



CAPHE PHAP-RM
6.13 SOUTHWEST DETROIT
2016

This work is made possible by National Institute of Health and Environmental Sciences, RO1ES022616, and the Fred A. and Barbara M. Erb Family Foundation. Additional support was provided by the Michigan Center on Lifestage Environmental Exposures and Disease (M-LEEaD), #P30ES017885.

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6.14 Southwest Detroit

Southwest (SW) Detroit residents live near a number of large air pollution sources that can increase pollution exposures, and also experience multiple exposures in the social environment, increasing their risk of and vulnerability to adverse health outcomes. The population of SW Detroit is approximately 84,000 (see [Figure 6-1](#), [Section 6.2](#)), and it contains several of the most densely populated areas of the city, with some areas showing population growth, and with large proportions of populations considered more vulnerable to adverse effects of air pollutants (e.g., children).¹ (See [Section 6.13.3](#) below and [Table 6-1](#)).

Air quality monitoring in SW Detroit is described in [Section 4](#). SW Detroit has a number of air quality monitors, including several that are source-oriented monitors designed to pick up impacts from industry, such as the Dearborn site. SW Detroit has had, and continues to have, the highest levels of SO₂, PM_{2.5} and toxics pollutants that have been measured in Detroit, and in many cases, in Michigan.

Below we describe sources of air pollutants in SW Detroit, as well as population and community characteristics that may influence vulnerability to adverse effects of exposures.

6.13.1 Point sources

[Table 6-2](#) shows point sources of pollutants located within the boundaries of Southwest Detroit. For each facility, the **Rank** indicates the rank order of this site in relation to others reporting to the Michigan Air Emissions Reporting System (MAERS), with the number “1” indicating the greatest number of pounds of emissions. Trends over time (2010-2014) are also shown, filtered to exclude some variations in emissions over time (see text in [Section 4.3](#) for a more detailed description), as well as the **rate of change** over that same 5 year period (see text, [Section 4.3](#)).

¹ Data Driven Detroit. 2010. Population Density Map and Population Growth Maps.

http://www.datadrivendetroit.org/web_ftp/Data_Mapping/Maps/BG_PopDensitySqMile.pdf and

http://www.datadrivendetroit.org/web_ftp/Data_Mapping/Maps/BG_PctPopChg00to10.pdf [Accessed 14 March 15].

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Rank	Facility	NO _x			SO ₂			PM _{2.5}			PM ₁₀			VOC			CO		
		5 Year Filtered Average	Note	Annual Change (%/yr)	5 Year Filtered Average	Note	Annual Change (%/yr)	5 Year Filtered Average	Note	Annual Change (%/yr)	5 Year Filtered Average	Note	Annual Change (%/yr)	5 Year Filtered Average	Note	Annual Change (%/yr)	5 Year Filtered Average	Note	Annual Change (%/yr)
8	Marathon	408			163		24	94.6	(3)	43	94.5			558.9		-10	128		
10	EES Coke Battery LLC	1193	(1)		2050	(1)		18.9	(1)		433.5	(3)		200.0	(3)		370	(1)	
38	Detroit Wastewater Treatment	281			56			0.1	(3)		4.7			56.1			2	(1)	
45	St. Mary's Cement	5			0			0.0			42.6	(1)		0.0			4		
70	EDW Levy Co Plant	0			0			0			12.2		-44	0.0			0		
88	Magni Industries	0			0			0			6.3		6	34.4		5	0		

Table 6-2: Point source emissions of conventional pollutants (tons/year) in Southwest Detroit. Excerpted from full [Table 5-4](#). Note indicates type of variation. 1= one or two low values excluded; 2=one or two high values excluded; 3=based on last two years of data.

Health Effects: Health effects associated with exposure to the pollutants listed in [Table 3-1](#) include increased risk of respiratory problems (e.g., asthma exacerbations and hospitalizations, COPD, cardiovascular effects). See Health Effects [Table 3-1](#) for a complete listing. [Section 5.5.3](#) provides quantitative estimates of health impacts from the two largest of these point sources for three pollutants: PM_{2.5}, NO_x, and SO₂.

