

# Non-Driver ArcGIS Online Application: Methodology and Assumptions

This document provides a description of the methodology and assumptions used in the creation of the WisDOT Non-Driver ArcGIS Online Application.

## Summary of Methodology

Datasets were merged to estimate the percentage of non-drivers in the state of Wisconsin for each county, city, village, town, U.S Census Tract, and U.S. Census Block Group using the following methodology.

1. U.S. Census Bureau geographic data joined with U.S. Census Bureau Income, Sex and Race data.
2. WisDOT Division of Motor Vehicles (DMV) driver license and vehicle registration data extracted and filtered to arrive at the number of drivers in the state.
3. Driver data summarized and geo-located to the appropriate county, city, village, town, U.S Census Tract and U.S. Census Block Group.
4. Non-driver estimate calculated by subtracting the overall population of a geometry (for example, a city, or a block group) from the number of drivers in that same geometry and assigning a percentage range value based on the calculated value.

Example calculation for illustrative purposes only:

1000 people live in town x, and 850 drivers are identified

(Total Population - Drivers) = Non-Drivers

- $1000 - 850 = 150$

Non-Drivers/Total Population = Non-Driver percentage estimate (all ages)

- $150 / 1000 = 15\%$

Sort non-driver percentage estimate into nearest range category (e.g., 0-10%, 10-20%, etc.)

- 15% falls into the 10-20% category, thus the 10-20% category is assigned to town x.

## Geographic Data

The Non-Driver ArcGIS Online Application utilizes the data sources below to establish the city, village, town, county, U.S. Census tract, and U.S. Census block group geometries displayed within the Non-Driver ArcGIS Online Application.

1. **U.S. Census Bureau - [TIGER/Line Shapefiles \(census.gov\)](https://www.census.gov)**
  - a. 2020 Census Tracts
  - b. 2020 Census Block Groups
  - c. Wisconsin Counties
2. **[Wisconsin State Legislature's GIS Open Data Portal](#)**
  - a. Wisconsin Cities, Villages, and Towns (July 2021 collection)

## U.S. Census Bureau Attribute Data

The application displays selected attributes from the [2016-2020 American Community Survey \(ACS\) 5-Year Estimates](#). The table locations and descriptions of these attributes are described below.

1. Income Data
  - a. ACS Table identification number B19013
  - b. MEDIAN HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2020 INFLATION-ADJUSTED DOLLARS)
2. Sex by Age
  - a. ACS Table identification number B01001
  - b. SEX BY AGE
3. Race
  - a. ACS Table identification number B02001
  - b. RACE

For more information about ACS data and accuracy, refer to these U.S. Census websites:

- [American Community Survey Multiyear Accuracy of the Data \(5-year 2016-2020\) \(census.gov\)](#)
- [Code Lists, Definitions, and Accuracy \(census.gov\)](#)

## WisDOT Division of Motor Vehicles (DMV) Data

The application makes use of two datasets managed and maintained by the Wisconsin Department of Transportation Division of Motor Vehicles (DMV)—the driver dataset and the vehicle registration dataset.

1. Driver dataset: contains driver licenses issued in the state of Wisconsin
  - a. The following records were excluded from the driver dataset for use in the ArcGIS application:
    - i. Deceased individuals
    - ii. People who have moved out of the state as confirmed by another state
    - iii. Primary address is not Wisconsin
    - iv. Identification (ID) Card holders
    - v. Driver license expired for more than one year
2. Vehicle dataset: contains vehicle registrations in the state of Wisconsin
  - a. The following records were excluded from the vehicle dataset for use in the application:
    - i. Primary owner or lessee is not an individual
    - ii. Vehicle is flagged as “junk” (i.e., an inoperable vehicle)
    - iii. Vehicle types that cannot be driven independently (e.g., trailers)
    - iv. Vehicle registration has been expired for more than one year

An active driver is defined as an individual in the driver dataset that could be matched to a vehicle in accordance with the following logic:

- a. A valid driver and a valid vehicle match based on a unique DMV customer number (primary key).

