of Ann Arbor.

<sup>5</sup> For more information on Census Reporter, please visit <https://censusreporter.org/>.

<sup>6</sup> For more information on the Census Data Explore, please visit <https://data.census.gov/>.

<sup>7</sup> Land area value taken from: <https://aatwp.org/#:~:text=Geography-,Geography,borders%20of%20Ann%20Arbor%20Township.>

## Population, Household, and Housing Characteristics

According to the 2019: ACS 5-Year Estimates Data Profile, the Township had a population of 4,544 residents with a population density of 269.2 people per sq. mile. The median age of Township residents was 47.9 years. The Township population is approximately 1.2% of the total population of Washtenaw County and is the smallest municipality by population in the eastern half of the County. The Township is considerably less dense than neighboring Pittsfield Township (1,443 people/sq. mile), Scio Township (554 people/sq. mile), Superior Township (424 people/sq. mile); and the City of Ann Arbor (4,310 people/sq. mile) but is consistent with its northern neighbor Northfield Township (242 people/sq. mile), which is more similarly a rural community.

In 2019, the Township was home to 1,894 households (2.34 persons/household).<sup>8</sup> 70.1% of households live in single unit structures while 29.4% are in multi-unit buildings and 0.5% are in mobile homes or other types of housing units. 67.4% of households are in owner-occupied housing units with the remaining 32.6% rent.<sup>9</sup> Within the Township, the median value of owner-occupied housing units is \$496,000 - nearly double that in the rest of Washtenaw County. Similarly, the median household income in the Township was \$135,128 - more than 1.5x the amount in Washtenaw County. 5.3% of households in the Township are below the poverty line, however, this is below the county average of over 13%.<sup>10</sup>

In summary, in contrast to other parts of the county and elsewhere in Michigan, the Township is a relatively affluent community. Ann Arbor Charter Township has a significantly higher income and a lower poverty rate. These characteristics are important because funding from many state and federal climate action grants tend to be directed to low income and disadvantaged communities (LIDCs). Conversely, given the relatively more affluent households, residents may be more resilient to climate related impacts at the household level and may be more able and willing to adopt low and zero-emissions and energy efficient technologies.

## Transportation Infrastructure and Travel

The functional classification of a road is the class or group of roads to which the road belongs. To an extent, the functional classification helps to define the use and travel characteristics of a roadway. There are three main functional classes: arterial, collector, and local. The Township is flanked by major arterial roads like M-14, US-23, and Plymouth Road that serve tens of thousands of commuters and commercial vehicles from around the region daily. Other regionally significant collector roads include Whitmore Lake Road, Pontiac Trail, Nixon Road, and Dixboro Road. The Township is also home to many miles of unimproved gravel roads. Most roads in the Township are managed primarily by the Washtenaw County Road Commission with the exception of the major arterials that are managed by the Michigan Department of Transportation (MDOT). Table 5, below, provides the centerline length by road functional class.

Table 1: Township Roadway Centerline Length by Road Type

Functional Class	Length (mi)
Freeway (and Ramps)	35.37
Arterial	6.15
Collector or Local Roads	80.85

<sup>8</sup> 2019: ACS 5-Year Estimates Subject Tables, Table S1101 "Households and Families"

<sup>9</sup> Ibid

<sup>10</sup> 2019: ACS 5-Year Estimates Subject Tables, Table S1903 "Median Income in the past 12 months (in 2019 Inflation-Adjusted Dollars)"

The Southeast Michigan Council of Governments (SEMCOG), the regional planning agency in the seven-county region of Southeast Michigan, estimates that 766,411 vehicle miles are traveled daily within the Township.<sup>11</sup> The vast majority of these vehicle miles are pass-through freeway traffic on US-23 and M-14. The next highest vehicle miles within Ann Arbor Township are on Plymouth Road. As a primarily rural, low-density community, Ann Arbor Charter Township residents are primarily car-dependent as demonstrated by Table 2 below.

Table 2: Means of Transportation to Work of Workers 16 years and over (ACS 2019 5-year, table S0801)<sup>12</sup>

Transport Mode	Percent
Car, truck, or van - drove alone	77.70%
Car, truck, or van - carpooled	10.50%
Public transportation (excluding taxicab)	1.10%
Bicycle	1.40%
Walked	0.9%
Taxicab, motorcycle, or other means	0.30%
Worked from home <sup>13</sup>	8.2%

Another concurrent measure to “means of transportation to work” is “travel time to work.” The table below captures the commute time distribution of residents. The mean travel time to work of residents in the Township is 26 minutes, however nearly 40% of Township residents have greater than a 30 minute commute to their place of work.

Table 3: Travel Time to Work (ACS 2019 5-year, table S0801)

Trip Duration	Percent
Less than 5 minutes	1.89%
5 to 9 minutes	4.48%
10 to 14 minutes	17.60%
15 to 19 minutes	19.31%
20 to 24 minutes	13.44%
25 to 29 minutes	4.06%
30 to 34 minutes	13.30%
35 to 39 minutes	2.49%
40 to 44 minutes	7.16%
45 to 59 minutes	10.12%
60 to 89 minutes	4.67%
90 or more minutes	1.48%

Another important note regarding transportation infrastructure and travel behavior is the activity of commuters traveling to places of work within the Township. The Township is home to a number of large employers including:<sup>14</sup>

- Toyota Motor North America, Research and Development (TMNA R&D) - 1,200 – 1,299 employees (across 2 campuses)
- Domino’s Farms - 1,200 – 1,299
- University of Michigan East Medical Campus
- KLA Corporation - 600 – 699
- Washtenaw Community College - 500 – 599 employees

<sup>11</sup> Southeast Michigan Council of Governments “Traffic Volume” map, available at <https://maps.semco.org/TrafficVolume/>

<sup>12</sup> 2019: ACS 5-Year Estimates Subject Tables S0801 “Commuting Characteristics by Sex”

<sup>13</sup> Note, as reported by the ACS, in 2019, 8.2% of workers worked from home. This number more than doubled to 18.9% in 2021.

<sup>14</sup> <https://annarborusa.org/spark-services/business-expansion/regional-demographics/top-regional-employers/>

Many of these employees do not live within the Township and therefore contribute to the transportation demand of the roadway network and resultant transportation sector GHG emissions. Often, this work-related population increase is referred to as the commuter-adjusted population, or daytime population, and is the number of people who are assumed to be present in an area during normal business hours, including workers. This is in contrast to the resident population, or people who reside in a given area and are assumed to be present during the evening and nighttime hours. Using data from the 2019 American Community Survey, we can estimate the commuter-adjusted population using the following formula:<sup>15</sup>

$$\text{Commuter-adjusted population} = \text{Total resident population} + \text{Total workers working in area} - \text{Total workers living in area.}$$

where, in 2019,

$$\text{Total resident population (var. B01003)} = 4,544$$

$$\text{Total workers working in area (var. B08604)} = 8,282$$

$$\text{Total workers living in area (var. B08301)} = 2,358$$

$$\begin{aligned} \text{Commuter-adjusted population} &= 4,544 + 8,282 - 2,358 \\ &= 10,468 \end{aligned}$$

This means that in 2019, 5,924 commuters traveled to places of employment within the Township daily. While this is not an absolute estimate, it does provide a basis of determining non-resident commuter travel within the Township as examined in the Community-Wide Transportation emissions discussion later in this document. For contrast, using the same formula, the 2019 county-wide commuter-adjusted population for Washtenaw County is 291,150. In other words, the Township commuter-adjusted population is approximately 3.6% of the county commuter-adjusted population.

### Transportation Alternatives

The “Travel Time to Work” table, above, underscores the car-dependence of residents of the Township. 88.2% of work-related trips are taken by automobile. While commutes account for less than 20% of all trips taken, commute trips have a unique role when considering the balance of overall trips by determining peak travel demand across transportation systems.<sup>16</sup> Another reinforcing measure is Walk Score. Walk Score rates the 48105 ZIP code as walk score of 2, or car-dependent with almost all errands requiring a car, and a bike score of 33, or somewhat bikeable.<sup>17</sup> Walk Score measures the walkability of an address by analyzing hundreds of walking routes to nearby amenities. Points are awarded based on the distance to amenities in each category. Bike Score is calculated by measuring bike infrastructure (lanes, trails, etc.), hills, destinations and road connectivity, and the number of bike commuters. Furthermore, the Township has very limited access to fixed-route transit, regionally provided by the Ann Arbor Area Transportation Authority (AAATA or The Ride), with most residents either not directly served or service is accessible but requires a 10–30-minute walk which, in many cases, requires crossing highway overpasses or along routes without existing pedestrian facilities.<sup>18</sup>

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<sup>15</sup> U.S. Bureau (2023) *Calculating commuter-adjusted population estimates*, Census.gov. Available at: <https://www.census.gov/topics/employment/commuting/guidance/calculations.html>.

<sup>16</sup> Federal Highway Administration. Summary of Travel Trends: 2009 National Household Travel Survey. FHWA-PL-11-022. <http://nhts.ornl.gov/2009/pub/stt.pdf>

<sup>17</sup> Data provided by Walk Score for zip code 48105, available at <https://www.walkscore.com/score/48105>.

<sup>18</sup> Southeast Michigan Council of Governments “Access to Core Services in Southeast Michigan”. January 2016. Available at: <https://www.semco.org/desktopmodules/SEMCOG.Publications/GetFile.ashx?filename=AccessToCoreServicesInSoutheastMichiganJanuary2016.pdf>.

It is important to note, the Township has limited jurisdiction over local transportation infrastructure and service provision. Locally, the Washtenaw Area Transportation Study (WATS) is responsible for transportation planning in Washtenaw County, including in the Township, which would include the planning and funding of non-motorized facilities and broader active transportation network including bike lanes, sidewalks, and multi-use trails. Expansion of transit service by the AAATA within the Township would likely require a millage vote by Township residents but may remain limited due to the substantial car-centric development patterns within the Township that are not transit-supportive (e.g. low density, lower quality pedestrian environment) nor cost effective.

### Land Use

Land use in the Township is varied but is still largely rural. 42% of the land area is still used for agricultural production or rural residential use with additional significant land areas that remain vacant or preserved lands. The table below provides the breakdown of land use within the Township. For the current Township Master Plan and Parks and Recreation Master Plans and maps of land use within the Township, please visit the Ann Arbor Charter Township Planning and Development page at <https://aatwp.org/business/planning-and-development/>.

*Table 4: Land Area of Parcels Categorized by Type of Use<sup>19</sup>*

<b>Parcel Land Use</b>	<b>Acres</b>	<b>Percent</b>
Single-Family Residential	936.5	9.0%
Attached Condo Housing	8.1	0.1%
Multi-Family Housing	71.6	0.7%
Mobile Home	0	0.0%
Agricultural/Rural Residential	4,415.60	42.4%
Mixed Use	0	0.0%
Retail	157.6	1.5%
Office	148.3	1.4%
Hospitality	0	0.0%
Medical	76.9	0.7%
Institutional	353.5	3.4%
Industrial	170.6	1.6%
Recreational/Open Space	913.1	8.8%
Cemetery	65.2	0.6%
Golf Course	268.6	2.6%
Parking	0	0.0%
Extractive	0	0.0%
Transportation/Comm/Utilities	177.4	1.7%
Vacant	1,394.50	13.4%
Water	225.4	2.2%
Not Parceled	1,040	10.0%
<b>Total</b>	<b>10422.9</b>	<b>100%</b>

<sup>19</sup> Southeast Michigan Council of Governments “Community Profile - Environment and Land Use” for Ann Arbor Township available at <https://www.semkog.org/data-and-maps/community-profiles/communities=4010#Land>.

# IMPACTS OF A CHANGING CLIMATE

## A Changing Climate

Since the mid-20th Century, the climate in Southeast Michigan has changed in many ways, including:

- Total annual precipitation in Southeast Michigan has increased by 20% when compared to the same period 1951-1980.
- Precipitation has increased 48% in Ann Arbor compared to a 20% increase across Southeast Michigan.
- Winter total precipitation has increased 65% in Ann Arbor.
- Number of days with greater than one inch of precipitation has increased by 2.3 days/year.

Downscaled climate modeling predicts increased precipitation, more extreme storms, and more extreme temperatures (both high heat and intense cold events).<sup>20</sup> A summary of the climate impacts in the Great Lakes Region is included below.

*Table 5: Summary of Climate Risks and Predicted Impacts*

<b>Risk</b>	<b>Prediction</b>
Convective Weather (Severe Winds, Lightning, Tornadoes, Hail)	Warmer temperatures and additional moisture increase the potential for severe weather (e.g., tornadoes and hail) and allow for a longer severe weather season.
Severe Winter Weather (Ice/Sleet Storms, Snow Storms)	Warmer, shorter winters will reduce winter-related impacts, though lake-effect snow will continue increasing in the near future. Due to natural variability, cold air outbreaks are still possible and can lead to ice, sleet, freezing rain, and wet snow.
Extreme Heat	The number of extremely hot days (over 95°F and 100°F) will likely increase. Overnight lows have warmed faster than daytime highs, which may lessen opportunities for relief during heat waves. Increased heat waves and humid conditions elevate the risk of heat-related deaths and illnesses.
Extreme Cold	The number of extremely cold days (i.e., days below 10°F) have decreased in the region and are projected to decrease even more in the future. However, cold air outbreaks are still possible due to natural variability.
Dam Failures	Stronger and more extreme precipitation events coupled with aging dam infrastructure will increase the probability of dam failure.
Flood Hazards	Stronger and more extreme precipitation events will be more likely to overwhelm stormwater infrastructure.
Drought	Summer drought and the number of consecutive dry days will likely increase, interspersed with periods of increased rainfall.
Wildfires	Increased summer drought and the number of consecutive dry days will increase the risk of wildfires, particularly in the northern portions of the region.
Infestation	Shorter, warmer winters and longer growing seasons will create more suitable conditions for the spread of invasive species and pests (e.g., ticks, mosquitoes) and associated vector-borne illnesses.