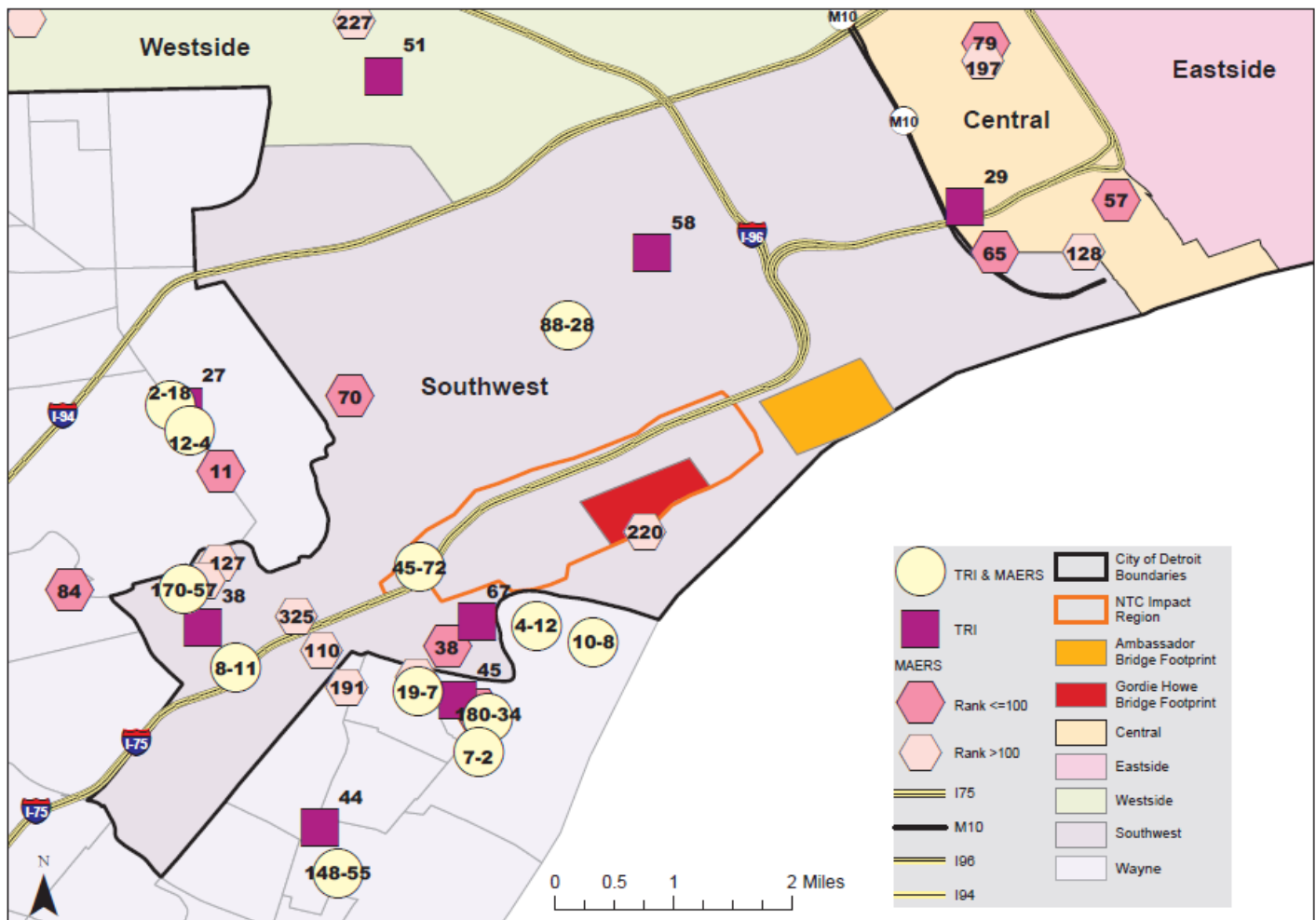
[Table 6-2](#) shows emissions of toxic air pollutants for facilities located in SW Detroit, as reported in the Toxic Release Inventory (TRI). For each facility, pounds per year of toxics reported are shown. This table shows the rank order for each facility for SW Detroit, with “1” indicating the highest emissions of toxics. The full table is shown in [Section 5.2.3](#).