- b. A Driver primary address matches to a Vehicle primary owner address
- c. A Driver primary address matches to a Vehicle lessee address
- d. Regardless of the number of vehicles a driver owns or has access to, once a driver-vehicle match is found, the driver is considered a “driver” and removed from further attempts to find a vehicle match. This ensures each driver is only counted once.
- e. After all driver records were assembled, any address with more than 3 drivers had the additional driver records removed from the dataset.

Non-drivers are individuals who 1.) do not hold a driver license or 2.) who do hold a driver license but cannot be reliably matched to a vehicle.

## Notes about data quality:

WisDOT has identified several factors that could affect data quality in some geometries:

- The U.S. Census Bureau calculates a margin of error for the data that it produces. Margin of error (MOE) is a measure of the possible variation of the estimate from the actual population value. The estimate and the actual population value will differ by no more than the value of the MOE at a 90% confidence level.
- Geocoding addresses relies on an automated process and is estimated to produce a 1-3% margin of error when locating an address.
- The data contained within the application has been obtained from multiple sources; each source has different data collection principles and refreshes data on different time horizons.
  - The Non-Driver application uses population data from the U.S. Census 2020 American Community Survey (ACS). The 2020 ACS estimates data for geometries based on the 2020 U.S. Census and ACS estimation models.
  - The Wisconsin driver data profile is from January 2021 point in time.
  - The integration of recently released 2020 U.S. Census population data is anticipated to produce estimates more in line with current WisDOT driver data.
- Individuals may relocate into, out of, and within the state of Wisconsin.
  - WisDOT updates addresses based on driver self-reported address changes or quarterly based on address changes reported by the United States Postal Service (USPS) via the National Change of Address process. This can change approximately 1-2% of addresses within the Wisconsin driver dataset each quarter.
  - A driver that moved out of state is not removed from the dataset until another state notifies WisDOT that the driver has registered for a license with the new state. The notification timeline can vary depending on the reporting state and may account for approximately 1% of drivers in the statewide driver dataset.
  - Individuals that move to the state of Wisconsin are not represented in this dataset until they have been issued a Wisconsin driver’s license and/or have registered a vehicle.
- This application relies on an indirect method of determining whether an individual is a non-driver.
  - Non-drivers are individuals who 1.) do not hold a driver license or 2.) who do hold a driver license but cannot be reliably matched to a vehicle.

## Definitions

**ArcGIS Online (AGO)**- is an online geographic information system service developed and maintained by Esri. The Non-Driver ArcGIS Online Application is hosted on ArcGIS Online.

**Attribute Table-** In ArcGIS Online, an attribute table displays application data in a tabular format. The Non-Driver ArcGIS Online Application allows users to download attribute tables in formats compatible with other applications (e.g., Microsoft Excel).

**Census Block Groups-** Census block groups are statistical divisions of census tracts, are generally defined to contain between 600 and 3,000 people and are used to present data and control block numbering.

**Census Tracts-** Census tracts are small, relatively permanent statistical subdivisions of a county or equivalent entity that are updated by local participants prior to each decennial census as part of the Census Bureau's Participant Statistical Areas Program. The primary purpose of census tracts is to provide a stable set of geographic units for the presentation of statistical data. Census tracts generally have a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people.

**Geometry-** Geometries represent real-world objects or areas by defining a shape at a specific geographic location. They are used throughout the application to represent the shapes of, for example, counties, cities, villages, towns, census tracts, census block groups, and tribal lands.

**Layer-** In ArcGIS, layers are collections of geographic data. Layers reference a data source, and if ArcGIS interprets data as spatial, the data's properties and attributes specify how the layer draws on the map. Data gathered in a layer is represented with points, lines, shapes (polygons), or surfaces.

**Non-Driver-** Non-driving populations can include aging adults, students, low-income individuals, those with physical, mental or intellectual/developmental disabilities, those ineligible to drive, those with no access to a vehicle, or those who prefer not to drive.