Climate change impacts are often described in terms of risk and vulnerability. Risks are the likelihood of changes in climatic conditions and resulting consequences. Vulnerability is an assessment of the exposure, sensitivity and adaptive capacity of systems, assets and populations. As noted above, increased precipitation, more intense storms, and extreme temperatures may have impacts on residents and infrastructure.

<sup>20</sup> GLISA - Climate Hazards and Impacts in the Great Lakes – October 2023 available at: [https://glisa.umich.edu/wp-content/uploads/2023/10/Climate-Hazards-Great\\_Lakes\\_GLISA\\_October\\_2023.pdf](https://glisa.umich.edu/wp-content/uploads/2023/10/Climate-Hazards-Great_Lakes_GLISA_October_2023.pdf)

## Community Vulnerability

The ability to prepare for, recover from, and adapt to these impacts is referred to as “climate resilience.” Many households in Ann Arbor Charter Township are likely to be more resilient to climate impacts due to high household income (e.g. having or installing air conditioning, having better insulated homes or the ability to improve insulation, having or the being able to purchase back-up power systems to contend with power outages, financial and physical ability to deal with flooding or storm damage situations, etc.). However, even within relatively affluent communities, there are financially vulnerable individuals, and it is important to recognize these conditions for some residents. Unfortunately, the data do not allow for more specific location and identification of vulnerable households – households vulnerable due to health conditions, age, or economics. One potential follow-up item to the development of this report is a community vulnerability assessment to identify areas and community members most vulnerable based on their exposure to projected climate impacts and their sensitivity or adaptability to handle those changes.

## Infrastructure Vulnerability

Infrastructure such as public roads, water and sewer systems, and other public utilities, are also vulnerable to the impacts of climate change. The following sections explore how climate change may impact infrastructure within the Township.

### Roads

Roads will be impacted in several ways. First, increased winter rain followed by freeze/thaw cycles will result in a shorter lifespan for all Township roads, both paved and gravel, and will require more regular maintenance during the road’s functional lifespan. Second, more intense rainfall may undermine sections of roadway and wash out culverts and gravel roads. During periods of intense rainfall, many gravel roads and sections of gravel roads will wash out due to the volume and speed of the stormwater runoff. These same roads will experience “washboarding” or rutting, and more and larger potholes resulting from stormwater flow that is exacerbated by use during these weather events. While the Township’s Road Committee is tracking the location and frequency of road maintenance and major replacement projects, it can be expected that the Township will need to work with the Washtenaw County Road Commission to address the increased frequency and cost of maintenance over time.

Extreme heat also adversely impacts asphalt roads. With more days expected over 90 degrees, this heat may buckle roads, melt sealant, and create failures at the edge of pavements. There currently is no tracking of heat-related repair or maintenance by the Washtenaw County Road Commission.

### Electrical Distribution

Electricity is fundamental to many aspects of today’s life and the disruption of electrical service impacts social, economic and transportation sectors. The electrical distribution system, particularly above ground lines, are increasingly vulnerable to changing climatic patterns in storm systems, precipitation and intensity of wind. Higher, sustained wind patterns damage trees and vegetation which may take down electrical lines, leaving residents without power. Snow and ice can also weaken the electrical lines and cause power failure to local and sometimes regional residents. Although most power outages may be related to weather changes, power outages can also occur because of equipment failure. The community wide electrical distribution system has become increasingly vulnerable to storm damage due to more intense storms and weather events, the aging distribution equipment and lack of adequate maintenance.

A community response is needed for addressing both short-term and long-term power outages. Extreme temperatures may require additional warming and cooling centers for vulnerable populations. Disruptions can also affect essential medical equipment and water wells. Residents may experience food spoilage and flooding in their homes from frozen pipes. Individuals who depend on using electronic devices for work or school may be unable to complete their work. The County should explore creating

resilience hubs to provide heating and cooling centers and serve as information and food/water distribution centers.

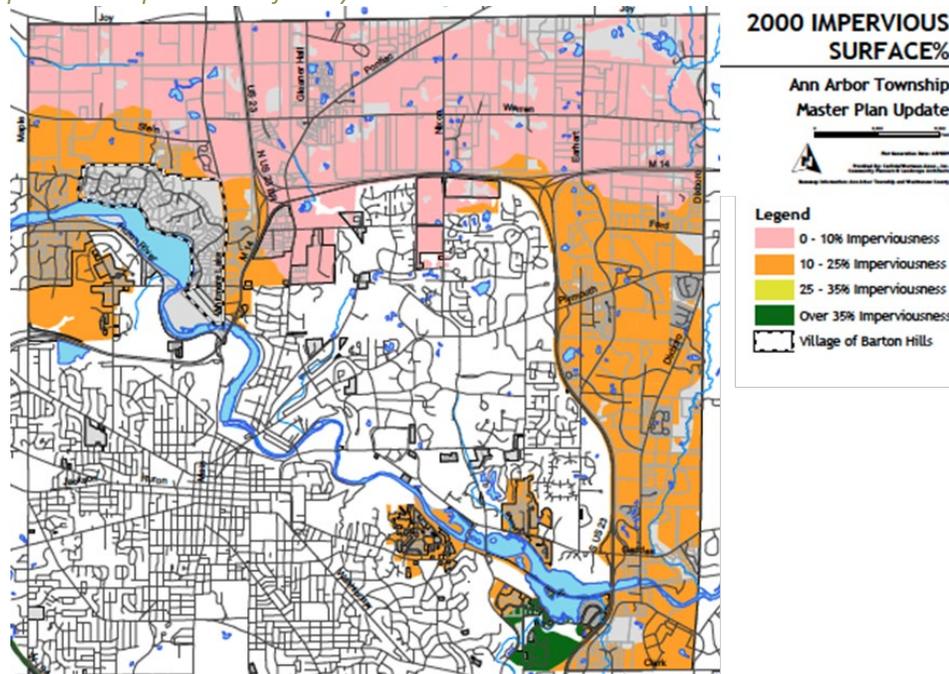
The Township should work with DTE, the owner of the electrical distribution system, to track and build a database of electrical outages to better monitor the reliability of the DTE grid within the Township and Township islands. This can be measured by creating and maintaining a database and map with this information. The electrical distribution system can be more resilient by regular maintenance and continued investment in upgrades to the system.

### Water, Sewer, and Stormwater

The bulk of the Township is on well water and septic systems. The Township has one area with a joint use agreement to service water and sewer and one area with water and sewer service. Climate change impacts both water and sanitary sewer infrastructure. Typically, water mains and lines are subject to more stress due to extreme freeze and thaw cycles. Sanitary lines are often impacted when major precipitation events overwhelm the Ann Arbor Wastewater Treatment Plant and cause untreated sewage to be discharged into the Huron River.

The Township has a very low area of impervious surface at just 9.2%. However, different watersheds within the Township have higher levels of impervious surface than others. Once a watershed exceeds 10% impervious surface, it begins to lose habitat and experience reductions in water quality. The considerable amount of open space, forested land, and agricultural land is an adaptive asset for the Township particularly for stormwater management and reducing current and future vulnerability to flooding.

Figure 2: Township Percent Impervious Surface by Watershed



The stormwater system is most vulnerable to increased precipitation. The great concern is the combination of stormwater volume and the velocity of runoff. Higher precipitation totals in more intense storm events leads to increased runoff velocity. High volumes of stormwater runoff traveling at high speeds undermines roads, washes out creek and riverbanks, increases siltation in water bodies, overwhelms stormwater systems, and creates flash flooding hazards. Similarly, high runoff rates do not allow water to infiltrate into groundwater reserves.

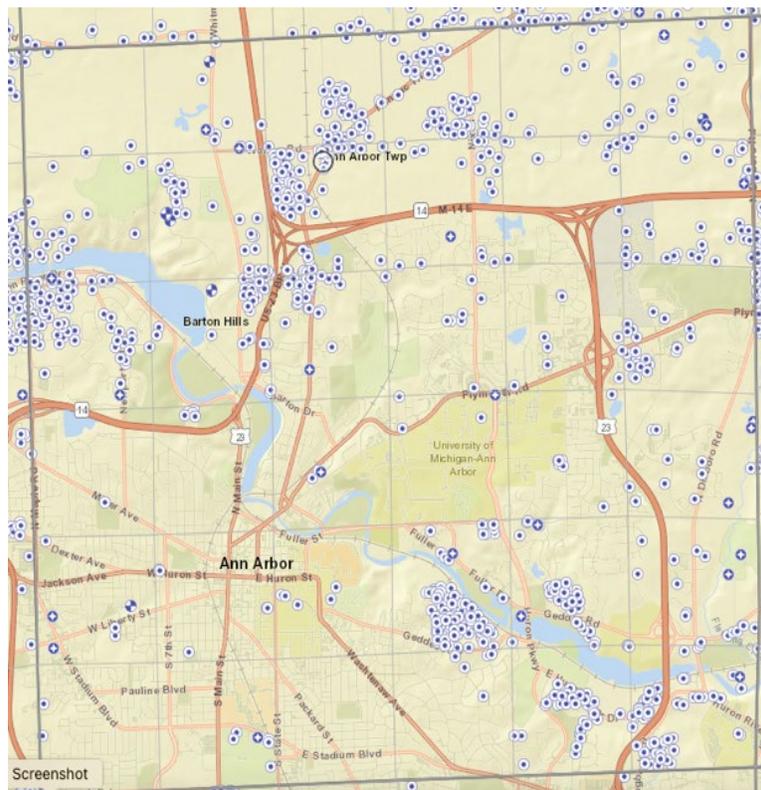
The Township does not have a dedicated community-wide storm sewer network, and relies on a combination of infiltration, some privately-owned and maintained stormwater impoundment basins, and county drains to address stormwater runoff. Slowing the velocity of stormwater runoff is as important as providing opportunities for infiltration and/or detention to avoid potentially damaging properties located along the creeks and streams and degrading water quality. Green Stormwater Infrastructure (GSI) is a proven successful approach to meeting the varied stormwater runoff needs of our Township. Types of GSI include bioswales, permeable pavement, constructed wetlands and green roofs.

Including GSI requirements in land development standards, offering informational resources to developers and landowners engaged in landscaping projects, and providing native plant seedlings are all options to protect and improve the water quality of our groundwater, rivers, creeks, and watershed. A quantitative projection of estimated storm water levels for some future year (e.g. 2040) should be conducted and used to improve the township stormwater management ordinances and master plan to increase stormwater retention.

### Groundwater Availability and Water Quality Vulnerability

Most Township residents rely on groundwater to meet their domestic water needs (Figure 3). Groundwater also supplies irrigation water for agricultural operations. Water table aquifers are recharged by precipitation infiltrating into the ground.

Figure 3: Wells in and around Ann Arbor Township<sup>21</sup>



Changes in precipitation patterns, particularly in times of drought, may lower the elevation of the water table and possibly make water less available. In times of intense rain events, water may run off rather

<sup>21</sup> Image extracted from EGLE Water Well Viewer available at <https://www.mcgi.state.mi.us/waterwellviewer/>.

than infiltrate into the ground. Groundwater would not be replenished. Confined aquifers, aquifers that are located between two confining layers, are recharged from surface features. These features may be located at great distance from wells that are drilled into these aquifers. Reduced recharge from drought, increased runoff, or development may limit the ability to withdraw water from these wells.

Monitoring groundwater levels is important for both proposed and current development, however, we do not have an existing groundwater quantity or quality program. A database of well data from the original well drilling is maintained by the State of Michigan, but this database doesn't show changes over time or indicate water quality. The Township should dialog with state and county agencies to discuss possible programs to monitor groundwater levels and quality.

It is important to consider the quality and quantity of both groundwater and surface water when planning for residential development. Reducing impervious surface is an important factor in maintaining and improving water quality, both surface water and groundwater. The Township should map important aquifer recharge areas and develop standards to protect these areas.

### Agriculture Vulnerability

Farmers in the Township already face increased operational challenges as climate change impacts planting and harvesting schedules. More chaotic weather patterns may repeat early thaw and hard freeze events that have decimated fruit tree crops in Michigan. Farmers that can normally get two crops a year on their farms may only get one in some years. Overall crop yields may decline. On the other hand, farmers will also likely see longer growing seasons and may be able to diversify the crops that can be successfully grown in the Township. The Township is not aware of the extent of farmers using irrigation. Anecdotal evidence from farmer interviews suggested it was not significant. Extended periods of drought may increase the need for irrigation and potentially further deplete aquifers that would affect well water availability. Though the Township has done some engagement with the farming community, ongoing meetings to discuss ongoing issues (climate, development) will be important to understanding and addressing the impacts on the Township's working lands.<sup>22</sup>

### Natural Systems Vulnerability

Climate change will have an impact on natural systems within the Township. Specifically, native species of flora and fauna may not be compatible with changes in temperature and precipitation and will either migrate north or die off over the next 100 years. New invasive pests, fungi, and diseases that are more adaptable to the new climate reality will likely provide challenges for agriculture and native plants and trees. What we have observed in Washtenaw County is longer prolonged periods without rain events followed by very intense storms. These swings stress native plants and trees, agricultural crops and may require extensive irrigation for gardens and farms. In the long-term, the Township and partners may seek to conduct flora inventories on preserved lands and track the numbers and health of these species to better understand the impact of climate change on the Township's flora and fauna.

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<sup>22</sup> In March 2023, the Township held a meeting with area farmers to discuss their thoughts on a changing climate and what the Township could do to support local farmers. A synopsis of this meeting is available in the Appendix under the Agricultural Interests Meeting subheading.