Rank	Facility	Acids	VOC	Metals and Metal Compounds	Nitrogen Compounds	Sulfur Compounds	Other
8	EES Coke Battery LLC	41754	16500	24	14246	15740	0
11	Marathon	9759	12763	101	15484	7513	21
28	Magni Industries	0	1994	719	0	0	0
38	Air Products & Chemicals INC/Detroit Hydrogen	0	55	0	3078	0	0
57	EDW C Levy Co Plant	0	0	109	0	0	0
58	Inland waters pollution control Detroit facilities	0	89	0	0	0	0
67	Superior materials 32	0	56	0	0	0	0
72	St. Mary's cement	0	0	17	0	0	0

Table 6-3: Emissions of toxics pollutants (pounds/year) by facility in Southwest Detroit by pollutant type. Average 2010-2014. In approximate rank by total TRI emissions. Excerpted from [Table 5-6](#).

[Figure 6-11](#) maps locations of facilities that are point sources of air pollutants located in or immediately adjacent to Southwest Detroit. Symbols indicate facilities that emit conventional air pollutants reported in the Michigan Air Emissions Reporting System (MAERS) and air toxics reported in the Toxic Release Inventory (TRI), as described in the legend. Numbers indicated for each facility reflect its ranking in the listing of MAERS emissions ([Table 5-4](#)) and the listing of toxic emissions ([Table 5-7](#)).

Air Pollutant Point Sources in the City of Detroit - Southwest Region



NOTE: TRI & MAERS Source Rank: First number indicate MAERS rank, second number indicate TRI rank.

Figure 6-11: Air pollutant point sources in Southwest Detroit.

Wayne County, Michigan is currently (2015) in compliance with National Ambient Air Quality Standards for five of the six criteria pollutants (ozone, PM, NO_x, CO, lead). However, it does not meet the National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO₂).

While many point sources in SW Detroit and the surrounding area emit SO₂, about 85% of SO₂ emissions in the county are emitted by coal-fired power plants burning coal to produce electricity. DTE Energy's River Rouge, and Trenton Channel facilities and EES Coke at U.S. Steel are all located in or adjacent to SW Detroit; DTE's Monroe facility is some distance to the south but also affects air quality in SW Detroit. Brief periods of exposure (as short as 5 minutes) to SO₂ can lead to asthma exacerbation and other serious health concerns.² Section 5.5.2 quantifies the health impacts of SO₂ (and other pollutants) in Detroit; Section 5.5.3 shows maps of SO₂ concentrations across Detroit. The SO₂ Fact Sheet provides more information on the health effects of SO₂.

² TBD

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SW Detroit residents are exposed to SO₂ and other pollutants from DTE's coal-fired power plants and from other industrial sources, see [Figure 4-11](#). DTE Energy installed two scrubbers on its power plant located in Monroe, Michigan in 2009 and two additional scrubbers in 2015: together these scrubbers have significantly reduced emissions of SO₂ from this plant. However, scrubbers have not been added to other large SO₂ point sources affecting SW Detroit residents: the DTE River Rouge plant, the DTE Trenton Channel plant, and the EES Coke LLC Subsidiary at U.S. Steel. Together, these three plants emit 33,317 tons of SO₂ annually. As shown in [Figure 4-11](#), SO₂ emissions from these and other facilities affect residents of SW Detroit, and SO₂ exposure has been linked with exacerbations of asthma among children living in these areas.³ In March 2016, DTE proposed replacing 4 coal-fired boilers at DTE Trenton Channel with 5 natural gas boilers, which should significantly decrease SO₂ and PM_{2.5} emissions at this facility, although the largest boiler at Trenton Channel will continue to burn coal without a scrubber.

Several other sources of SO₂, while smaller in terms of tons/year, produce localized "hotspots" of high SO₂ concentrations, most notably Carmeuse Lime. The 2015 SO₂ State Implementation Plan (SIP) designed to attain the SO₂ NAAQS in Detroit proposes to increase the stack height at this facility (from 60 to 100 feet) in order to reduce this SO₂ hotspot. (No emission reductions are anticipated at this facility.) The SIP may lower SO₂ emissions at US Steel, which also produces localized SO₂ hotspots.

