Hillsborough County

Palm River Redevelopment Area

Infrastructure Assessment

February 2022

Prepared by

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Hillsborough County

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Executive Summary

In 2016, the Hillsborough County Economic Development Department created the Targeted Redevelopment Program to enhance and encourage development within several pilot areas. The primary objective of the program is to encourage private sector investment in sites and buildings that will encourage retention and attraction of businesses and jobs for the communities identified as pilot areas. One of these pilot areas is the Palm River Redevelopment Area. The purpose of the Infrastructure Assessment is to evaluate how well the current transportation, utility, and stormwater infrastructure will support infill, redevelopment, and economic development in the Palm River Redevelopment Area, consistent with the Targeted Redevelopment Program goals.

This Infrastructure Assessment includes a **Transportation Assessment** (page 16) identifying locations for capacity, safety, mobility, and roadway condition improvements based on context sensitive users including pedestrians, cyclists, commuters, freight and commercial vehicles. The improvements identified in the Transportation Assessment seek to improve the roadway conditions of users and connections that promote development in the study area. Improvements in the highest areas of need include intersection safety improvements, complete street improvements including speed management and dedicated user facilities, and pavement rehabilitation or preventative treatments.

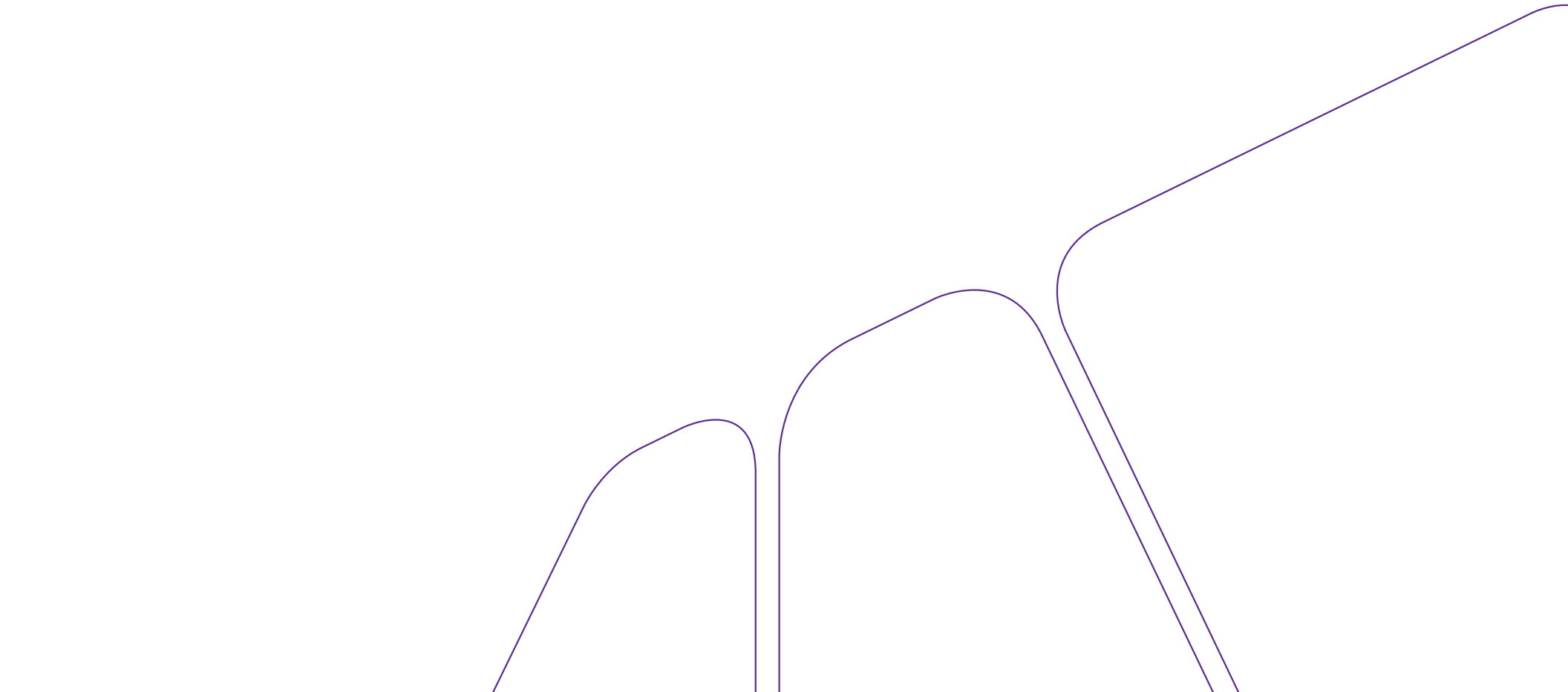
The **Utility Assessment** (page 38) estimates the available water and wastewater treatment plant capacity and potential transmission line upgrades necessary to better serve the existing development and support infill and redevelopment in the study area. Improvements in the highest areas of need include sewer system extension, converting septic to sewer facilities, and water system extension or replacement .

The **Vulnerability Assessment** (page 46) identifies areas with the highest flood potential including the criticality of flood depths. These locations should be a focus of flood mitigation and adaptation strategies to improve conditions for the existing development and promote redevelopment in the study area. Improvements in the highest areas of need should include roadway and area flood exposure treatments which could include but is not limited to hardening and elevating infrastructure, additional stormwater storage, bioswales, and landscaping.

The recommended actions (page 68) are a summary of the assessment findings and identification of the highest areas in which to focus to support the Targeted Redevelopment Program goals. A map of the recommended improvements is shown on page 71, **Figure 23**. A summary of assessment measures and improvement benefits is provided in the Assessment Matrix in Appendix A. The matrix may be used to further prioritize and identify improvement projects following more detailed project scope definition through analyses, public outreach and coordination with responsible parties including Hillsborough County departments, City of Tampa, Florida Department of Transportation and CSX.

Section 1

Introduction and Context



Introduction and Context

Background

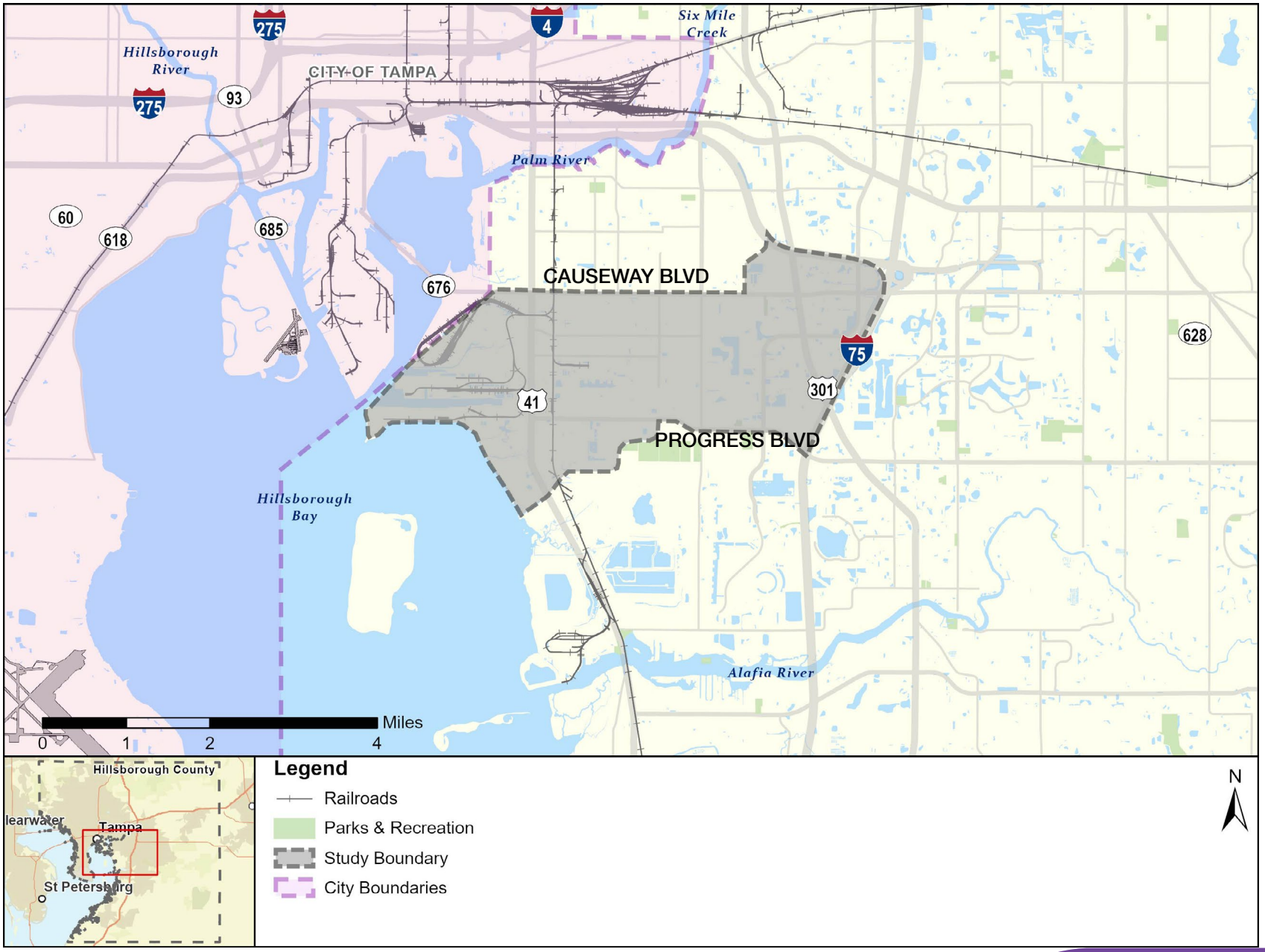
In 2016, the Hillsborough County Economic Development Department created the Targeted Redevelopment Program to enhance and encourage development within several pilot areas. The primary objective of the program is to encourage private sector investment in sites and buildings that will encourage retention and attraction of businesses and jobs for the communities identified as pilot areas. One of these pilot areas is the Palm River Redevelopment Area.

The Palm River Redevelopment Area, located in central Hillsborough County, is comprised of approximately 6,610 gross acres of land. As shown in **Figure 1**, the redevelopment area is bounded by Causeway Boulevard and Selmon Expressway/State Road 618 to the north, Madison Boulevard/ Progress Boulevard to the south, I-75 to the east, and the Port of Tampa/Hillsborough Bay to the west. Key elements within the study area include the freight terminals on Hillsborough Bay and a freight rail line that vertically traverses the study area. Additional key elements of the redevelopment area include the Port of Tampa to the west, multiple new housing developments being constructed, and various manufacturing and warehousing operations located near the port.

Project Purpose

The purpose of this assessment is to evaluate the current infrastructure in terms of how well the Palm River Redevelopment Area will support infill and redevelopment consistent with the economic development goals for the area. The infrastructure assessment, including a resiliency analysis, is the starting point to determine future investment and make infrastructure decisions. Another consideration of this study is the relationship between the redevelopment area as a whole and the surrounding major activity centers and future expansion opportunities. This infrastructure assessment provides recommendations that Hillsborough County can consider and implement as part of continued planning efforts in the Palm River Redevelopment Area. The recommendations focus on identifying current inadequacies in the existing critical infrastructure, as well as opportunities to plan for enhanced infrastructure. A critical element in the assessment will be providing recommendations to improve the resiliency of the existing infrastructure in the redevelopment area.

Figure 1. Palm River Redevelopment Area



Study Area Context

Study Boundary

The study boundary was developed based on the Redevelopment Area, as shown in **Figure 2**. The study boundary shown in the dashed black line is roughly bounded by Causeway Boulevard and Selmon Expressway/State Road 618 to the north, Madison Boulevard/Progress Boulevard to the south, I-75 to the east, and the Port of Tampa/Hillsborough Bay to the west.

Existing Land Use

There are a mixture of existing land uses within the redevelopment area with single-family residential uses, public/quasi-public/institutions, public communications/utilities and vacant lands being the most prominent categories. Other uses include multi-family residential, light commercial, heavy and light industrial, and agricultural. The existing land uses are shown on the following page in **Figure 3**.

Figure 2. Study Area Boundary

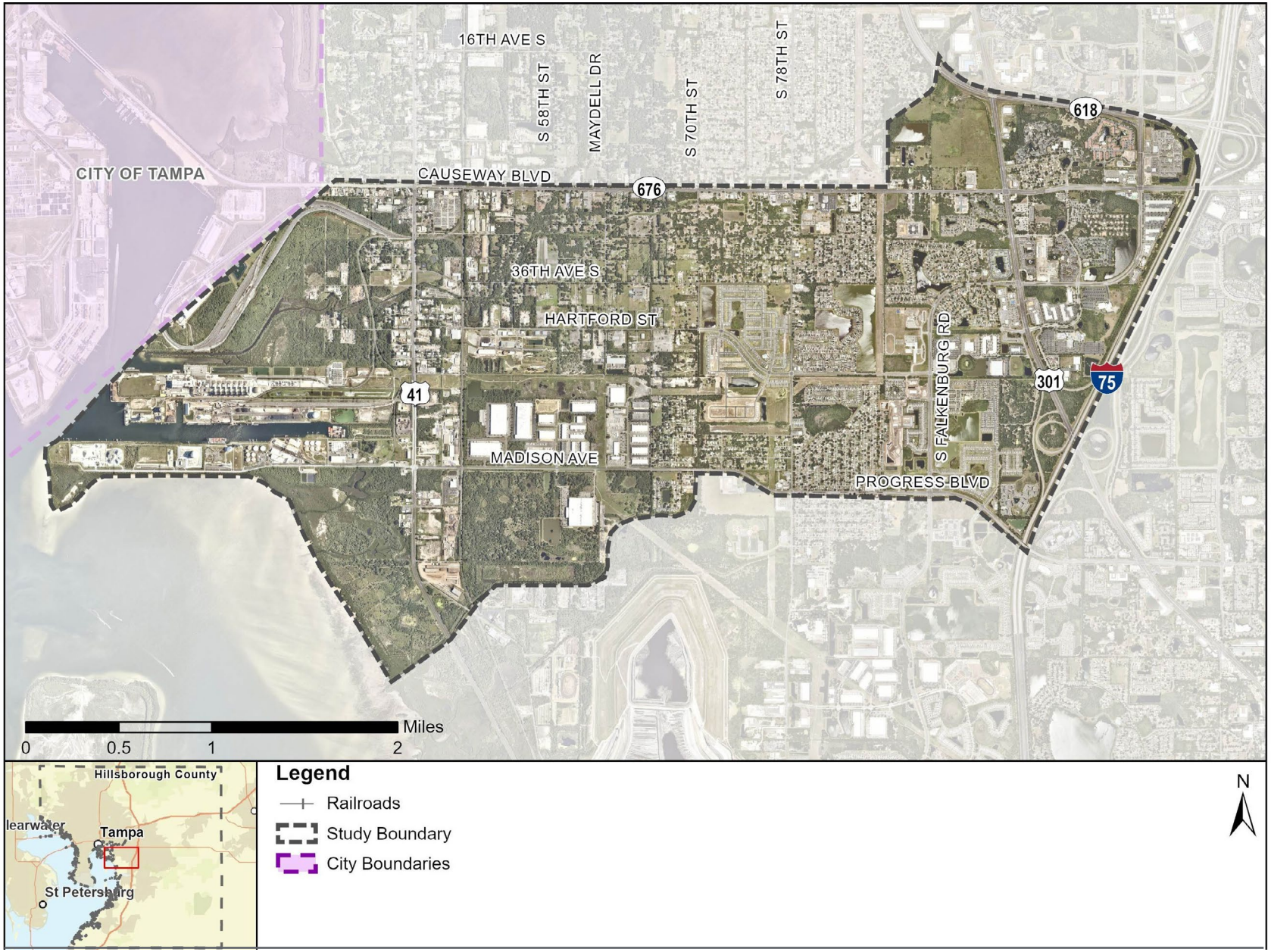
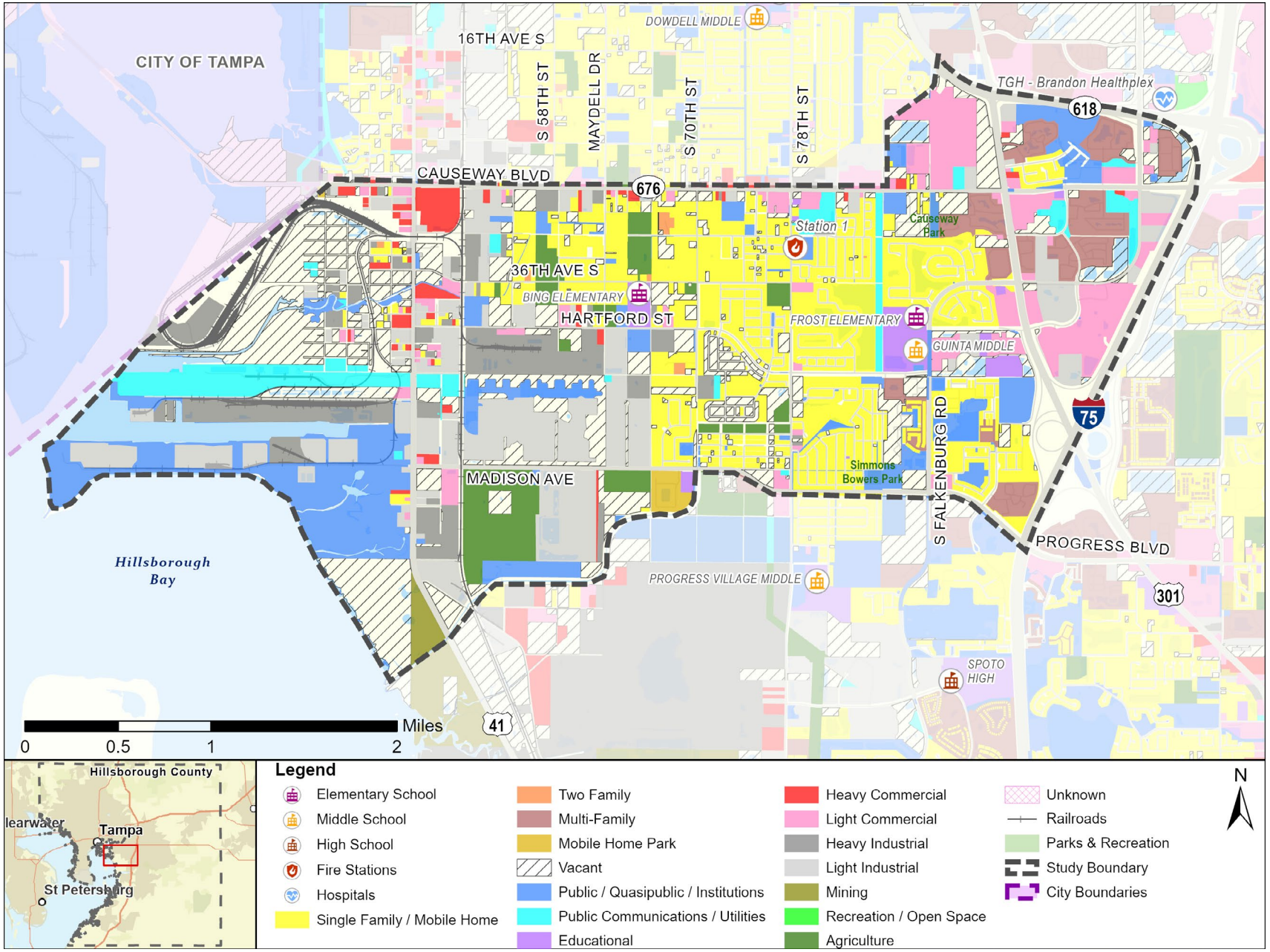


Figure 3. Existing Land Use and Community Facilities



Community Facilities

The Palm River Redevelopment Area includes several community facilities within the redevelopment area boundary which includes schools, parks, and emergency management/police/fire. The current community facilities in the redevelopment area are identified in **Figure 3**. The area contains two elementary schools, one middle school, one fire station, and two parks: Causeway Park and Simmons Bowers Park.

