REGIONAL FREIGHT TRANSPORTATION PLAN UPDATE

ENVIRONMENTAL AND COMMUNITY IMPACT SCAN AND ANALYSIS

OCTOBER 30, 2023

CORE
COASTAL REGION MPO

Regional Freight Transportation Plan Update

Environmental and Community Impact Scan and Analysis

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1 INTRODUCTION

The Coastal Region Metropolitan Planning Organization (CORE MPO) region serves as a gateway for global trade and for freight movement in the Southeast, due in large part to the Port of Savannah – the nation's 4th largest container port. In addition to the Port of Savannah, the region contains a comprehensive multimodal network of freight railroads and railyards, major highways, cargo-serving airports, as well as a substantial warehousing/distribution/logistics industry to manage freight movements over that network. In addition, the region is an emerging manufacturing hub for businesses looking to create and ship a diverse portfolio of finished products to clients around the globe. Overall, goods movement in the Savannah region has a major impact on the regional and state economy.

In support of the region's multimodal freight network and the people and businesses that rely on it, the CORE MPO is conducting an update of its Regional Freight Transportation Plan. The purpose of this memorandum is to characterize the impacts of goods movement on the environment and community. This report first performs a freight equity analysis. This analysis describes how the impacts vary in different parts of the CORE MPO region, identifies communities that are disproportionately impacted, and quantifies the magnitude of those impacts. It then performs an environmental impacts analysis that examines freight impacts to wildlife habitats, wetlands, national parks, and other natural resources. Lastly, the report develops preliminary strategies for addressing freight equity and environmental challenges. Preliminary strategies include a range of actions that CORE MPO may take as well as examples of best practices from peer regions facing similar challenges.

Much of the analysis presented in this technical memorandum focuses on the negative externalities of freight for the purpose of developing strategies to avoid and mitigate those negative outcomes from an equity and environmental standpoint. However, it is important to note that freight also delivers substantial value to communities in the form of jobs, a lower cost of living, and economic development. The Task 4 technical memorandum discusses the economic benefits of freight and freight-related industries in detail. Because of this, it is important that the final strategies and recommendations include methods that simultaneously enhance the positive outcomes of freight while minimizing negative impacts.

2 FREIGHT EQUITY IMPACTS ANALYSIS

Transportation equity seeks fairness in mobility and accessibility to meet the needs of all community members[1]. A core tenet of transportation equity is ensuring that the benefits and burdens of the transportation system are equitably distributed. Under Executive Order 13985, equity is defined as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.[2] Executive Orders 12898[3] and 13985 direct federal agencies, including the U.S. Department of Transportation (USDOT), to take steps to advance equity for all.

The CORE MPO Regional Freight Transportation Plan is a critical vehicle for the region to advance transportation equity. Compared to passenger travel, freight transportation has a higher marginal impact on surrounding communities. This is because of freight transportation's contribution to increased noise, higher emissions, reduced safety (as crash outcomes are typically more severe), infrastructure degradation, and often reduced mobility and accessibility (as freight corridors can act as physical barriers) for the communities adjacent to freight assets. Advancing transportation equity within a freight context is challenging. The benefits of freight are diffuse as they are broadly distributed across geography and stakeholders. Meanwhile, the burdens of freight tend to be localized and disproportionately borne by communities adjacent to freight assets. Developing a freight program that delivers benefits to burdened communities while mitigating or avoiding negative impacts is no small task.

2.1 Identification of Disadvantaged Communities

Two sources were used to define and identify disadvantaged communities, the CORE MPO's Environmental Justice Plan (2019 Update) and the USDOT's Transportation Disadvantaged Census Tracts (Historically Disadvantaged Communities) geodatabase. Both sources provide rigorous methodologies for identifying disadvantaged communities. Importantly, the USDOT-defined "Historically Disadvantaged Community" is consistent with the federal Justice40 Initiative and the guidelines of the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Discretionary Grant program.[4] Both sources are discussed in detail in the sections that follow.

Locally Defined Environmental Justice Areas

In its Environmental Justice Plan, developed in 2002 and most recently updated in 2019, CORE MPO outlined its approach to environmental justice. Included in the approach was the methodology used to identify environmental justice (EJ) populations. The Environmental Justice Plan identified target EJ

[1] FHWA, Transportation Planning and Capacity Building. Transportation Equity. https://www.planning.dot.gov/planning/topic_transportationequity.aspx.

[2] Federal Register Vol. 86, No. 14, Monday, January 25, 2021. Presidential Documents: Executive Order 13985 of January 20, 2021. https://www.govinfo.gov/content/pkg/FR-2021-01-25/pdf/2021-01753.pdf.

[3] Federal Register Vol. 59, No. 32, February 16, 1994. Presidential Documents: Executive Order 12898 of February 11, 1994. https://www.govinfo.gov/content/pkg/FR-1994-02-16/html/94-3685.htm

[4] https://www.transportation.gov/RAISEgrants/raise-app-hdc

populations as minority populations (African Americans, Hispanic populations, Asian Americans, American Indians and Alaskan Natives, Native Hawaiian or Other Pacific Islanders, and people with two or more races) and low-income populations (persons below poverty).

The Environmental Justice Plan defined thresholds for identifying EJ populations at the Census tract level. The thresholds are based on the regional shares of the EJ populations and are updated as new data from the Decennial Census and the American Community Survey are provided by the U.S. Census Bureau. Census tracts with shares of minority populations and/or low-income populations that exceed the regional shares are designated as EJ areas. The EJ thresholds based on data from the 2020 Decennial Census and the 2016-2020 American Community Survey 5-Year Estimates is shown in Table 2.1.

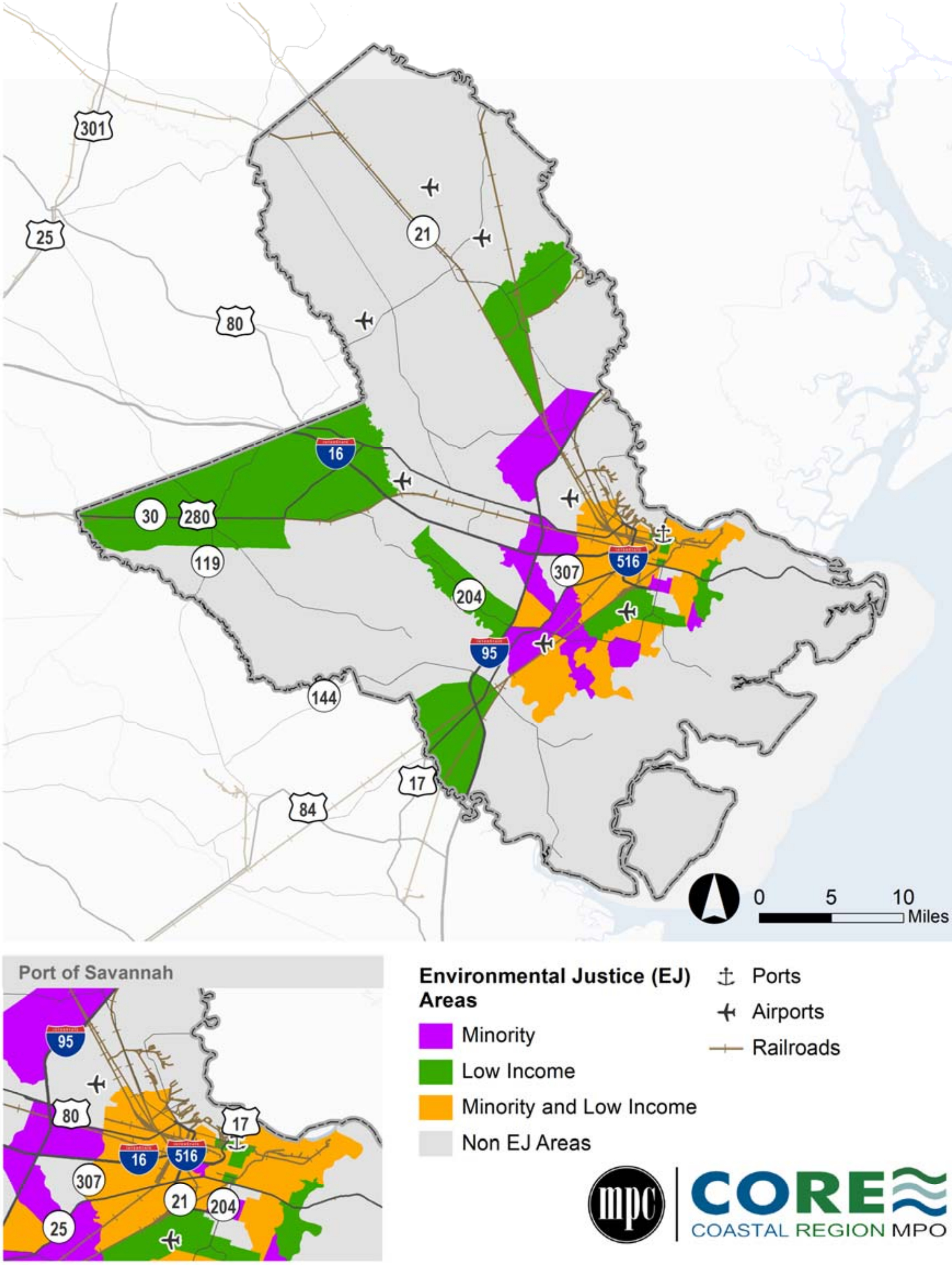
TABLE 2.1 THRESHOLDS OF CORE MPO EJ TARGET POPULATIONS, 2022

Census Population	Bryan	Chatham	Effingham	Savannah MSA	Threshold
2020 Total Population	44,738	295,291	64,769	404,798	
Not Hispanic or Latino - White Alone	31,321	139,433	48,204	218,958	
Minority - All Others	**13,417**	**155,858**	**16,565**	**185,840**	**45.9%**
2016-2020 ACS 5-Year Estimates Total Estimated Persons for Poverty	38,069	277,048	61,602	376,719	
2016-2020 ACS 5-Year Estimates Total Estimated Persons below Poverty Level	**3,927**	**39,940**	**4,530**	**48,397**	**12.8%**

Source: U.S. Census Bureau, 2020 Decennial Census and the 2016-2020 American Community Survey 5-Year Estimates; Cambridge Systematics, Inc. analysis.

The region's EJ target areas based on the thresholds defined in Table 2.1 are depicted in Figure 2.1. Consistent with the Environmental Justice Plan (2019 Update), minority concentrated areas are primarily located in Chatham County. In particular, these include areas within Savannah's urban core, the north side of Ardsley Park, and several neighborhoods just south of DeRenne Avenue. Other areas with higher shares of minority populations include Garden City south of Smith Avenue along SR 21 and SR 25, areas along Veterans Parkway, areas surrounding Hunter Army Airfield, and areas south of Montgomery Cross Road along SR 204. Because of the rapid development in west Chatham County, minority concentrated areas also expand into Port Wentworth, Pooler, and West Savannah along the SR 21 corridor.

FIGURE 2.1 ENVIRONMENTAL JUSTICE TARGET AREAS, 2020



Source: U.S. Census Bureau, 2020 Decennial Census and the 2016-2020 American Community Survey 5-Year Estimates; Cambridge Systematics, Inc. analysis.

Low-income areas are defined as those Census tracts with a share of the population below poverty level larger than the regional share of 12.8 percent. The areas around the City of Richmond Hill in Bryan County and those Census tracts north of Fort Steward were identified as an environmental justice area based on income. Also in Bryan County, the areas along U.S. 280 and I-16 (near the City of Pembroke, the Ellabell community, and the Black Creek community) were identified as environmental justice areas based on their share of low-income populations. In Effingham County, income-based environmental justice areas were identified around the Cities of Rincon and Springfield. In Chatham County, several Census tracts meet the thresholds for both minority and low-income environmental justice designations as shown in Figure 2.1. Examples include the Savannah urban core, portions of Garden City, areas around the Savannah Mall, and areas around the US 17/SR 204 interchange area.

USDOT Defined Disadvantaged Communities

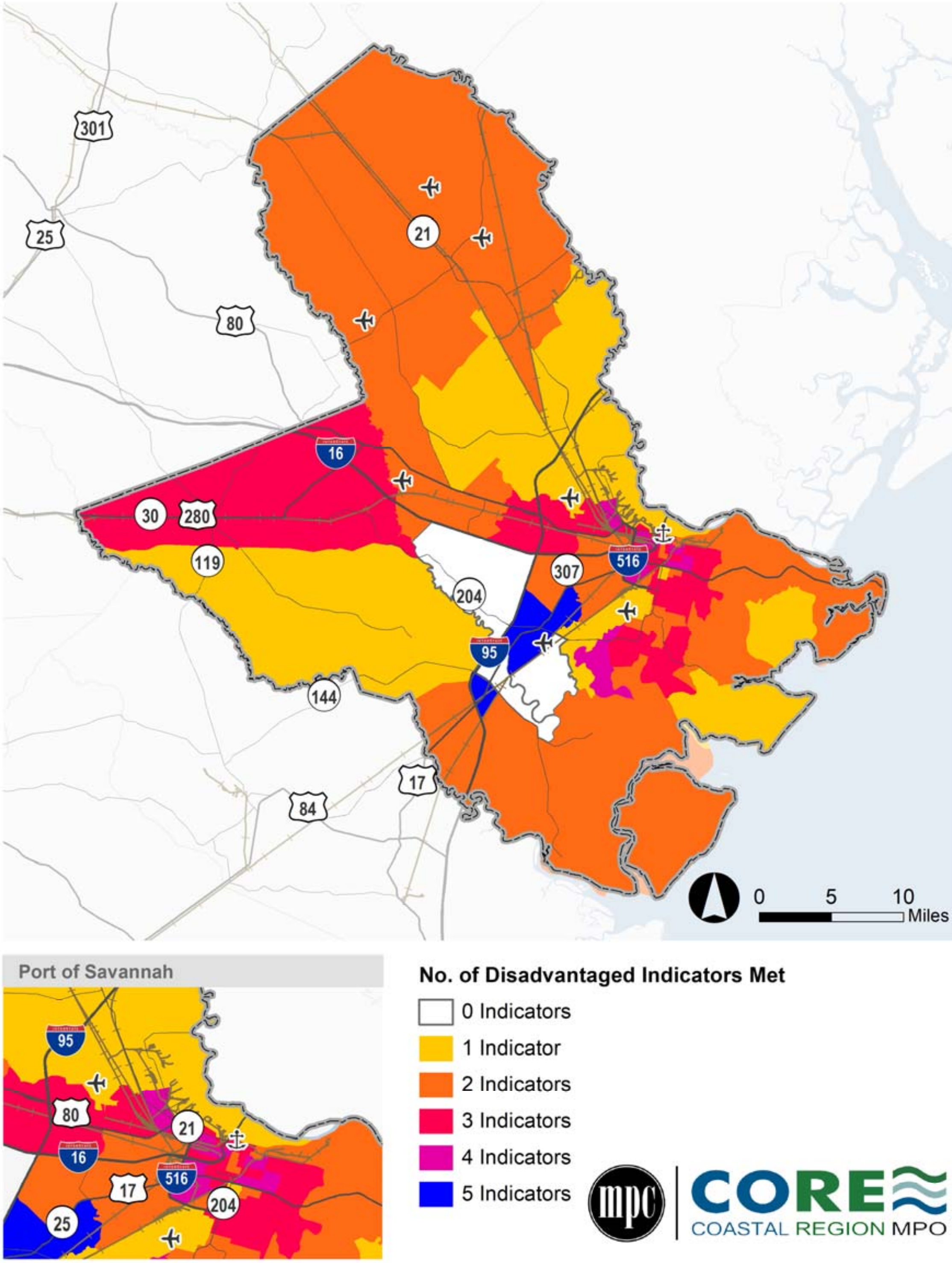
Transportation equity seeks to ensure that the benefits and burdens of the transportation system are equitably distributed and to provide fairness in mobility and accessibility to meet the needs of all community members. Under Executive Order 13985, equity is defined as the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment. The USDOT classifies Census tracts as disadvantaged or non-disadvantaged according to six indicators using publicly available data from various sources:[5]

- **Transportation Access disadvantage** identifies communities and places that spend more, and take longer, to get where they need to go.
- **Health disadvantage** identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures.
- **Environmental disadvantage** identifies communities with disproportionate pollution burden and inferior environmental quality.
- **Economic disadvantage** identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality.
- **Resilience disadvantage** identifies communities vulnerable to hazards caused by climate change.
- **Equity disadvantage** identifies communities with a high percentile of persons (age 5+) who speak English "less than well."