Overall, SW Detroit has an unusually high density of heavy industry, including steel mills, a large refinery, coking plants, power plants, incinerators, and other large industrial emitters. In addition to SO₂ emissions, these facilities emit significant quantities of other pollutants, including PM_{2.5}, NO_x, volatile organic compounds, semi-volatile compounds, metals, and toxic pollutants. Many of these pollutants are not well characterized in emissions inventories.

6.13.2 Mobile sources

Mobile sources emit NO_x, PM_{2.5}, VOCs, CO, diesel exhaust and other pollutants, which significantly increase the exposure of SW Detroit residents to air pollutants. Emissions result when a vehicle is idling and on the road, and also when refueling. Importantly, a large truck produces considerably more emissions than a car, and trucks are responsible for a large share of both PM_{2.5} and NO_x emissions. The area also contains extensive off-road sources (such as construction equipment); these are quantified in [Section 5.4](#).

Main Sources: Major freeways, including I-75 and I-94, run through SW Detroit. In addition to local traffic, international traffic moves through SW Detroit on its way to and from Canada via the Ambassador Bridge. Sections of the freeways running through SW Detroit contain the highest traffic counts (number of vehicles per day) in the city. According to the Michigan Department of Transportation, sections of both I-75 and I-94 have average daily vehicle traffic over 100,000. The volume of average daily total vehicle traffic and daily truck traffic volume on major roadways through Southwest Detroit is shown in [Table 6-4](#).

³ Batterman, S. Publication TBD.

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Highway	2013 Average Daily Vehicle Traffic (cars/day) ⁴	2013 Average Daily Commercial Vehicle Volume (trucks/day) ⁵
I-75 (Fisher Fwy)	95,700 - 106,500	11,400 - 11,500
I-94	117,300 - 126,400	11,000
Ambassador Bridge	13412	6441
M-12	11,300 - 22,300	610 – 780
M-85 (w Fort St)	7,000 - 27,500	620 - 3,300
M-10	95,300 - 107,100	870 – 1600

Table 6-4: Average daily vehicle traffic and average daily commercial vehicle volume, Southwest Detroit

Of particular concern is the amount of commercial traffic the area receives, most of which is diesel-powered trucks and buses. Commercial traffic includes heavy duty diesel trucks that drive through SW Detroit across the Ambassador Bridge to Canada. These large vehicles produce most of the on-road mobile source emissions of PM_{2.5} (See [Section 5.3](#)). In 2013, MDOT found that sections of I-75 and I-94 which run through SW Detroit have some of the heaviest commercial traffic in the entire state of Michigan, with an average 24-hour volume of truck traffic of over 10,000 trucks.⁶ (See Diesel Fact Sheet: Appendix TBD). Pollutant emissions associated with traffic will shift with the construction of the Gordie Howe (formerly called the New International Trade Crossing or NITC) Bridge, to be located just 2 miles south of the Ambassador Bridge (see [Figure 6-12](#)). Government traffic projections predict traffic volume on the NITC Bridge will reach up to 10 million crossings a year by 2030. This is a 50% increase in vehicle crossings from those currently occurring on the Ambassador Bridge.⁷

Owners of the Ambassador Bridge have also petitioned to construct a second ‘twin’ alongside the existing bridge. The project is currently stalled awaiting permits, and it is unclear when or if construction would start.⁸ Any additional bridge projects, however, would likely alter or increase truck and vehicle traffic in Southwest Detroit.

⁴MDOT (Michigan Department of Transportation). 2014. MDOT Traffic Volumes. Available: <http://mdot.maps.arcgis.com/apps/Viewer/index.html?appid=18a4b2f2ba3b4e079e935f8835862c73> [Accessed 17 March 15].

⁵ MDOT (Michigan Department of Transportation). 2014. MDOT Traffic Volumes. Available: <http://mdot.maps.arcgis.com/apps/Viewer/index.html?appid=18a4b2f2ba3b4e079e935f8835862c73> [Accessed 17 March 15].

⁶ Michigan Department of Transportation. 2013. Commercial ADT Maps. Available: http://www.michigan.gov/mdot/0,4616,7-151-11151_11033_11149_11162-30009--,00.html [Accessed 17 March 15].