The two elementary schools located in the redevelopment area are Bing Elementary and Frost Elementary. The sole middle school in the redevelopment area is Giunta Middle School. Bing Elementary is located off 36th Avenue S near Maydell Drive, and Frost Elementary is located on S Falkenburg Road next to Giunta Middle School. Giunta Middle School is located at S Falkenburg Road and Camden Field Parkway. **Table 1** shows existing and projected school capacities to the 2024-2025 school year based on Florida Department of Education Florida Inventory of Schools Houses (FISH) data. Both elementary schools and the middle school have available capacity and are not projected to reach maximum capacity through 2025.

Table 1. Existing and Projected School Capacities

School	Actual 2019-2020 FISH Capacity	Actual 2019-2020 Utilization	Projected 2024-2025 Utilization
Bing Elementary	738	63%	83%
Frost Elementary	966	58%	60%
Giunta Middle	1,558	51%	57%

The sole emergency management/police/fire facility in the redevelopment area is Fire Station 1, located off S 78th Street and S 33rd Avenue. Located just outside the redevelopment area boundary at the northwest corner of the I-75 and Selmon Expressway/SR 618 is the Tampa General Health Brandon Healthplex. There are two parks in the redevelopment area: Causeway Park is located off Causeway Boulevard and S 90th Street and Simmons Bowers Park located on Progress Boulevard near S 58th Street.

Business and Demographics

An estimated 585 businesses are located in the study area that support 7,050 employees, based on 2021 ESRI Business Analyst. The breakdown of businesses by North American Industry Classification System (NAICS) category are shown in **Table 2**. Wholesale Trade and Retail Trade make up the largest percent of total businesses in the study area based on percent of total employees with 18.7%, and 14.0%, respectively. These trades involve businesses across the study area including supply and food stores, repair and maintenance shops, and other commercial and personal services. Other significant businesses in the area include construction and engineering services, and warehousing and distribution centers. Many of the businesses are accessed by freight rail and trucks, requiring a large footprint for parking lots and rail right-of-way.

The United States Census Bureau tool, OnTheMap, was used to summarize employee inflow and outflow within the study area based on most recently available data (2019). It should be noted that the number of employees vary between the OnTheMap and ERSI projection due to different data sources, time frames and analysis methodologies. According to the OnTheMap application, approximately 63% of the labor market (employees in the area or residents in the area) comes from outside of the study area. The remaining labor market includes 35% who leave the study area for work, and 2% who live and work in the study area.

The Palm River Redevelopment Area has an estimated population of 19,996 people and 7,735 households, based on ESRI 2021 projections. Residential uses are concentrated in the redevelopment area between S 66th Street and S 86th Street. Vulnerable populations in the study area include those 65 years old or older, and households with a median income less than the county average or income less than $25,000. When compared to Hillsborough County as a whole, the study area has a higher percentage of population that is 15 years old or younger, a lower median household income, and higher percentage of households with income below $25,000, than that of Hillsborough County. A comparison of socioeconomic statistics for the study area and Hillsborough County is provided in **Table 4**.

Table 2. NAICS Business Types

2021 ESRI Forecast	Total Business	Total Employees
	585	7,050
NAICS Code	**Percent of Total Business**	**Percent of Total Employees**
Wholesale Trade	8.50%	18.70%
Retail Trade	16.40%	14.00%
Construction	10.60%	10.60%
Professional, Scientific & Tech Services	6.80%	9.10%
Manufacturing	4.10%	6.90%
Other Services (except Public Administration)	12.00%	6.60%
Accommodation & Food Services	5.30%	5.50%
Administration & Support & Waste Management & Remediation	4.80%	5.30%
Transportation & Warehousing	4.60%	5.30%
Education Services	1.40%	5.30%
Health Care & Social Assistance	3.20%	4.90%
Real Estate, Rental, & Leasing	4.80%	2.20%
Arts, Entertainment & Recreation	2.60%	1.80%
Information	1.40%	1.50%
Public Administration	0.50%	0.70%
Finance & Insurance	2.20%	0.60%
Utilities	0.30%	0.30%
Unclassified Establishments	9.90%	0.20%
Management of Companies & Enterprises	0.30%	0.20%
Mining	0.20%	0.20%
Agriculture, Forestry, Fishing & Hunting	0.20%	0.00%

Source: ESRI Business Analyst (2021)

Table 3. Employment and Population Statistics

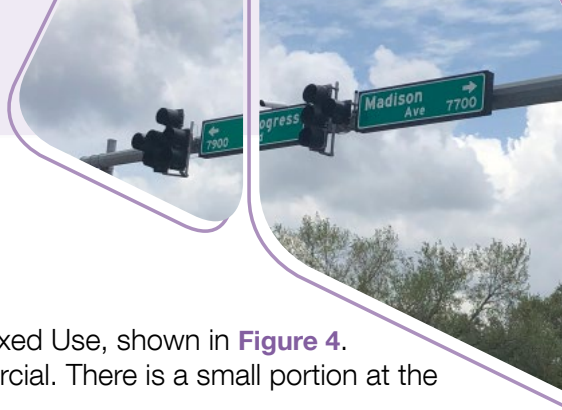
	2021 ESRI Forecast
Total Employees	7,050
Total Population	19,996
Employee/Residential Population Ratio	0.35

Source: ESRI Business Analyst (2021)

Table 4. Socioeconomic Data

Socioeconomic Statistics	Palm River Redevelopment Area	Hillsborough County
Income		
Median Household Income	$54,423	$60,625
Percent of Households with Income Below $25,000	19.3%	18.1%
Age		
Percent of Population 65 Years Old and Older	10.0%	15.7%
Percent of Population Younger than 15 Years Old	22.3%	18.1%
Race		
Percent of Population - Minority	46.3%	32.4%
Percent of Population - Hispanic Origin	26.6%	31.0%

Source: ESRI Business Analyst (2021)



Future Land Use and Planned Development

The primary future land uses in the redevelopment area are Heavy Industrial, Light Industrial, Residential, and Mixed Use, shown in **Figure 4**. There are portions of the redevelopment area along Causeway Boulevard that are categorized as Office Commercial. There is a small portion at the southwest corner of the redevelopment area that is categorized as Natural Preservation.

Currently, there are approximately 2,263 acres of Planned Development (PD) within the redevelopment area. Competitive Sites have also been identified in the redevelopment area. Competitive Sites are defined by the Hillsborough County Economic Development Department's Competitive Sites Program as locations with the capacity to support targeted office/industrial development. The Program crafts policies and programs to guide public sector engagement and investment to meet economic development objectives in redevelopment areas. Most competitive sites have an approved Planned Development or Development of Regional Impact (DRI) Development Order with a minimum of 100,000 square feet of office and/or industrial entitlements or the site has appropriate zoning that allows for a minimum of 100,000 square feet of office/industrial targeted industry development. Competitive sites located in the redevelopment area have a lower threshold with a minimum of 50,000 square feet.

The redevelopment project locations shown in **Figure 5** are part of Hillsborough County's Targeted Redevelopment Grant Program. The grant program targets development and uses in areas that are traditionally seen as declining in value or are underutilized relative to their location and existing built infrastructure. In the Palm River Redevelopment Area, these sites include site development and construction for warehouse and flex workspace uses.

Figure 4. Future Land Use Map

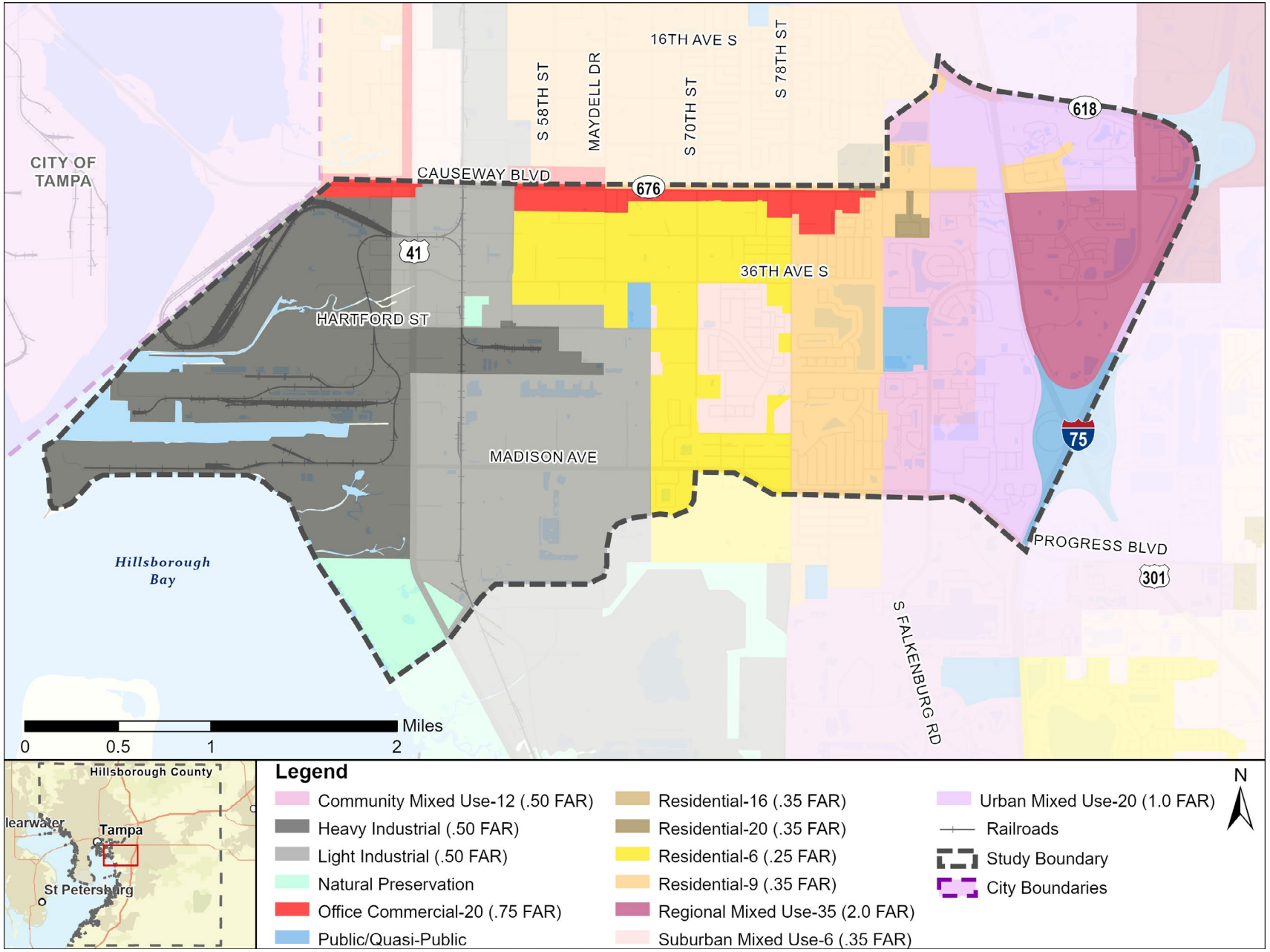
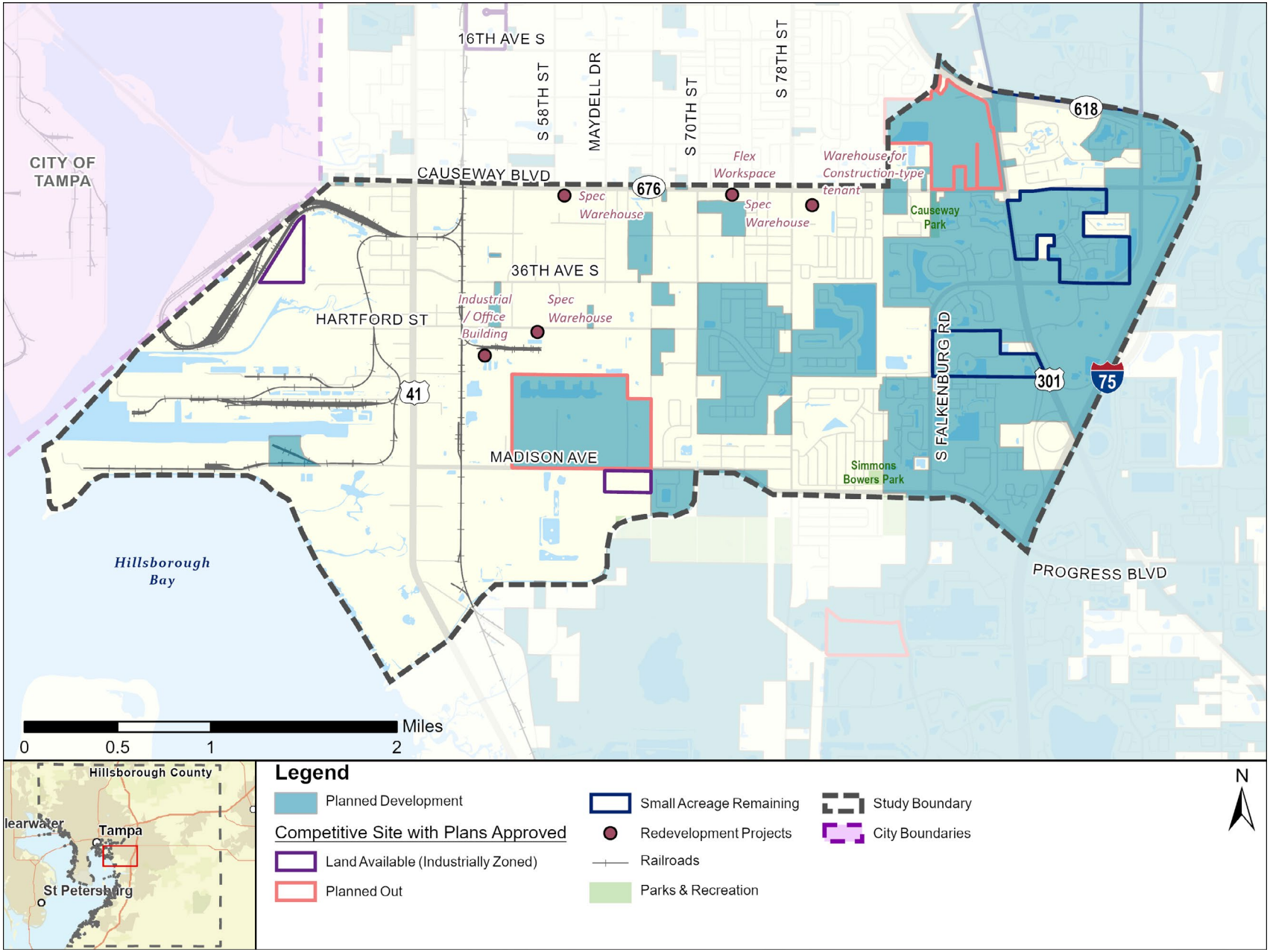


Figure 5. Planned Development and Competitive Sites




TOUCHSTONE

Section 2

Transportation Assessment

Transportation Assessment

The Palm River Redevelopment Area is generally bounded by state-owned principal and major arterial roadways including US 41, US 301, I-75, Selmon Expressway and Causeway Boulevard (FL 676). Access from I-75 to the study area is limited to only US 301 and Causeway Boulevard. Falkenburg Road and Madison Avenue/Progress Boulevard are also classified as arterial roadways, but are maintained by Hillsborough County with Suburban context classification and provide connection to residences and employment areas internal to the area. 36th Street, Hartford Street, and 78th Street are defined as collector roadways, maintained by Hillsborough County and have Suburban or Urban context classification to provide user facilities for higher non-vehicle activity. The roadway classifications and characteristics are described further in the following Transportation Assessment.

Congestion Management

Roadway Level of Service

Peak volume to capacity (v/c) data from the 2019 Level of Service (LOS) Report was reviewed as the most recently available data due to COVID-19 impacts to traffic conditions. Capacity is based on the adopted LOS for each roadway. A v/c ratio of 1.00 or greater indicates that the volume exceeds the capacity of the road and indicates areas with a high amount of peak congestion. The roadway v/c ratios and average daily traffic are shown in **Table 5** and **Figure 6**.

Travel Time Reliability

To measure travel time reliability, Travel Time Index (TTI) data was documented from Iteris Clearguide for 2019. TTI is the ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. The TTI was documented for the a.m. peak-hour period (7 a.m. to 9 a.m.) and the p.m. peak-hour period (4 p.m. to 6 p.m.).

The morning TTI indicates travel times greater than 20% of the free-flow speed travel time in both directions for all study roadways except for US 41 and S 78th Street. Both US 41 and S 78th Street have travel times greater than 10% in the southbound direction. The evening TTI indicates travel times greater than 20% of the free-flow speed travel time in both directions for all study roadways except for S 78th Street and I-75. Both roadways have travel times greater than 10% of free-flow speed travel time in both directions.

Trucking and Freight

As defined in the Hillsborough TPO's 2016 Freight Logistics Zone Strategic Plan, the Palm River Redevelopment Area is within a logistics cluster as an existing center of freight activity. As a result of the industrial uses and freight-oriented businesses, several truck routes and rail lines connect into the redevelopment area. To best serve those uses, it is important for truck routes to be reliable from a travel time and pavement condition perspective. Truck routes are shown in **Figure 9** with the underlying p.m. peak-hour TTI, and in **Figure 10** with the underlying pavement conditions.