A Census tract is considered disadvantaged if it exceeds the 75th percentile for the resilience indicator and the 50th percentile for all others. Figure 2.2 shows the number of disadvantaged indicators met by the region’s Census tracts.

[5] CDC Social Vulnerability Index, Census America Community Survey, EPA Smart Location Map, HUD Location Affordability Index, EPA EJ Screen, FEMA Resilience Analysis & Planning Tool, and FEMA National Risk Index.

FIGURE 2.2 INDICATORS FOR HISTORICALLY DISADVANTAGED COMMUNITIES, 2022



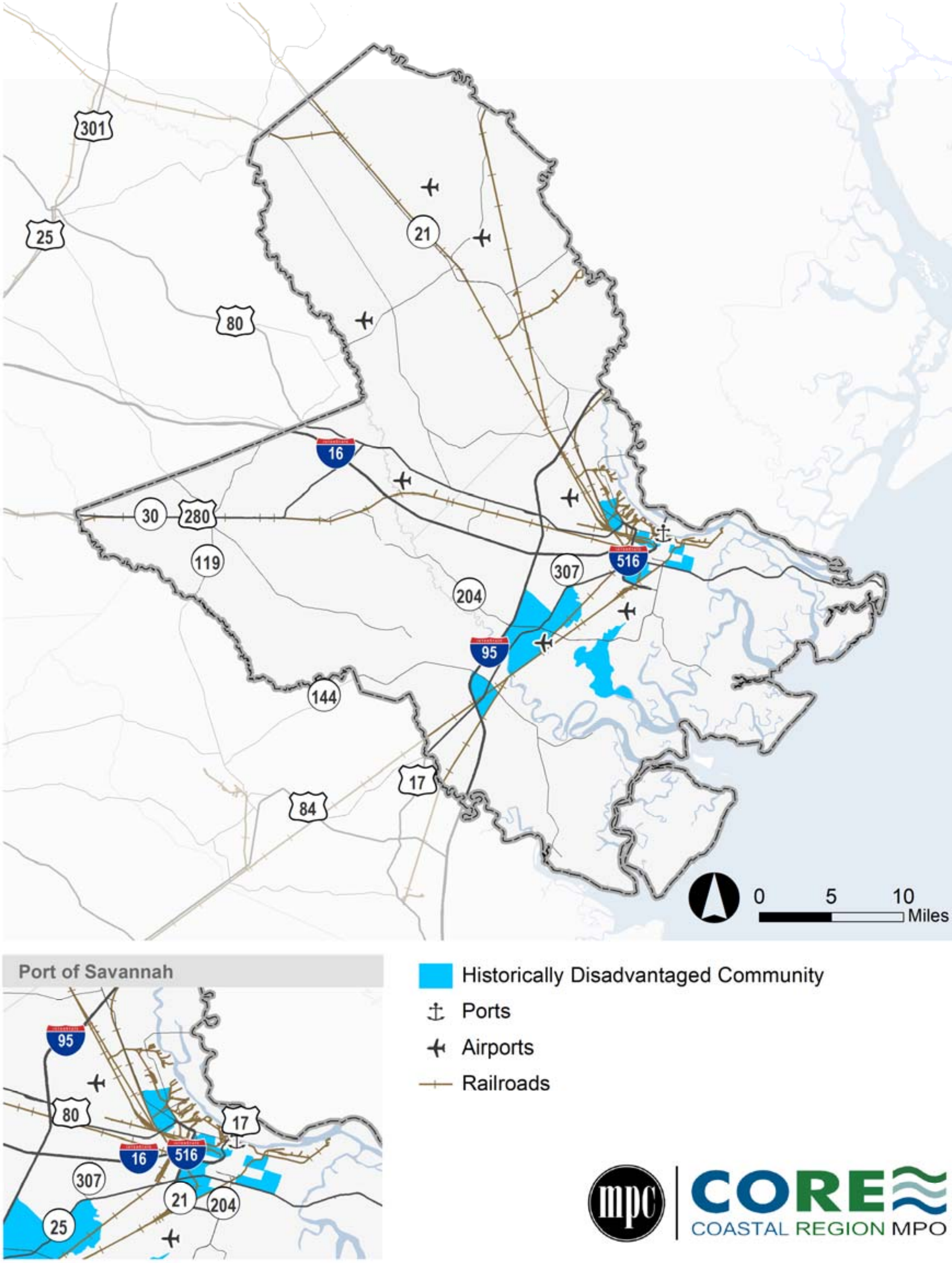
Source: U.S. Department of Transportation.

If a Census tract meets the criteria for four or more indicators, then it is classified as a disadvantaged community. Figure 2.3 shows historically disadvantaged communities in the CORE MPO region in relation to the multimodal freight transportation network. These communities are primarily clustered around six areas of the region:

- The Garden City area – east of the Norfolk Southern rail line, west of SR 25, north of Louisville Road, and south of SR 307.
- The west Savannah area – east I-516, west of Martin Luther King, Jr. Blvd., south of Bay Street, and north of DeRenne Ave./I-516.
- The east Savannah area – west of Truman Parkway, east of Price Street, north of Victory Drive, and south of Wheaton St.
- Wilshire Estates area – west of Middleground Road, east of Rio Road, south of Perimeter Road, and north of Abercorn Street.
- US 17 corridor in south Chatham County – the areas along US 17/Ogeechee Road from the Bryan County line to SR 307/Dean Forest Road.
- Richmond Hill area – the area bounded by SR 144, I-95, and the CSX Transportation rail line.

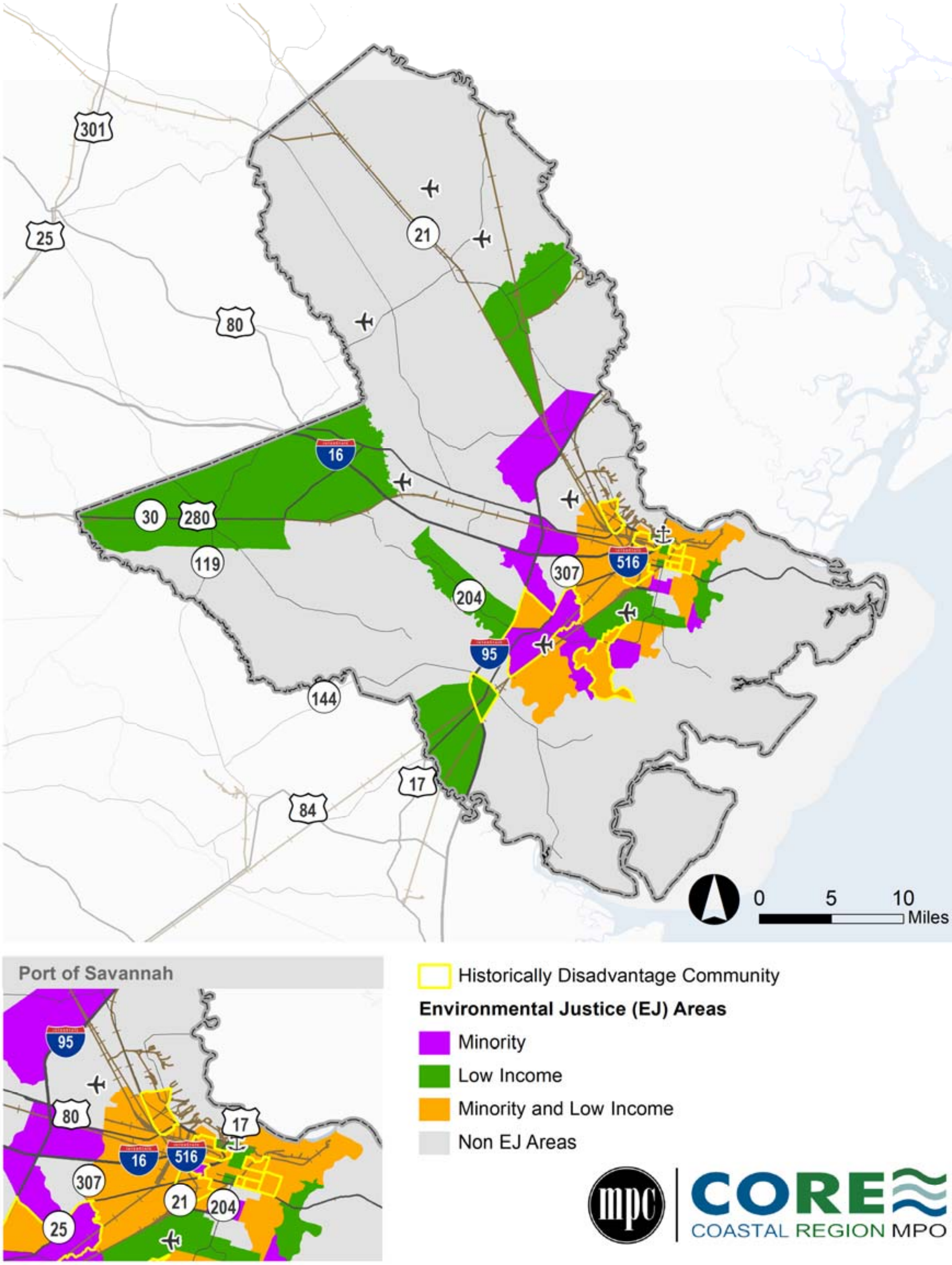
As shown in Figure 2.4, all of these areas overlap with the region's environmental justice areas.

FIGURE 2.3 HISTORICALLY DISADVANTAGED COMMUNITIES, 2022



Source: U.S. Department of Transportation.

FIGURE 2.4 ENVIRONMENTAL JUSTICE TARGET AREAS AND HISTORICALLY DISADVANTAGED COMMUNITIES, 2022



Source: U.S. Census Bureau, 2020 Decennial Census and the 2016-2020 American Community Survey 5-Year Estimates; U.S. Department of Transportation; Cambridge Systematics, Inc. analysis.

2.2 Impacts to Environmental Justice Areas and Disadvantaged Communities

Freight transportation brings positive and negative impacts to a community. Job creation and access to goods can improve quality of life, while exposure to pollutants and noise can damage health outcomes. Increased traffic due to freight activity may also impact crash rates or severity, especially if facilities are not designed to accommodate mixing freight, passenger, and non-motorized traffic. The analysis presented in this section compares negative freight impacts across communities. This analysis primarily focuses on the distribution of the negative impacts related to highway infrastructure because this is the mode and network for which data are available, and negative impacts present the greatest opportunity for CORE MPO planning consideration. Highway, rail, maritime ports, airports, border ports-of-entry, and industrial land uses all have positive and negative impacts on the general population. The following indicators were used to capture negative impacts:

- **Congestion and Reliability.** These indicators include measures that describe how congestion and unreliable truck travel times are distributed throughout the region.
- **Freight Activity.** These indicators characterize how trucking, freight rail, and waterborne freight activity is distributed throughout the region.
- **At-Grade Rail Crossing.** These indicators include measures that characterize the concentration of at-grade rail crossings and crossing incidents in communities.
- **Roadway Safety.** These indicators describe how crashes involving trucks vary throughout the region.

Importantly, though not within the scope of this analysis, noise is also an important impact to communities. Freight facilities and vehicles can generate significant noise, with loading and unloading equipment and 24-hour operations contributing to noise pollution in areas surrounding freight-intensive uses.

It should also be noted, that though the indicators included in this analysis were selected to focus on freight and to reflect components of the freight network that the CORE MPO could potentially impact though project and policy interventions, they are not exhaustive. The Climate and Economic Justice Screening Tool[6], USDOT Equitable Transportation Community Explorer[7], and the U.S. Environmental Protection Agency's (EPA) EJScreen[8] tool all provide additional indicators and resources that could be incorporated into a future analysis of freight equity. These tools would also prove useful for a broader analysis of transportation equity as part of future updates to the region's Metropolitan Transportation Plan.

Congestion and Reliability Impacts

To determine the impact of freight congestion on equity focus areas, this analysis examines the truck buffer time index (BTI) and truck travel time index (TTI) in disadvantaged versus non-disadvantaged communities. Specifically, this analysis uses truck travel time data from the 2021 NPMRDS database to calculate the truck BTI and TTI for the CORE MPO region. The BTI is the ratio of the difference between the 95th percentile

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6 https://screeningtool.geoplatform.gov/en/methodology#3/33.47/-97.5

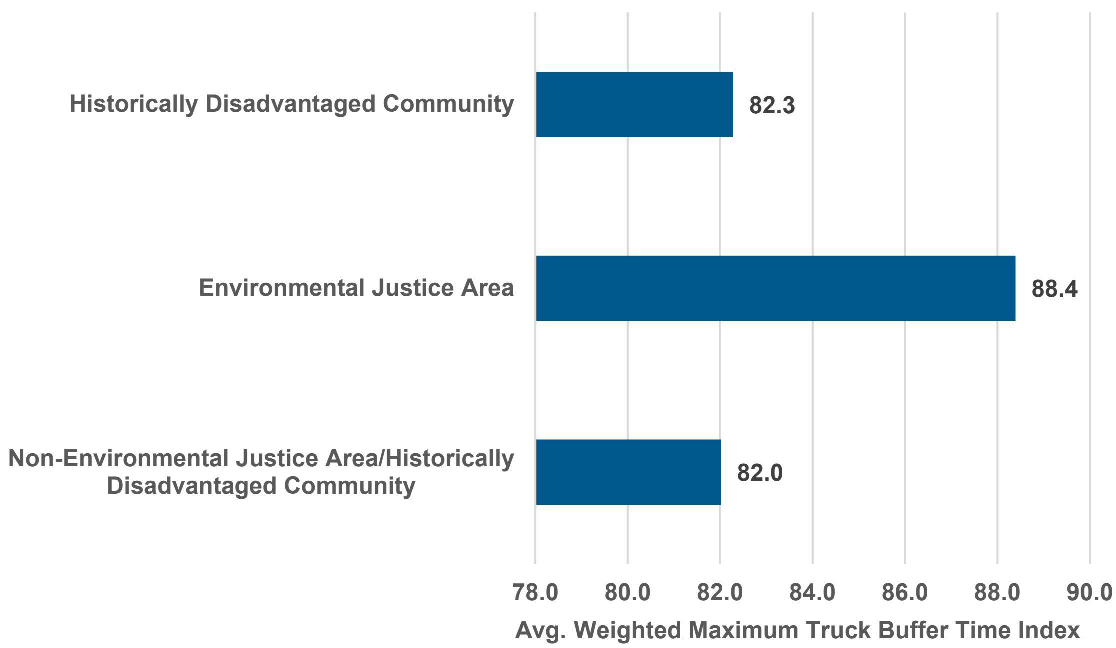
7 https://www.transportation.gov/priorities/equity/justice40/etc-explorer

8 https://www.epa.gov/ejscreen

truck travel time and average travel time to the average travel time: ((95th Percentile Travel Time – Average Travel Time) / Average Travel Time) x 100%. Thus, the BTI represents the extra time (i.e., buffer) that must be factored into scheduling to ensure an on-time arrival for 95 percent of truck trips. A lower buffer time index indicates that expected travel delays are minimal and additional time may not be required to travel through a corridor. A higher BTI indicates the opposite, that extra travel time is needed to traverse a corridor. For example, a BTI equal to 50 percent indicates that a trip that on average takes 30 minutes would need an extra 15 minutes (for a total scheduled travel time of 45 minutes) to reach its destination on time. Buffer time is a useful measure of reliability, especially for the CORE MPO region, because it provides an indication of the extra cost in terms of travel time that is imposed on motor carriers. This impacts schedules, workforce size, and the number of trucks motor carriers send over the road.