⁷ Gallagher, J. 2011. Future Traffic A Key Rumble in the Bridge Debate. Detroit Free Press. Available: <http://archive.freep.com/article/20110713/BUSINESS04/107130399/Future-traffic-key-rumble-bridge-debate> [Accessed 19 March 15].

⁸ Spangler, T. 2016. Approval for new bridge span could come in March. Available: <http://www.freep.com/story/news/local/michigan/2016/01/04/approval-new-bridge-span-could-come-march/78278380/> [Accessed 4 April 2016].

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Health Effects: Substantial health effects have been demonstrated for people who live, work, or go to school near major freeways. In particular, those who live within about 150 meters (about 500 feet) of roadways with high volumes of traffic, and in particular, diesel truck traffic, experience increased risk of respiratory and cardiovascular health effects. Health impacts from on-road traffic is quantified in [Section 5.5.4](#). See Health Effects [Table 3-1](#) for greater detail. Approximately 69,000 persons (about 10% of Detroit's population) lives within 150 meters of such heavily trafficked roadways.

Vehicles and the related infrastructure (e.g., fuel distribution facilities) are among the largest emitters of NO_x and VOCs in the urban area. In summer, the NO_x emitted by vehicles and other sources combines with VOC emissions from vehicles and other sources to produce ground-level ozone (O₃), another pollutant which is harmful to health. Currently, O₃ levels in Detroit are very close to the new (2015) National Ambient Air Quality Standard for O₃. [Section 4.3](#) provides further information on O₃ trends in Detroit.

City of Detroit - Southwest Region (150 meters buffers from freeway)