Table 5. Roadway V/C Ratios

Roadway	Limits	Peak V/C	AADT
78th Street	Madison Avenue to Causeway Boulevard	0.95	15,092
Causeway Boulevard	50th Street to US 301	0.78	29,000
	US 301 to Falkenburg Road	0.44	30,554
	Falkenburg Road to Providence Road	0.44	50,208
Falkenburg Road	Progress Boulevard to US 301	0.43	14,729
	US 301 to Lumsden Road	0.41	17,452
	Lumsden Road to Selmon Expressway	**1.01**	37,500
Madison Avenue	US 41 to 78th Street	0.62	10,487
Progress Boulevard	78th Street to Falkeburg Road	0.62	17,601
	Falkenburg Road to I-75	**1.42**	17,601
Selmon Expressway	78th Street to I-75	0.43	73,000
US 301	I-75 to Crosstown W Ramp	**1.03**	58,000
US 41	Riverview Drive to Madison Avenue	0.78	29,000
	Madison Avenue to Port Sutton Road	**1.05**	32,824
	Port Sutton Road to Causeway Boulevard	0.69	32,824
I-75	Gibsonton Drive to US 301	0.80	143,500
	US 301 to Selmon Expressway	0.65	91,500

Figure 6. Peak Volume to Capacity

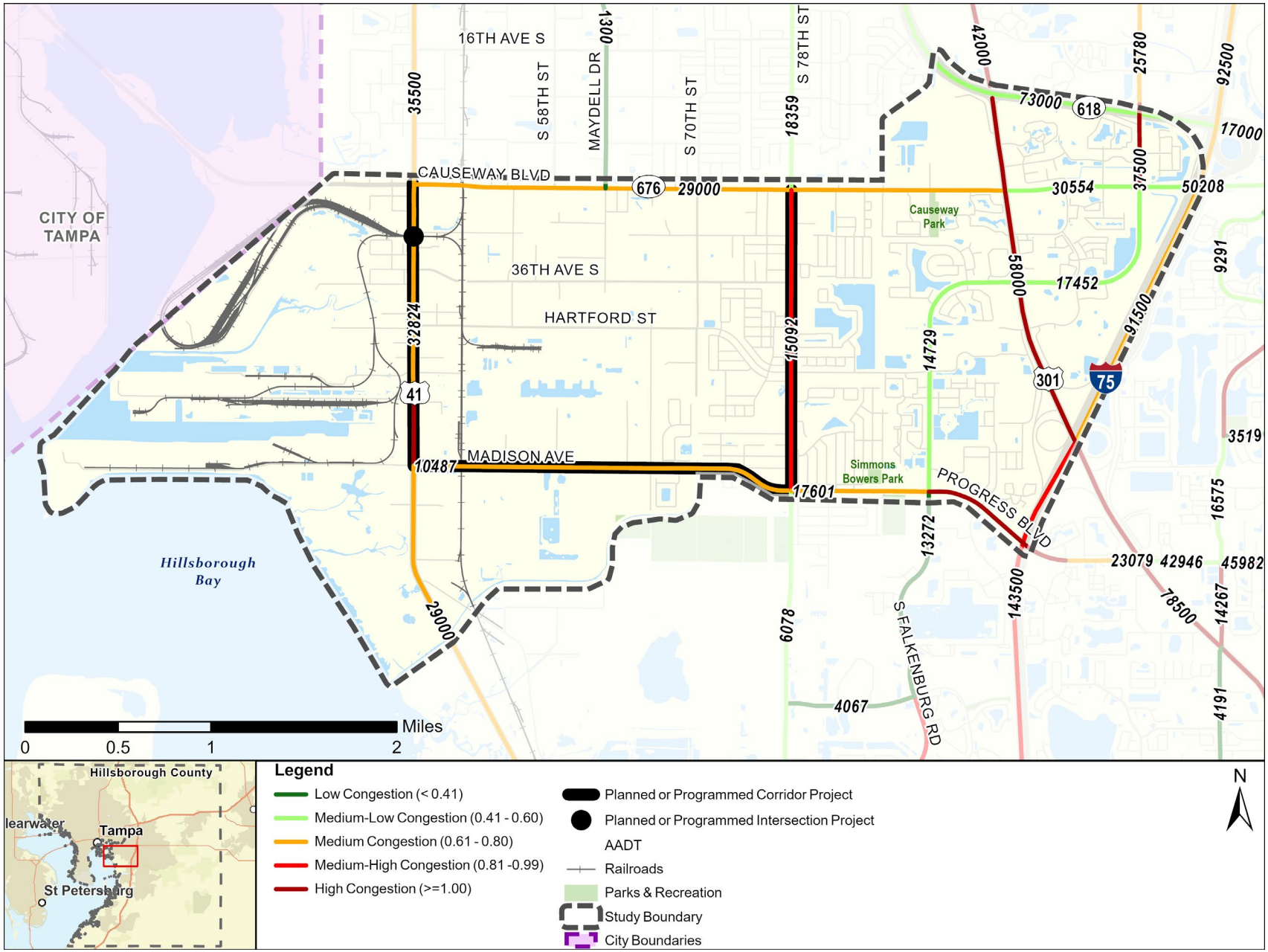


Figure 7. AM Travel Time Index (TTI)

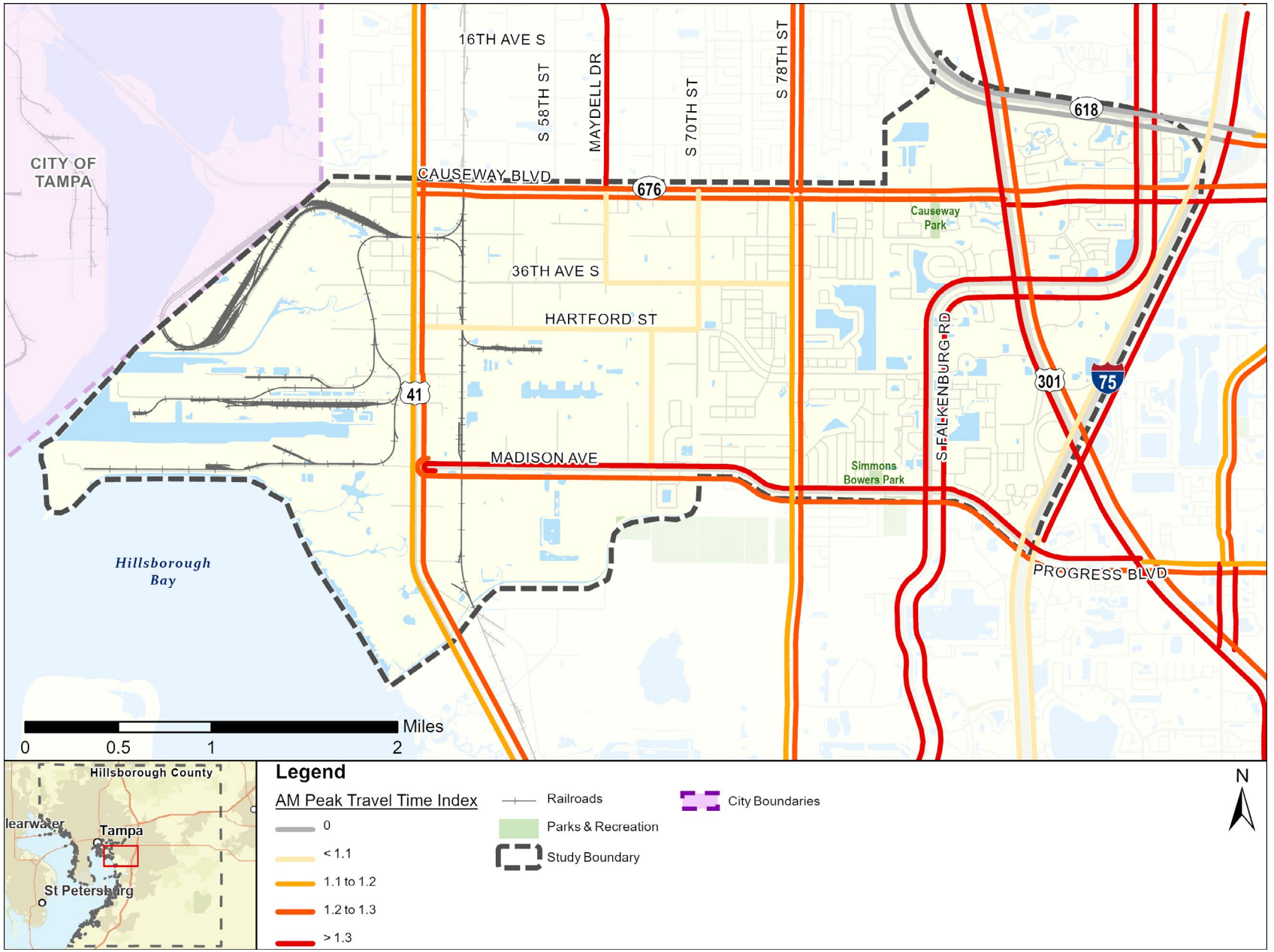


Figure 8. PM Travel Time Index (TTI)

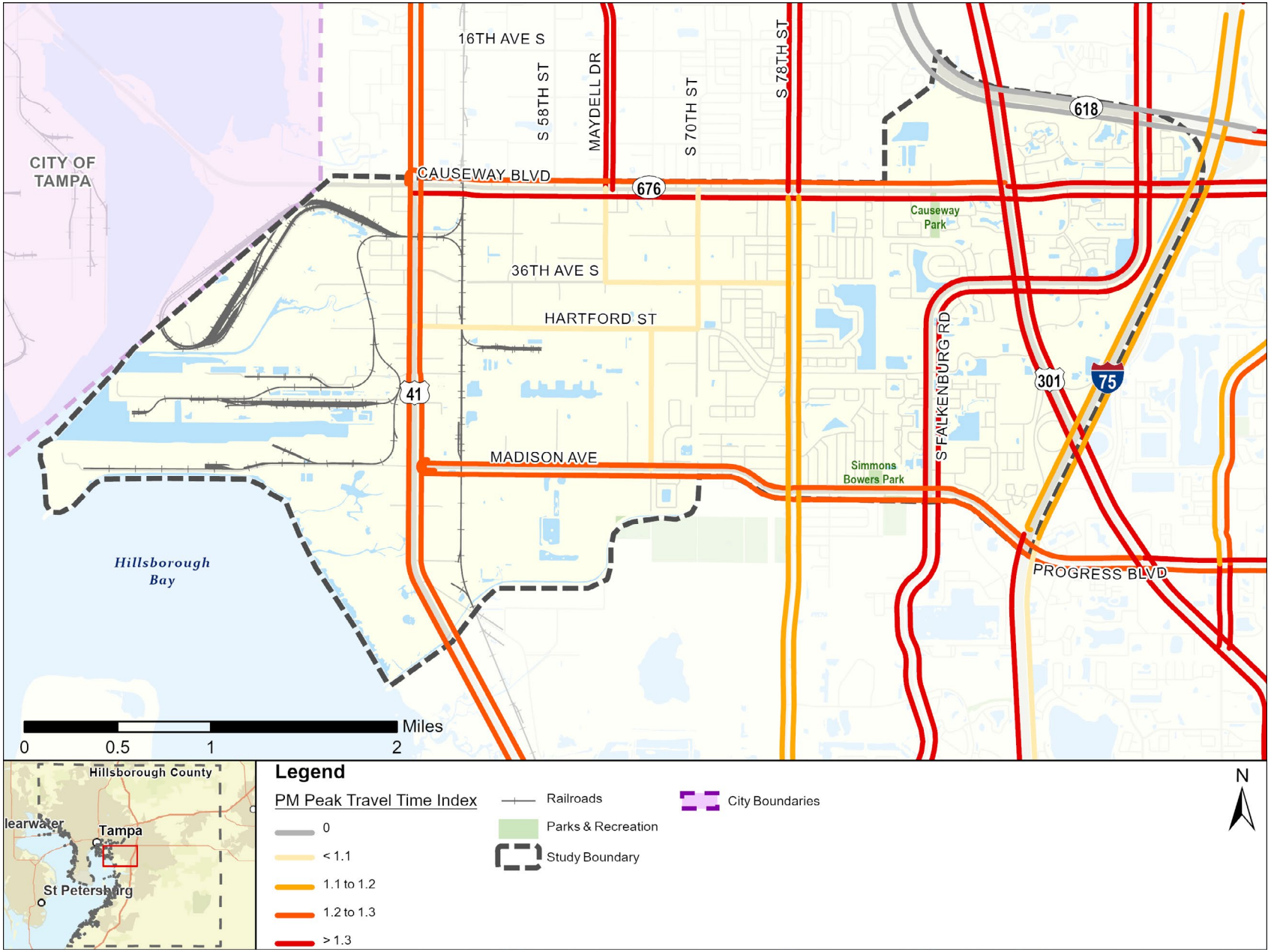


Figure 9. Truck Routes and PM Travel Time Index (TTI)

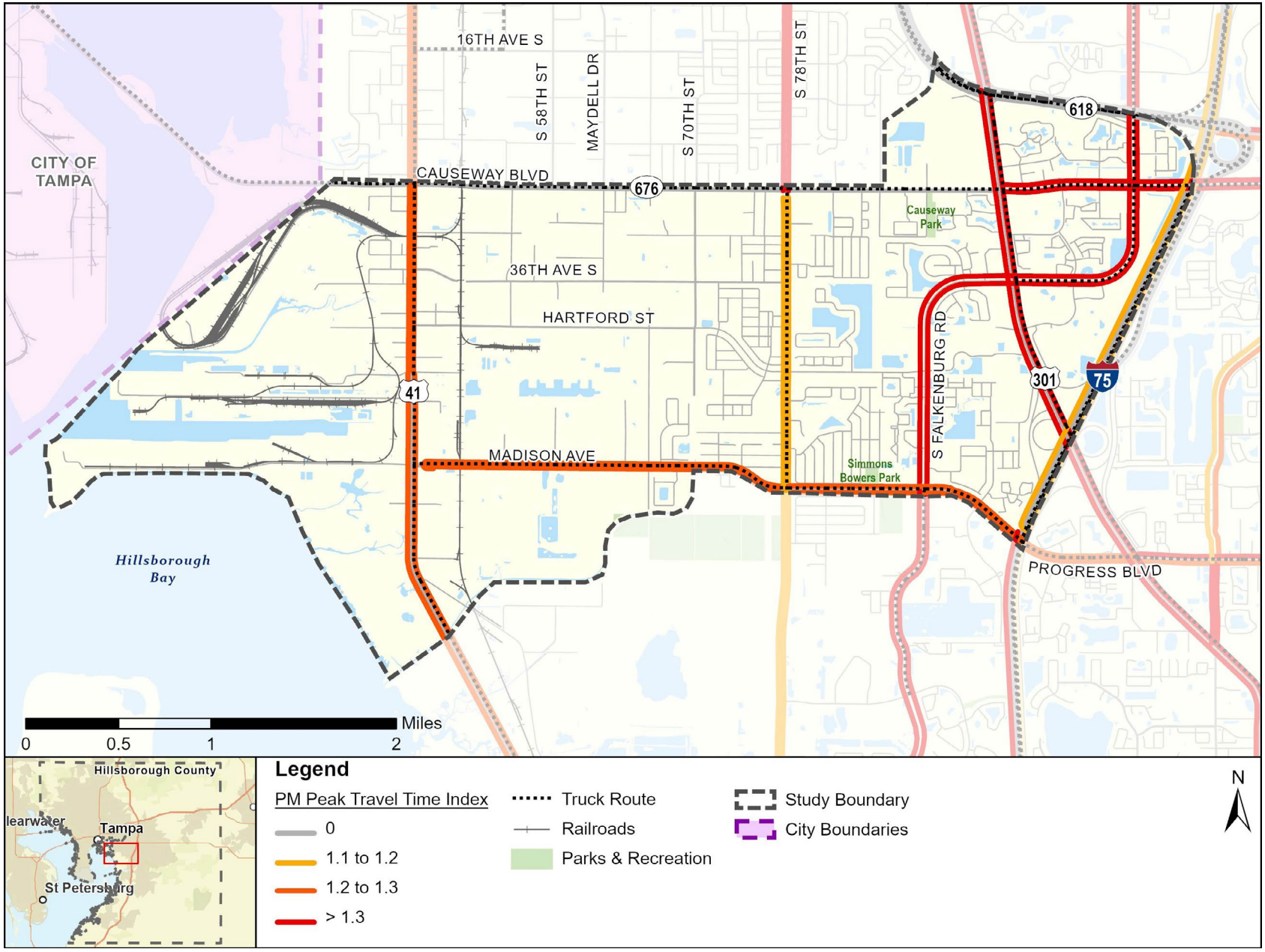
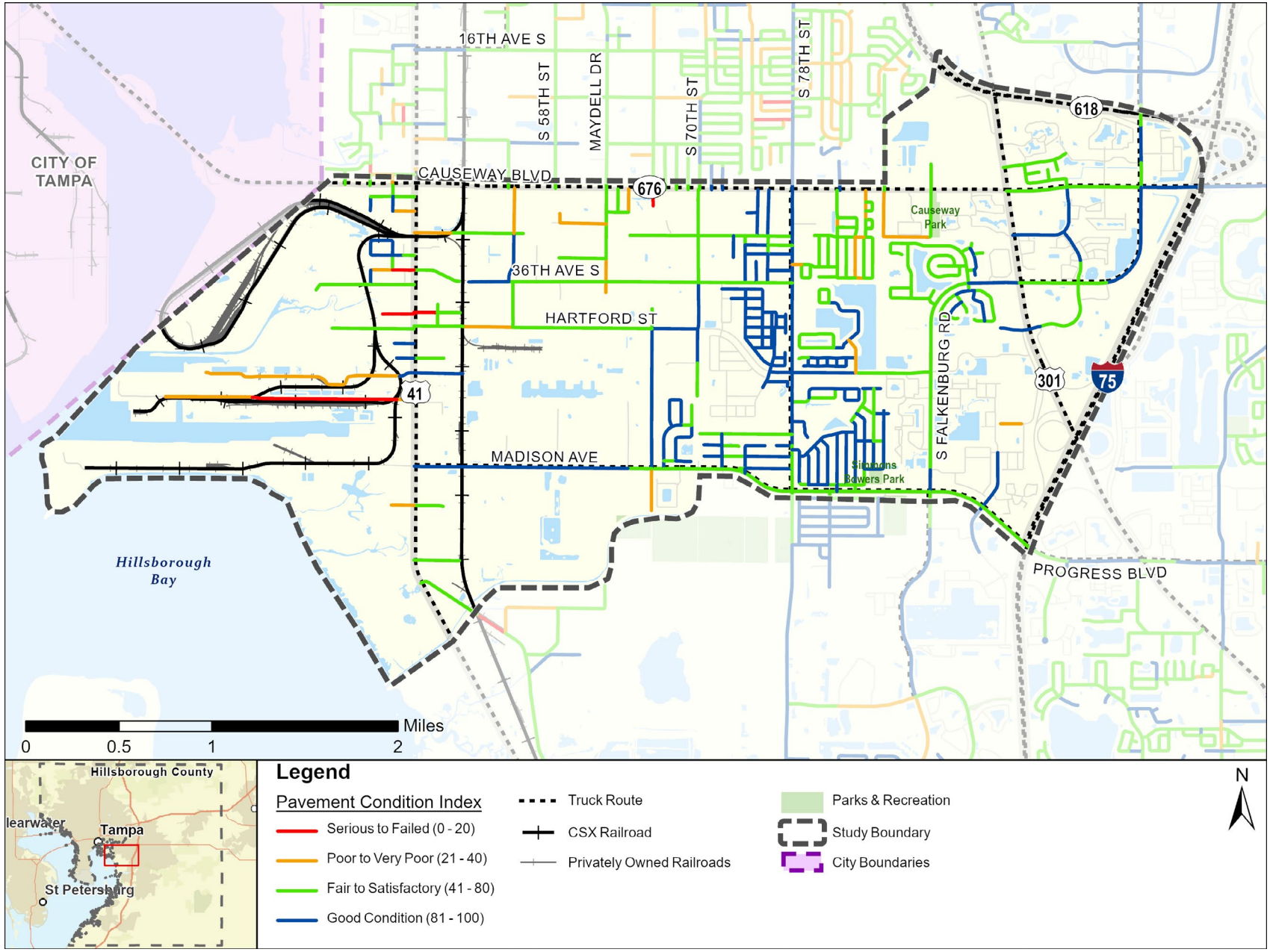