# ECOSYSTEM SERVICES OF TOWNSHIP

## NATURAL LANDS

One byproduct of the Township’s land use decisions are the many ecosystem services provided by the lands that remain as vacant, preserved lands, or in agricultural production and low-density rural residential use. Ecosystem services are the direct and indirect contributions ecosystems, also known as natural capital, provide for human wellbeing and quality of life.<sup>23</sup> These services can be practical like providing food and water (provisioning services), mitigating urban heat islands and flood control (regulating services), nutrient cycling and soil creation (supporting services), as well as providing opportunities for recreation and scenic beauty (cultural services). An additional service provided by the vacant, preserved lands, or in lands in agricultural production is carbon sequestration. Plant-rich landscapes such as forests, grasslands and rangelands sequester carbon by capturing carbon dioxide from the atmosphere and transforming it into biomass through photosynthesis. These ecosystem services provide value far beyond the Township’s boundaries.

Land cover is often used as a proxy for ecosystem services. For example, permeable surfaces, such as agricultural fields, grasslands, and forests, allow water to percolate into the soil to filter out pollutants and recharge the water table. Whereas impervious surfaces like buildings, roads, driveways, parking lots and other hardscapes are solid surfaces that don’t allow water to penetrate, forcing it to run off. Similarly, dense concentrations of impervious surfaces also absorb and retain heat contributing to urban heat island effect. A summary of the Township’s land cover is provided in the table below.

Table 6: Township land cover<sup>24</sup>

Land Cover Type	Description	Acres	Percent
Impervious Surfaces	buildings, roads, driveways, parking lots	942.3	9.2%
Trees <sup>25</sup>	woody vegetation, trees	4,696.7	45.7%
Open Space	agricultural fields, grasslands, turfgrass	4,424.7	43.1%
Bare	soil, aggregate piles, unplanted fields	32.5	.3%
Water	rivers, lakes, drains, ponds	180.2	1.8%
<b>Total Acres</b>		<b>10,276.5</b>	<b>100%</b>

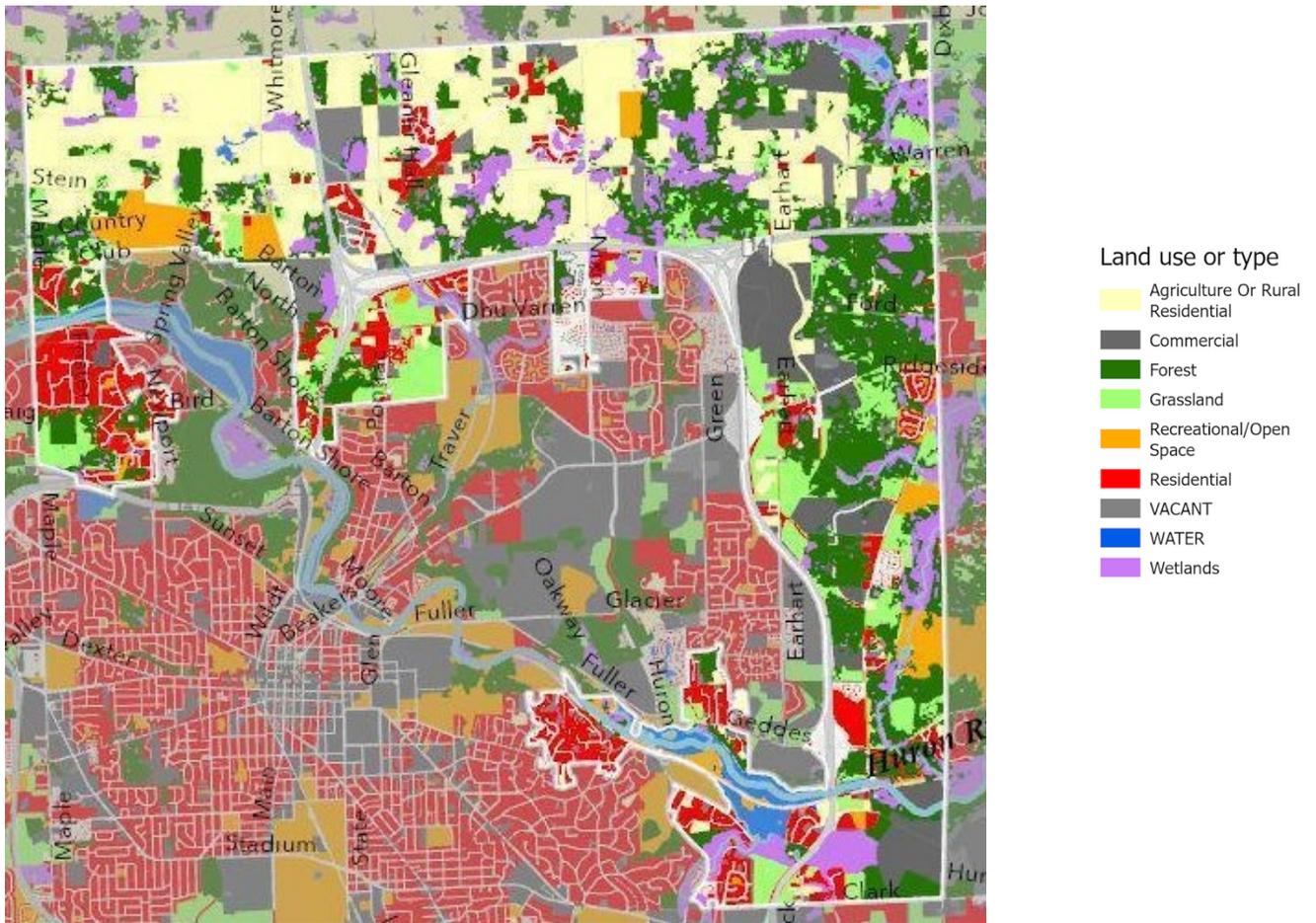
Figure 4 illustrates the distribution and contrast of land cover type between Ann Arbor Charter Township and the City of Ann Arbor, its neighbor to the south.

<sup>23</sup> Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Current State & Trends Assessment, Volume 1 World Resources Institute, Washington, DC. p. 29-30

<sup>24</sup> 2020 Environment and Land Use data for Ann Arbor Township <https://www.semco.org/data-and-maps/community-profiles/communities=4010#Land>

<sup>25</sup>Note, SEMCOG’s mapping and land use analysis identified 5,351 acres of tree canopy (52.1% of total Township land). Tree canopy is defined as the layer of tree leaves, needles, branches, and stems that provide tree coverage of the ground, viewed from an aerial perspective. This total is different from the land cover acreage based on the different methodology used to identify tree canopy.

Figure 4: Land Use and Land Cover Map (Huron River Watershed Council 2023)



### Township Preserved Lands

Preserving working and natural lands has been a priority for the Township through a Purchase of Development Rights program. As of 2019, The Township has protected approximately 1,175 acres of land through this program. These lands provide several climate benefits including:

- Working farmland available for local food production,
- Preserved land to help sequester carbon,
- Preserved land to help hold and infiltrate stormwater to reduce flooding, and
- Preserved forests and wetland to provide habitat and connected wildlife corridors.

Figure 5 and Table 7 provide additional information on the Township’s protected properties.

Figure 5: Protected Land in Ann Arbor Charter Township

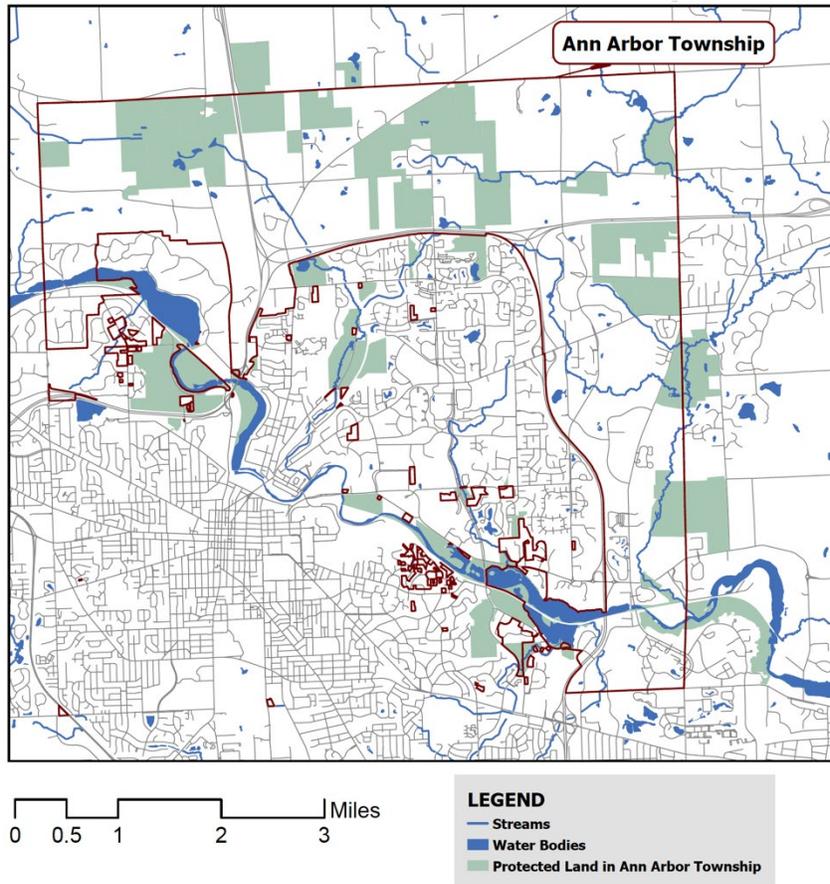


Table 7: Land Area of Protected Parcels Categorized by Type of Use<sup>26</sup>

Owner	Acres	Belowground Carbon Storage (MT CO <sub>2</sub> e)	Soil Carbon Social Cost (\$)	Aboveground Carbon Storage (MT CO <sub>2</sub> e)	Aboveground Carbon Social Cost (\$)
Braun, Charles and Catherine	286.51	4,808	245,213.00	2,401	122,437.39
Gould	50.93	n/a	n/a	65	3,334.73
Braun, Thomas & Theodore	187.06	2,548	129,950.75	1,632	83,207.28
Pardon	73	503	25,644.36	244	12,466.40
Newton (Green Things)	58.85	1,705	86,959.62	1,262	64,353.79
Bloch	22.34	337	17,168.31	1,427	72,777.80
Domino's Farms	12.33	849	43,289.75	1,051	53,624.03
Novick, Jack and Kerry Kelly	11.43	125	6,394.24	1	43.34
DF Land Development LLC	81.12	3,222	164,299.29	1,657	84,530.34
Lada Rolling Acres, LLC	37.67	1,475	75,228.28	1,825	93,053.25
Stiles-Kaldjian	161.47	6,873	350,541.92	1,933	98,570.20
Seeley Farm	27.52	1,106	56,402.70	1,412	72,034.98
Koch	40	31	1,577.84	93	4,734.04
Moehrle	114.77	859	43,824.39	1,007	51,366.89
Landau	9.268	n/a	n/a	n/a	n/a
<b>Total</b>	<b>1,174.3</b>	<b>19,633</b>	<b>1,001,281.45</b>	<b>16,010.00</b>	<b>816,534.46</b>

<sup>26</sup> Table extracted from "ALL COMPLETED GREENBELT ACQUISITIONS" table from City of Ann Arbor "Open Space and Parkland Preservation Program Fiscal Year 2023 Annual Report" available at <https://www.a2gov.org/greenbelt/Documents/FY23%20Greenbelt%20Annual%20Report.pdf>

There is considerable value for these ecosystem services of the Township's preserved lands. According to an April 2021 paper, *Assessing and Communicating Climate and Water Ecosystem Services of the City of Ann Arbor Greenbelt Program*, the carbon in the uppermost layer of forested and wetland soils of the Township preserved lands is 19,633 MTCO<sub>2e</sub>.<sup>27,28</sup> Using the Biden Administration Social Cost of Carbon value of \$51/MTCO<sub>2e</sub>, this has a value of \$1,001,281. The estimated aboveground carbon stored in the preserved lands is 16,010 MTCO<sub>2e</sub>, with a social cost of carbon value of \$816,534.

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<sup>27</sup> Edinger, J. et al. (2021) 'Assessing and Communicating Climate and Water Ecosystem Services of the City of Ann Arbor Greenbelt Program', Umich.edu [Preprint]. Available at: <https://deepblue.lib.umich.edu/handle/2027.42/167368>.

<sup>28</sup> Note, not all of the Township's preserved lands were included in the 2021 report.

# GREENHOUSE GAS EMISSIONS INVENTORY

A greenhouse gas (GHG) inventory is a list of emission sources and the associated emissions quantified using standardized methods. At its very simplest, emissions can be quantified for an emission source simply as an activity unit multiplied by an emission factor (e.g.  $A \times EF = \text{Emissions}$ ). An emission factor presents the quantity of a GHG emitted associated with a specific activity. For example, the amount of CO<sub>2</sub> emitted when generating electricity is typically expressed as kg CO<sub>2</sub> per megawatt-hour (MWh) electricity generated (kg CO<sub>2</sub>/MWh). For the purposes of the Townships inventory, emission factors are in metric tons (MT) of carbon dioxide equivalent (CO<sub>2</sub>e). CO<sub>2</sub>e means the mass unit of CO<sub>2</sub> emissions with the same global warming potential as the mass unit of another greenhouse gas (i.e. 1 ton of methane has the equivalent global warming potential of 25 tons of CO<sub>2</sub>).<sup>29</sup>

Because a GHG inventory captures a point in time and is often reflective of exogenous factors like macroeconomic conditions, the baseline year for data was set to 2019, as the global Covid-19 pandemic caused 2020 and 2021 to be outliers in terms of emissions and not representative of future trends. Furthermore, a 2019 base year is consistent with the base year for the Resilient Washtenaw GHG inventory. The Township's GHG inventory covers activities from Township operations (TO) and community-wide (CW) for Scope 1 and 2 emissions. Scope 1 emissions are direct GHG emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles). Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.<sup>30</sup> The inventory sectors include buildings, transportation, and waste for TO and CW activities. The Township provided data on energy consumption across its building portfolio as well as information about its fleet of vehicles. Emissions for the community were calculated based on locally available data and standard methods to estimate emissions where local data were not available. There was a desire for GHG estimation methodologies and results to be compatible with those of Resilient Washtenaw therefore, in some cases, Township-wide emissions sectors rely on Resilient Washtenaw results scaled to the Township based on fractional population or households. One aspect that should be considered is that the level of granularity of an emission inventory should be reflective of the policy interventions applicable to the unit of analysis. For example, the policy levers targeted at businesses will be different than households. Therefore, the level of analysis is commensurate with the types of policies and audiences that the Township may explore.