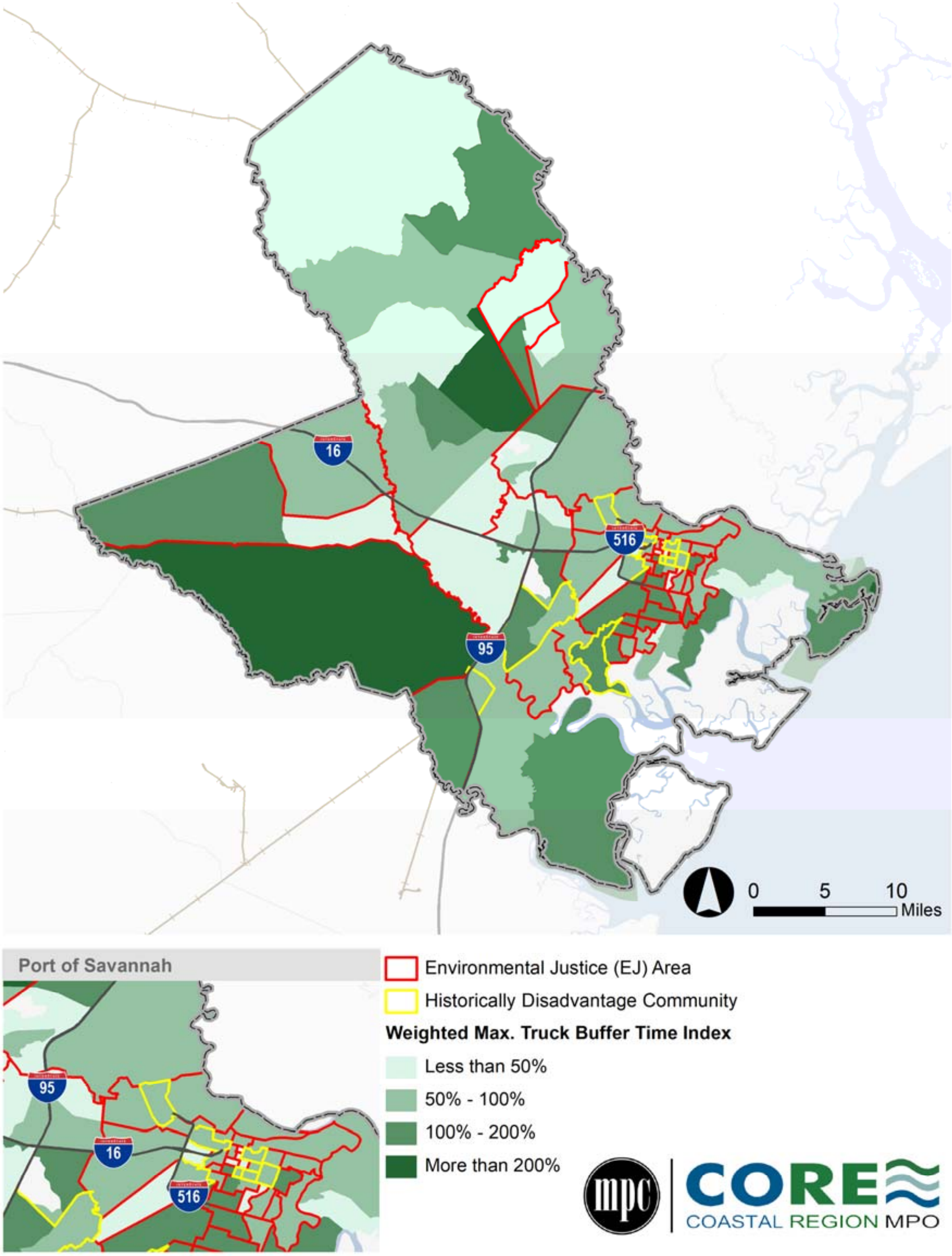
Figure 2.5 and Figure 2.6 show how truck BTI varies across communities in the CORE MPO region. The truck BTI values shown in Figure 2.5 are the maximum values calculated across four time periods: AM Peak (6 a.m.–10 a.m. Monday–Friday), Midday (10 a.m.–4 p.m. Monday–Friday), PM Peak (4 p.m.–8 p.m. Monday–Friday), Overnight (8 p.m.–6 a.m. Monday–Friday), and Weekend (6 a.m.–8 p.m. Saturday–Sunday). Furthermore, they are weighted averages according to the length of roadway miles in each community as indicated by the NPMRDS database. The results indicate that EJ areas on average experience truck travel times that are less reliable than non-EJ area/historically disadvantaged communities.

FIGURE 2.5 AVERAGE WEIGHTED MAXIMUM TRUCK BUFFER TIME INDEX ACROSS COMMUNITIES



Source: National Performance Management Research Data Set; Cambridge Systematics, Inc.

FIGURE 2.6 MAP OF AVERAGE WEIGHTED MAXIMUM TRUCK BUFFER TIME INDEX ACROSS COMMUNITIES



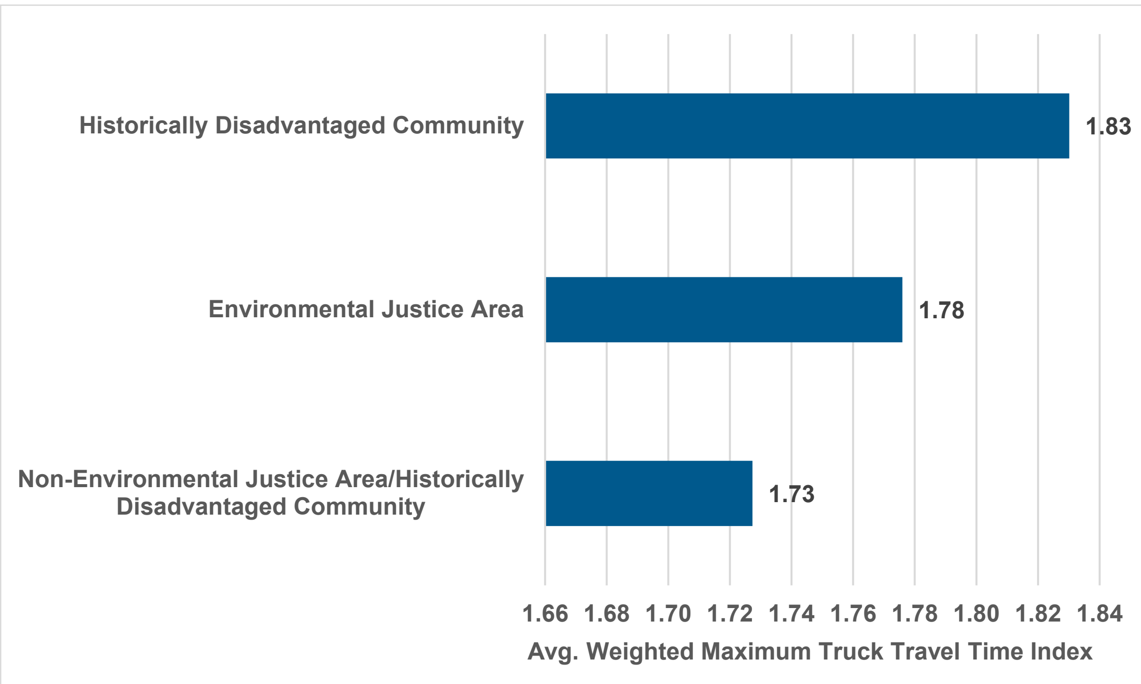
Source: National Performance Management Research Data Set; Cambridge Systematics, Inc.

Travel time index (TTI) is a commonly used measure of congestion intensity on a roadway network. It is expressed as the ratio of the average travel time to the reference travel time: Average Truck Travel Time /

Reference Speed Truck Travel Time.[9] Thus, TTI reflects the degree to which speeds decline during peak periods. A low truck TTI indicates that that the peak and off-peak travel periods have generally the same level of intensity, and that variability between these time periods is minimal. Conversely, a high TTI indicates that peak period performance is much worse relative to its off-peak performance. For instance, a TTI equal to 1.6 indicates that travel times during peak periods are 60 percent longer than during free flow conditions.

Figure 2.7 and Figure 2.8 show how truck TTI varies across communities in the CORE MPO region. The truck TTI values shown in Figure 2.5 are the maximum values calculated across the same four time periods as the truck TTI. Furthermore, they are weighted averages according to the length of roadway miles in each community as indicated by the NPMRDS database. The results indicate that EJ areas on average experience more intense truck congestion than non-EJ area/historically disadvantaged communities.

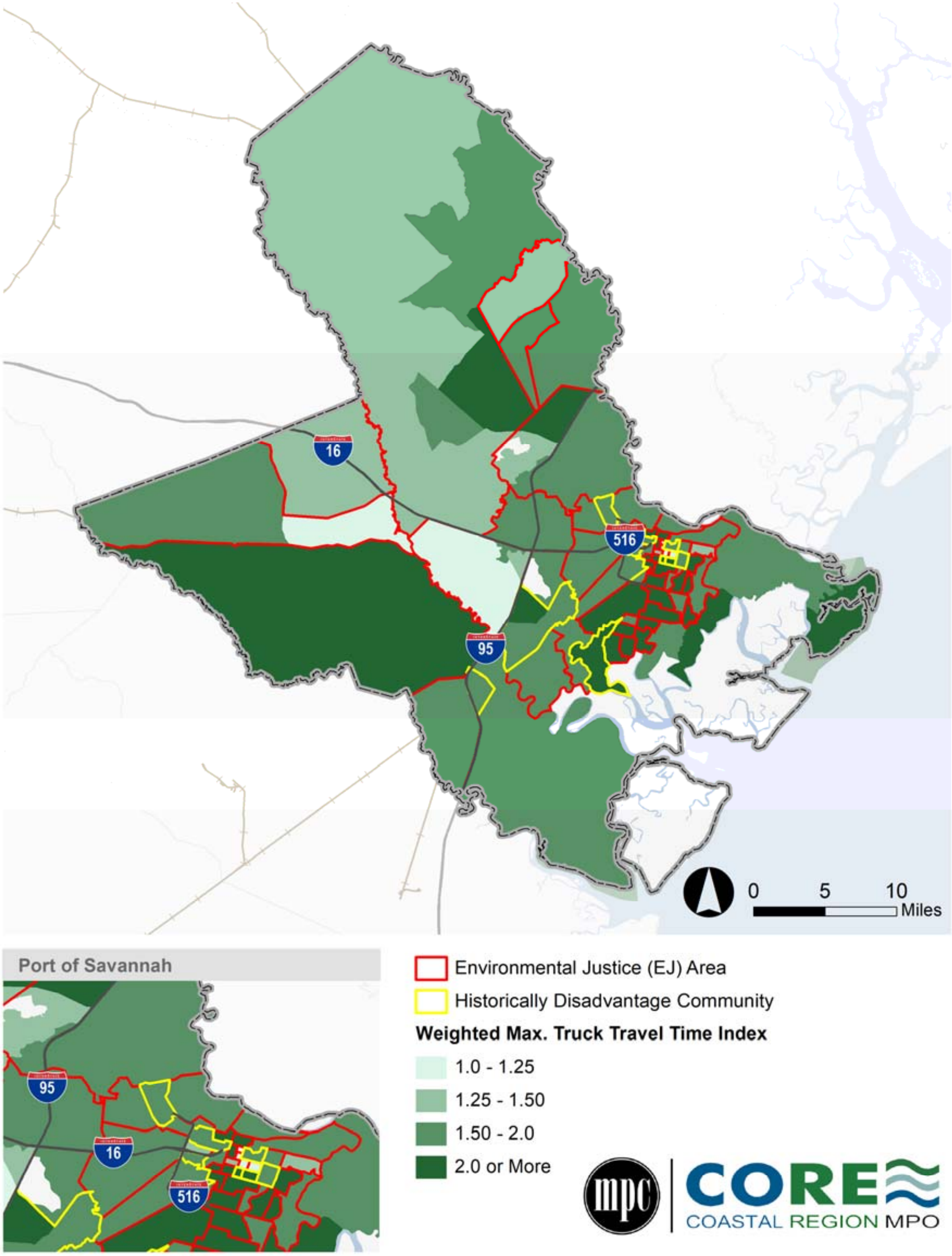
FIGURE 2.7 AVERAGE WEIGHTED MAXIMUM TRUCK TRAVEL TIME INDEX ACROSS COMMUNITIES



Source: National Performance Management Research Data Set; Cambridge Systematics, Inc.

[9] The reference travel time is based on the NPMRDS-defined reference speed which is the calculated "free flow" mean speed for the roadway segment in miles per hour. This attribute is calculated based upon the 95th percentile of observed speeds on that segment between 10pm and 5am, which establishes a reliable proxy for the speed of traffic at free flow for that segment.

FIGURE 2.8 MAP OF AVERAGE WEIGHTED MAXIMUM TRUCK TRAVEL TIME INDEX ACROSS COMMUNITIES



Source: National Performance Management Research Data Set; Cambridge Systematics, Inc.

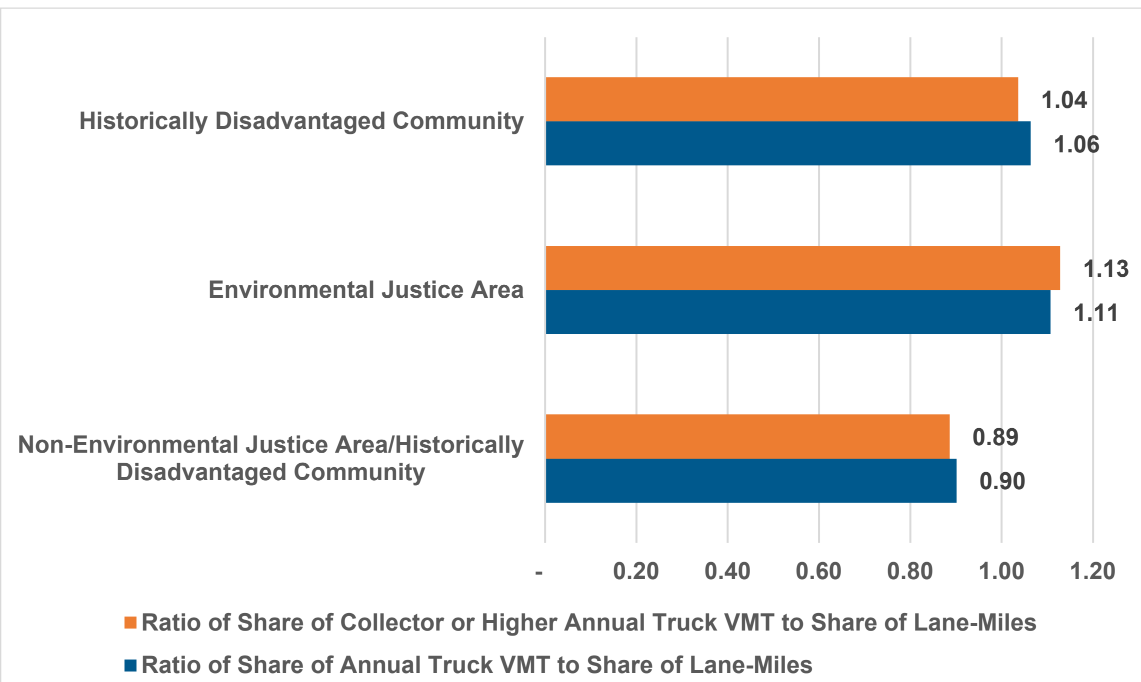
Freight Activity Impacts

Another concern is the level of freight activity in environmental justice areas and historically disadvantaged communities. Due to historical land use development patterns, freight assets such as major highways and rail terminals tend to be clustered in those communities. As a result, EJ areas and historically disadvantaged communities often bear a disproportionate share of freight activity and its associated negative externalities. For the CORE MPO region, this analysis examines freight activity as captured by three indicators: truck vehicle-miles traveled, rail carload-miles, and proximity to the Port of Savannah.