Figure 10. Truck Routes and Pavement Conditions



Planned and Programmed Projects

Funded and unfunded planned projects aimed to manage congestion within the redevelopment area were reviewed from the Hillsborough County CIP, Hillsborough TPO, and FDOT. The planned or programmed projects are described below:

- Hillsborough County CIP 69666000: South 78th Street from Progress Boulevard to Causeway Boulevard – roadway and turn-lane improvements to improve traffic flow, efficiency and congestion
- Hillsborough County CIP 6115000: Madison Avenue from US Highway 41 to 78th Street – expansion from undivided 2-lane roadway to a divided 4-lane roadway, including CSX crossing improvements and enhanced pedestrian and bike safety improvements
- FDOT 2022 to 2026 Work Program: US 41 – connected vehicle technology implementation
- FDOT 2022 to 2026 Work Program: US 41 from Madison Avenue to Hartford Street – road widening from 4 lanes to 6 lanes
- FDOT 2022 to 2026 Work Program: US 41 at CSX crossing – overpass / bridge construction

Adopted as part of Hillsborough County's Comprehensive Plan, the Corridor Preservation Plan (CPP) identifies right-of-way, general alignments and standards for transportation corridors to support development patterns as defined in the Future Land Use Element over a 30-year time frame. The CPP will be updated in 2022. The roadways in the redevelopment area as defined in the Corridor Preservation Plan are the following:

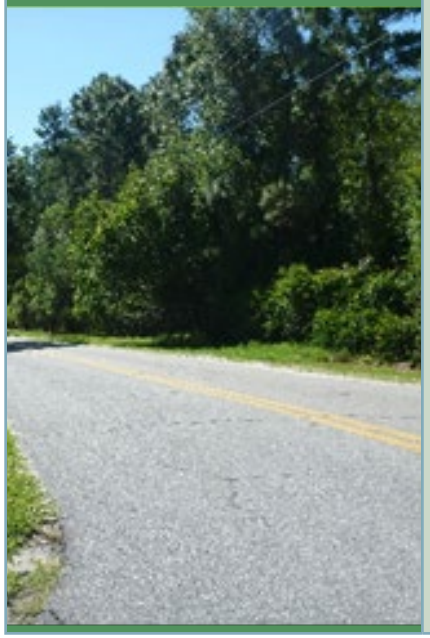
- Madison Avenue (4 lanes)
- 78th Street (2 lane enhanced)
- Falkenburg Road (6 lanes)
- Camden Field Parkway (2 lanes)
- US Highway 41 (6 lanes)
- US Highway 301 (6 lanes)
- I-75 (10 lanes)
- Causeway Boulevard & US Highway 301 (grade separation)

As identified in Port Tampa Bay's Port Vision Capital Improvement Program, improvements are planned at East Port located northwest of the study area. Improvements include 72 acres of upland cargo yard area expansion to be completed in 2027. The expansion improvements and off-port property improvements, including those identified above, are priority investments for Port Tampa Bay to ensure improved mobility on regional freight corridors and maintain the Port's ability to expand and grow their business.

Resurfacing

Roadway pavement condition inventory for all non-state roadways within the study area boundary is based on pavement condition data from July 2021. Roadway pavement condition is scored out of 100 to indicate the pavement condition index (PCI) with higher numbers indicating a better pavement condition. Hillsborough County's pavement condition target is 55. Within the study area, 64,760 feet of roadway are below the target condition. This accounts for approximately 22% of the total linear feet of roadway in the study area with a PCI score below Good. **Figure 11** shows roadways with the following score categories:

Table 6. Pavement Condition and Improvements

Good 	Roadways identified in good condition are not recommended for improvements at this time.	**Routine Maintenance** 
Fair to Satisfactory 	The roadways are identified as fair to satisfactory conditions and are recommended to be considered for preventative treatments: • Causeway Boulevard from US 301 to Falkenburg Road • Falkenburg Road from Fallen Leaf Drive to Bellewater Boulevard • Falkenburg Road from US 301 to Crescent Park Drive • Hartford Street west of railroad • Hartford Street from 54th Street to 66th Street • Madison Avenue from Joann Kearney Boulevard to 78th Street • Progress Boulevard from 78th Street to I-75 • 36th Avenue from US 41 to railroad • 36th Avenue from 54th Street to 78th Street • 70th Street from Causeway Boulevard to 36th Avenue • 70th Street south of Chattin Road • 78th Street from 50th Avenue to Madison Avenue • Maydell Drive from Causeway Boulevard to 34th Avenue • Local streets as shown in **Figure 11**	**Preventative Treatments** 

Pavement Condition and Improvements Continued

Poor to Very Poor

The following roadways are identified as poor to very poor conditions and are recommended to be considered for major rehabilitation:

- Hartford Street from railroad to South 54th Street
- 54th Street from Causeway Boulevard to St Paul Street
- 66th Street south of Madison Avenue
- Santa Fe Road west of railroad
- Local streets as shown in **Figure 11**

Major Rehabilitation

Serious to Failed

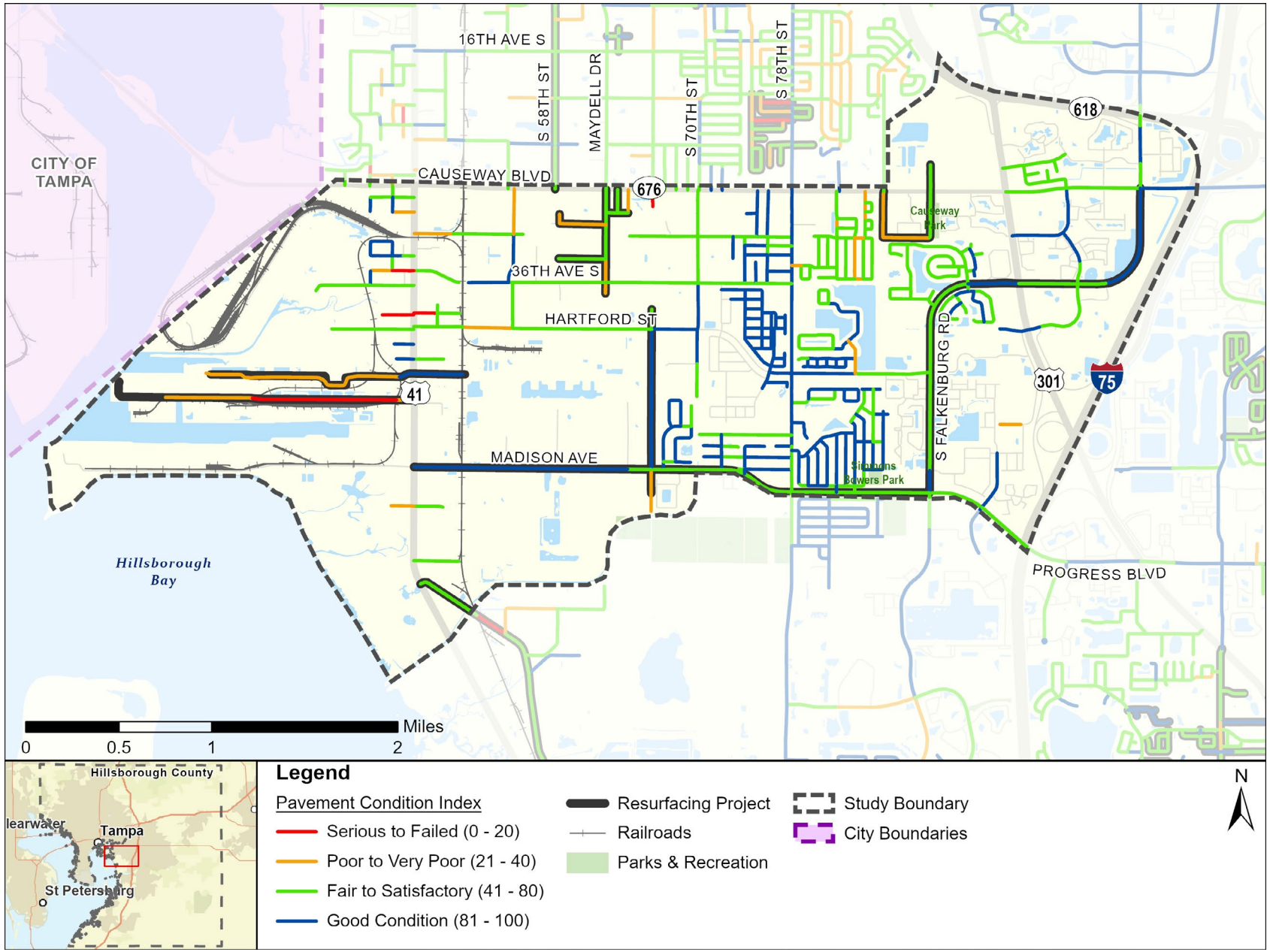
The following roadways are identified as serious to failed conditions and are recommended to be considered for reconstruction:

- Port Sutton Road west of railroad
- Trenton Street west of 51st Street
- Towaway Avenue from US 41 South to Sagasta Street

Reconstruction

Figure 11 also shows the planned, unfunded resurfacing projects within the redevelopment area including Madison Avenue from US 41 to 78th Street, Progress Boulevard from 78th Street to Falkenburg Road, Falkenburg Road from Progress Boulevard to Causeway Boulevard, Santa Fe Road and Port Sutton Road west of US 41, 66th Street, Maydell Drive, and 86th Street. In addition, the FDOT 2022 to 2026 Work Program includes resurfacing on US 41 from Denver Street to 27th Avenue.

Figure 11. Pavement Conditions and Planned Improvements



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Mobility and Safety

Multimodal Facilities

Multimodal facilities provide non-vehicle connections to destinations and activity centers. Multimodal facilities in the redevelopment area include sidewalks, bicycle lanes, and connections with Hillsborough Area Regional Transit Authority (HART) routes and stops. Sidewalks are available along South Falkenburg Road and Madison Avenue. There are also fragmented portions of sidewalk located along Causeway Boulevard and local roads throughout the study area (**Figure 12**). Bicycle facilities in the study area include bike lanes on US Highway 41, Causeway Boulevard, South Falkenburg Road, Madison Avenue, Camden Field Parkway and Everhart Road.

HART provides transit service in the redevelopment area via Route 8 on S 78th St and Madison Avenue, Route 360 on Causeway Boulevard and US Highway 301, and Route 25 and Route 24 on US Highway 618. Along these routes, the stops at the intersection of South 78th Street & Hartford Street, South 78th Street & Camden Woods Drive and South 78th Street & South 49th Street have the highest daily average ridership activity in the redevelopment area (**Figure 13**). Funded transit improvements identified in the HART Transit Development Plan (TDP) for the redevelopment area include 15-minute frequency enhancements for Route 8, Route 24, Route 25, and Route 360.

Figure 12. Existing and Planned Pedestrian and Bicycle Facilities

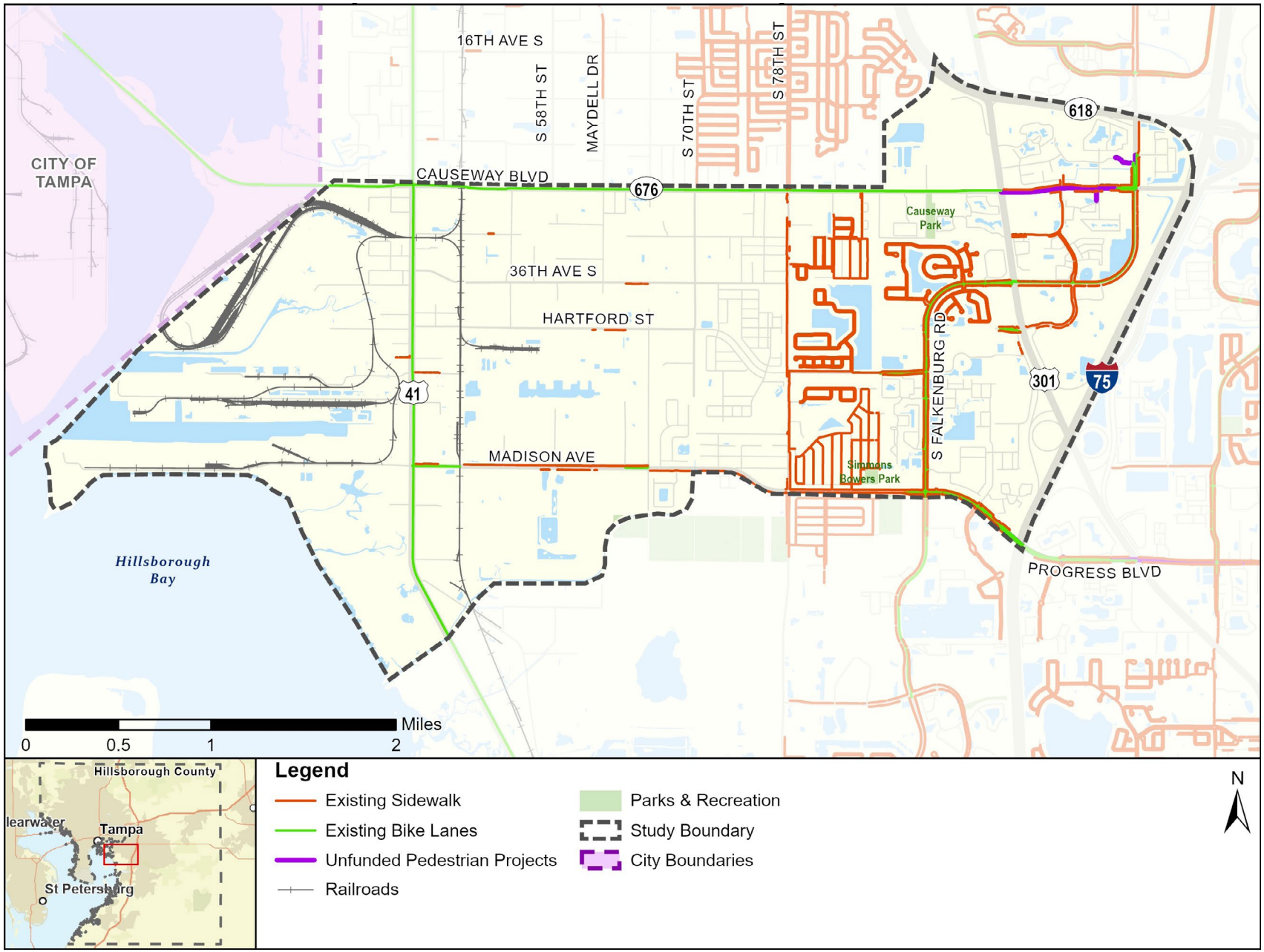
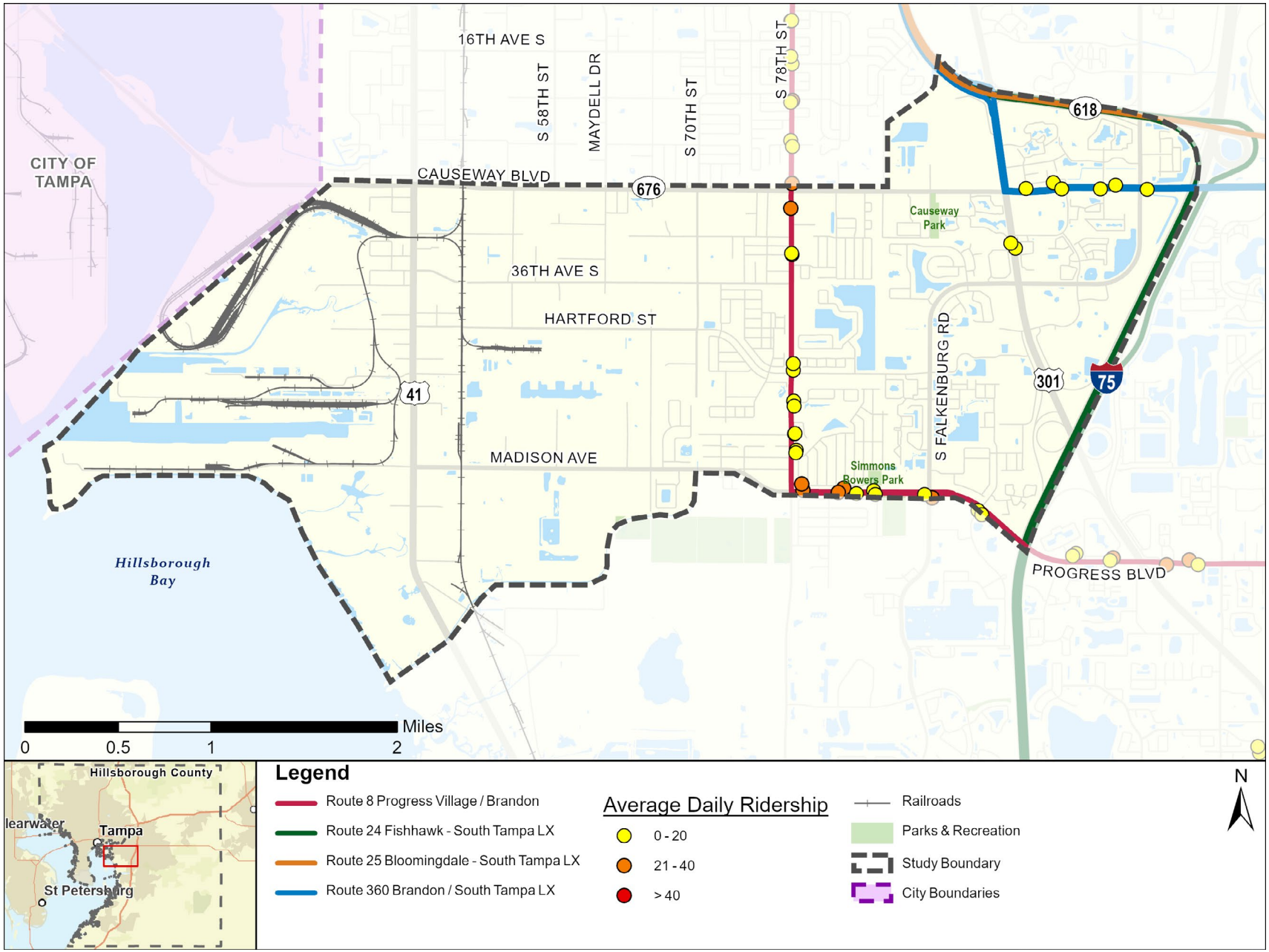


Figure 13. HART Routes with Stop Activity



Safety

Peak hour crash data from 2015 to 2019 was reviewed for the redevelopment area based on Hillsborough County data. During this time-frame, 1,142 crashes were reported within the redevelopment area (**Table 7**). Of those crashes, one crash resulted in a fatality and 33 crashes resulted in serious injury (**Table 8**). The fatal crash occurred at the intersection of Madison Avenue and Dacca Drive, involving an automobile driver turning left and hitting a motorcyclist.