At the end of each section is a short list of proposed ways to measure progress toward monitoring and mitigating that category of emissions. Many of these proposed ways to measure progress use data that are available but are currently not being tracked systematically by the Township. Furthermore, it will be important for the Township to consider what kinds of targets to set both for TO and CW activities and whether those targets are absolute versus intensity-based targets. Absolute targets aim to reduce GHG emissions by a set amount (e.g. net zero, etc.). An intensity target is a normalized metric that sets an organization's emissions target relative to a variable (e.g. per capita, per household, per job, etc.). An important next step for the Township to consider is what kind of targets to set, for what emissions sectors, and by when.

## Township Operations (TO)

Township operations are those things in which the Township has direct control, chiefly Township facilities and vehicle fleet. Electricity, in kilowatt hours (kWh), and natural gas, in centum cubic feet (CCF), consumption data was available for all Township buildings from utility bill information. Emission rates

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<sup>29</sup> For a complete list of GHGs and the CO<sub>2</sub>e global warming potential (GWP), see to 40 CFR Appendix Table A-1 "Global Warming Potentials" to Subpart 98 available at <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A/appendix-Table%20A-1%20to%20Subpart%20A%20of%20Part%2098>

<sup>30</sup> [The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard \(GHG Protocol Corporate Standard\)](#)

were available from the Emissions and Generation Resource Integrated Database (eGRID) for the RFC Michigan / Eastern Power Grid (RFCM) subregion.<sup>31</sup> Township transportation emissions were calculated from the fleet mileage data provided by the Township and applied to the emissions profile of the county-wide municipal fleet.

### Township Operations: Facilities

The Township maintains 10 facilities of varying uses. Township Hall/Fire Station 1 and Fire Station 2 are the most occupied buildings with round the clock usage by the Township’s fire department. There are also several utility facilities that house water and sewer pump equipment. Note, data on the use of refrigerants and other high impact GHG products was unavailable. A breakdown of the Township facilities and associated energy consumption is provided in the table below.

Table 8: Township Operations Facility Energy Usage (2019)

Description	Address	Square Footage	Electricity (KWH)	Natural Gas (CCF)
Township Hall / Fire Station 1	3792 Pontiac Trail	7238	49600	4487
Fire Station 2	4319 Goss Rd	9050	51120	3737
Utility Building	1343 Stark Strasse		12964	164
Utility Building	1947 N. Dixboro Rd		27520	136
Utility Building	4620 E. Huron River Dr		2031	110
Utility Building	3695 Washtenaw		4619	439
Utility Building	3701 Plymouth Rd		159	0
Utility Building	1300 Earhart Rd		715	0
Tilian Farm	4400 Pontiac Trail		0	0
Water Utility Building	4231 Whitehall Dr		78178	3
<b>Total</b>			<b>226,906</b>	<b>9,076</b>

In 2019, Township facilities used 226,906 kWh of grid supplied electricity and 9,076 CCF of natural gas. Resultant emissions are as follows:

$$\begin{aligned} \text{Electricity Emissions} &= 226,906 \text{ kWh} \times 0.000543 \text{ MT CO}_2\text{e per kWh within RFCM subregion}^{32} \\ &= 123 \text{ MT CO}_2\text{e} \end{aligned}$$

$$\begin{aligned} \text{Natural Gas Emissions} &= 9,076 \text{ CCF natural gas} \times 0.005 \text{ MT CO}_2\text{e per CCF natural gas}^{33} \\ &= 45 \text{ MT CO}_2\text{e} \end{aligned}$$

$$\text{Total Township Operations Buildings} = \mathbf{169 \text{ MT CO}_2\text{e}}$$

Of note, on December 29th, 2023, Michigan passed Senate Bill 271 requiring electric utilities in Michigan to achieve a renewable energy credit (REC) portfolio of at least 15% through 2027, 50% in 2030 through 2034, 60% in 2035 and achieve a clean energy portfolio of 80% in 2035 through 2039 and 100% in 2040 and after.<sup>34</sup> Though this action does not guarantee that these milestones will be achieved by DTE, the regional electric utility, it does mark a key pivot in Michigan’s energy landscape.

### Measuring Progress (Proposed)

<sup>31</sup> <https://www.epa.gov/egrid>

<sup>32</sup> Electricity CO<sub>2</sub>e emission factor derived for 2019 from EPA eGRID data available at: <https://www.epa.gov/egrid/data-explorer>

<sup>33</sup> Natural gas CO<sub>2</sub>e emission factor derived from EPA Center For Corporate Climate Leadership “Emission Factors for Greenhouse Gas Inventories” available at: [https://www.epa.gov/system/files/documents/2022-04/ghg\\_emission\\_factors\\_hub.pdf](https://www.epa.gov/system/files/documents/2022-04/ghg_emission_factors_hub.pdf)

<sup>34</sup> <http://legislature.mi.gov/documents/2023-2024/publicact/htm/2023-PA-0235.htm>

- Conduct energy audits of existing facilities
- Conduct ongoing monitoring of Township facility energy usage and benchmark against comparable facilities (e.g. Energy Star Portfolio Manager)
- Develop and implement an energy efficiency plan for existing facilities
- Phase out natural gas for building space and water heating
- Develop and implement a plan for onsite renewable energy for Township buildings
- Establish a minimum energy performance policy for any new construction or major renovations of Township facilities

### Township Operations: Vehicle Fleet

Township transportation emissions were calculated from the fleet mileage data provided by the Township and applied to the emissions profile of the county fleet. Countywide, the municipal fleet has a combined average fuel economy of 13.13 miles per gallon (mpg).<sup>35</sup> At the time of the GHG inventory, all Township vehicles were internal combustion vehicles powered by gasoline or diesel. Additionally, the Township fleet is skewed toward heavier-duty vehicles that may have lower average fuel economy. A listing of Township vehicles, fuel type, and annual mileage are provided below.

Table 9: Township Vehicle Fleet and Associated Usage (2019)

Model Year	Make/Model	Dept.	Annual Usage	Unit	Fuel
2005	Spartan/Tanker	Fire	1,693	Miles	Diesel
2007	Spartan/Aerial 207	Fire	1,334	Miles	Diesel
2009	Ford/F550	Fire	5,495	Miles	Diesel
2011	Spartan/Legend Pumper	Fire	6,174	Miles	Diesel
2011	Spartan/Legend Pumper	Fire	7,119	Miles	Diesel
2015	Ford/F150	Building	4550	Miles	Gasoline
2016	Ford/F550	Utility	5107	Miles	Diesel
2016	Toyota/Tundra	Fire	12869	Miles	Gasoline
2018	Ford/F150	Utility	12,156	Miles	Gasoline
2018	Ford/Ranger	Building	3416	Miles	Gasoline
2019	Ford/F250	Fire	4235	Miles	Gasoline
2020	Ford/F350	Utility	11505	Miles	Gasoline
2020	Rosenbauer	Fire	831	Miles	Diesel
2020	Rosenbauer	Fire	705	Miles	Diesel
2019	Ranger/ATV	Fire	40	Miles	Gasoline
2011	Kubota/ATV	Utility	96	Hours	Diesel
2012	Skid Steer	Utility	69	Hours	Diesel
2004	Ford/Tractor	Farm	174	Hours	Diesel

Given the relatively small size of the Township fleet, subsequent GHG inventories of fleet transportation emissions should be directly estimated from fuel receipts, noting volumes, rather than scaled from county emissions. This is especially important for vehicles with high idling activity such as emergency response vehicles and nonroad equipment. However, using the scaled county fleet emissions based on Township vehicle miles traveled, the resultant Township fleet emissions are estimated as follows:

- Township Operations Transportation – **43.08 MTCO<sub>2e</sub>**

<sup>35</sup> 2019 Leadership Development Group, “A Framework for Moving Washtenaw County Toward Net Zero,” August 9, 2020.

Measuring Progress (Proposed)

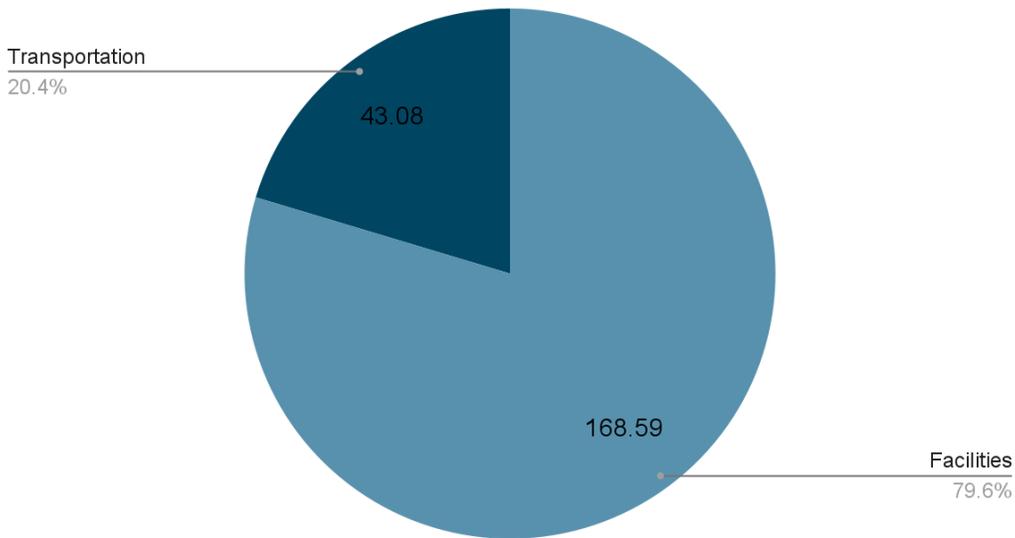
- Future Township fleet transportation emissions should be directly estimated from fuel receipts, noting fuel consumption, rather than scaled from county-level fleet emissions.
- As the Township fleet transitions to alternative fuel types, documenting the start of year and end of year odometer readings for each vehicle and submetering of any electric vehicle supply equipment will be helpful in tracking fuel/energy consumption by fuel type (e.g., gas vs. diesel vs. electric).
- For future Township vehicle replacement, consider vehicle right-sizing and/or selecting hybrid or electric market offerings. For example, The U.S. Department of Energy's Alternative Fuels Data Center Vehicle Technologies Office provides a simple tool for comparing convention, hybrid, and electric options that the Township could consider for future vehicle purchases, available at <https://afdc.energy.gov/calc/>.
- An expansion of the scope of Township operations could include the calculation of emissions from employee commuting.

Township Operations (TO) Total

For the 2019 base year GHG inventory, TO activities contributed:

- Facilities = 168.59 MT CO<sub>2</sub>e
- Vehicle Fleet = 43.08 MT CO<sub>2</sub>e
- = **211.67 MT CO<sub>2</sub>e**

Township Operations (TO) Emissions in MTCO<sub>2</sub>e



## Community-Wide (CW) Emissions

Community-Wide (CW) emissions include those emissions resulting from activities that are outside of Township’s direct influence from community members at large within the Township’s geographic boundaries. Community members include households, institutions, and commercial and industrial businesses within the Township. Many of the community-wide emissions are calculated as a share of total county-wide emissions from a given unit in that category.

### Community-Wide: Buildings

Residential electricity and gas consumption data for households was calculated based on the total share of households in Ann Arbor Charter Township to that within the County. It is important to note, due to the rural nature of the Township, some residents may rely on fuels, such as residential fuel oil and propane used for home heating, not captured in the county-wide emissions estimation based on estimates from DTE and Consumers Energy. The table below details the number of accounts and annual consumption by account type within the Township for 2019 provided by DTE via the Resilient Washtenaw data collection efforts.

Table 10: Community-Wide Estimated Energy Usage (2019)

Account Type	Electric		Natural Gas	
	Accounts	Annual kWh	Accounts	Annual CCF
Residential	1,729	12,477,664	1,441	1,356,607
Commercial	675	29,725,452	311	1,252,877
Industrial	9	50,385,227	3	2,732,532
Lighting	1	9,732		
Total	2,413	92,598,075	1,755	5,342,016

$$\begin{aligned} \text{Electricity Emissions} &= 92,598,075 \text{ kWh} \times 0.000543 \text{ MT CO}_2\text{e per kWh within RFCM subregion}^{36} \\ &= 50,280.75 \text{ MT CO}_2\text{e} \end{aligned}$$

$$\begin{aligned} \text{Natural Gas Emissions} &= 9,076 \text{ CCF natural gas} \times 0.005 \text{ MT CO}_2\text{e per CCF natural gas}^{37} \\ &= 26,710.08 \text{ MT CO}_2\text{e} \end{aligned}$$

$$\text{Total Community-Wide Buildings Emissions} = \mathbf{76,990.83 \text{ MT CO}_2\text{e}}$$

Another way of looking at this data is to look at the relative GHG contributions by account type. Using the same mission factors above for electricity and natural gas, the following table gives the relative contribution of GHG emissions by account type.