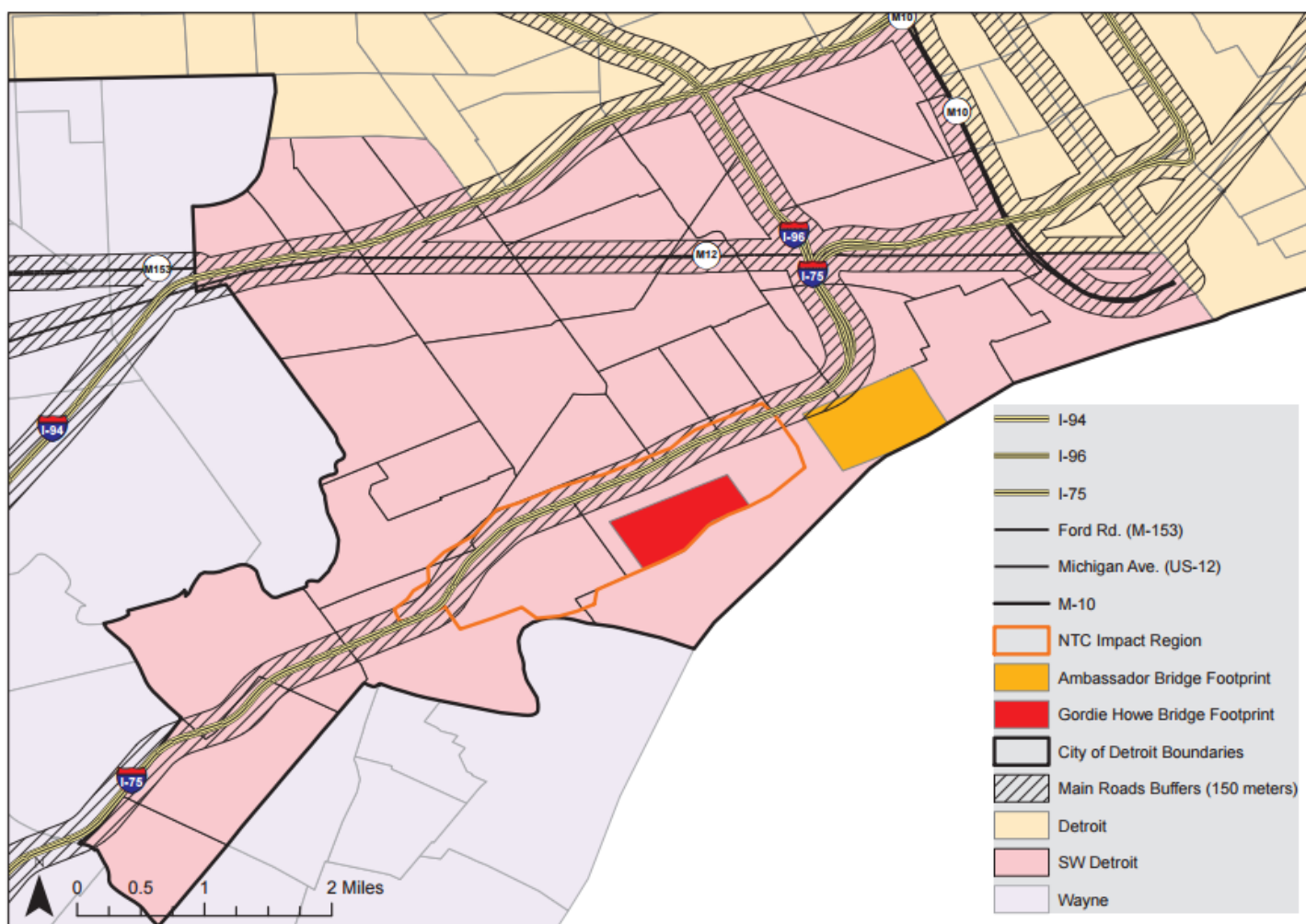


Figure 6-12: 150 meter roadway buffers in Southwest Detroit

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6.13.3 Vulnerability

As described in [Section 6](#), some communities or individuals may be more vulnerable to the adverse effects of exposure to air pollutants because they are exposed to higher levels, or because they are more adversely affected by exposure than others. Low income communities and communities of color are disproportionately likely to be exposed to high levels of air pollutants. Existing health conditions, low levels of some nutrients in the diet, young age, older age, and poor housing condition can increase the severity of health effects from exposure to air pollutants. As shown in [Table 6-1](#), residents of Southwest Detroit are more likely to be exposed to higher levels of diesel PM and have higher cancer mortality risk than the city as a whole, or than the surrounding tri-county area.

In addition, SW Detroit has a higher percentage of children (9.5%), an age group that is particularly vulnerable to adverse health effects associated with exposure to air pollutants, than other areas of the City. SW Detroit has a large proportion of Hispanic/Latino residents (43%), who may experience particular stressors associated with immigration surveillance. 39.9% of SW Detroit residents age 25 and over have less than a high school diploma, and a greater proportion of the population of this area of the city rent rather than own their homes. Young age, and living in rental properties are associated with increased health risks associated with exposure to air pollutants. See [Figures 6-5 and 6-10](#) for maps showing the Cumulative Vulnerability Index for census tracts in the Tri-County Area and Detroit, respectively.