One indicator of freight activity used in this analysis was the ratio of the share of annual truck vehicle-miles traveled (VMT) to the share of lane-miles. Using Federal Highway Administration HPMS 2020 data, for each Census tract the total annual truck VMT was calculated and then divided by the total annual VMT for the region (i.e., $Share\ of\ Annual\ Truck\ VMT = Annual\ Truck\ VMT_{Census\ Tract}/Annual\ Truck\ VMT_{Region}$). Similarly, for each Census tract the share of lane-miles was calculated and then divided by the lane-miles for the region (i.e., $Share\ of\ Lane\ Miles = Lane\ Miles_{Census\ Tract}/Lane\ Miles_{Region}$). The trucking activity indicator is calculated as the ratio of the two: $Trucking\ Activity\ Indicator = Share\ of\ Annual\ Truck\ VMT/Share\ of\ Lane\ Miles$. A value greater than 1 would imply that a Census tract handles a larger share of trucking activity relative to other areas.

Figure 2.9 shows the results of the analysis. They indicate that historically disadvantaged and EJ areas handle larger shares of trucking activity compared to non-EJ areas/historically disadvantaged communities. This trend holds even when the analysis is limited to roadways with higher functional classifications (i.e., collectors and above). These results have implications for the associated negative impacts of increased trucking activity for historically disadvantaged and EJ areas, namely exposure to emissions.

FIGURE 2.9 COMPARISON OF TRUCK ACTIVITY ACROSS COMMUNITIES

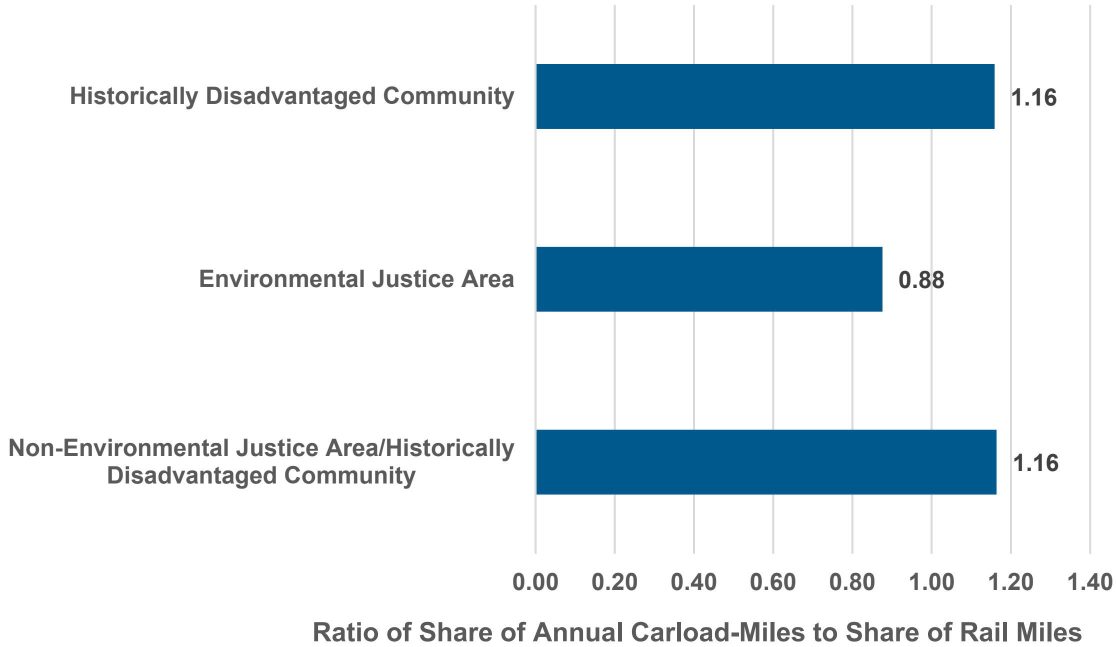


Source: FHWA Highway Performance Monitoring System, 2020; U.S. Census Bureau TIGER/Line Shapefile Database, 2020; Cambridge Systematics, Inc. analysis.

About 57 percent of the region's freight rail is located in EJ areas and historically disadvantaged communities. In order to provide insight into the magnitude of freight rail activity facilitated by these communities, this analysis developed a freight rail activity indicator. The freight rail activity indicator was calculated as the ratio of the share of annual rail carload-miles (VMT) to the share of rail miles. Using 2019 TRANSEARCH routed waybill data, for each Census tract the total annual carload miles was calculated as the total carloads traversing a rail segment multiplied by the segment's length. That value was then divided by the total annual carload-miles for the region (i.e., $Share\ of\ Annual\ Carload\ Miles = Annual\ Carload\ Miles_{Census\ Tract}/Annual\ Carload\ Miles_{Region}$). Similarly, for each Census tract the share of rail miles was calculated and then divided by the rail miles for the region (i.e., $Share\ of\ Rail\ Miles = Rail\ Miles_{Census\ Tract}/Rail\ Miles_{Region}$). The freight rail activity indicator is calculated as the ratio of the two: $Freight\ Rail\ Activity\ Indicator = Share\ of\ Annual\ Carload\ Miles/Share\ of\ Rail\ Miles$. A value greater than 1 would imply that a Census tract handles a larger share of freight rail activity relative to other areas.

Figure 2.10 shows the results of the analysis. They indicate that EJ areas do not experience higher levels of freight rail activity as measured by the ratio of carload-miles to rail miles when compared to non-EJ areas/historically disadvantaged communities. The average indicator value is less than 1 for these communities. Though historically disadvantaged communities experience higher levels of freight rail activity as implied by an average indicator value exceeding 1, it is comparable to freight rail activity levels in non-EJ areas/historically disadvantaged communities.

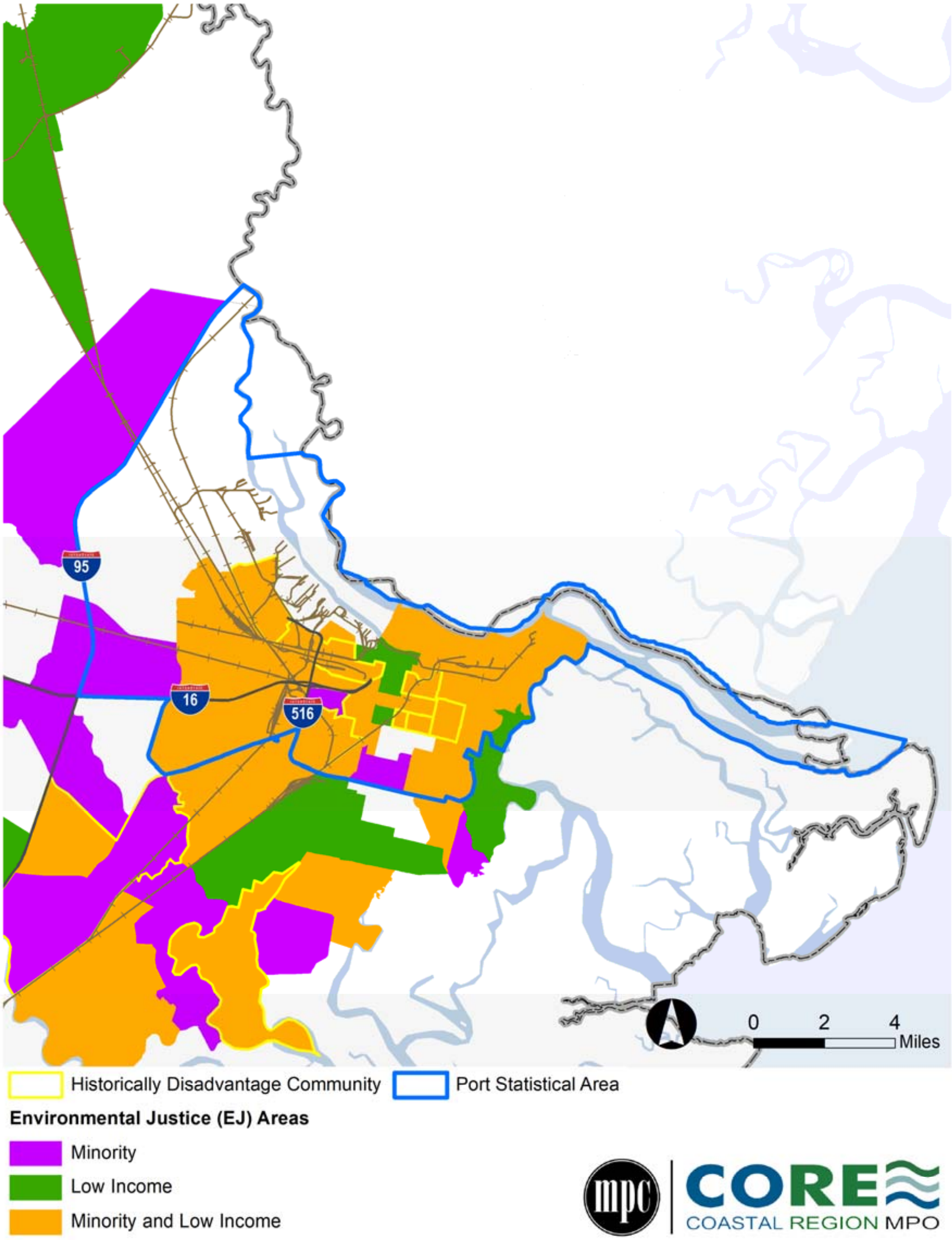
FIGURE 2.10 COMPARISON OF FREIGHT RAIL ACTIVITY ACROSS COMMUNITIES, 2019



Source: TRANSEARCH; U.S. Census Bureau TIGER/Line Shapefile Database, 2020; Cambridge Systematics, Inc. analysis.

The last indicator used in this component of the analysis was proximity to the Port of Savannah. The port statistical area represents the port limits as defined by legislative enactments of state, county, or city governments. It captures the multiple rail terminals, truck terminals, rail-served docks, and other facilities that may be privately owned but effectively expand the footprint of the port and the amount of capacity it may handle. The port statistical area provides an indication of the broader reach of the port in terms of the facilities that support port operations. As shown in Figure 2.11, several EJ areas and historically disadvantaged communities are within or adjacent to the port statistical area. This implies that initiatives to improve the efficiency of the port (e.g., decreasing gate times to reduce truck idling, increasing share of shipments handled by rail for reduced emissions and roadway congestion) would help to limit impacts on these communities.

FIGURE 2.11 PROXIMITY OF EJ AND HISTORICALLY DISADVANTAGED COMMUNITIES TO PORT ACTIVITY



Source: U.S. Army Corps of Engineers; U.S. Census Bureau, 2020 Decennial Census and the 2016-2020 American Community Survey 5-Year Estimates; U.S. Department of Transportation; Cambridge Systematics, Inc. analysis.

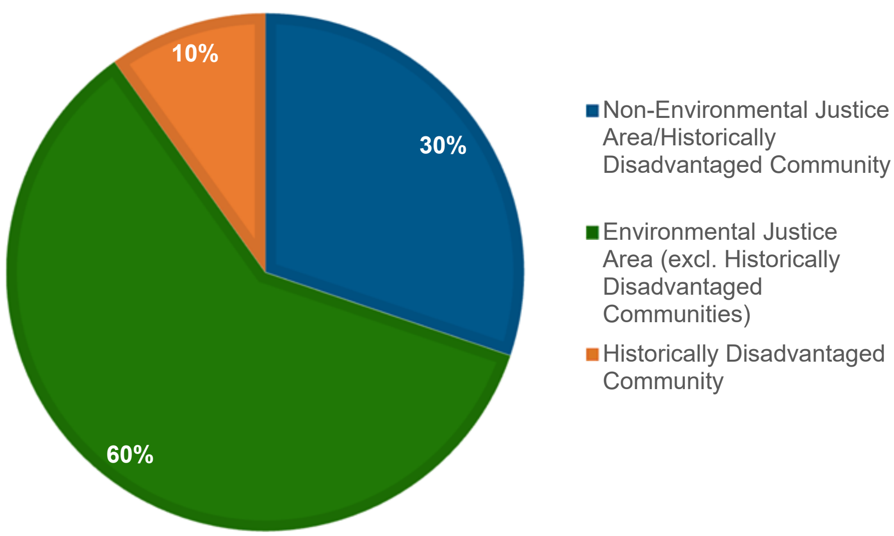
Safety Impacts

Two primary topics related to safety and freight movement were analyzed: at-grade crossing safety and highway freight safety. Involvement of a freight vehicle (truck or rail) in a crash does not necessarily indicate that the freight vehicle was at-fault. However, identifying locations with higher rates of truck- or rail-involved crashes can help identify and prioritize locations for improvement.

At-Grade Crossing Safety Impacts

At-grade rail crossings represent points where the highway and rail systems interact and have the potential for conflict. Grade-level rail crossings can impose significant delays to trucks and other vehicles as they wait for trains to pass. In addition, trucks idling at crossings emit more pollutants especially as they must accelerate from a complete stop. Furthermore, at-grade crossings are a potential safety hazard as they present an opportunity for trains to collide with vehicles, pedestrians, or other roadway users. In total, there are 192 public at-grade rail crossings in the 3-county region. As shown in Figure 2.12, 90 percent of at-grade crossings are located in environmental justice areas and historically disadvantaged communities. This implies that initiatives to separate crossings, improve their safety, or reduce associated delays would benefit these communities.