Table 11: Community-Wide Estimated Energy Usage Related GHG Emissions (2019)

Account Type	Electric MT CO <sub>2</sub> e	Natural Gas MT CO <sub>2</sub> e	Total MT CO <sub>2</sub> e	Percent
Residential	6,775.37	6,783.04	13,558.41	17.61%
Commercial	16,140.92	6,264.39	22,405.31	29.10%
Industrial	27,359.18	13,662.66	41,021.84	53.28%
Lighting	5.28	0.00	5.28	0.01%
Total	50,280.75	26,710.08	76,990.83	100.00%

<sup>36</sup> Electricity CO<sub>2</sub>e emission factor derived for 2019 from EPA eGRID data available at: <https://www.epa.gov/eGRID/data-explorer>

<sup>37</sup> Natural gas CO<sub>2</sub>e emission factor derived from EPA Center For Corporate Climate Leadership “Emission Factors for Greenhouse Gas Inventories” available at: [https://www.epa.gov/system/files/documents/2022-04/ghg\\_emission\\_factors\\_hub.pdf](https://www.epa.gov/system/files/documents/2022-04/ghg_emission_factors_hub.pdf)

Measuring Progress (Proposed)

- The Township should compile and maintain a database of installed renewable energy and energy efficiency projects based on building permits issued noting:
  - Installed Solar PV systems - number of projects and installed capacity MW)
  - Installed EV chargers - number and charge level of chargers
  - Installed Energy Efficiency Appliances (heat pump, electric hot water heater, etc.) - number and type
- The Township should establish goals for renewable energy and energy efficiency projects based on the real-time permit data. This information could be reported to the Township Board quarterly and provided on a public facing dashboard.
- The Township should track outreach and education efforts around renewable energy and energy efficiency and establish a goal of the number of residents and businesses reached.
  - Township Residents participating in Energy Concierge/Home Energy Advisor.
  - Township Residents participating in group bulk buys such as Ann Arbor Solarize.
- The Township should seek to promote energy efficiency and renewable energy projects in new construction projects, as such, the Township should track:
  - New construction projects without a natural gas service (all electric)

Community-Wide: Transportation

Transportation-related emissions come from a variety of activities including passenger travel, freight and commercial vehicles travel, railway use, and from the use of a host of non-road vehicles and equipment such as construction equipment, lawn and garden equipment, etc. However, due to data limitations, the transportation emissions calculations are based on the share of Township commuter-adjusted populations compared to that of Washtenaw County.

Total county-wide VMT was provided by Google Environmental Insights Explorer. Google uses proprietary data to characterize the trips taken within a given jurisdictional boundaries and the trips that crossed the city boundaries.

Table 12: Washtenaw County VMT by Travel Type (2019)

Travel Type	VMT
Cross Boundary Inbound	1,913,405,292
In Boundary	1,216,622,232
Total	3,130,027,524

Based on the fraction of the commuter-adjusted population of the Township to that of the county (approximately 3.6%), the estimated Township-wide VMT is 112,536,933 miles.

Using fleetwide average emissions of 541 g CO<sub>2</sub>e/mi, a crude estimate of total Township-wide transportation emissions is **60,882.48 MT CO<sub>2</sub>e**.<sup>38</sup>

There are additional approaches to quantifying transportation related emissions. The following sections explore some considerations for further evaluation of various transportation subsectors that include: 1) Township household travel, 2) non-resident commuter travel, and 3) incidental (passthrough) travel on Township roads.

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<sup>38</sup> U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel, Jun. 21, 2024. Available at: <https://www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and>

### *Township Household Travel*

Average weekday household vehicle-miles traveled (VMT) can be estimated in Local Area Transportation Characteristics by Household (LATCH) dataset. The average Township household has 1.83 vehicles with each vehicle traveling on average 43.31 miles per weekday resulting in an average weekday household daily travel of 79.18 VMT.<sup>39</sup> While weekend household travel patterns may vary from weekday travel patterns, this information provides a basis of estimating annual Township resident travel.

$$\begin{aligned} \text{Total Annual Township Resident VMT} &= 71.18 \text{ VMT/day} \times 1,894 \text{ households} \times 365 \text{ days} \\ &= 57,366,258.77 \text{ VMT} \end{aligned}$$

This value is approximately 51% of Township-wide VMT. It is important to note that this figure represents total household travel and not just travel within the Township boundaries.

### *Non-Resident Commuter Travel*

As noted in the Transportation Infrastructure and Travel section, Ann Arbor Charter Township has a significant increase in daytime population. The commuter-adjusted population is 10,468. By subtracting the resident population from the commuter-adjusted population, the result is 5,924. What this means is that, in 2019, an estimated 5,924 commuters traveled from outside of the Township to places of employment within the Township daily. This figure provides a basis of determining non-resident commuter travel activity within the Township. However, absent origin-destination commuting flow information, non-resident commuter travel VMT cannot be estimated. However, this size of the commuter population indicates that there may be a significant share of community-wide transportation emissions from commuters coming into the area.

### *Incidental (Passthrough) Travel*

A final category of travel that contributes to regional transportation-related emissions and air quality impacts is incidental or passthrough travel. As noted, the Township is flanked by major arterial roads like M-14, US-23, and Plymouth Road that serve tens of thousands of commuters and commercial vehicles from around the region daily. SEMCOG estimates that Annual Average Daily Vehicles Miles Traveled VMT on these interstate and arterial segments totals 564,688 miles (or 206,111,120 per year).<sup>40</sup> While this activity may not be directly reflected in the community-wide transportation emissions estimate, it certainly has an impact on regional air emissions and noise.

### Measuring Progress (Proposed)

- Because the estimate of Township-wide transportation sector emissions is so crude, the Township should consider refining them in the future to provide better insights and could consider proxies to measure progress for this sector. For example:
  - What is the public availability of electric vehicle chargers within the Township?
  - What fraction of households own or have access to an electric vehicle?
  - What is the number of lane miles of bicycle and pedestrian facilities within the Township?
  - How many employees within the Township use alternative transportation methods such as ridesharing (carpool/vanpool), bicycling or take public transportation?
  - How many employees of employers within the Township have access to telework?
- Number or percent of residential units served by transit
- Number or percent of jobs served by transit
- Number of lane miles of non-motorized, active transportation facilities that could include:

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<sup>39</sup> Data from the Local Area Transportation Characteristics by Household Average weekday household vehicle-miles traveled by U.S. Census Tract (per day) table available at [www.bts.gov/latch/latch-data](http://www.bts.gov/latch/latch-data) for Census Tract 4060.

<sup>40</sup> SEMCOG's traffic volume map representing Average Annual Daily Traffic (AADT) is available at <https://maps.semco.org/TrafficVolume/>.

- Bicycle facilities - lanes, routes, etc.
- Pedestrian facilities - sidewalk coverage
- Other multi-use facilities - side paths, shared-use paths, natural beauty roads, etc.

### Community-Wide: Materials and Waste Management

The materials and waste sector includes how the community handles waste streams and the ways in which it works to reduce them. The waste sector consists of municipal solid waste (MSW) landfills, industrial waste landfills, industrial wastewater treatment systems, and facilities that operate combustors or incinerators for the disposal of nonhazardous solid waste. The waste sector is a significant contributor to greenhouse gas emissions, particularly methane, which is a potent climate pollutant. Regionally, there are numerous opportunities for recycling, reuse of materials, composting programs, along with initiatives, programs, and partners to help make the best possible use of MSW rather than sending it to the landfill. Examples include Washtenaw County’s Home Toxics Center, a county-wide household hazardous waste program accepting many items for reuse, recycling, or safe disposal, and the Recycle Ann Arbor Recovery Yard, Michigan’s only non-profit construction and demolition recycler. Similarly, per a new state law, all Michigan counties will be required to create a plan for improved recycling and composting of solid waste, with the goal of increasing the state’s recycling rate from its current 19% to 45% by 2030.<sup>41</sup>

In 2019, Republic Services was the preferred waste-hauling service within Ann Arbor Township. In addition to waste-hauling, Republic Services provided curbside recycling for single family homes as well as seasonal yard waste collection. According to information collected by Washtenaw County, Ann Arbor Township’s MSW system data is as follows:

Table 13: Township MSW Flows (2017)

MSW Flow	Tons (T)
MSW Generation	1,852
Est. Recycling	378
Est. Yard Waste	264
Total Waste Disposed	1,210

According to this data, Ann Arbor Township has a waste diversion rate of approximately 35% (378T + 264T / 1,852T).

Using the fraction of the commuter-adjusted population of the Township to that of the county (approximately 3.6%), the estimated Township-wide waste GHG emissions are:

- Township-wide Waste Emissions – **2,418.64 MT CO<sub>2</sub>e**

### Measuring Progress (Proposed)

- Continue monitoring Township diversion rates (e.g., recycling)
- Explore options for Township participation in regional compost and food waste prevention programs.

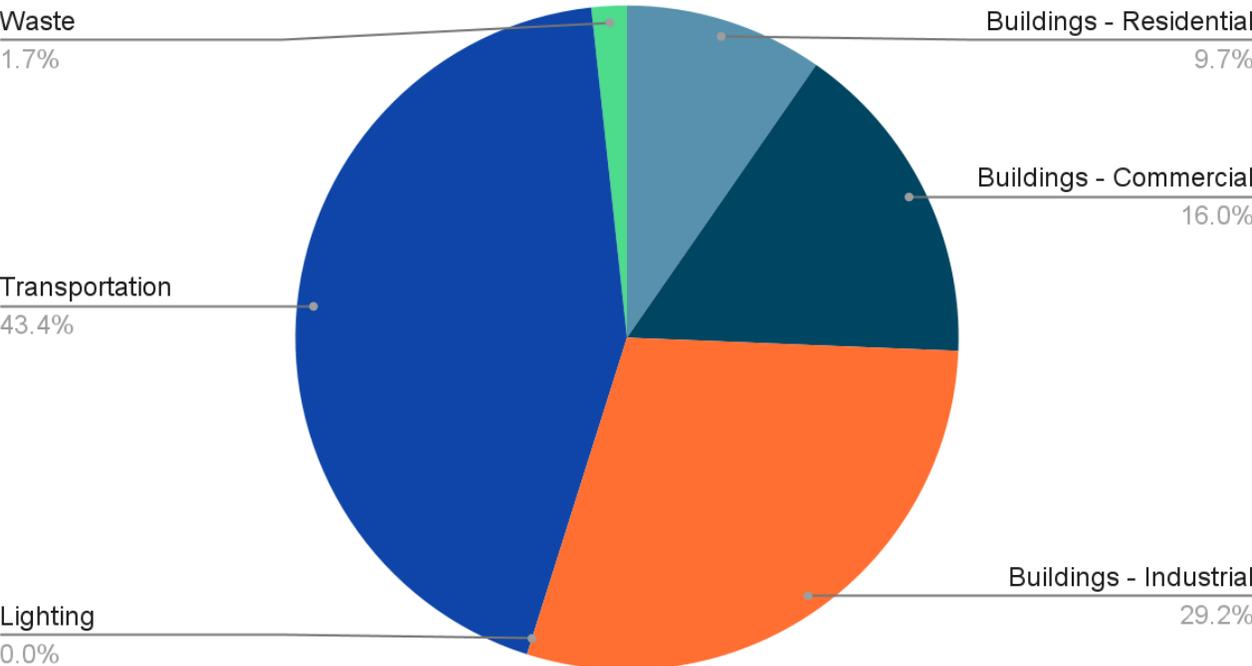
### Community-Wide (CW) Total

For the 2019 base year GHG inventory, CW activities are estimated to contribute:

- Buildings = 76,990.83 MT CO<sub>2</sub>e
  - Transportation = 60,882.48 MT CO<sub>2</sub>e
  - Waste = 2,418.64 MT CO<sub>2</sub>e
- =140,291.95 MT CO<sub>2</sub>e**

<sup>41</sup> Michigan Public Act Number 0244 of 2022 available at <https://www.legislature.mi.gov/Home/Document?objectName=2022-PA-0244>.

# Community-Wide (CW) Emissions in MTCO<sub>2</sub>e



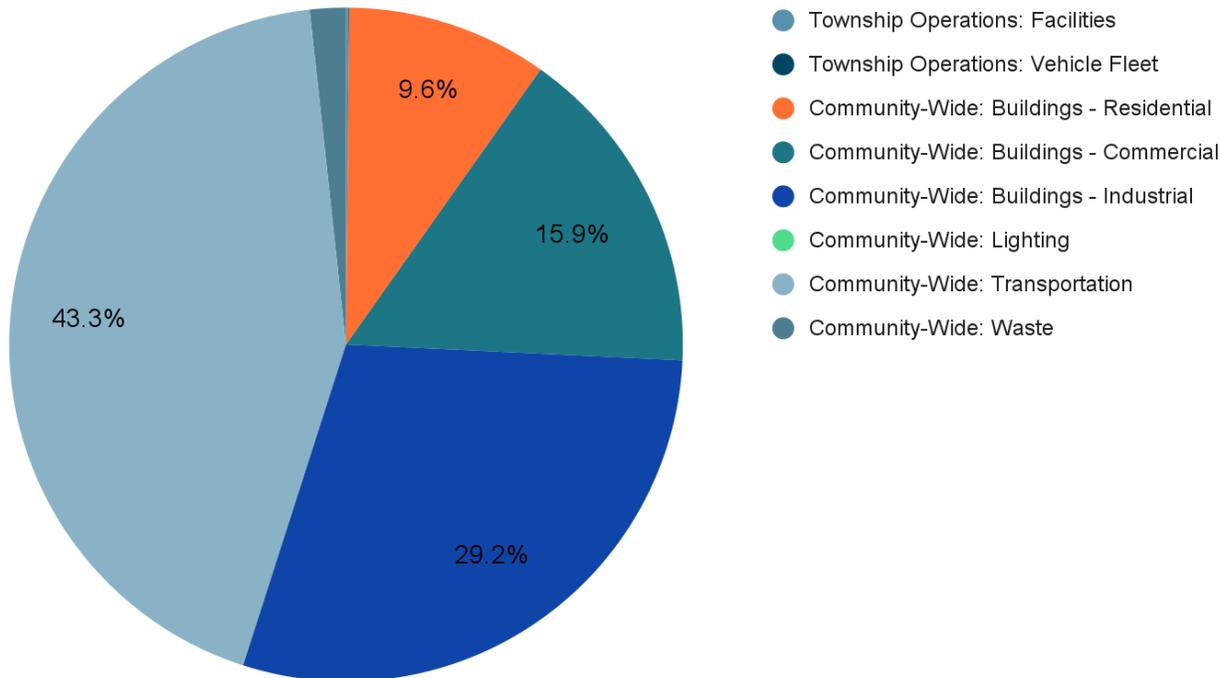
# CONCLUSIONS AND CONTEXT

In 2019, Ann Arbor Charter Township are estimated to have emitted a total of **140,503.62 MT CO<sub>2</sub>e** from Township operations and community-wide activities. Emissions can be broken down in the following categories:

Table 14: Summary of Ann Arbor Charter Township 2019 Greenhouse Gas Emissions

Category	Emission Sector	GHG Emission (MT CO <sub>2</sub> e)	Percent	Category Total (MT CO <sub>2</sub> e)
Township Operations (TO)	Township Operations: Facilities	168.59	0.12%	211.67
	Township Operations: Vehicle Fleet	43.08	0.03%	
Community-Wide (CW)	Community-Wide: Buildings - Residential	13,558.41	9.65%	140,291.95
	Community-Wide: Buildings - Commercial	22,405.31	15.95%	
	Community-Wide: Buildings - Industrial	41,021.84	29.20%	
	Community-Wide: Lighting	5.28 MT	0.01%	
	Community-Wide: Transportation	60,882.48	43.33%	
	Community-Wide: Waste	2,418.64	1.72%	
Total Township Emissions		140,503.62	100.00%	

## Ann Arbor Charter Township 2019 Greenhouse Gas Emissions



Overall, the emissions from Community-Wide: Transportation and Industrial Building energy use are the largest contributors to GHG emissions in the Township. Transportation emissions are high in Ann Arbor Charter Township because of the high commuter-adjusted population, the high number of residents who commute out of the area for work and its proximity to two major freeways. The Township has limited direct control over most of these emissions but could encourage area employers to expand employee

commute options aimed at reducing the use of single-occupant automobiles for commuting by employees working at Township employers. The emissions from community building energy use are also not in the direct control of the Township. However, the Township can influence building practices through zoning and permitting actions that incentivize energy efficiency, renewable energy deployment, and promote community designs that create environmentally friendly development.