Table 7. Crashes by Crash Type (Peak Hour, 2015 – 2019)

Crash Type	2015	2016	2017	2018	2019	Total	Percent
Angle	26	17	26	36	34	139	12%
Bike	3	0	1	2	2	8	1%
Head On	4	5	3	4	7	23	2%
Hit Fixed Object	16	10	6	11	13	56	5%
Hit Non-Fixed Object	2	0	0	4	2	8	1%
Left Turn	8	12	16	20	12	68	6%
Pedestrian	1	0	2	1	2	6	1%
Rear End	94	118	122	122	142	598	52%
Right Turn	2	1	5	5	1	14	1%
Run Off Road	1	1	1	2	1	6	1%
Sideswipe	20	24	31	44	55	174	15%
Single Vehicle	3	5	5	4	4	21	2%
Unknown		1	1	1	3	6	1%
U-Turn	1	4	2	3	5	15	1%
Total	181	198	221	259	283	1,142	100%

Source: Hillsborough County Crash Data Management System

Table 8. Crashes by Highest Severity (Peak Hour, 2015 – 2019)

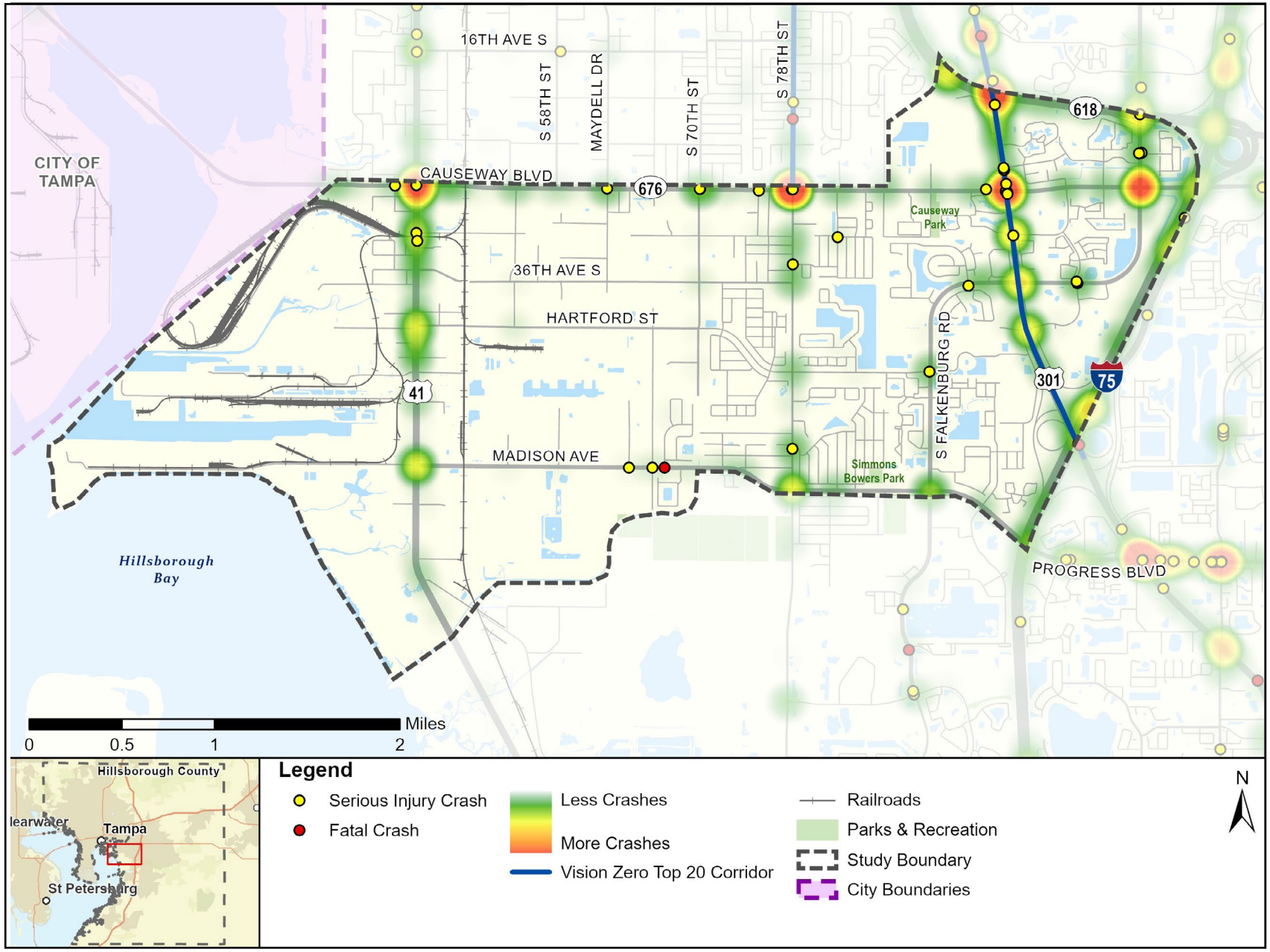
Highest Crash Severity	2015	2016	2017	2018	2019	Total
Fatal	0	0	0	0	1	1
Incapacitating	7	3	10	6	7	33
Non-Incapacitating	23	20	21	30	30	124
Possible Injury	31	42	52	45	44	214

Source: Hillsborough County Crash Data Management System

Intersection safety improvements are recommended at the following intersections based on a pattern of crash types identified at the following locations. Improvements for state road-to-state road intersections are not included.

- **S 78th Street & Causeway Boulevard**: based on the high number of reported rear end, angle, and left turn crashes, intersection safety improvements could include signal timing adjustments, geometric changes, and review of sight distances and traffic control visibility.
- **Progress Boulevard & S 78th Street**: based on the high number of reported angle and left turn crashes intersection, safety improvements could include signal timing and phasing adjustments, geometric improvements, and review of sight distances and traffic control visibility.
- **Madison Avenue & US 41**: based on the high number of reported rear end and sideswipe crashes, intersection safety improvements could include signal timing phasing adjustments and review of sight distances and traffic control visibility.
- **Madison Avenue & 66th Street:** based on the number of fatal and injury crashes, intersection safety improvements could include geometric improvements, speed reduction, and review of sight distances and traffic control visibility
- **US 301 & Causeway Boulevard**: based on the high number of reported rear end and angle crashes, intersection safety improvements could include signal timing adjustments and review of sight distances and traffic control visibility. Improvements should also take into consideration existing condition of bicycle facilities at the intersection due to the reported bicycle involved crash.
- **S Falkenberg Road & Causeway Boulevard**: based on the high number of reported rear end crashes, intersection safety improvements could include signal timing adjustments and review of sight distances and traffic control visibility.

Figure 14. Crash Hot Spot Map (Peak-Hour, 2015 - 2019)



Context Classification

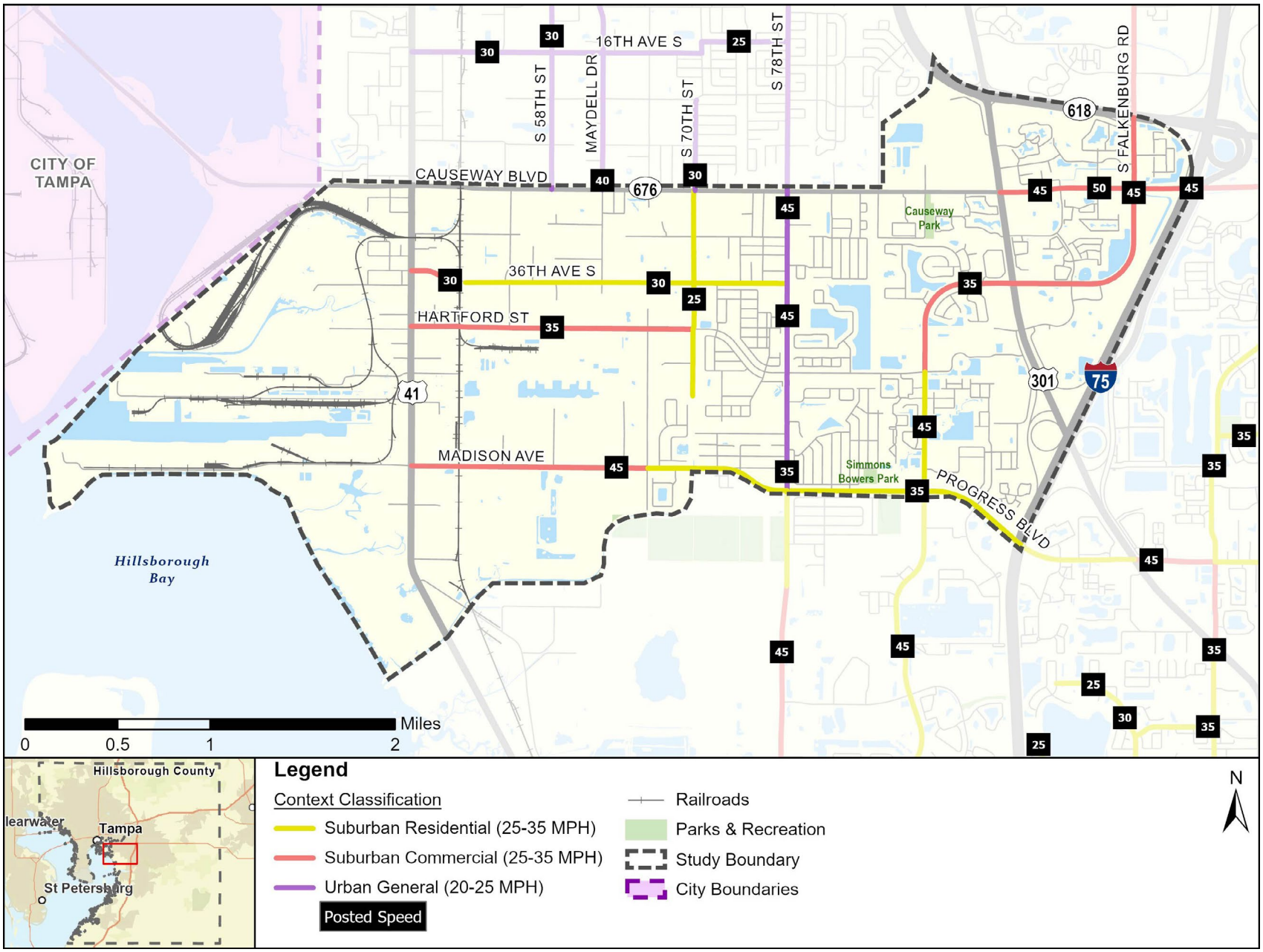
Context based classifications provide a link between land use and transportation planning efforts by defining overall development patterns and form for Collector and Arterial roadways. Hillsborough County's Context Based Classification system includes five contexts derived from Future Land Use Community Plans – Rural, Suburban Residential, Commercial, Town, and Urban General. Context based classification focus on local context and typologies to address use and community needs, connectivity, walkability, placemaking, livability, and community values.

The context classifications of County roads in the Palm River Redevelopment Area include Suburban Residential, Suburban Commercial, and Urban General. As indicated in **Table 9**, Hartford Street, South 78th Street, Causeway Boulevard, South Falkenburg Road, and Madison Avenue currently have a posted speed limit that is greater than the target speed for their respective context classifications. It is recommended to implement speed management strategies to reduce the posted speed limit based on the target context classification speed. Each context classification includes typical section design elements that are designated as high or low priority. The missing required elements identified in **Table 9** are considered high priority for each context classification and are recommended improvements for the roadways.

Table 9. Context Classification

Roadway	Context Classification	Posted Speed	Target Speed	Missing Required Elements
Causeway Boulevard	Suburban Commercial	**50 MPH**	25 – 35 MPH	Shared Use Path (remove on-street bike lanes and widen sidewalk)
Falkenburg Road	Suburban Residential	**45 MPH**	25 – 35 MPH	Shared Use Path (remove on-street bike lanes and widen sidewalk)
	Suburban Commercial	**45 MPH**	25 - 35 MPH	Shared Use Path
Hartford Street	Suburban Commercial	35 MPH	25 – 35 MPH	Shared Use Path
Madison Avenue	Suburban Commercial	**45 MPH**	25 – 35 MPH	Shared Use Path
	Suburban Residential	35 MPH	25 - 35 MPH	
Progress Boulevard	Suburban Residential	35 MPH	25 - 35 MPH	Shared Use Path
36th Street	Suburban Residential	30 MPH	25 - 35 MPH	Sidewalk and shared lane markings
70th Street	Suburban Residential	25 MPH	25 - 35 MPH	Sidewalks and shared lane markings
78th Street	Urban General	**45 MPH**	20 - 25 MPH	Dedicated pedestrian and bike facilities

Figure 15. Context Classification Map



Transportation Infrastructure Assessment Findings

The Transportation Assessment included a review of the existing roadway conditions along Hillsborough County maintained roadways and state facilities based on available data. The review of congestion, mobility, and safety conditions included data for volume to capacity ratios, travel time index, Context Classifications, pavement conditions, existing truck routes, existing HART routes, and crash patterns.

Based on a review of the existing volume to capacity ratios and Context Classification considerations, the following roadways are recommended for complete street and safety improvements that could include speed reduction, improved facilities for all modes, and congestion reduction measures:

- Falkenburg Road from Progress Boulevard to Selmon Expressway
- Hartford Street from US 41 to 70th Street
- Madison Avenue from US 41 to 78th Street
- 36th Avenue from US 41 to 78th Street
- 70th Street from Causeway Boulevard to end
- 78th Street from Causeway Boulevard to Madison Avenue
- S Falkenberg Road & Causeway Boulevard

Intersection safety improvements are recommended at the following intersections based on a pattern of crash types. Improvements should take into consideration access management strategies, lane geometry, existing pedestrian and bike facilities, and sight distance, following a detailed safety analysis at the intersection locations.

- S 78th Street & Causeway Boulevard
- Progress Boulevard & S 78th Street
- Madison Avenue & US 41
- Madison Avenue & 66th Street
- US 301 & Causeway Boulevard
- S Falkenberg Road & Causeway Boulevard

Based on the pavement condition index of County maintained roadways in the study area, the following roadways have poor to very poor pavement condition and are recommended to be considered for major rehabilitation:

- Hartford Street from railroad to South 54th Street
- 54th Street from Causeway Boulevard to St Paul Street
- 66th Street south of Madison Avenue
- Santa Fe Road west of railroad

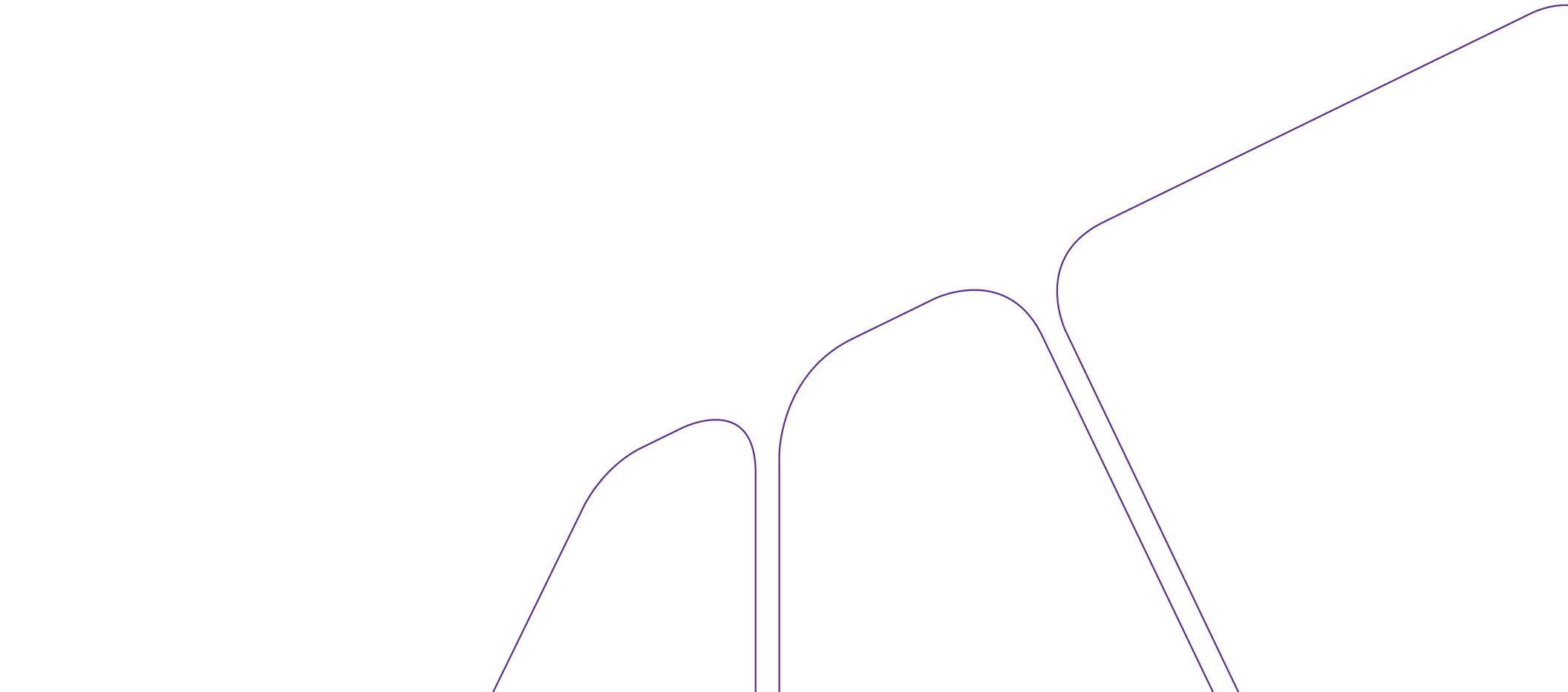
The following roadways are identified as serious to failed conditions and are recommended to be considered for reconstruction:

- Port Sutton Road west of railroad
- Trenton Street west of 51st Street
- Towaway Avenue from US 41 South to Sagasta Street

To further identify the project scopes for the transportation improvements, identifying the required funding sources, public engagement, and coordination with partner agencies including the City of Tampa and Florida Department of Transportation, should be completed.