FIGURE 2.12 DISTRIBUTION OF AT-GRADE RAIL CROSSINGS ACROSS COMMUNITIES



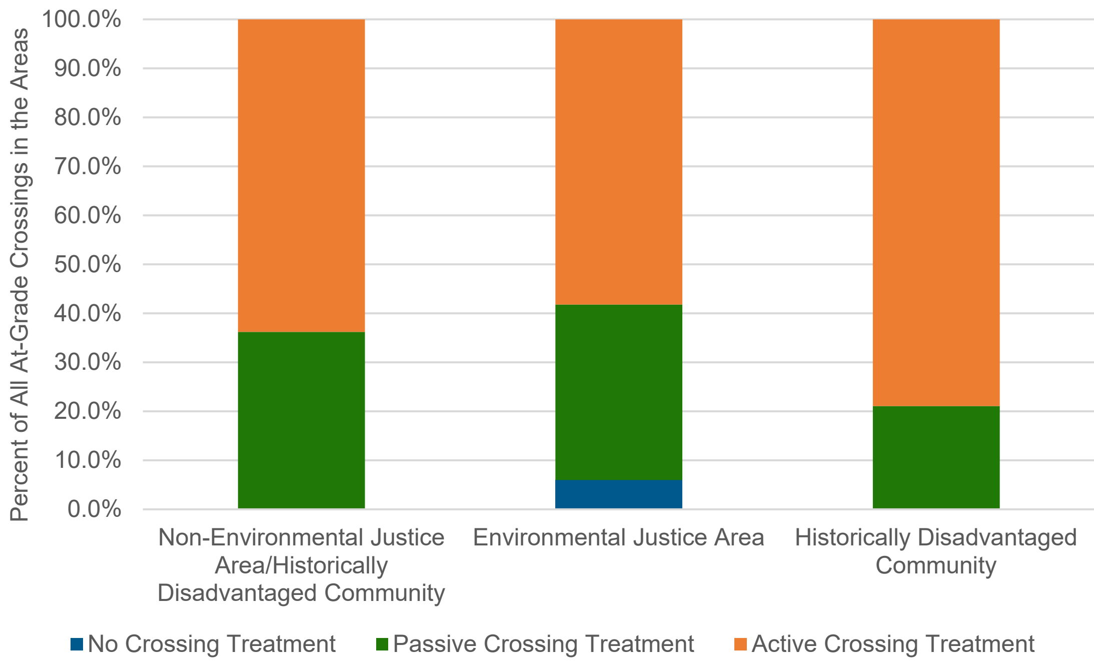
Source: Federal Railroad Administration, Highway-Rail Crossing Inventory; Cambridge Systematics, Inc.

Another aspect of safety investigated as part of this analysis was the distribution of at-grade rail crossing warning devices. Active crossing treatments are those that give visual and audible advance notice of the approach of a train.[10] These include flashing-light signals (both mast-mounted and cantilevered), bells, automatic gates, active advance warning devices, and highway traffic signals. Passive crossing treatments

[10] Federal Highway Administration, Highway-Rail Crossing Handbook, 3rd edition, https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/fhwasa18040/chp2f.cfm#:~:text=Active%20traffic%20control%20devices%20are,devices%2C%20and%20highway%20traffic%20signals.

consist of regulatory signs, warning signs, guide signs, and pavement markings. These devices provide static messages of warning, guidance, and in some instances, mandatory action for the driver. Generally, active crossing treatments provide greater safety to roadway users than passive or no treatments. As shown in Figure 2.13, the share of crossings in EJ areas with active treatments is comparable to non-EJ areas/historically disadvantaged communities (i.e., about 58 percent in EJ areas versus 64 percent in other communities). Historically disadvantaged communities have a higher share of crossings with active treatments relative to non-EJ areas/historically disadvantaged communities (i.e., about 79 percent in historically disadvantaged areas versus 64 percent in other communities). This result implies that EJ areas and historically disadvantaged communities are generally not disproportionately impacted in this regard. **Error! Reference source not found.**

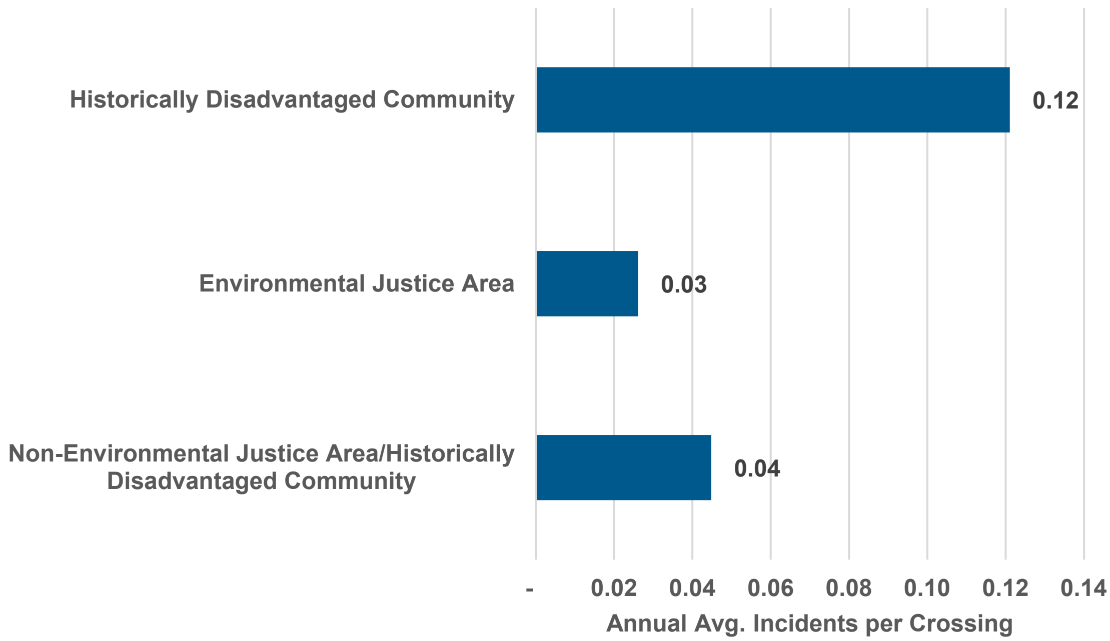
FIGURE 2.13 AT-GRADE RAIL CROSSING TREATMENTS ACROSS COMMUNITIES



Source: Federal Railroad Administration, Highway-Rail Crossing Inventory; Cambridge Systematics, Inc.

Identifying areas with higher rates of rail-involved crashes can help to prioritize locations for improvement. Figure 2.14 shows the variation in at-grade crossing incident rates across communities using 2011-2021 Federal Railroad Administration data. It measures the annual average number of incidents per crossing. The results show that relative to non-EJ areas/historically disadvantaged communities, EJ areas experience a lower rate of at-grade crossing incidents. However, historically disadvantaged communities experience at-grade crossing incidents at a rate 3 times higher than non-EJ areas/historically disadvantaged communities. This implies that from an equity standpoint, regional efforts to improve at-grade crossing safety should consider prioritizing those communities.

FIGURE 2.14 AT-GRADE RAIL CROSSING INCIDENTS ACROSS COMMUNITIES, 2011-2021



Source: Federal Railroad Administration, Highway-Rail Crossing Inventory; AECOM; Cambridge Systematics, Inc.

Highway Freight Safety Impacts

To determine the highway freight safety impacts of goods movement on the region, this analysis calculated annual average truck-involved crash rates and compared those values across communities. In addition, the analysis specifically considers truck-involved crashes with active transportation users. The data used in this analysis is 2016-2020 crash data from the GDOT Numetrics database and roadway network data from the 2020 Federal Highway Administration HPMS.

Truck-Involved Crash Rates

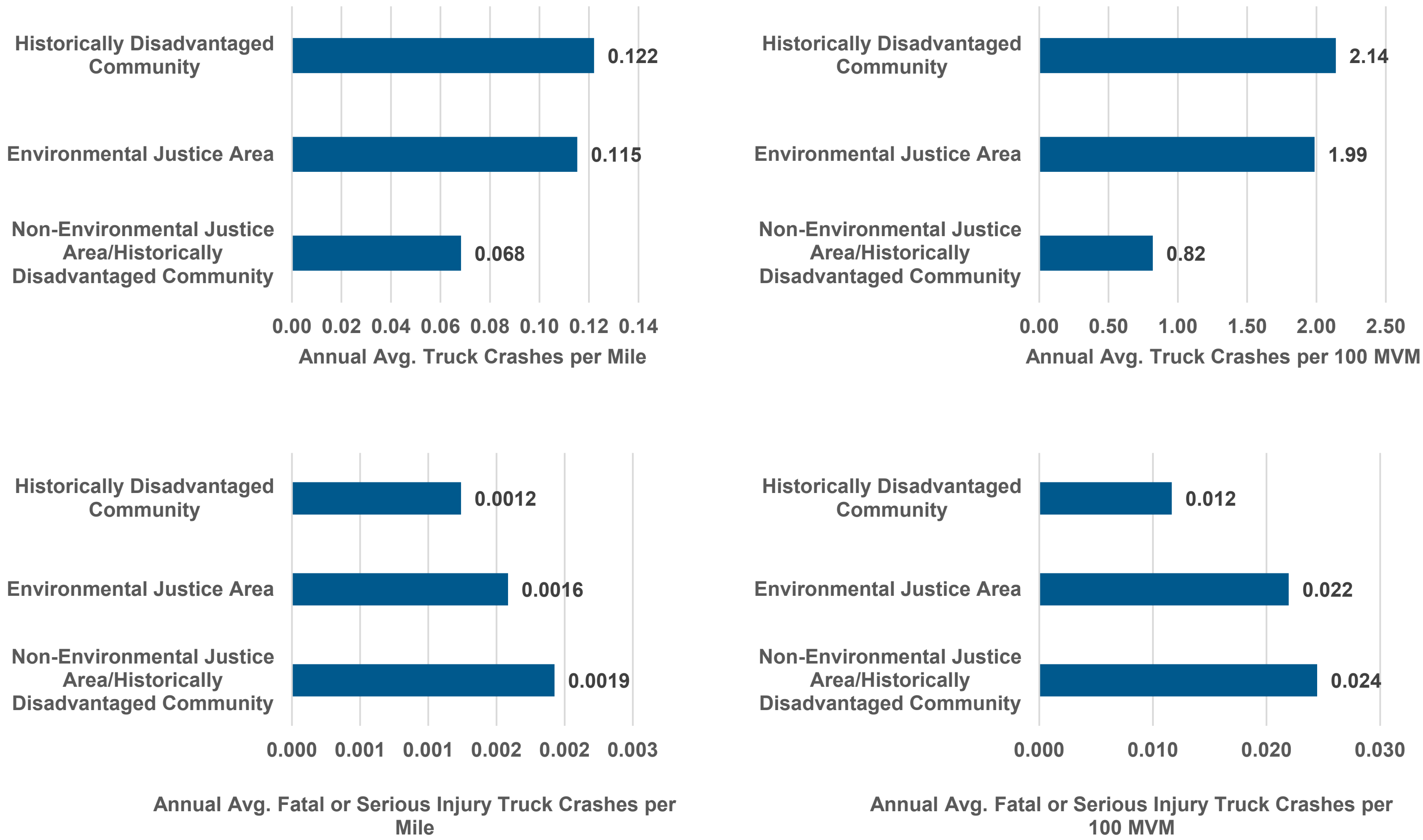
The first two sets of indicators used in this analysis are the annual average truck-involved crash rate and the annual average fatal/serious injury truck-involved crash rate. For both sets of indicators, two measures of crash exposure[11] were used: (1) miles of roadway and (2) 100 million truck vehicle-miles traveled (100 MVM). As shown in Figure 2.15, relative to non-EJ areas/historically disadvantaged communities EJ areas and historically disadvantaged communities experience a higher rate of truck-involved crashes. On a per mile basis, historically disadvantaged communities experience truck crashes at a rate 1.8 times higher than non-EJ areas/historically disadvantaged communities while EJ areas experience truck crashes at a rate 1.7 times higher. On a per truck VMT basis, historically disadvantaged communities experience truck crashes at a rate 2.6 times higher than non-EJ areas/historically disadvantaged communities while EJ areas experience truck crashes at a rate 2.4 times higher.

However, historically disadvantaged communities and EJ areas experience fatal or serious injury truck crashes at lower rates than non-EJ areas/historically disadvantaged communities. As shown in Figure 2.15,

[11] Crash exposure measures provide an indication of the potential for a roadway segment to experience a crash. Generally, roadways that carry higher volumes of traffic have a higher potential to experience a crash.

on a per mile basis, historically disadvantaged communities experience about 1/3 fewer fatal or serious injury truck crashes than non-EJ areas/historically disadvantaged communities. EJ areas have fatal or serious injury truck crash rates that are comparable to non-EJ areas/historically disadvantaged communities. On a per truck VMT basis, historically disadvantaged communities experience fatal or serious injury truck crashes at about half the rate than non-EJ areas/historically disadvantaged communities while EJ areas have rates that are comparable.

FIGURE 2.15 COMPARISON OF TRUCK-INVOLVED CRASH RATES ACROSS COMMUNITIES

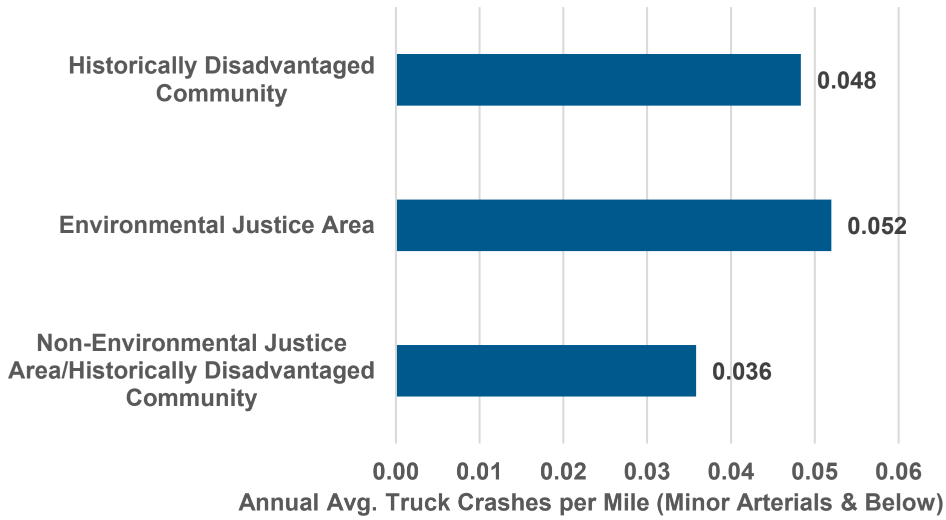


Source: GDOT Numetrics Database; FHWA Highway Performance Monitoring System, 2020; U.S. Census Bureau TIGER/Line Shapefile Database, 2020; Cambridge Systematics, Inc. analysis.

Local Impacts of Truck-Involved Crashes

Most truck-involved crashes occur on major highways. Between 2016 and 2020, about 18 percent of truck-involved crashes occurred on interstates and 39 percent occurred on principal arterials. Another 6 percent of truck-involved crashes occurred on ramps which often link interstates and principal arterials to other roadways. The remaining 37 percent of crashes occurred on minor arterials, major and minor collectors, and local roads. Crashes on these roadways, often the first or last mile connections to freight facilities, were assessed as a measure of local community safety impacts related to freight movement. As shown in Figure 2.16, EJ areas and historically disadvantaged communities generally experience higher crash rates on these corridors.

FIGURE 2.16 COMPARISON OF TRUCK-INVOLVED CRASH RATES ACROSS COMMUNITIES ON MINOR ARTERIALS & BELOW



Source: GDOT Numetrics Database; FHWA Highway Performance Monitoring System, 2020; U.S. Census Bureau TIGER/Line Shapefile Database, 2020; Cambridge Systematics, Inc. analysis.

Active Transportation and Truck-Involved Crashes

Freight also impacts communities in the form of truck crashes with pedestrians or bicyclists. The prevalence of truck crashes with active transportation modes along certain corridors, or areas of the region, would indicate potential conflict areas between trucks and vulnerable roadway users. As environmental justice and historically disadvantaged communities tend to have lower rates of vehicle ownership and often rely on transit and active transportation modes, the prevalence of these types of crashes would imply a need to take steps to limit the safety impacts of freight on these communities.