To put Ann Arbor Charter Township's 140,503.62 MT CO<sub>2</sub>e in perspective, the following entities have estimated their respective 2019 GHG emissions as follows:

- State of Michigan – 174,900,000 MT CO<sub>2</sub>e
- Washtenaw County – 4,490,000 MT CO<sub>2</sub>e
- City of Ann Arbor – 1,490,000 MT CO<sub>2</sub>e
- The University of Michigan – 487,000 MT CO<sub>2</sub>e

In total, the Township's emissions are about 3% of the 4.49M MT CO<sub>2</sub>e emitted from the entire county. Of note, the Township has a higher proportion of the county emissions that would be expected per capita. However, this, again, may be attributed to its relatively high daytime population and proximity to regionally significant transportation infrastructure.

Looking forward, mitigation for many of these emission sectors will require investment by members of the community without direct Township intervention. However, the Township can play a role both by directly deploying renewable energy and energy efficiency projects in its operation and building an education and outreach program to increase awareness and support the community investments in energy efficiency and renewable energy. Similarly, the Township can advocate regionally to improve non-motorized facilities and advance transit access. Finally, establishing indicators, some of which are discussed in the "Measuring Progress" subsections of the Greenhouse Gas Emission Inventory sectors, will be important to benchmark and measure progress over time.

# APPENDIX A – IMPLEMENTING RESILIENT WASHTENAW WITHIN THE TOWNSHIP

RRS, contractor to Ann Arbor Charter Township, developed the following list of actions, adapted from the Resilient Washtenaw Plan, that could be implemented in the Township. Recommended Climate Actions are listed below in order of priority as established by RRS. These priorities have not been approved or established by Ann Arbor Township Committee for Climate Resilience or the Board of Trustees and will be the subject of future discussions. The scope of the action is denoted by CW for Community-Wide actions or TO for Township Operations actions. The GHG benefit, in MT CO<sub>2</sub>e, is estimated for each action. The “Township Government Investment” column estimates the costs of each action and by whom the investment will be made. Many actions from Resilient Washtenaw are not included below because the Township either lacks jurisdiction/legal authority to undertake such actions or because they are not applicable to the Township. Oftentimes, implementing these actions is more efficient with partnerships among Washtenaw County governments. To expedite implementation, the Township should invest in key areas including education and mechanisms to share funding and incentive opportunities with residents and businesses. The Township could consider this list of actions as possible implementation items following the adoption of the Climate Report but are in no way obligated to pursue all or any items listed below.

Priority	Scope	Action	Estimated GHG Benefit (MTCO <sub>2</sub> e)	Township Government Investment
1	CW	On-going Climate Education and Public Engagement	High (9,866)	\$150,000/yr
2	CW	Home Energy Advisor Program		
3	CW	Residential & Commercial Weatherization and Energy Efficiency		
4	CW	Community Bulk Buy for Solar and Building Electrification		
5	CW	Join the Regional Resilience Authority	Support	TBD
6	CW	Carbon Pricing in Decision Making	Support	
7	CW	100% Renewable Energy Options for Everyone	High (44,648)	Lobbyist
8	CW	Enabling Legislation for Township Energy Programs		Lobbyist
9	CW	Improve Transit Access in the Township	Low (201)	TBD
10	CW	Expand the Active Transportation Network	Medium (1,250)	TBD
11	CW	Update Stormwater Regulations	Adaptation	Existing Investment
12	CW	Natural Area Preservation	Adaptation/Sequestration	Existing Investment
13	CW	Farmland Preservation	Adaptation/Sequestration	Existing Investment
14	CW	Provide Comment on Infrastructure Agency Planning Projects	Adaptation	Existing Investment
15	CW	Time of Marketing Energy Rating Disclosure	Support	Adopt Model Ordinance
16	CW	Expand Rain Garden Program	Adaptation	Existing Investment

<b>Priority</b>	<b>Scope</b>	<b>Action</b>	<b>Estimated GHG Benefit (MTCO<sub>2e</sub>)</b>	<b>Township Government Investment</b>
17	CW	Expand Electric Mobility Options	High (18,308)	Community Investment
18	CW	Emissions Accounting Mechanism	Support	TBD
19	CW	Prioritize Capital Projects that Reduce Emissions and Prepare for Extreme Weather	Adaptation	Existing Investment
20	CW	Develop a Township Organics/Compost Program	Low (342)	Community Investment
21	CW	Reduce Vehicle Miles Traveled (VMTs)		Community/Grant/Township Investment
22	CW	Support and Grow the Washtenaw Regional Resource Management Authority (WRRMA)	Support	Existing Investment
23	TO	100% Renewable Energy for Township Operations	Low (83)	Township Investment
24	CW	Create Resilience Hub	Adaptation	Township Investment/Grant Opportunity
25	CW	Maintain and Expand Township Tree Canopy	Adaptation/Sequestration	Community Investment
26	CW	Stormwater Basin Inspection and Retrofit	Adaptation	Existing Investment
27	CW	Materials Management Program	Low (838)	Community Investment
28	CW	Incentivize Local Food Production	Support	Existing Investment
29	TO	Township Fleet Electrification	Low (25)	TBD

# APPENDIX B – NET ZERO ANALYSIS

## Foreword

This analysis was performed by RRS and their subcontractor Elevate. A Net Zero analysis examines the amount of predicted emission reduction from a set of actions. The assumptions, targets, scenarios, and recommended actions within this section do not necessarily reflect input from and commitments of the Township and was meant solely as an exercise to explore achieving net zero GHG emissions. This analysis helps to prioritize actions and place the emissions inventory in a larger, regional context. In each section, Township Operations and Community-Wide emissions, a set of assumptions have been made to develop the analysis. The methodology used in these assumptions is explained in each section.

## Township Operations (TO) Net Zero Analysis

### Buildings

Business as Usual (BAU) buildings emissions were calculated assuming that 1) there are no new Township facilities, 2) no changes to the number of heating and cooling degree days per year and 3) the electricity grid serves the Township with more renewables based on existing policy commitments by the utilities.

Assumed actions modeled to reduce emissions include:

- 35% energy savings through deep energy efficiency investments in facilities
- 100% of natural gas usage transitioning to 100% electricity usage for building operations
- 30% of electricity being provided by on-site renewable energy

### Transportation

Business as Usual (BAU) fleet emissions were calculated assuming no expected increases in fleet activity, but slight changes in purchases of electric vehicles and better fuel economy that would naturally happen over time.

Assumed actions modeled to reduce emissions include:

- 70% of fleet miles transitioned to electric vehicles by 2030
- 20% better fuel economy from purchased fleet vehicles, for both gas and electric vehicles, than BAU estimates
- 50% of electric fleet miles powered by on-site renewable energy at Township facilities

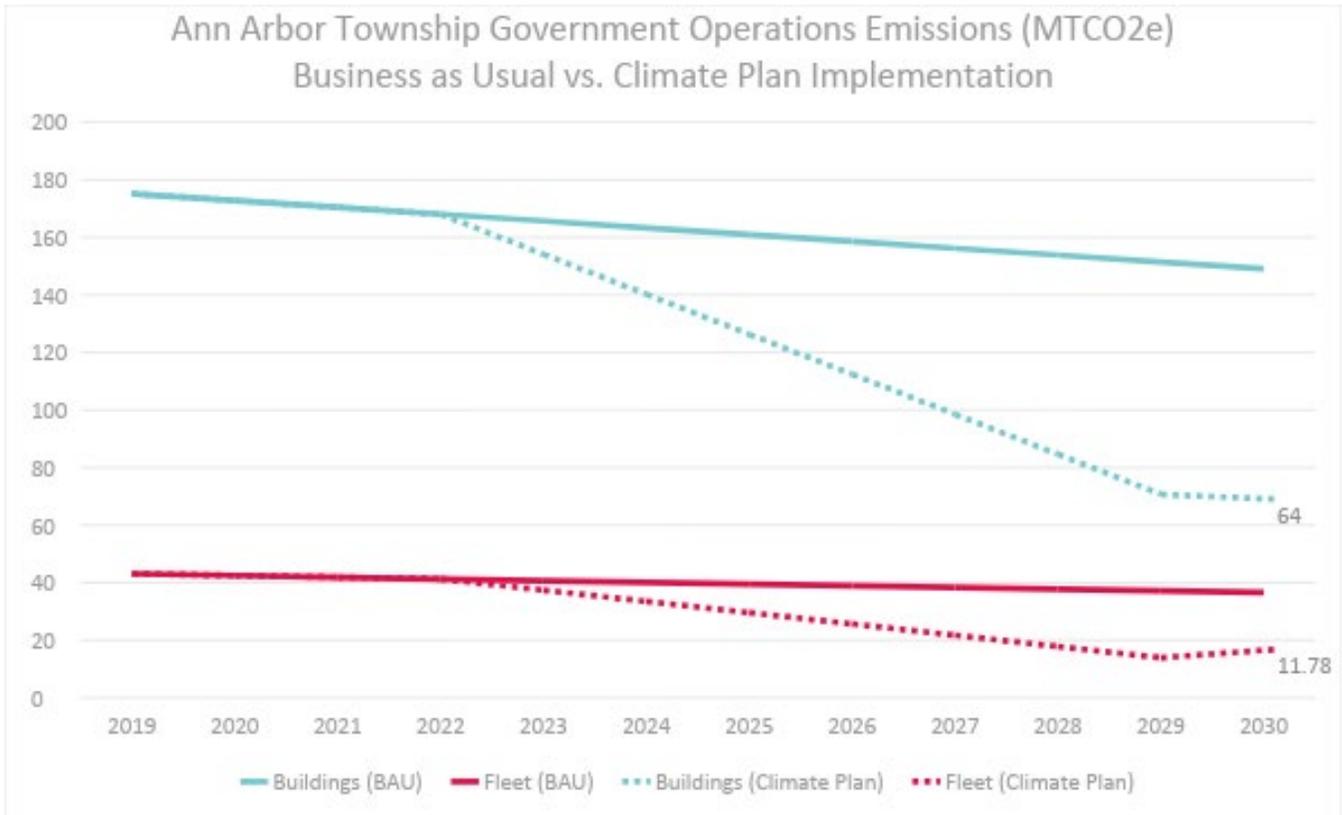
### Township Operations Net Zero Analysis

A net zero analysis compares the Business as Usual (BAU) case with our assumptions of reductions in Building Energy Use, Building Natural Gas Use, Fleet Electrification, and Grid Renewable Energy.

The Township has a recommended goal of reaching carbon neutrality in Township operations by 2030. The current mix of actions in the plan leads towards reductions from the BAU forecast. The graph below shows where different net zeros of emissions will be reduced from the BAU forecast through 2030.

Remaining emissions reductions will come from renewables added to grid-supplied electricity.

Figure 15 - Township Operations Net Zero Analysis



## Community-Wide (CW) Emissions

### Buildings

Business as Usual (BAU) buildings emissions were calculated using SEMCOG growth projections for the County. SEMCOG estimates that county employment is expected to increase by 5.6% while population is expected to grow by 15.5% by 2035. Additional changes to the BAU include expected changes to the number of heating and cooling degree days per year and a grid with more renewables in the fuel mix due to existing policy commitments by the utilities.

Actions modeled to reduce emissions include:

- 50% energy savings through energy efficiency investments in existing buildings. This would be the equivalent of 865 households and 342 commercial and industrial buildings.
- 50% of buildings natural gas or propane use transitioning to electricity use. This would be the equivalent of 721 households and 157 commercial and industrial buildings.
- 50% of all new buildings would be all-electric and energy efficient buildings. This would be the equivalent of 134 new households and 43 commercial and industrial businesses.
- 30% of electricity coming from on-site renewable energy. This would be the equivalent of 599 households and 218 commercial and industrial businesses.

Examples of efficiency investments include:

- Lighting Upgrades: Upgrading from traditional incandescent bulbs to LED lighting can lead to electricity savings of around 75% to 80% for lighting-related consumption.
- Appliance Upgrades: Replacing older, energy-inefficient appliances with Energy Star-rated or other energy-efficient models can result in electricity savings of 10% to 50% per appliance.