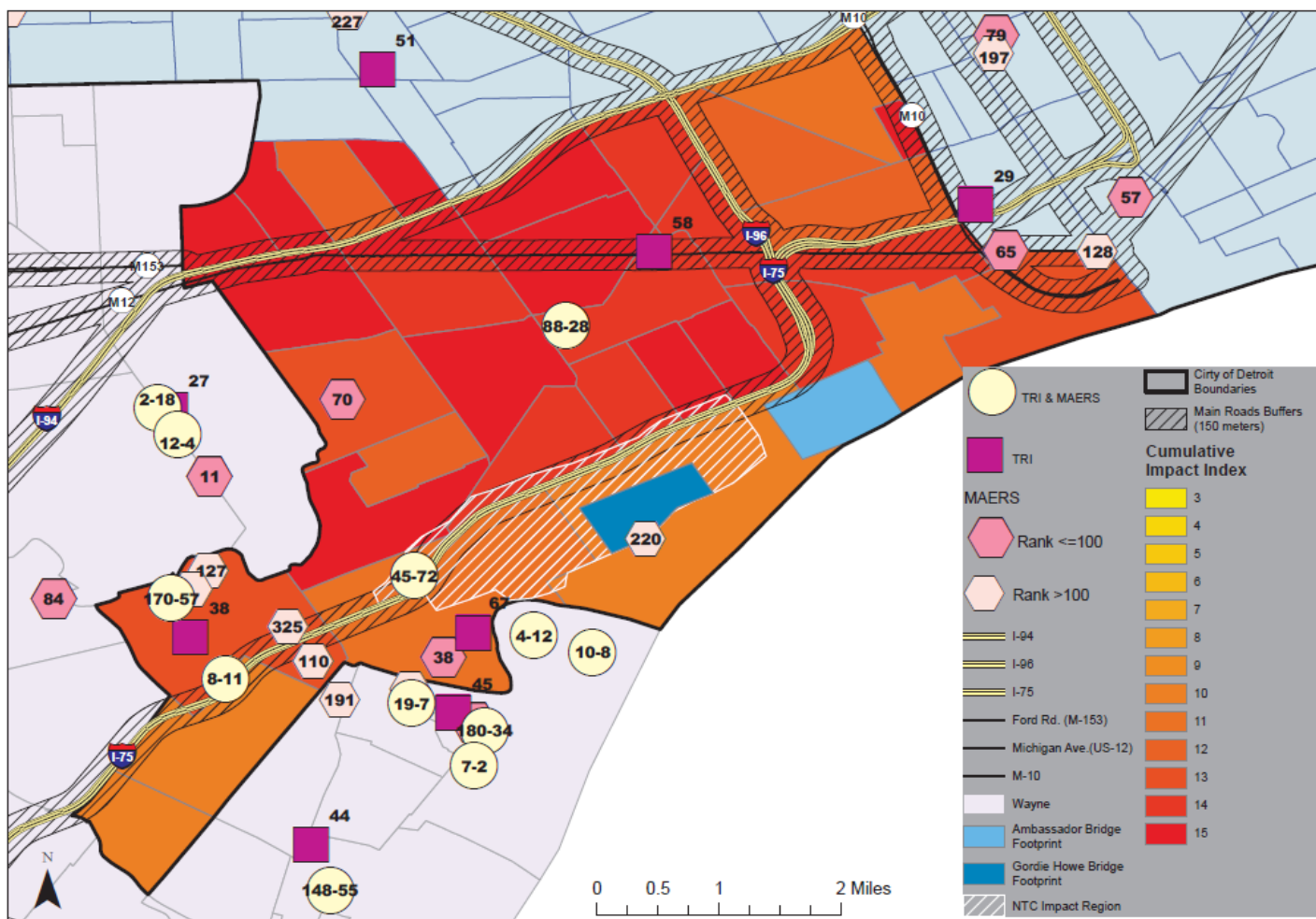
6.13.4 Cumulative risk

[Figure 6-13](#) maps the Cumulative Risk Index for census tracts in Southwest Detroit, along with point sources of conventional air pollutants (MAERS) and toxics (TRIs), major freeways traveling through the area, and the footprints of the existing Ambassador Bridge and the proposed Gordie Howe International Bridge.

The cumulative risk score is the sum of three indices assessing proximity of population to hazardous land uses (e.g., railyards, freeways), exposure to air pollutants and associated health risks (e.g., diesel PM, respiratory risk, cancer risk), and vulnerabilities (e.g., percent below poverty, percent children under age 5). Briefly, these are calculated by rank ordering census tracts in the Tri-County area by each indicator, and constructing quintiles with 1=low and 5=high exposure or vulnerability. The sum of the risk and vulnerability scores creates a cumulative risk score ranging from 3 (lowest cumulative risk) to 15 (highest cumulative risk).⁹ Note that all census tracts in SW Detroit fall into the upper ranges of risk (darker oranges and reds) when ranked against all census tracts in the Tri County Area ([Figure 6-6](#)).

⁹ Schulz AJ, Mentz GB, Sampson N, Ward M, Anderson R, deMajo R, et al. 2016. RACE AND THE DISTRIBUTION OF SOCIAL AND PHYSICAL ENVIRONMENTAL RISK: A Case Example from the Detroit Metropolitan Area. DuBois Review. In Press.

Air Pollutant Point Sources, Cumulative Risk and 150 meters buffers from Freeway in the City of Detroit - Southwest Region



NOTE: TRI & MAERS Source Rank: First number indicate MAERS rank, second number indicate TRI rank.
Cumulative impact polygons (CI) include: residential areas, child care facilities, health care facilities, schools and playgrounds.
Total Cumulative Impact includes: Hazardous Facilities and Land Uses, Exposure and Health Risk and Vulnerabilities

Figure 6-13: Cumulative risk index, 150 meter roadway buffers, MAERS and TRI emission sources in SW Detroit.