Section 3

Utilities and Services Assessment



Utilities and Services Assessment

Central Services

This analysis includes the identification of water/sewer service providers, water and wastewater treatment plant permitted capacities, and large water/sewer transmission infrastructure locations. Traffic Analysis Zone (TAZ) data and future land use data from 2015 to 2045 were used to determine future population growth in the study area. Hillsborough County and City of Tampa utility GIS files, the 2018 City of Tampa Howard F. Curren AWTP Phase 2 Master Plan Report, the 2018 City of Tampa Master Plan Report – Potable Water Master Plan, Florida Department of Environmental Protection (FDEP) permit data, and the 2018 Hazen and Sawyer Hillsborough County Septic Tank Conversion – Neighborhood Prioritization Report were used to analyze the existing utility infrastructure. The projected water demand and wastewater flow increase was estimated from the future population growth to determine if there is enough capacity available to support the anticipated growth in the redevelopment area.

The Palm River redevelopment area is served by a combination of City of Tampa and Hillsborough County water and wastewater collection and transmission systems. The City of Tampa provides potable water to approximately 75% of the study area, primarily in the western portion, from the David L. Tippin Water Treatment Plant (WTP). Hillsborough County provides water to the remainder of the study area through the South-Central water system which includes the Lithia WTP and the Central Hillsborough WTP. There are 12 interconnects between the City of Tampa and Hillsborough County water systems within the study area. Hillsborough County treats the majority of wastewater from the redevelopment area, but the City of Tampa owns and maintains several force mains on the northern edge of the study boundary. The redevelopment area is served by both the Hillsborough County Falkenburg Advanced Wastewater Treatment Plant and the City of Tampa Howard F. Curren Advanced Wastewater Treatment Plants (AWWTP).

Future Land Use/Growth

A map showing the future land use of the Palm River redevelopment area is included in **Figure 4**. The redevelopment area is comprised mainly of heavy and light industrial land, with some larger areas of regional mixed-use, residential, and urban mixed-use land. Smaller portions of public/quasi-public, natural preservation, and suburban mixed-use land are also located in the study area.

Based on the future land use from provided TAZ data, Hillsborough County population projections in the Palm River redevelopment area are expected to have a population increase of 9,978 people between 2015 to 2045. Using the County standard of 300 gallons per day (GPD) water demand per Equivalent Residential Connection (ERC) this population growth is expected to increase the water flows by 2.99 MGD. Using the County standard of 200 GPD of wastewater per ERC this population growth is expected to increase the wastewater flows by approximately 2.00 MGD.

Existing Public Water and Wastewater Infrastructure

Water Treatment Plant Capacity

The Palm River redevelopment area is served by the South-Central water system which includes the Lithia WTP and the Central Hillsborough WTP, as well as the City of Tampa's David L. Tippin WTP. The South-Central potable water system has a permitted capacity of 88.6 million gallons per day (MGD) of flow, as provided by the County. The system's maximum flow is 68.9 MGD and its available treatment capacity is 19.7 MGD. As reported in the 2018 City of Tampa Master Plan Report – Potable Water Master Plan, the David L. Tippin WTP has a max flow of 120 MGD and an annual average daily flow of 81 MGD. The available potable water production capacity of the facility is 39 MGD for new development. Both the Hillsborough County and City of Tampa potable water production capacity are adequate to support growth in this study area.

Wastewater Treatment Plant Capacity

The Palm River redevelopment area is served by the Hillsborough County Falkenburg AWWTP and City of Tampa Howard F. Curren AWWTP. The Falkenburg AWWTP has a permitted capacity of 12 MGD, an annual average flow of 10.2 MGD, and a maximum flow of 11.71 MGD, with available annual average flow capacity of 1.8 MGD. As reported in the 2018 City of Tampa Howard F. Curren AWTP Phase 2 Master Plan Report, the Howard F. Curren AWWTP has a permitted capacity of 96 MGD, with an annual average flow of 60 MGD and a maximum hourly flow of 190 MGD. This leaves 36 MGD of available annual average flow capacity.

See **Table 10** below for a summary of the capacity analysis.

Table 10. System Capacity Analysis

Facility		ID	Permit Capacity (MGD)	Annual Average Flow (MGD)	Max Flow (MGD)	Available Annual Average Flow Capacity (MGD)
Name	Type					
David L. Tippin	WTP	FLR20EB89	120	81	120	39
South-Central	WS	6290787	88.6	-	68.9	19.7
Falkenburg	AWWTP	FL0040614	12	10.2	11.71	1.8
Howard F. Curren	AWWTP	FL0020940	96	60	190	36

Existing Public Water and Wastewater Large Transmission Mains

Water

The Palm River Redevelopment Area has several water transmission lines within its boundaries including the following:

- US Highway 301 S – 36” ductile iron water main (installed 1990/1995)
- South 50th Street – 24” cast iron water main (installed 1957)
- Madison Avenue, Pendola Point, and 78th Street – 16” ductile iron water mains (installed in 1981, 2001, and 1975, respectively)

The ductile iron pipes are within their lifespan of 50 years, but the cast iron piping on South 50th Street is reaching the end of its life expectancy of 80 to 100 years. It is recommended to further evaluate the remaining useful life of the cast iron pipe water main. There are 12 interconnects between the Hillsborough County and the City of Tampa water systems along the north edge and within the study boundary. The interconnects serve as redundancy for the potable water systems and emergency backup. **Figure 16** is a map of the existing water distribution infrastructure in this study area.

Wastewater

The redevelopment area has several wastewater force mains within its boundaries including:

- Falkenburg Road – 20” PVC force main south of Causeway, 24” force main north of Causeway (Hillsborough County)
- Progress Boulevard – 16” PVC force main (Hillsborough County)
- US 301 – 12” ductile iron force main (City of Tampa)
- Madison Avenue – 6” PVC force main (Hillsborough County)
- CSX track – 8” PVC force main (City of Tampa)

According to County GIS records, most of these force mains were installed in the 1990s or later. Ductile iron and PVC pipes have an expected useful life of 50 to 60 years thus these pipes are assumed to be in fair condition and should have adequate remaining useful life.

There is a total of 11 lift stations owned by the County and 3 lift stations owned by the City of Tampa within the eastern portion of the study area. There are residential gravity sewer mains that connect to lift stations, which connect to force mains within the eastern half of the study area, but wastewater infrastructure is minimal in the western half of the area. **Figure 17** is a map of the existing wastewater infrastructure in this study area.

Figure 16. Water Infrastructure Map

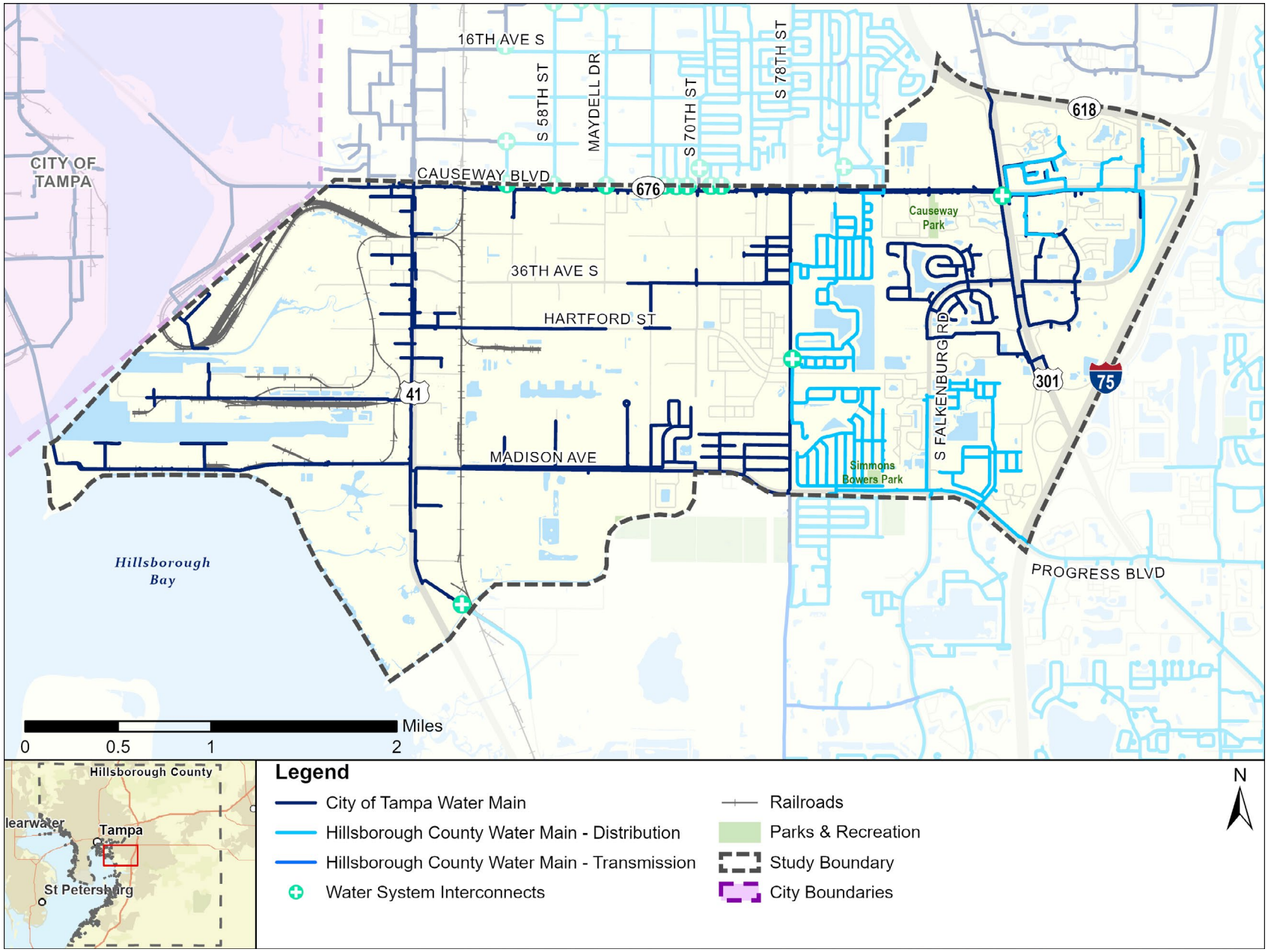
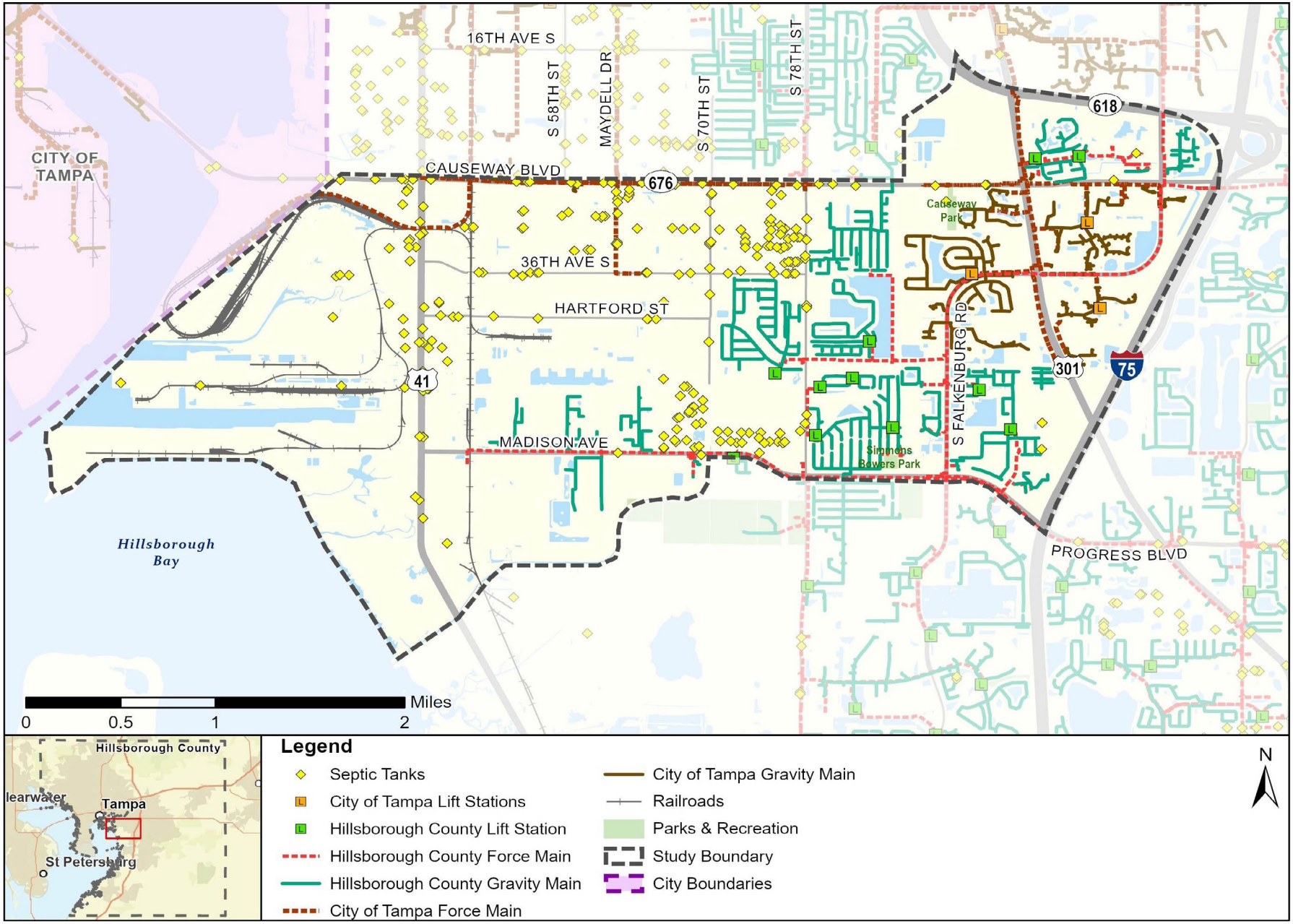


Figure 17. Wastewater Infrastructure Map



Septic Tanks

According to the Florida Water Management Inventory – Hillsborough County Wastewater Map, the redevelopment area has a mix of sewer and septic systems. Primarily in the western half of the area, wastewater is treated by onsite septic systems. Existing County GIS data has a total of 246 septic systems within the study area and the locations of the septic tanks are shown on **Figure 17**.

The 2018 Hazen and Sawyer Hillsborough County Septic Tank Conversion – Neighborhood Prioritization Report, the Palm River redevelopment study area falls within group D of potential septic to sewer conversion. In this report, parcels that already had wastewater service were removed from the study and only parcels that were single family residential were labeled as a priority for conversion. The County has an estimated total of $17.3M for septic to sewer improvements in an area north of Causeway Boulevard but does not include the Palm River redevelopment area at this time. Based on this assessment of wastewater infrastructure, a location with existing single family residential and septic systems between 54th Street and 84th Street may be a candidate for septic to sewer conversion.

Water and Wastewater Infrastructure Assessment Findings

The Traffic Analysis Zone (TAZ) data and future land use data provided by Hillsborough County for the Palm River redevelopment area shows a 9,978 person increase in population from 2015 to 2045. The estimated increase in potable water demand is 2.99 MGD and the estimated increase in wastewater generation is 2.00 MGD. The South-Central water system has 19.7 MGD of available permit capacity and the David L. Tippin WTP has 39 MGD of available capacity showing adequate production capacity to serve the 2.99 MGD increase in water demand. The Hillsborough County Falkenburg AWWTP has 1.8 MGD of available permit capacity and the City of Tampa Howard F. Curren AWWTP has 36 MGD of available permit capacity. If the majority of the increased wastewater flow is to be routed to Hillsborough County, there may be a treatment capacity issue at the Falkenburg AWWTP to serve the anticipated growth.