- HVAC Improvements: Upgrading to energy-efficient heating, cooling, and ventilation systems can lead to electricity savings of 20% to 50% for HVAC-related consumption.
- Insulation and Sealing: Improving insulation and sealing air leaks can result in electricity savings of 10% to 20% or more by reducing the need for heating and cooling.
- Smart Technologies: Implementing smart thermostats, energy management systems, and other automation technologies can help optimize energy use and lead to electricity savings of around 10% to 20%.

Figure 16 - Township Building Emissions (MTCO<sub>2</sub>e)

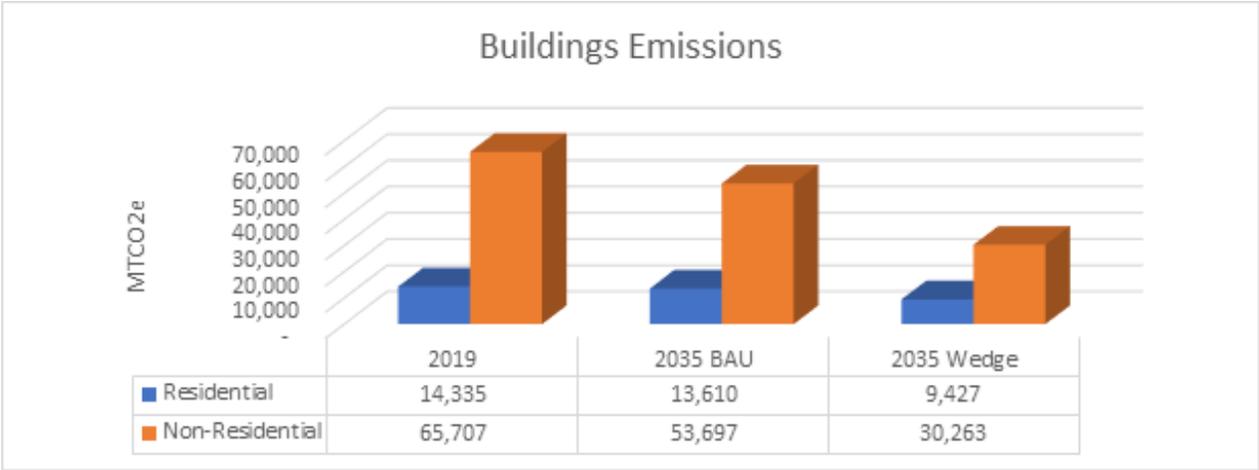


Figure 17 - Township Building Emissions (per square foot)

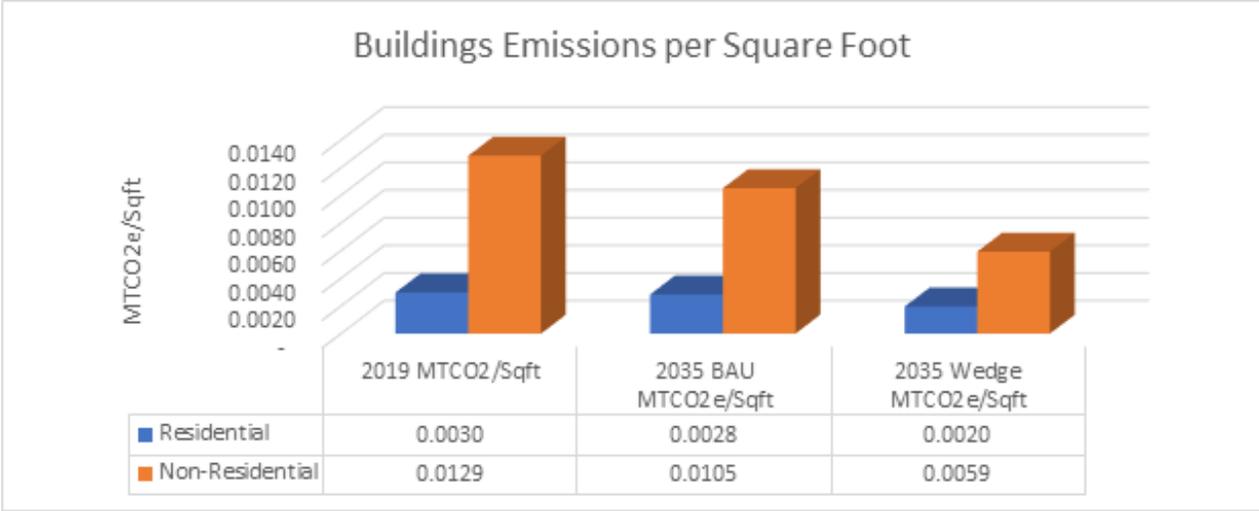
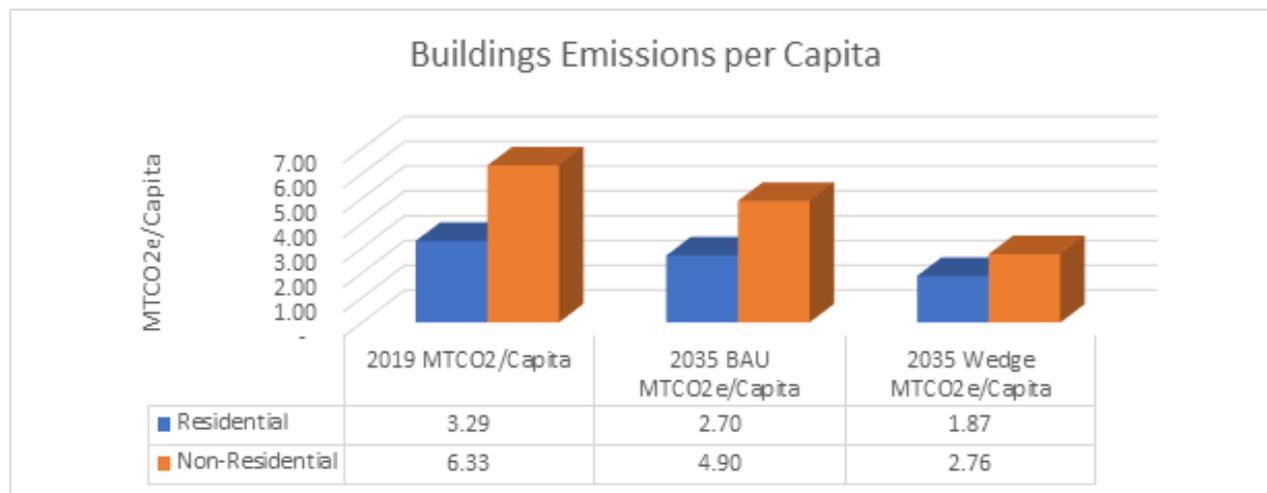


Figure 18 - Township Building Emissions (per capita)



Note: Per Capita for Residential is Population and Per capita for Non-Residential is Jobs

### Transportation

Transportation emissions were calculated as a portion of the County’s emissions based on the daytime population share of Ann Arbor Charter Township compared to the County. Ann Arbor Charter Township has a significant increase in daytime population, indicating a larger share of transportation emissions from commuters into the Township.

Actions taken to reduce emissions include:

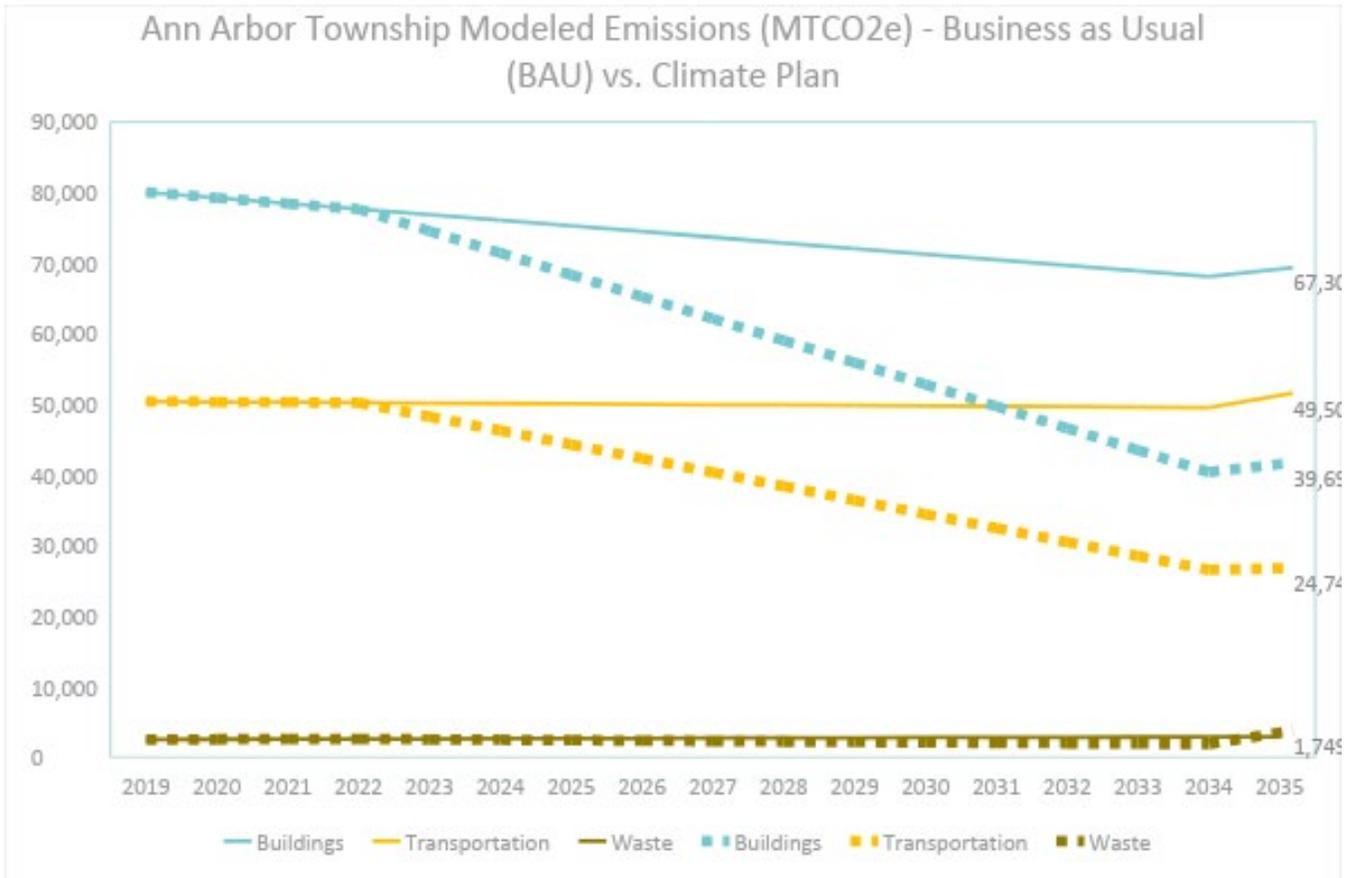
- 20% reduction in vehicle miles traveled within the Township
- 1% of vehicle miles traveled reduced through transit
- 50% of vehicle miles traveled transitioned from gas to electric vehicles
- 20% increase in fuel economy from purchases of more fuel-efficient vehicles than the BAU
- 30% of electric vehicle miles traveled powered by on-site renewable energy at households and commercial and industrial businesses
- 25% of off-road vehicle emissions reduced through a combination of fuel efficiency, transitioning from gas to electric, and electric vehicle miles being powered by on-site renewable energy
- Document start of year and end of year odometer readings for each vehicle and track fuel/energy purchases for vehicles by fuel type (e.g., gas vs. diesel vs. electric).

### Township-wide Net zero Analysis

Using the assumptions noted above, the net zero analysis shows most of the Township-wide emission reductions coming from:

- Grid Renewable Energy - 44,648 MTCO2e reduction by 2035
- Buildings – 27,617 MTCO2e reduction by 2035
- Transportation – 24,759 MTCO2e reduction by 2035
- Waste – 1,180 MTCO2e reduction by 2035
- Carbon Offsets – 21,500 MTCO2e needed in 2035 under these assumptions to meet Net Zero goal.

Figure 19 - Township Net Zero Analysis



The graph above shows estimated emissions under a Business-as-Usual Scenario (BAU) with no implementation of climate actions. Some emissions will go down anyway with more efficient appliances, etc. Modeled emission reductions with implementation of climate actions are shown with dotted lines. These actions significantly increase the emission reductions needed to reach Net Zero. By 2030, with full implementation of recommended climate actions, the Township would still be emitting approximately 66,188 MTCO<sub>2</sub>e. However, outside of the Township’s control, there will be more renewable energy added to the electricity grid and this “greening of the grid” will reduce Building and Fleet emissions by 44,648 MTCO<sub>2</sub>e by 2035. Together, these Climate Actions and a greener grid help to bring modeled emissions in 2035 to 21,540 MTCO<sub>2</sub>e. These emissions would need to be offset to reach net zero in 2035.

### Renewable Energy Certificates and Carbon Offsets

Achieving carbon neutrality (net zero GHG emissions), will require the purchase of renewable energy certificates (RECs) and/or carbon offsets. A REC is a tradeable, market-based instrument that represents the legal property rights to the “renewable-ness”—or non-power (i.e., environmental) attributes—of renewable electricity generation. A REC is created for every megawatt hour (MWh) of electricity generated and delivered to the grid from a renewable energy resource. Electricity cannot be considered renewable without a REC to substantiate its renewable-ness.<sup>42</sup> “Carbon offsets are tradable “rights” or certificates linked to activities that lower the amount of carbon dioxide (CO<sub>2</sub>) in the atmosphere.” (MIT Climate Project). Many rightfully view carbon offsets with skepticism, as the environmental benefits of many carbon offset projects is unverifiable. Any investment in carbon offsets should be done in

<sup>42</sup> USEPA Offsets and RECs: What’s the Difference – February 2018

conjunction with the development of a Washtenaw County-based program with measurable results. Nevertheless, it is not realistic to achieve net zero emissions by 2035 without the use of offsets.