Truck-active transportation crashes for the 2016-2020 time period were identified in the GDOT Numetrics data where the first harmful event or the most harmful event was listed as a cyclist or pedestrian. In the CORE MPO region, there were 3 crashes involving trucks and active transportation users over the analysis period. This represents less than 0.1 percent of all truck-involved crashes. Two of those crashes involved single unit trucks and the other a combination unit truck. In addition, two of the crashes resulted in minor injuries while the other did not result in an injury.

3 FREIGHT ENVIRONMENTAL IMPACTS ANALYSIS

Environmental considerations are an important aspect of freight transportation planning, project development and operations. Freight impacts the environment in the form of emissions from freight vehicles and infrastructure development that results in the loss or adverse impacts to wildlife habitats and ecosystems. Understanding where the region's multimodal freight network intersects its environmental assets is an important first step to include environmental considerations into the freight transportation planning process. In addition, measuring (where possible) impacts of freight on the environment is an important step as well. This section of the report examines potential freight impacts to wildlife habitats and emissions.

3.1 Wildlife Habitat Impacts

Transportation networks intertwine with wildlife habitats and can have adverse effects such as loss of habitat, degradation of habitat quality, crashes that can reduce animal populations, and population fragmentation and isolation. Consideration of the effects of transportation on wildlife and mitigation projects that facilitate movement of animals across transportation infrastructure help support the natural patterns of wildlife. As shown in Figure 3.1, the CORE MPO region is home to multiple state parks, national parks, land trusts, and wildlife management areas that serve as wildlife habitats. In addition, the CORE MPO region contains privately held conservation lands. In Georgia, conservation lands may have restrictive covenants that limit development and other activities for a period of 10 years in order to preserve wildlife habitats and environmentally sensitive areas in its natural state or under management.[12] It is important that the strategies and recommendations developed to address the region's freight transportation needs consider impacts to wildlife and wildlife habitat loss.

Also shown in Figure 3.1 are critical habitats for threatened and endangered species. These areas of the region, primarily along the coast, have been designated by the by United State Fish and Wildlife Service (USFWS) as critical habitat for various species. Threatened, endangered, priority, and unique species found in these locations include the Diamondback Terrapin, Gopher Tortoise, West Indian Manatee, Robust Redhorse (sucker fish located in rivers), and Sea Turtles, among others.[13]

Wetlands are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.[14] They are a vital part of the region that provide benefits for people and wildlife (both aquatic and terrestrial).[15] For people, wetlands provide erosion control, flood control, and improve water quality and availability. Regarding wildlife, wetlands are some of the most productive ecosystems in the world given the wide variety of amphibians, animals, plants, and microbes that inhabit them. As shown in Figure 3.2, much of the region is covered by wetlands.

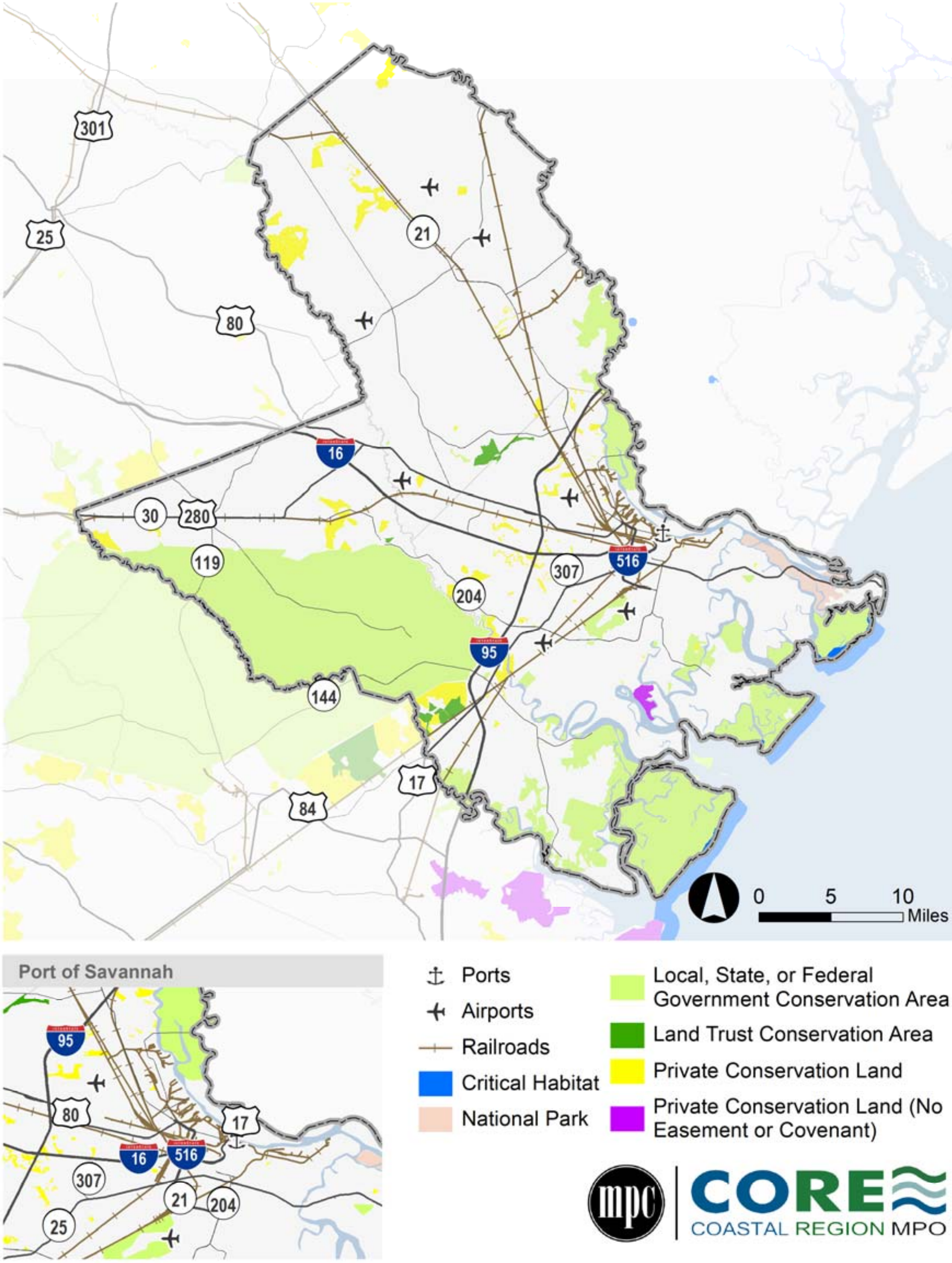
[12] O.C.G.A. Section 48-5-7.4

[13] https://georgiabiodiversity.org/portal/table/all/ga_protected/13051/.

[14] https://www.epa.gov/wetlands/what-wetland

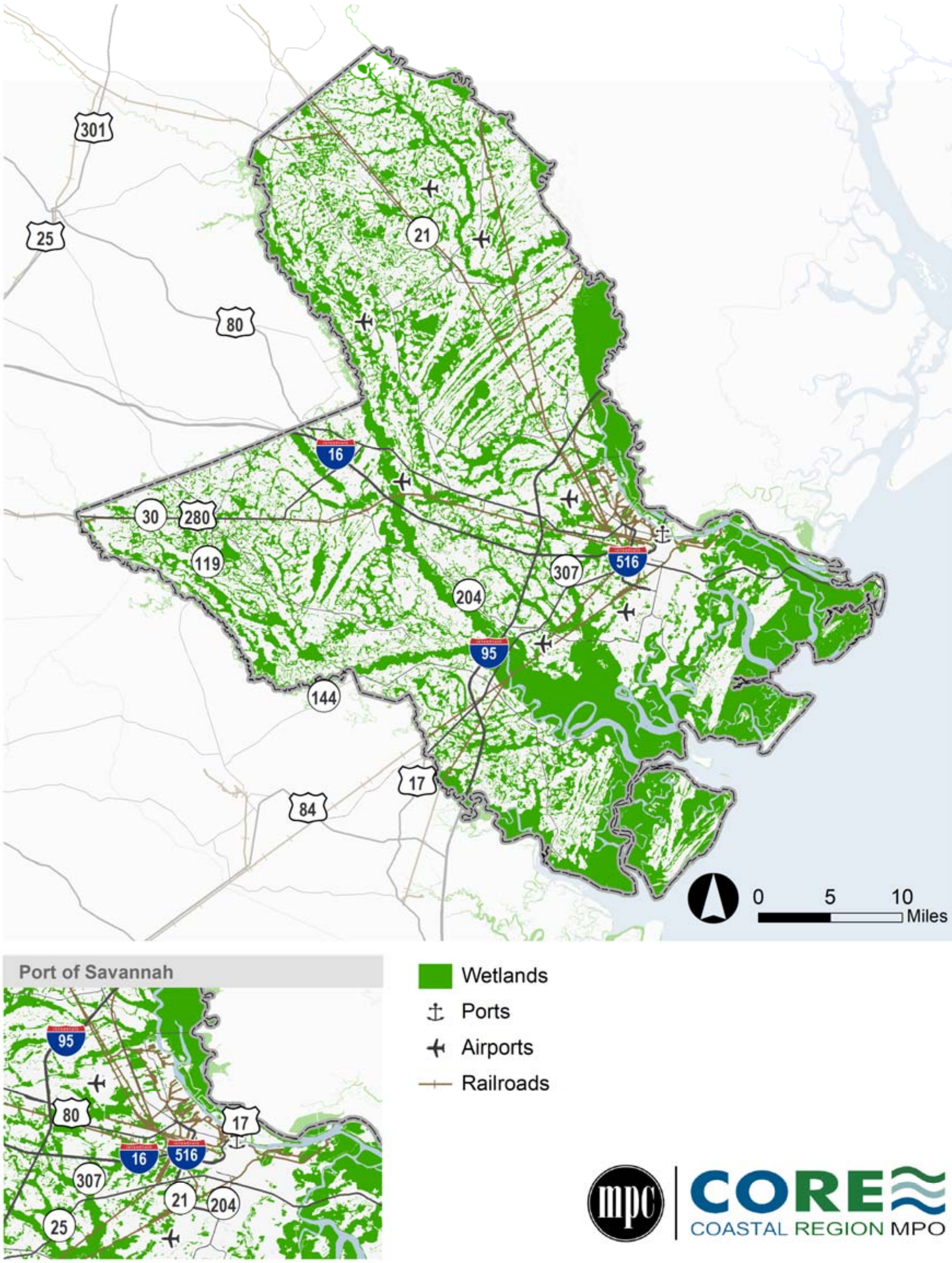
[15] https://www.epa.gov/wetlands/why-are-wetlands-important#:~:text=Far%20from%20being%20useless%2C%20disease,our%20use%20at%20no%20cost.

FIGURE 3.1 WILDLIFE HABITATS IN THE CORE MPO REGION



Source: Georgia Department of Natural Resources; U.S. Fish and Wildlife Service.

FIGURE 3.2 WETLANDS IN THE CORE MPO REGION



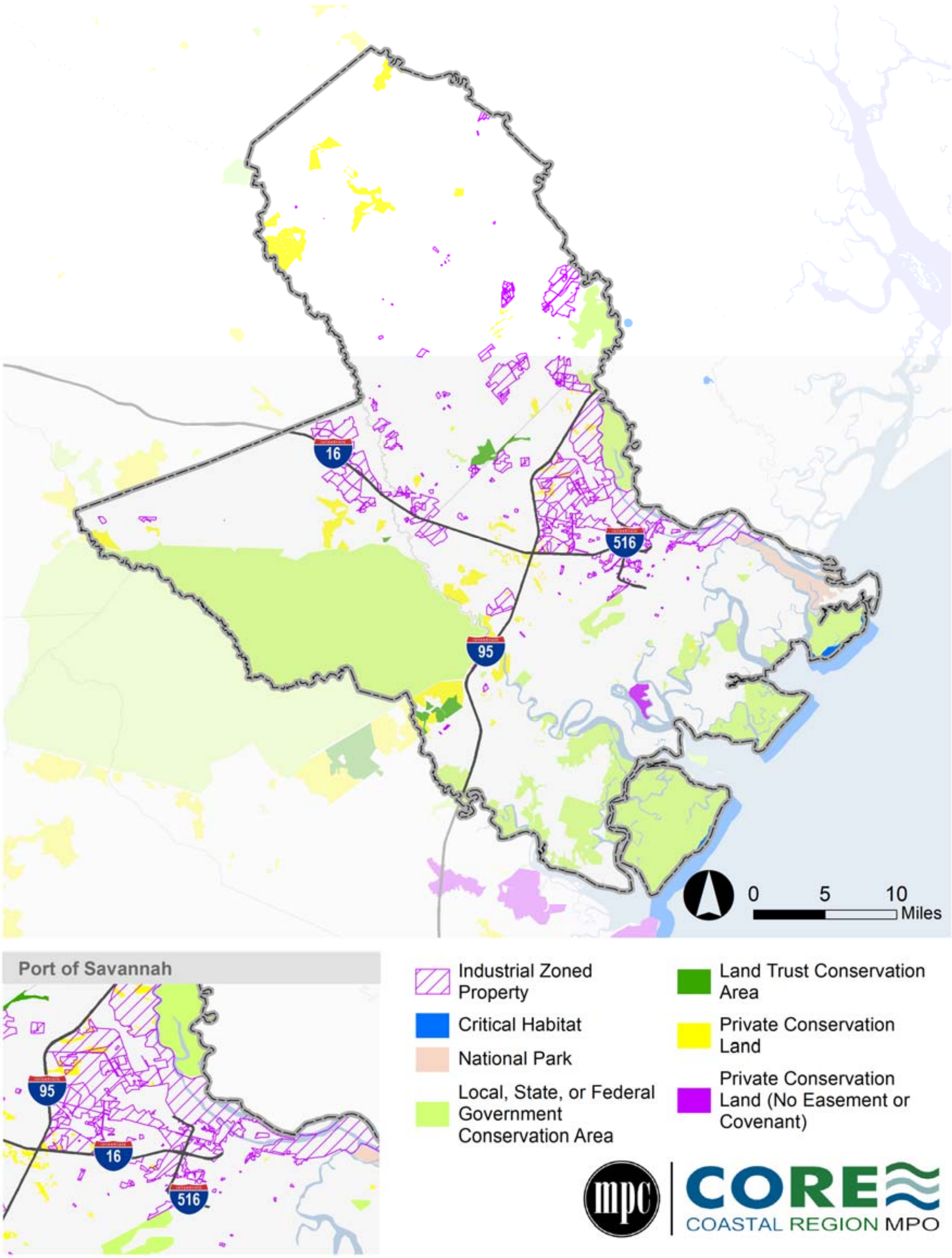
Source: U.S. Fish and Wildlife Service.

Figure 3.3 and Figure 3.4 show the proximity of industrial zoned properties to wildlife habitats and wetlands in the CORE MPO region. Industrial zoned properties are generally generators of freight activity in the form truck or rail trips. Their proximity to wildlife habitats and wetlands is an indication of their potential to impact these areas. Throughout the region, industrial zoned properties are largely removed from wildlife habitat. The exceptions are properties located along the Savannah River in Chatham County.