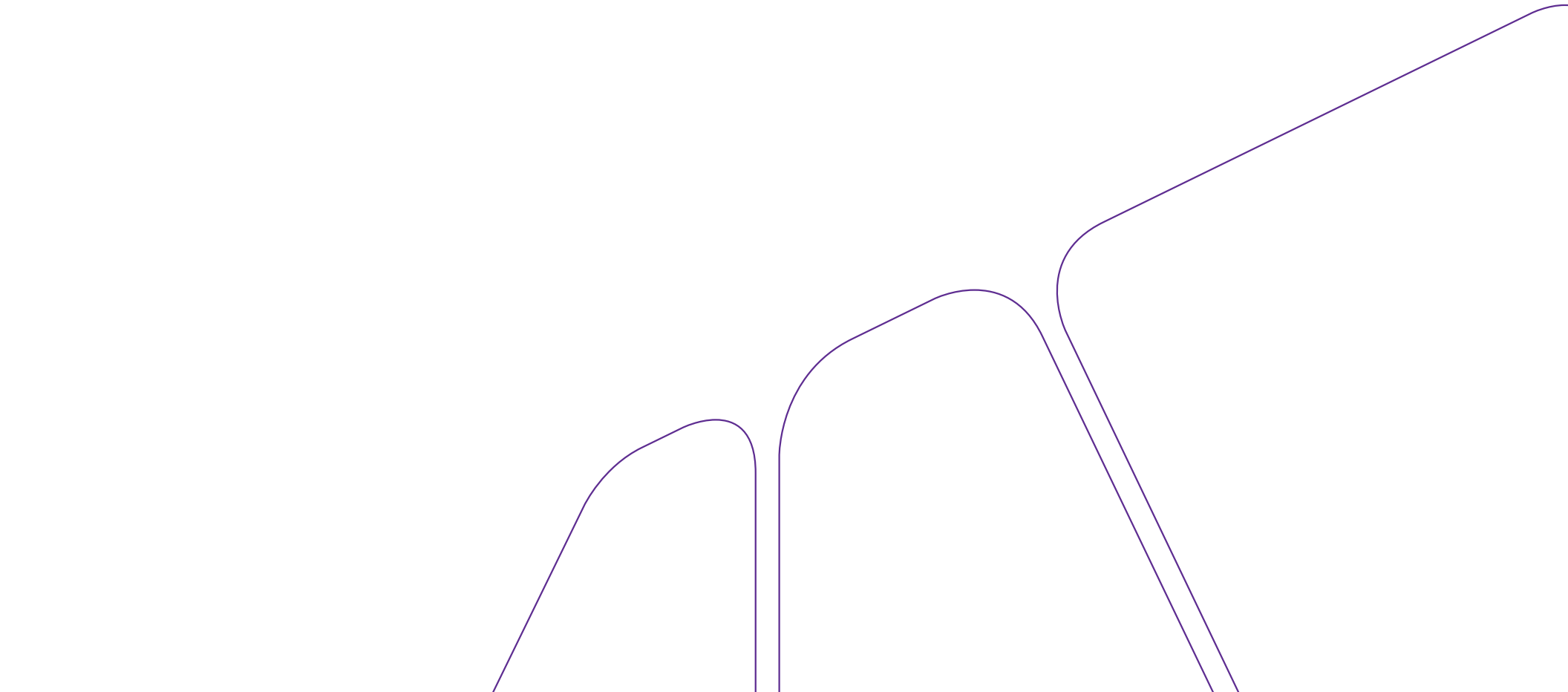
If no wastewater treatment plant expansions are planned by Hillsborough County at the Falkenburg AWWTP, wastewater would need to be diverted to the City of Tampa or to the Hillsborough County Valrico AWWTP so that the Falkenburg AWWTP does not exceed its available permit capacity. The Hillsborough County Valrico AWWTP has a permitted capacity of 12 MGD, with an annual average flow of 7.25 MGD and a maximum hourly flow of 7.93 MGD. This provides an additional 4.07 MGD wastewater treatment plant permitted capacity for new development or redevelopment. This capacity analysis is based only on the available permitted capacities of the water and wastewater treatment facilities; no hydraulic capacity analysis of water/sewer transmission mains was completed.

Based on the water and wastewater infrastructure assessment completed for the Palm River Redevelopment Area, potable water is available to all redevelopment project sites identified in **Figure 5** of the report. Sewer collection is available for all redevelopment project sites except the two projects located along Hartford Street, which have septic systems. Further evaluation of the City's and County's water, sewer, and septic systems need to be studied prior to redevelopment. The following action items have been identified for the Palm River Redevelopment area:

- Coordination between the County and City of Tampa utility departments to identify capacity issues in the potable water and sewer collection/transmission systems
    - Study existing potable water hydraulic model to determine pipe capacity and sizing needs of future developments with new water demands
    - Study existing wastewater collection, transmission, and wastewater treatment plant capacity to determine if the increased wastewater flow will affect the system
- Extend sewer collection/transmission system to the redevelopment projects on Hartford Street to eliminate the septic sewer system
- Provide water and sewer service connection along street areas that are not currently served to promote redevelopment:
    - Hartford Street, 36th Avenue, 70th Street, 78th Street, and US 41/50th street areas were identified as areas the County will need to coordinate sewer collection/transmission system extensions to eliminate septic to sewer systems
    - 36th Street and 70th Street areas were identified as areas that the County will need to coordinate transmission main extensions

Section 4

Vulnerability Assessment



Vulnerability Assessment

Exposure Analysis

The first step of this assessment evaluates the exposure of Hillsborough County assets within the redevelopment area. The exposure analysis is the first step in completing a vulnerability assessment identifying potential flood threats and assets exposed to flooding.

As part of this analysis, Asset Threat Matrices were developed to identify the flood exposure for the following assets:

- County Maintained Roads
- Evacuation Routes
- Hospitals
- Shelters
- Schools
- Libraries
- Public Pump Stations

It was determined that there are no libraries, hospitals, or shelters within the Palm River Redevelopment Area. The County assets within this area were analyzed based on the following flood threats:

- 100-Year Event - Southwest Florida Water Management District (SWFWMD) Board Certified Delaney Creek Watershed 100-year floodplain
- Federal Emergency Management Agency (FEMA) Flood Maps
- Category 1 and 3 Hurricane - National Oceanic and Atmospheric Administration (NOAA) National Storm Surge Maps
- 2050 Intermediate and High Sea Level Rise (SLR) - UF's Sea Level Scenario Sketch Planning Tool (2017 NOAA rates)

To determine if an asset is exposed to flooding, the flood data was overlayed on top of the asset locations. If the flood area intersects the asset footprint, then the asset is considered exposed.

Vulnerability Assessment

The Vulnerability Assessment of the roadways builds off the paired asset-threat matrices to determine the quantitative risk of flooding for the roadways. The Delaney/Archie Creek Watershed Management Master Plan Update (November 2016) defined Level of Service categories based on the depth of flooding at the crest of the road. See **Table 11** for the Flooding Level of Service (FLOS) criteria.

Table 11. Flooding Level of Service Criteria

FLOS Category	Hillsborough County Comprehensive Plan Definition	FLOS Definition
A	No street flooding. All lanes are drivable	All lanes are drivable
B	Minor street flooding. At least one lane is drivable	Flood depths are less than or equal to 3-inches
C	Street Flooding	Flood depths are more than 3-inches above the crown of the road, but less than or equal to 12-inches
D	No limitation on flooding	Street flooding is more than 12-inches above the crown of the road

The 25-Year/24-Hour storm (8-inches) is used on all County watersheds to determine the FLOS for County maintained roads. Climate threats for 2050 Intermediate SLR, 2050 High SLR, Category 1 and Category 3 Hurricanes were evaluated to determine the extent and depth of flooding on the County maintained roads. US 41 was also included in this analysis. The results of this analysis are summarized in **Table 13**. The roads that are blank for the Delaney-Archie Creek FLOS November 2016 did not have an assigned FLOS.

For the purpose of this Vulnerability Assessment, FLOS and criticality were correlated. Criticality was assigned as low, medium and high designations in comparison to FLOS criteria as shown in the **Table 12**.

Table 12. Correlation of FLOS and Criticality

FLOS Category	Criticality
A	Null
B	Low
C	Medium
D	High

Table 13 provides a summary of the vulnerability to flooding by each flood event, including the approximate linear feet of exposure and percentage of the total County maintained roadway length in the redevelopment area. For comparison, Table 14 includes a summary of the FLOS for roadways from the Delaney/Archie Creek Watershed Management 2016 Master Plan Update.

Table 13. Approximate Linear Feet of Roadways Vulnerable to Flooding (Approximate Percentage of Vulnerable Linear Feet)

Criticality	2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
Null	292,231 (100%)	290,758 (99%)	227,768 (78%)	78,763 (27%)
Low	0	631 (<1%)	0	0
Medium	0	784 (<1%)	14,697 (5%)	15,052 (5%)
High	0	58 (<1%)	49,767 (17%)	198,416 (68%)
Total County Maintained Road Length = 292,231 LF				

Table 14. Roadways Evaluated in Delanie/Archie Creek WMP (Palm River Limits)

FLOS Category	Linear Feet of Roadway (Percentage of Roadway)
A	193,852 (68%)
B	19,511 (7%)
C	29,463 (10%)
D	40,459 (14%)

County Maintained Roads

There are 143 County maintained roadways within the Palm River redevelopment area. The 100-Year Event exposed approximately 90% of the County maintained roads to flooding. FEMA Flood Maps, Category 1 Hurricane, and Category 3 Hurricane all exposed approximately 43%, 20% and 76% of roads, respectively. The two SLR flood threats exposed significantly less roads to flooding. The 2050 Intermediate SLR exposed approximately 3.5% and the 2050 High SLR exposed approximately 7.7%.

The roads on the western side of the redevelopment area were found to be the most prone to exposure. These roads are closer to East Bay and therefore more prone to flood threats that are associated with the ocean (hurricanes and SLR). These percentages refer to how many roads were impacted out of the total number of roads, not the total length of roadways submerged. Integrating flood depths is the next step of the vulnerability analysis. The asset threat matrix **Table 16** identifies each County maintained road and its exposure to flooding during each flood threat.

The results of this analysis were compared to the results of the USF Hillsborough County Community Vulnerability Study. The USF study maps showed Category 1 Hurricane with Intermediate-Low and High SLR to expose the western half of the redevelopment area and Category 3 Hurricane with Intermediate-Low and High SLR to expose almost the entire redevelopment area. These maps correlate to what was found in this analysis for Category 1 and Category 3 Hurricanes.

The maps for the 100-Year Event, FEMA Flood Map, Category 1 and 3 Hurricanes, and 2050 Intermediate and High SLR are shown in **Figure 18**, **Figure 19**, **Figure 20**, **Figure 21,** and **Figure 22**. **Table 21** (page 60) identifies the County maintained roadways exposed to each flood threat and critical flood depths associated with each threat.

Table 15 shows a summary of the percentage of County maintained roads exposed by each threat.

Table 15. Summary of County Maintained Roads Exposure

	Delaney Creek Watershed 100-Year Event	FEMA Flood Maps	Category 1 Hurricane	Category 3 Hurricane	2050 Intermediate SLR	2050 High SLR
% County Maintained Roads Exposed	90.21	43.36	19.58	75.52	3.50	7.69

Evacuation Route

The evacuation routes in this redevelopment area are S 50th St/US 41, Madison Avenue, Causeway Boulevard, and US 301. S 50th St/US 41, Madison Avenue, and Causeway Boulevard are all exposed to flooding for the 100-Year Event, FEMA Flood, Category 1 and Category 3 Hurricanes, as shown in **Table 16**.

Table 16. Evacuation Route Asset Threat Matrix

Evacuation Routes	Exposure					
	Delaney Creek Watershed 100-Year Event	FEMA Flood Maps	Category 1 Hurricane	Category 3 Hurricane	2050 Intermediate SLR	2050 High SLR
S 50th St / US 41	✓	✓	✓	✓		
Madison Ave	✓	✓	✓	✓		
US 301						
Causeway Blvd	✓	✓	✓	✓		

Pump Stations

All ten public sewer pump stations located within the Palm River redevelopment area were evaluated for this assessment. The pump stations within the Palm River redevelopment area are all located on the eastern side of the project area. Category 1 Hurricane, 2050 Intermediate SLR and 2050 High SLR flood threats all impact only the western side of the project area and therefore do not expose any pump stations. The flood threats that impact the entire redevelopment area, 100-Year Event, FEMA flood and Category 3 Hurricane, each impact at least one pump station, as shown in **Figure 18, Figure 19, Figure 21,** and **Table 17**.

Table 17. Pump Station Asset Threat Matrix

Pump Stations	Exposure					
	Delaney Creek Watershed 100-Year Event	FEMA Flood Maps	Category 1 Hurricane	Category 3 Hurricane	2050 Intermediate SLR	2050 High SLR
79th Street				✓		
Evergreen	✓			✓		
Hartford Lake	✓	✓		✓		
Alambra #1						
Alambra #2						
Camden Woods				✓		
Sienna Moss				✓		
Woods Landing				✓		
Chatterton Way	✓			✓		
Wild Senna				✓		

Schools

There are three schools within the Palm River redevelopment area: Bing Elementary, Frost Elementary, and Guinta Middle. Frost Elementary was found to be exposed to flooding in the Category 3 Hurricane. Bing Elementary and Guinta Middle were found to be exposed by the FEMA flood, as well as the Category 3 Hurricane, as shown in **Figure 18, Figure 19, Figure 21,** and **Table 18**.

Table 18. School Asset Threat Matrix

Schools	Exposure					
	Delaney Creek Watershed 100-Year Event	FEMA Flood Maps	Category 1 Hurricane	Category 3 Hurricane	2050 Intermediate SLR	2050 High SLR
Bing Elementary		✓		✓		
Frost Elementary				✓		
Guinta Middle		✓		✓		

Fire Stations

The Progress Village fire station is the only fire station located within the Palm River redevelopment area was found to be exposed for the Category 3 Hurricane event, as shown in **Figure 21** and **Table 19**.

Table 19. Fire Station Asset Threat Matrix

Fire Stations	Exposure					
	Delaney Creek Watershed 100-Year Event	FEMA Flood Maps	Category 1 Hurricane	Category 3 Hurricane	2050 Intermediate SLR	2050 High SLR
Progress Village				✓		