One way the Township could utilize offsets but keep the benefits of those offset local is to purchase property interests in natural areas either in the Township, further away in the County, or a bit more regionally within the Huron watershed. The Township implemented a Purchase of Development Rights program in 2003, and since that time has permanently preserved over 1200 acres of farmland and open space. The preservation of farmland and open space benefits the Township twice over by helping to meet its neutrality goals as well providing climate resilience and the other ecosystem services mentioned at the beginning of this report. Natural lands protected in the Huron watershed will also help protect the cleanliness of the Huron River, which provides drinking water to most of the Township's residents.

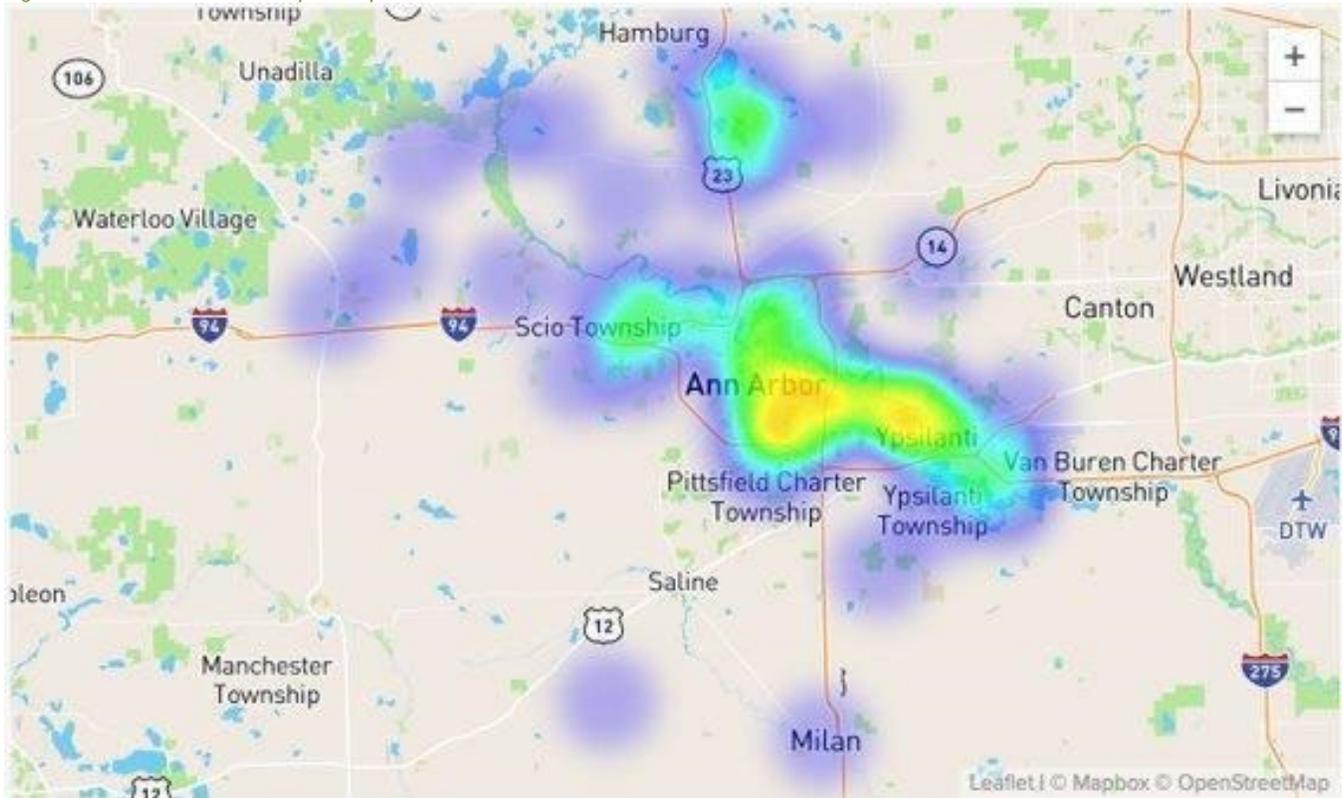
# APPENDIX C – COMMUNITY ENGAGEMENT SUMMARY

Community Engagement for the Ann Arbor Charter Township Climate Action Plan brought forward information gathered from the public during the Resilient Washtenaw process and was supplemented with specific feedback from Township farmers, the Township’s Climate Resilience Committee, the Farmland and Open Space Preservation Committee, Planning Commission, Township Board of Trustees, and the public. The following sections summarize the input provided by the community as a part of this project.

## Resilient Washtenaw – Township Specific Input

During the Resilient Washtenaw outreach efforts, the project team held County Commissioner district meetings across the County. At least three of these meetings were in or near Ann Arbor Charter Township in County Commission District 2. Additional information was also submitted to the Resilient Washtenaw Team from residents of Ann Arbor Charter Township via the CoUrbanize on-line portal. A heatmap of respondents is shown below. Ann Arbor Charter Township residents accounted for 4% of the responses in the Resilient Washtenaw Plan.

Figure 7 - CoUrbanize Heat Map of responses



## Agricultural Interests Meeting

In March of 2023, local farmers were invited to discuss their thoughts on a changing climate and what the Township could do to support local farmers. 12 farmers attended and participated for two hours.

Highlights from the meeting are included below. Some of these areas of interest are not directly related to climate change but are included because of their importance to local farmers.

- Deer - Deer management was a priority concern from the very beginning. More and more deer are causing problems for farmers. The farmers are concerned that land preservation has increased the property available to grow unmanaged herds of deer. They recognize that conservation is a benefit, but it can also have unintended consequences that need to be managed. The farmers noted they have data to document crop loss from deer.
- Moving Farm Equipment – Farmers raised concerns about moving farm equipment and the dangers associated with this seasonal transportation conflict.
- Zoning – Farmers raised concerns about putting homes on 10 acre lots where good agricultural land just sits and grows weeds that blow onto adjacent farmland. Farmers suggested focusing development in areas with sewers. Farmers raised specific examples and concerns about a new development using 200 acres for 50 houses and another where a builder gave 102 acres to the Township.
- Smaller Windows to Farm – The window available for farmers to sow their fields has become smaller, however efficiency has kept farming viable. Yields are higher now with efficiency. Farms and equipment are getting larger. All the farmers in the discussion were local farmers. Several also farmed in adjacent communities as well.
- Concerns About Young Farmers – What can the Township do to support the next generation of farmers?
- Taxes – Farmers raised the concern that Preserved Farmland is still taxed at a high rate and would welcome options to reduce farmland taxes.
- Processing Challenges – Farmers noted that they would like local options to process meats and grain. These processing options would create new businesses in the Township or county and could increase the amount of food grown in the community that stays in the community.
- Insufficient Local Production – Farmers noted that for some foods, there is very little local production (e.g., dairy farms) to supply local demand.
- Fertilizers – Farmers stated that they could use/purchase all organics/compost produced in the community if they knew it was clean. PFAS and other chemicals of concern were discussed as problematic.
- Farmers were concerned about a solar project in another county that took down 125 acres of mature woods. Farmers noted the conflict in that both they and solar developers want 1000 acres of cleared land. Farmers stated they would prefer preserving prime ag land over solar production.
- Carbon Sequestration – Farmers recognize the value of farming for carbon sequestration, noted that they are already farming in climate friendly ways, and would like to see that work recognized. Farmers would like to be involved in developing any local carbon offset program.
- Regular Meetings – Farmers suggested monthly opportunities to meet especially in the off- or mid-season. They suggested broadening the conversation to include the County Conservation District, NRCS, MSU Extension, Biologists from MDNR (e.g., Deer Management), State Climatologist, etc. Farmers suggested including both commodity and small farmers in these meetings and holding the meetings in person to the extent practicable.

### Township Government Participation

The project team engaged with Township Boards and Committees on several occasions. Specifically, the project team met with the following Boards and Committees:

- Scope Development Meeting – Township Climate Resilience Committee – June 8, 2022
- Multi-Board Meeting: Ann Arbor Charter Township Climate Resilience Committee Meeting - February 13, 2023, included members from the Board of Trustees, Planning Commission

- Agricultural Interests Meeting - March 7, 2023
- Insights presented to the Climate Resilience Committee in April 2023
- Township Climate Resilience Committee Meeting - April 12, 2023
- Township Climate Resilience Committee Meeting Aug 9, 2023 – Draft Plan initial review
- Township Climate Resilience Meeting – August 29, 2023 – Revised Draft Review
- Township Climate Resilience Committee Meeting – September 27, 2023 – Action on Draft Plan
- Township Board Draft Plan presentation and review

### Priorities and Strategies Workshop Summary – February 13, 2023

The Project Team met with the Township Climate Resilience Committee, members of the Township Board of Trustees, Planning Commission, and Farmland and Open Space Preservation Committee as well as interested members of the public. The meeting, held on February 13, 2023, was a hybrid meeting, with participants either in-person at Township Hall or on-line via Zoom. The purpose of the workshop was to have a deeper discussion on energy use and transportation, as these are the areas with the largest climate impacts. A summary - including recommendations from the participants - is provided below.

#### Energy Transition Discussion: 100% Renewable Energy Option for Everyone - Discussion

To fully decarbonize the energy system, residents and businesses must have equitable access to 100% renewable energy options from the grid. There are multiple pathways to achieve this. Community Choice Aggregation (CCA) which requires a change in state law and Sustainable Energy Utilities (SEU) are two examples. State law also would need to be changed to allow Townships to form/operate an SEU. The State of Michigan set the following goals: 50% renewable energy by 2030, 60% renewable energy by 2035, and 100% renewable energy by 2040.

The City of Ann Arbor has set 2030 for their target of providing 100% renewable electricity, and it will require a coordinated effort at all levels of government and community support to meet this target in the city and across the rest of the County.

#### Proposed Measures of Success:

- 100% Renewable Energy Options Available to All Residents, Businesses, and Local Units of Government
- Renewable Energy Options Available at or Below Current Cost of Electricity
- Renewable Energy comes from Local Sources

The following opportunities were discussed and are captured in the recommended Climate Actions.

#### Opportunities

- Provide EV charging stations at all Township owned/controlled sites and support EV charging at businesses. (Township Priority 23)
- Partner with local programs for solar group buys for Township residents. (Township Priority 4)
- Place solar on parking lots or other places. (Township Priority 4)
- The Township can purchase green power (MiGreenPower) or enter into EPA's green power partnership for its operations but has limited authority to improve accessibility to or availability of renewable energy from the grid for the broader community. (Township Priority 7)
- For distributed generation, the Township can assist via expedited permitting, adjust zoning to include bonuses for onsite generation, encourage the use of flat roofs for solar use, etc. The Township could also explore options for siting of medium and large-scale renewable energy production within the Township avoiding the use of prime agricultural land. (Township Priority 7)

#### Strategies to reduce building energy use include:

- Build awareness of federal tax credits and utility energy efficiency rebates (Township Priority 3)
- Emphasize HVAC - either heat pumps or geo-exchange technologies. (Township Priority 3)
- Provide energy concierge services - to reduce information and transaction costs for property owners interested in energy efficiency. The Township should partner with the Resilience Authority to leverage concierge services the County provides. (Township Priority 1)
- Increase distributed energy generation via solar – a high proportion of homes in the Township have roof or ground space for plenty of PV. (Township Priority 7)

New federal programs have been created under the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) acts to make funding available for energy efficiency and renewable programs. The State of Michigan MI Healthy Climate Plan may have similar, albeit smaller funding opportunities.

#### Workshop Energy Recommendations Discussion

- The Township should build grant writing and management capacity to take advantage of these new funding opportunities. (Township Priorities 1-4)
- The Township Master Plan Update should require incentives for developers/builders to reduce energy use, install renewable resources, support micro-grids in existing commercial districts, and over build the infrastructure for electric vehicles and EV chargers. (Township Priority 3)
- The Township must ensure that Township staff, including building inspectors, should be fully trained on energy efficiency and distributed energy and should be ambassadors/educators to property owners and trade when performing inspections. (Township Priority 2)

#### Mobility and Access Discussion: Reduce Vehicle Miles Traveled (VMT)

Reduction in VMTs is a very challenging goal, requiring significant behavior change and investments in alternative modes of transportation, specifically transit and safe non-motorized and multimodal routes. Creating these improvements and incentivizing behavior change requires a true multi-jurisdictional approach to mobility planning. The Washtenaw Area Transportation Study (WATS) is the primary transportation planning agency for the County and prepares both the Transportation Improvement Plan and Long-Range Transportation Plan. The Washtenaw County Road Commission (WCRC) maintains and manages the road network within the Township, and the Township works with MDOT on bridges. Washtenaw County Parks and Recreation Commission (WCPRC) oversees the Border-to-Border Trail. The Ann Arbor Area Transportation Authority (AAATA or The Ride) operates the regional transit system. All these agencies must be involved in efforts to reduce the number of VMT in the Township.

#### Proposed Measures of Success:

- Increase the number of lane miles of bicycle and pedestrian facilities by 50% BY 2035 (Township Priority 10)
- Increase the number of miles of designated natural beauty roads within the Township (Township Priority 12)
- Incentivize private and public connections from residential and commercial areas to the Border-to-Border Trail. (Township Priority 10)
- Use VMT calculations to consider carbon price as a part of all road projects and proposed developments. (Township Priority 6)

#### Workshop Transportation Recommendations Discussion

- The Township should prioritize development along existing areas served by transit and improve transit service in more developed areas of the Township. (Township Priority 9)

- The Township should also encourage additional bicycle and pedestrian network improvements, particularly at the boundaries with other jurisdictions. For example, connections such as Nixon Rd. from Huron Parkway approaching M-14 and the Warren Rd. and Joy Rd. bridges should be prioritized to improve non-motorized access. These new infrastructure improvements should be built with commuting in mind (wider and separated paths) and not just recreational uses. (Township Priority 10)