Given the prevalence of wetlands throughout the CORE MPO region, there is significant overlap between industrial zoned properties and wetlands. The 2040 Chatham County-Savannah Comprehensive Plan observed that upland areas of the region have forested and vegetated isolated wetlands that are frequently targeted for development. Between 1996 and2016, Chatham County was estimated to have loss 5.5 square miles of wetlands.[16] In general, wetlands throughout the region have been converted or altered due to development spurred by population and economic growth. This is reflected in the most recent comprehensive plans for Chatham County-Savannah, Garden City, Pooler, Effingham County, and Bryan County which all established land use goals that included the preservation and protection of wetlands as a component. Though freight-intensive land uses are not believed to be the primary driver of the region's loss of wetlands, they are a factor.

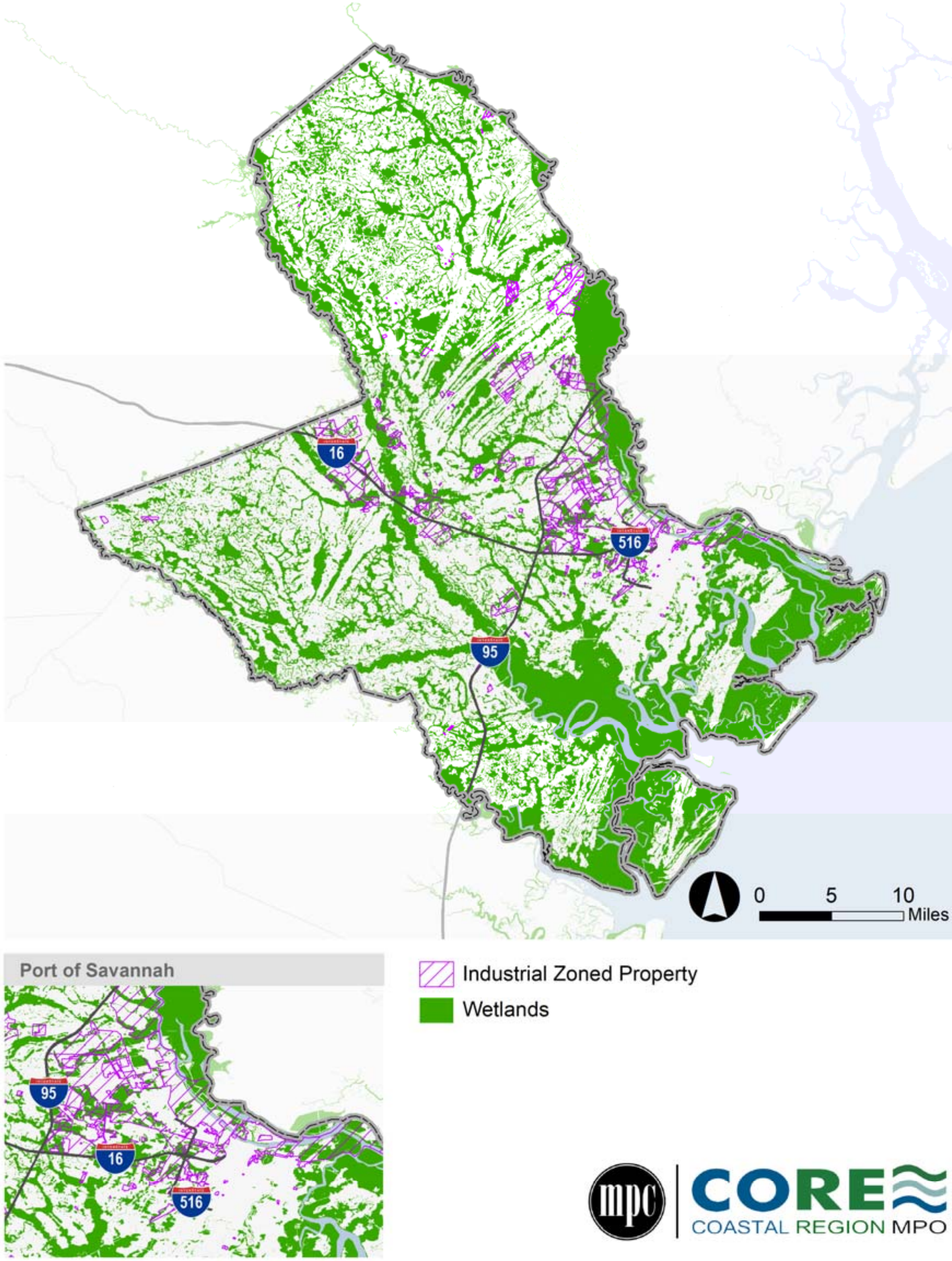
[16] Plan 2040: Chatham County-Savannah Comprehensive Plan.

FIGURE 3.3 WILDLIFE HABITATS AND INDUSTRIAL ZONED PROPERTIES IN THE CORE MPO REGION



Source: Georgia Department of Natural Resources; U.S. Fish and Wildlife Service; CORE MPO.

FIGURE 3.4 WETLANDS AND INDUSTRIAL ZONED PROPERTIES IN THE CORE MPO REGION



Source: U.S. Fish and Wildlife Service; CORE MPO.

For both wetlands and wildlife habitats, stormwater runoff from freight-related land uses is a concern. Logistics facilities (e.g., rail yards, container yards, airport runways, distribution centers, etc.) require stable surfaces constructed on engineered substrate capable of supporting the large weights of freight vehicles and their cargo. As a result, the prevalence of logistics facilities can result in large areas of impervious surface. In turn, these surfaces can result in flooding and stormwater runoff into waterways. Untreated stormwater runoff can impair nearby waters and their ability to support wildlife and provide safe drinking water for humans.[17]

Another impact of freight on wildlife is pollution generated by the degradation of tires from passenger and freight vehicles. As tires wear due to driving, tiny bits break off creating microplastics , and may be swept into and pollute waterways.[18] Once they enter waterways, tire particles can harm wildlife. Tire particles can also impact wildlife in the form of emissions as they can be small enough to be inhaled.[19]

Brownfields are another consideration for the environmental impacts of freight. A brownfield is a property where the expansion, redevelopment, or reuse of may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.[20] Those pollutants may also potentially impact wildlife habitats. Former industrial and logistics properties are often potential brownfield sites. Brownfields in the CORE MPO region, along with wetlands and wildlife habitats, are shown in Figure 3.5. Based on data from the U.S. Environmental Protection Agency Geospatial Data Download Service, all of these sites are located in Chatham County near the urban core of the region and are not proximate to wildlife habitats. However, there is greater proximity of brownfield sites to wetlands as wetlands are prevalent throughout the region.

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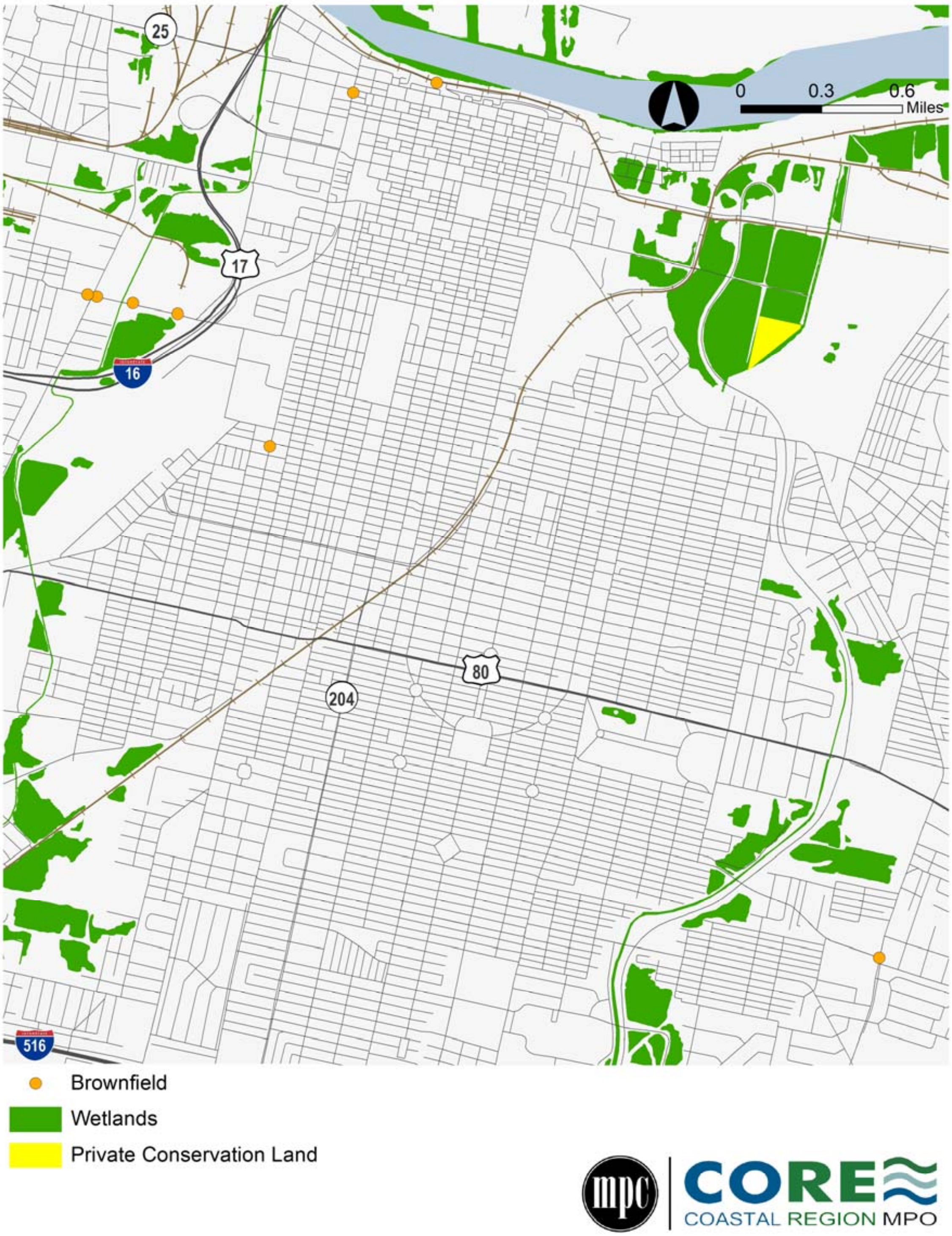
[17] https://www.gardencity-ga.gov/city-government/water-operations/coastal-georgia-s-red-zone-water-management-plan

[18] https://today.citadel.edu/tires-the-plastic-polluter-you-never-thought-about/

[19] https://ww2.arb.ca.gov/resources/documents/brake-tire-wear-emissions

[20] https://www.epa.gov/brownfields/overview-epas-brownfields-program

FIGURE 3.5 BROWNFIELDS IN THE CORE MPO REGION



Source: U.S. Environmental Protection Agency, Geospatial Data Download Service.

3.2 Wildlife Safety Impacts

Freight also impacts wildlife in the form of collisions involving animals and trucks. The prevalence of animal-vehicle crashes along certain corridors, or areas of the region, would indicate potential conflict areas between highways and wildlife habitat. Furthermore, it would imply a need to take steps to limit the impacts of freight on wildlife and improve safety for roadway users.

Animal-vehicle crashes for the 2016-2020 time period were identified in the GDOT Numetrics data where the first harmful event or the most harmful event was caused by a live animal. In the CORE MPO region, there were 4 crashes involving trucks and animals over the analysis period. This represents about 0.1 percent of all truck-involved crashes. None of the reported animal-vehicle crashes resulted in a human injury.

3.3 Emissions Impacts

The burning of fossil fuels such as coal and oil, along with deforestation, land-use changes, and other activities have caused the concentrations of heat-trapping greenhouse gases (GHG) to increase significantly in the Earth's atmosphere (IPCC 2021). GHG include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). These gases in the atmosphere absorb some of the energy being radiated from the surface of the Earth that would otherwise be lost to space, which makes the Earth's surface warmer than it would be otherwise. This has implications for rainfall patterns, snow and ice cover, sea level, other aspects of climate.

Among GHG, CO_2 is the largest source of U.S. emissions and has accounted for over 75 percent of total U.S. gross emissions across the 1990 – 2020 time period.[21] The majority of CO_2 emissions are generated by fossil fuel combustion – about 92.1 percent in 2020. Transportation activities accounted for 36.2 percent of U.S. CO_2 emissions from fossil fuel combustion in 2020, with the largest contributors being passenger vehicles (38.5 percent), followed by freight trucks (26.3 percent) and light-duty trucks (18.9 percent).

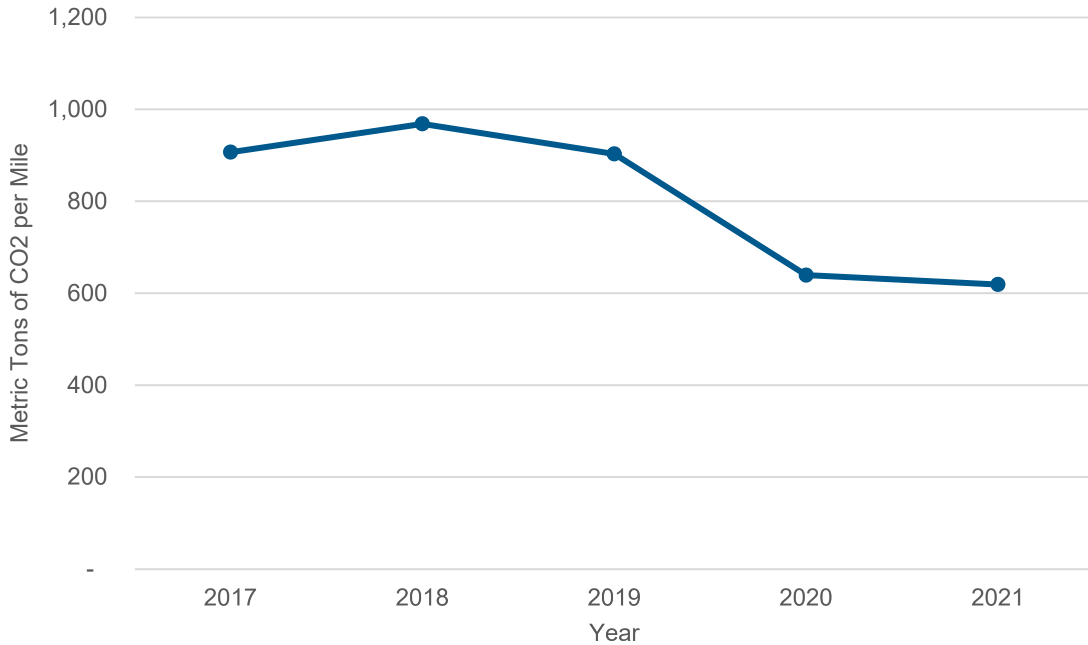
As part of its Freight Mobility Trends Report, the Federal Highway Administration (FHWA) estimates the amount of CO_2 generated per mile of National Highway System (NHS) roadways for states and urbanized areas. For the Savannah urbanized area, truck traffic on NHS roadways was estimated to generate approximately 619 metric tons of CO_2 per mile in 2021 as shown in Figure 3.6. The substantial decrease in CO_2 emissions per mile for 2020-2021, from a peak of 968 metric tons per mile in 2018, is likely due to the nationwide decrease in traffic volumes that resulted from the COVID-19 pandemic.[22] Though truck volumes largely remained consistent with pre-pandemic levels, they were operating on less congested roadways due to reduced commuter traffic. As a result, the improvement in efficiency for trucks reduced their emissions.

[21] United States Environmental Protection Agency, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2020," https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.

Washington DC, 2021. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019.

[22] Monthly traffic volumes for 2020 were much lower than 2019 values. Though volumes increased in 2021, they remained below 2019 values. Source: FHWA, Office of Highway Policy Information, https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm, Accessed December 3, 2022.

FIGURE 3.6 TRUCK CO2 EMISSIONS IN THE CORE MPO REGION, 2017-2021



Source: Federal Highway Administration, Freight Mobility Trends Report.

There are multiple regional trends indicating that truck CO_2 emissions will increase over the long term unless action is taken by regional leaders and their state and federal partners. The CORE MPO region is projected to experience substantial population growth over the next 20 years and will grow at a rate that exceeds statewide and national averages.[23] In addition, freight-related land uses throughout the region are becoming more prevalent. The region's various economic development agencies are currently developing over 15,000 acres of land for heavy industrial and logistics uses. This is in addition to privately held properties being developed by the private sector for industrial uses. Underlying both the population growth and freight land use trends is the trend of accelerated growth at the Port of Savannah. The Port of Savannah's annual containerized throughput is forecast to grow from 5.5 million twenty-foot equivalent units (TEU) in 2021 to 9 million TEU in 2025. All of these trends point to higher levels of truck CO_2 emissions over the long term.

[23] Georgia Governor's Office of Planning and Budget. 2021 Population Projections. https://opb.georgia.gov/census-data/population-projections

4 FREIGHT EQUITY AND ENVIRONMENTAL STRATEGIES

This section of the report presents potential strategies for addressing the region's freight transportation equity and environmental challenges. These strategies are not final recommendations, but instead represent starting points for addressing these challenges. Recommended strategies will be identified as part of Task 7.

4.1 Freight Equity Impacts Strategies

Although the intersection of freight and equity is complex, especially in relation to vulnerable communities, there are key strategies that can be used to mitigate negative externalities and increase economic opportunity. The Environmental Protection Agency (EPA) has developed resources for addressing EJ issues in near-port communities.[24] The EPA advocates for proactive communication, collaborative solutions, and win-win benefits like workforce programs. Additional strategies can be viewed generally as consisting of actions the region may take to avoid or mitigate negative impacts as well as to enhance access to the economic benefits associated with freight-related development. Examples of strategies include the following:

- **Freight Equity Indicators.** This strategy defines a set of freight equity indicators that may be tracked over time. Indicators developed in this report include those related to congestion and reliability, freight activity, and safety. By tracking how indicators of freight equity change over time, the region can better identify where its efforts need to be focused and proactively address freight transportation equity concerns. It will also allow the region to gauge how well current efforts are performing.

- **Avoidance, Mitigation, and Offsetting Enhancements Strategies.** Environmental justice strategies generally center on the avoidance of impacts, the mitigation of impacts, and implementing offsetting enhancements. This set of strategies focuses on taking actions in one or multiple of those areas. Furthermore, they may be applied using the freight equity indicators discussed in section 2 of this report as a basis for the need for action.

  - **Strategies to Avoid Impacts.** These strategies address equity concerns before a freight project takes place. An example would be identifying an alternative route for a new roadway or rail corridor that avoids an environmental justice area or historically disadvantaged community. Another example includes the current Georgia Ports Authority (GPA) and Georgia Department of Transportation (GDOT) initiative to reduce at-grade rail crossings by relocating a portion of the Norfolk Southern rail line near Brampton Road and forming a more direct connection between I-516 and the Port.[25]

  - **Strategies to Mitigate Impacts.** Mitigation strategies address equity after a freight project has been implemented. An example would be using Complete Streets policy and design approaches to improve safety on freight corridors through impacted communities, such as those recommendations outlined in the CORE MPO SR 21 Access Management Study. Another example would be implementing signal coordination on a major freight route to relieve congestion experienced by

[24] EPA. Environmental Justice Primer for Ports: Considering Near-Port Communities in Port Decisions. https://www.epa.gov/community-port-collaboration/environmental-justice-primer-ports-considering-near-port-communities

[25] https://www.dot.ga.gov/applications/geopi/Pages/Dashboard.aspx?ProjectID=0006328

people and freight. The use of dynamic message signs and other intelligent transportation systems (ITS) devices to manage freight traffic near major generators to limit their impacts on surrounding communities is also an example. Both of these examples of solutions are actively being implemented in the region through the state's Regional Traffic Operations Program (RTOP).

  – **Strategies to Provide Offsetting Enhancements.** These strategies enhance some other component of the transportation network in order to offset the impact of a freight project. An example would be expanding the active transportation network in an area to offset the impact of a freight project. A review of transit and freight connections within many of the region's disadvantaged communities indicates that, despite immediate proximity, pedestrian and transit facilities can be difficult to access. For example, many active transportation facilities are separated from residential disadvantaged communities by large infrastructure links which are difficult to cross, especially for those traveling on foot or by bicycle.

- **Economic Development/Local Benefits Strategies.** Though the analysis presented in section 2 focuses on addressing the negative impacts of freight, freight also delivers substantial value to communities in the form of jobs and economic development. Furthermore, a key tenet of the USDOT Justice40 initiative is to deliver at least 40 percent of the benefits from federal investments to disadvantaged communities.[26] These strategies would focus on providing access to economic benefits of freight-related investments to environmental justice areas and historically disadvantaged communities. Examples would include transit investments that connect these communities to freight job centers and workforce development programs.

  In relation to workforce development, the findings of the Task 4 technical memorandum indicated that freight-intensive industries account for a substantial share of the region's jobs. Furthermore, these industries have been growing and demonstrate potential for even greater growth over the long-term. Given the tight labor market that has persisted since the onset of the COVID-19 pandemic, there is a growing need for skilled workers in freight-based positions. Given that economic opportunity and employment are some of the most significant positive externalities associated with freight, the provision of skills and workforce development in equity areas is a potentially effective method of addressing EJ disparities. In these scenarios, tailoring programs at universities, community colleges, and other post-secondary education institutions, can help improve economic opportunities for vulnerable communities, while addressing ongoing labor shortages experienced in the industry. While many community colleges offer manufacturing courses and programs, there are comparatively fewer programs offered to provide "middle skill[27]" education and training to address transportation, logistics, and distribution skillsets.

- **Outreach Strategies.** This strategy focuses on developing and implementing freight-focused outreach strategies for the communities adjacent to or impacted by goods movement. This could include a freight equity working group comprising representatives from impacted communities, community based environmental and health organizations, and others to serve as an advisory body to ensure that investments, policies, and programs are grounded in equity considerations. The Los Angeles County Metropolitan Transportation Authority (LA Metro) is an example an agency employing this strategy.[28]

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[26] https://www.transportation.gov/equity-Justice40

[27] Middle skill is defined as jobs requiring more than a high school education, but less than a four-year degree.

[28] https://www.metro.net/about/equity-race/#additional-resources

This strategy is also consistent with the EPA's recommendations for addressing EJ issues in near-port communities.

- **Land Use Strategies.** These strategies address the land use decisions that precede and lead to freight equity transportation impacts. Equity land use strategies would work to avoid or mitigate negative impacts of goods movement. For example, an avoidance land use strategy would use zoning or other tools to discourage the further concentration of freight activity in or near environmental justice and historically disadvantaged communities. Examples of mitigation land use strategies include requiring for new developments buffer zones between freight activity centers and surrounding communities or on-site truck staging areas to prevent unauthorized parking.

- **Freight Equity Analysis and Evaluation Screening Tools.** This strategy focuses on developing tools for addressing freight equity. For example, the North Jersey Transportation Planning Authority (NJTPA)[29] and the Delaware Valley Regional Planning Commission (DVRPC)[30] employ tools for identifying traditionally underserved populations to aid agency staff and partner agencies in considering equity in their planning and project development processes. LA Metro developed a Rapid Equity Assessment Tool to assist agency staff in identifying and prioritizing equity opportunities.[31] The screening tool consists of a set of questions to be asked and answered before a transportation decision is made. The development and deployment of equity analysis and evaluation screening tools can help the region proactively address freight transportation equity concerns.

4.2 Freight Environmental Impacts Strategies

Similar to freight equity strategies, freight environmental impacts strategies consist of actions the region may take to avoid or mitigate negative impacts to its wildlife habitats and environmentally sensitive areas. Examples of strategies are outlined below. As broader environmental strategies are developed and incorporated as part of the Metropolitan Transportation Plan, the region should consult with applicable federal, state, and tribal land management, wildlife, and regulatory agencies.[32]

- **Green Infrastructure Development Strategies.** This strategy would incorporate green infrastructure such as bioswales, planter boxes, and street trees that can help to filter roadway surface pollutants from stormwater runoff before they enter water bodies. They also generally serve as another layer of flooding control for freight corridors. Green infrastructure can also help to preserve existing, aging gray infrastructure (e.g., curbs, gutters, pipes) as green infrastructure would divert some stormwater before it enters those systems.

- **Wildlife Crossing Strategies.** This strategy focuses on limiting impacts to wildlife habitats. Specifically, it identifies locations where wildlife crossings are needed and feasible to develop. It could also be implemented proactively where new or expanded corridors are being considered for the region.

- **Land Use Strategies to Protect Wildlife Habitats and Environmentally Sensitive Areas.** As there are multiple federal and state laws governing protected lands, wetlands, and conservation lands, this set

[29] https://equity-resources-njtpa.hub.arcgis.com/pages/equity-analysis-tool

[30] https://www.dvrpc.org/webmaps/IPD/#home

[31] https://www.metro.net/about/equity-race/

[32] Code of Federal Regulation, § 450.324(f)(10), "Development and content of the metropolitan transportation plan," https://www.ecfr.gov/current/title-23/chapter-I/subchapter-E/part-450/subpart-C/section-450.324.

of strategies would focus on local initiatives that could be taken to further protect these areas. Examples would include requiring buffer zones for any development near wildlife habitats and environmentally sensitive areas. It would also include limiting the types of developments that can be constructed near these areas. In Georgia, conservation lands are privately owned but may have restrictive covenants that limit development and other activities for a period of 10 years in order to preserve wildlife habitats and environmentally sensitive areas in its natural state or under management.[33] An example of an action that could be taken under this strategy is to identify and seek to permanently conserve portions of these lands for purposes of limiting impacts to wildlife habitats and environmentally sensitive areas.

- **Congestion Reduction to Lower Emissions.** This strategy would focus on implementing projects that reduce congestion, thereby lowering emissions, on freight corridors. As discussed in section 3.3, the transportation sector is one of the largest producers of CO_2 and other GHG emissions. Strategies that reduce congestion are important for lowering the environmental impacts of freight, especially strategies centered on technology and intelligent transportation systems applications as they do not require capacity expansions that may threaten wildlife habitats and environmentally sensitive areas.

[33] O.C.G.A. Section 48-5-7.4

5 SUMMARY

This technical memorandum characterized the impacts of goods movement on the environment and community. It performed a freight equity analysis which described how impacts vary in different parts of the CORE MPO region, identified communities that are disproportionately impacted, and quantified the magnitude of those impacts. From there, it performed an environmental impacts analysis that examined freight impacts to wildlife habitats, wetlands, national parks, and other natural resources. Lastly, the report developed preliminary strategies for addressing freight equity and environmental challenges.

There are a few key insights that can be taken away from the technical memorandum:

- **Locations of EJ Areas and Historically Disadvantaged Communities.** EJ areas are primarily located in Chatham County though some extend into Bryan and Effingham Counties. In particular, these include areas within Savannah's urban core, the north side of Ardsley Park, and several neighborhoods just south of DeRenne Avenue. Other EJ areas include Garden City south of Smith Avenue along SR 21 and SR 25, areas along Veterans Parkway, areas surrounding Hunter Army Airfield, and areas south of Montgomery Cross Road along SR 204. All of the region's historically disadvantaged communities are also regionally defined EJ areas.

- **Freight Congestion and Reliability Impacts to EJ Areas and Historically Disadvantaged Communities.** EJ areas on average experience truck travel times that are less reliable than non-EJ area/historically disadvantaged communities. In contrast, historically disadvantaged communities experience truck travel times that are comparable to non-EJ area/historically disadvantaged communities. Both EJ areas and historically disadvantaged communities on average experience more intense truck congestion than non-EJ area/historically disadvantaged communities.

- **Freight Activity Impacts to EJ Areas and Historically Disadvantaged Communities.** On average, historically disadvantaged and EJ areas handle larger shares of trucking activity compared to non-EJ areas/historically disadvantaged communities. Regarding freight rail activity, EJ areas do not experience higher activity levels as measured by carload-miles to rail miles when compared to non-EJ areas/historically disadvantaged communities. Though historically disadvantaged communities were found to experience higher levels of freight rail activity, it is comparable to freight rail activity levels in non-EJ areas/historically disadvantaged communities. These results have implications for the associated negative impacts of increased freight activity for historically disadvantaged and EJ areas, namely exposure to emissions.

- **Freight Safety Impacts to EJ Areas and Historically Disadvantaged Communities.** Regarding safety at at-grade rail crossings, the analysis found that 90 percent of crossings are located in environmental justice areas and historically disadvantaged communities. It also determined that relative to non-EJ areas/historically disadvantaged communities, EJ areas experience a lower rate of at-grade crossing incidents. However, historically disadvantaged communities experience at-grade crossing incidents at a rate 3 times higher than non-EJ areas/historically disadvantaged communities. This implies that from an equity standpoint, regional efforts to improve at-grade crossing safety should consider prioritizing those communities.

  For highway freight safety, the analysis found that on a per mile basis, historically disadvantaged communities experience truck crashes at a rate 1.8 times higher than non-EJ areas/historically disadvantaged communities while EJ areas experience truck crashes at a rate 1.7 times higher. On a per truck VMT basis, historically disadvantaged communities experience truck crashes at a rate 2.6 times higher than non-EJ areas/historically disadvantaged communities while EJ areas experience truck crashes at a rate 2.4 times higher. However, historically disadvantaged communities and EJ areas experience fatal or serious injury truck crashes at lower rates than non-EJ areas/historically disadvantaged communities.

- **Freight Impacts to Wildlife.** The CORE MPO region is home to multiple state parks, national parks, land trusts, critical habitats, conservation lands, and wildlife management areas that serve as wildlife habitats. In addition, much of the CORE MPO region is covered by wetlands. The region's multimodal freight network intersects and intertwines with all of these natural resources. As a result, it can have adverse effects such as loss of habitat, degradation of habitat quality, crashes that can reduce animal populations, and population fragmentation and isolation. It is important that the strategies and recommendations developed to address region's freight transportation needs consider impacts to wildlife and wildlife habitat loss.

- **Freight Impacts to the Environment.** The burning of fossil fuels such as coal and oil, along with deforestation, land-use changes, and other activities have caused the concentrations of heat-trapping greenhouse gases (GHG) to increase significantly in the Earth's atmosphere. Among GHG, CO_2 is the largest source of U.S. emissions and freight trucks are a significant contributor. For the CORE MPO region, truck traffic on NHS roadways was estimated to generate approximately 619 metric tons of CO_2 per mile in 2021. Though the region's truck CO_2 emissions per mile have continually dropped from their 2018 peak, this is likely due to the nationwide decrease in traffic volumes that resulted from the COVID-19 pandemic. As commuter traffic volumes continue to recover to pre-pandemic levels, truck CO_2 emissions for the region are likely to rise.

Though much of the analysis presented in this technical memorandum focuses on avoiding and mitigating the negative externalities of freight as it pertains to equity and environmental impact, it is important to note that freight also delivers substantial value to communities in the form of jobs, a lower cost of living, and economic development. The economic value of freight to the CORE MPO region is discussed in detail in the Task 4 technical memorandum. In order to enhance the positive outcomes of freight while minimizing negative impacts, the final strategies and recommendations will focus on identifying methods to achieve both.