Figure 18. 100-Year Flood Event Map

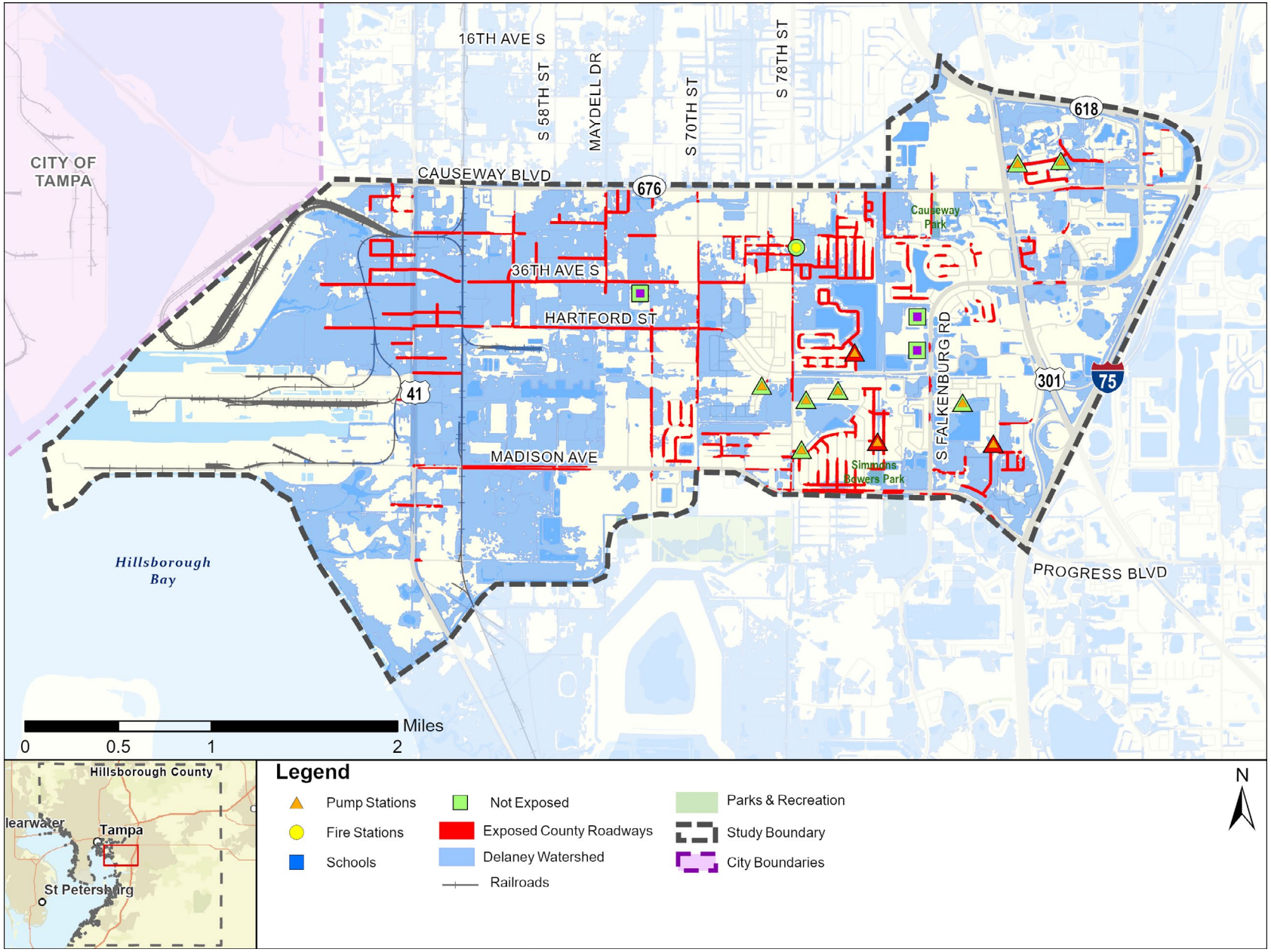


Figure 19. FEMA Flood Map

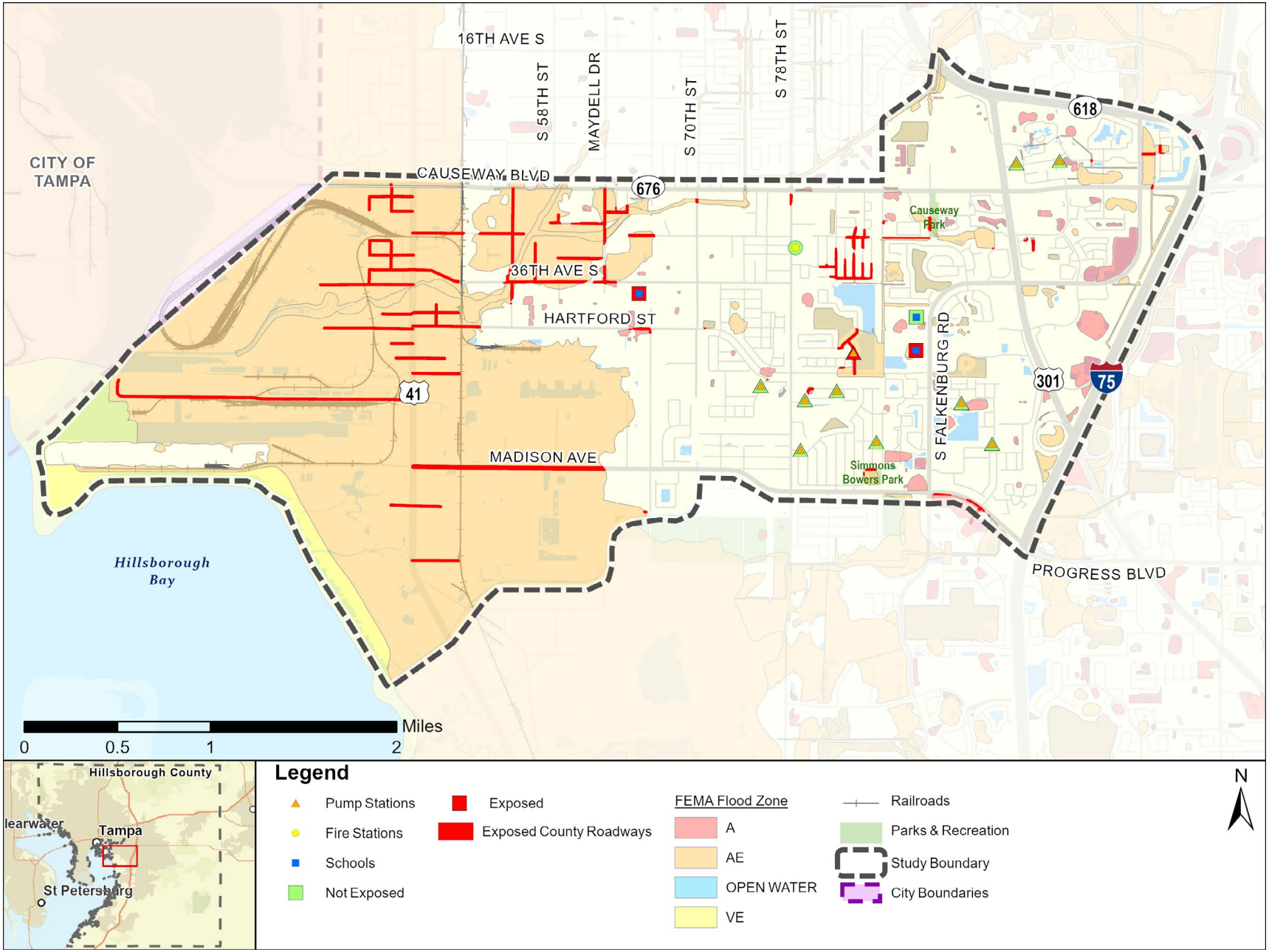


Figure 20. Category 1 Hurricane Exposure and Criticality

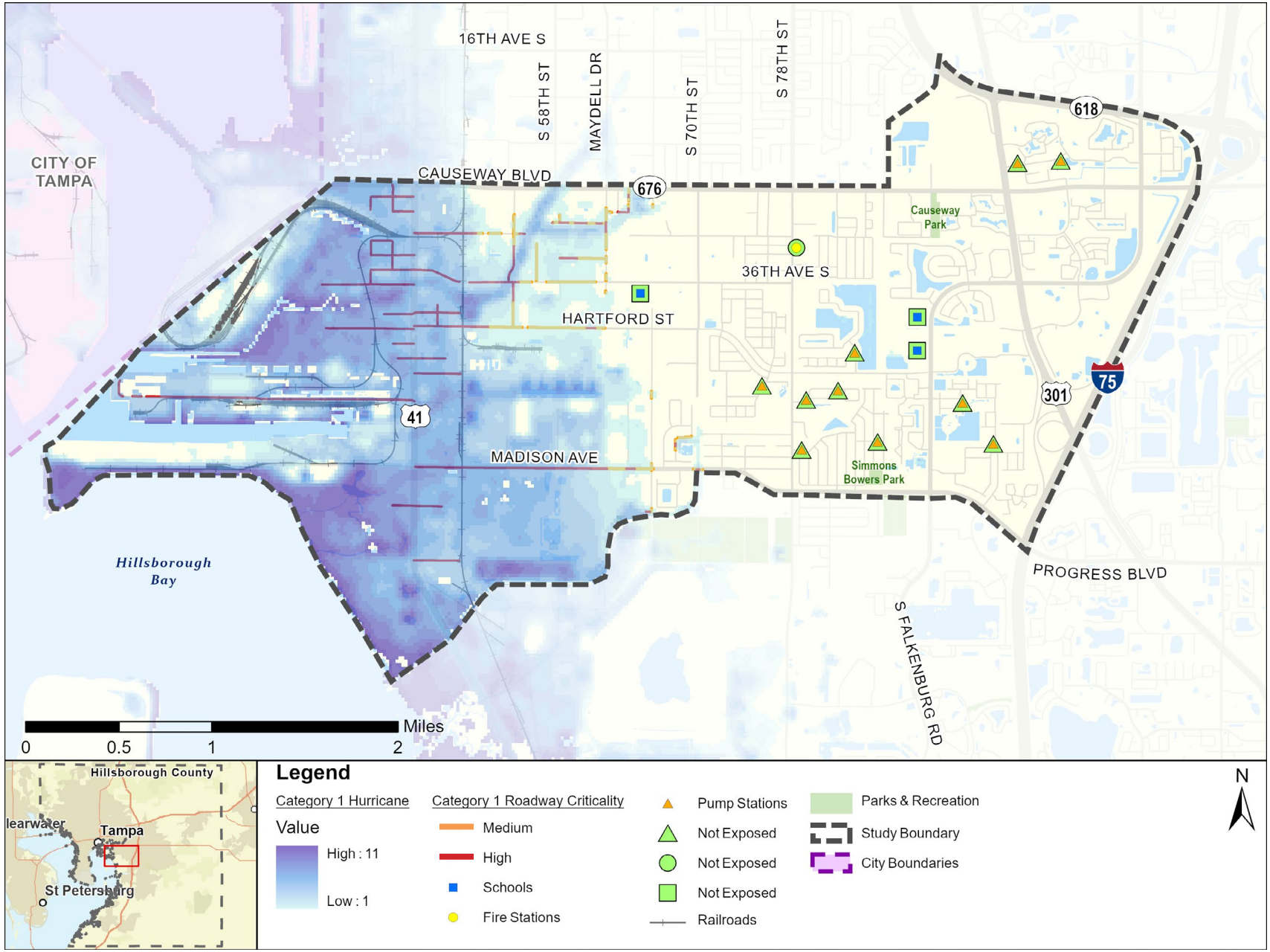


Figure 21. Category 3 Hurricane Exposure and Criticality

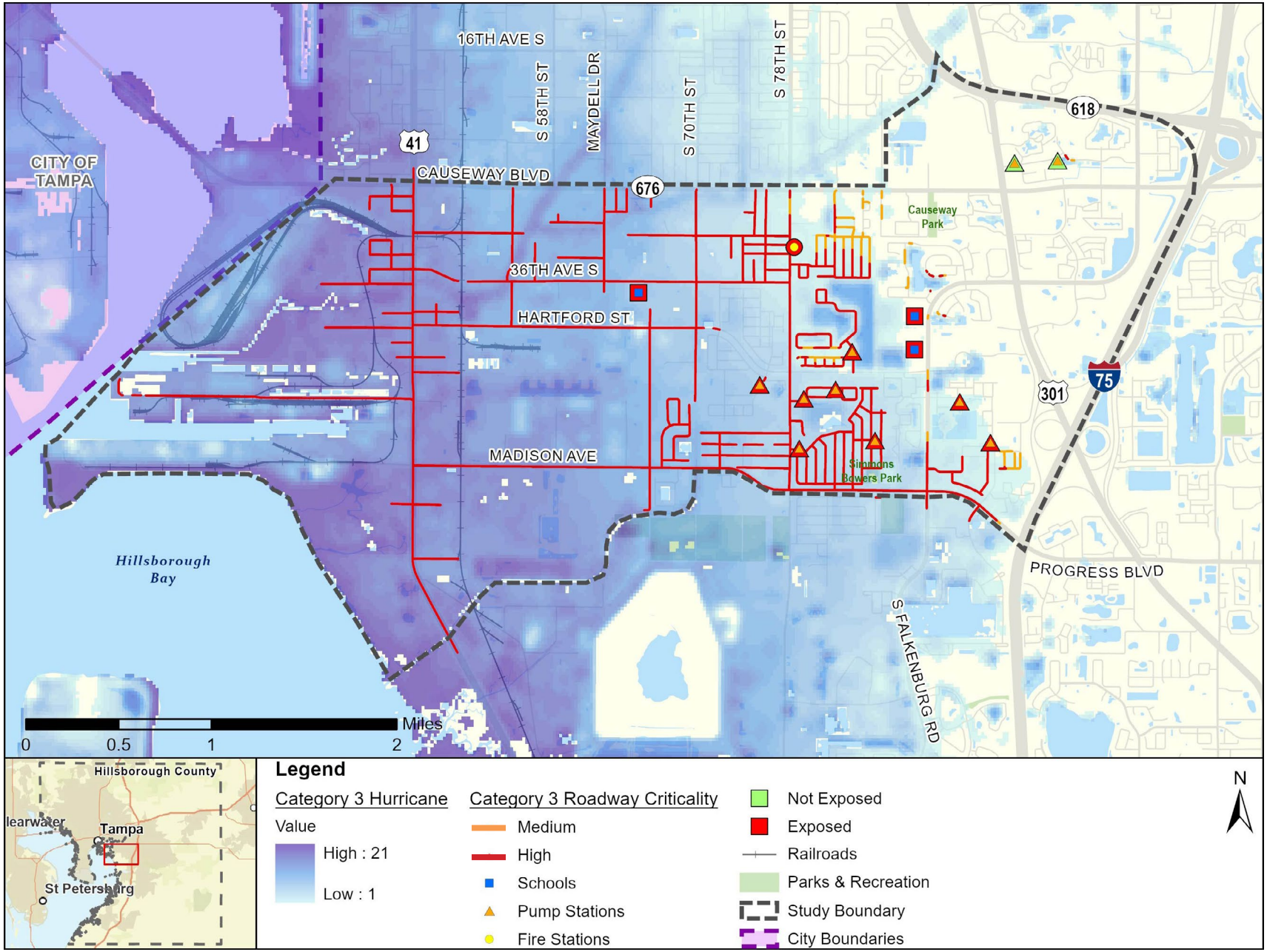
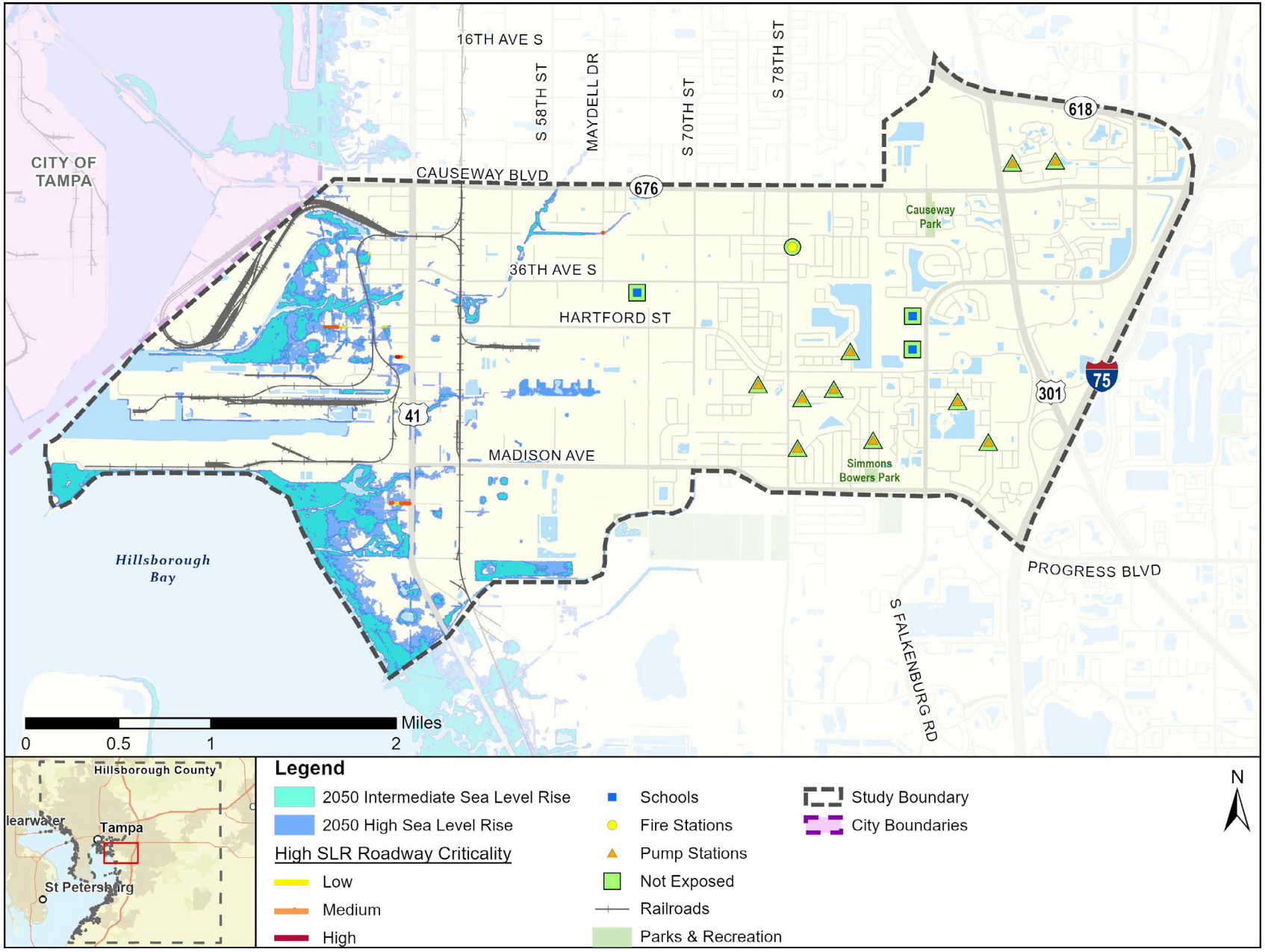


Figure 22. 2050 Intermediate and High Sea Level Rise Exposure and Criticality



Vulnerability Assessment Findings

The 100-Year Event and the Category 3 Hurricane expose the most assets within the Palm River redevelopment area. The flooding caused by SLR is isolated to areas along East Bay which does not expose many assets. Combining SLR and surge protection was not performed for this assessment but is recommended to be completed to better understand future threats. The southeast area of the Palm River redevelopment area was determined be the most exposed area within this project boundary due to the number of assets and the frequency they were found to be exposed to flooding. There are eight pump stations and two schools in this area that were all determined to be exposed during the Category 3 Hurricane.

Potential improvements for addressing flooding within the Palm River Redevelopment Area include a combination of gray, green, and blue infrastructure such as integrating living shorelines, raising roads, and adding storage in local and regional stormwater ponds. Improvement strategies should seek to protect or extend the duration from which assets may be exposed. These adaptation strategies and examples are included in **Table 20**.

Table 20. Adaptation Strategies

Strategy	Example
Gray, Green & Blue Infrastructure	Gray • Hardening or raising of infrastructure • Adding storage/capacity • Diverting flows Green • Living shorelines • Bioswales, upflow filters • Landscaping – green roofs, canopy coverage Blue • Passive water parks
Land-use Planning	• Development of adaptation action areas • Identification of resilience overlay zones • Resilience Comprehensive Plan Chapter – Peril of Flood • Dual use transportation systems
Disaster Planning	• Loss avoidance studies • Benefit-cost analyses (GIS based)
Asset Management	• Schema development/updates • Assigning condition codes • Assigning remaining useful life
Policy Updates	• Update of Stormwater Master Plans (frequency based – e.g. every five years) • Attenuation/treatment credits • Land Development Code updates
Social Equity	• Personal preparedness campaigns in highly vulnerable areas • Build-a-bucket event • Project prioritization that addresses projects in highly vulnerable areas with highly vulnerable populations

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Table 21. Asset Threat Matrix for Flood Exposure and Criticality

County Maintained Roads	Delaney/Archie Creek FLOS November 2016	FEMA Flood Maps	Exposure (inches)			
			2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
30th Ave S	C	✓			72	204
31st Ave S	A	✓			60	192
32nd Ave S	A	✓				132
33rd Ave S	A					48
34th Ave S	D	✓	✓		84	204
35th Ave S	A					48
36th Ave S	D	✓	✓		72	180
49th Ave S	B					132
50th Ave S	D					120
51st Ave S	A					120
52nd Ave S	A					96
85th Dr	A					84
Abbey Mist Cv	C	✓				60
Alambra Ave	D					
Allamandra Ave	D					72
Ash Ave	D					96
Asturias Pl	D					
Austin St	C	✓		4	72	192
Barrington Manor Pl						
Bellewater Blvd	A					12
Bianca Ct	C					
Birch Ave	B	✓				84
Bloomingdale Ave	A	✓			60	180

County Maintained Roads	Delaney/Archie Creek FLOS November 2016	FEMA Flood Maps	Exposure (inches)			
			2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
Boise St	C	✓			72	204
Brown Noddy Ln	X					
Calle St	C					
Camden Field Pkwy	A	✓				120
Camden Woods Dr	A	✓				96
Canterbury Lake Blvd	D	✓				96
Causeway Blvd	A	✓				
Clifford Sample Dr	D	✓				48
Crescent Park Dr	A					
Dacca Dr	B					132
Darlington Dr	D	✓				48
Deerfield Dr	C	✓				48
Delaney Creek Ln	X	✓			12	144
Delray Dr	D	✓				36
Denver St	D	✓		19	84	216
Devane Dr	D	✓				24
Dhanmandi Cir	A					120
Dover St	A	✓		8	96	216
Dunlin Dunes Pl	X	✓				
Egret Cove Cir	C					24
Estate Cove Cir	A					48
Evergreen Ave	C					60
Everhart Rd	A					

County Maintained Roads	Delaney/Archie Creek FLOS November 2016	FEMA Flood Maps	Exposure (inches)			
			2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
Fallen Leaf Dr	X					48
Fir Dr	B					84
Foxworth Rd	C					
Foxye Ln	X					12
Game Day Ct	A					24
Grand Harvest Ct	X					12
Grand Palm Ct	A					
Grapefruit Ave	D					72
Gumwood Ave	B					84
Hartford Lake Dr	C	✓				60
Hartford St	D	✓	✓	12	96	216
Hidden Water Cir	C					48
Hillcroft Dr	X					36
Ironwood Ave	D					60
Ixora Ct	A					
Jad Dr	D	✓				48
Knob Lake Ct	A					24
Kona Village Dr	X	✓				
Laguna Ln	B					36
Lancaster Ln	B					36
Laurel Creek Pl	X					24
Leto Dr	C					120
Libby Ln	D	✓				72
Libby Loop	D					36
Madison Ave	C	✓			96	216

County Maintained Roads	Delaney/Archie Creek FLOS November 2016	FEMA Flood Maps	Exposure (inches)			
			2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
Magnolia Park Blvd	A	✓				72
Manor Cove Cir	C	✓				
Marc Dr	C				24	144
Mariposa Pl	B					
Maydell Dr	C	✓		6	24	156
Monarch Breeze Dr	X					
Morning Breeze Ct	A					24
Osprey Cove Dr	C					12
Oyster Catcher Ct	X					
Palm Dr	A					108
Pavilion Palms Cir		✓				
Pinellas Pl	C	✓				36
Port Sutton Rd	C	✓	✓		84	216
Progress Blvd	C	✓				96
Raleigh St	D	✓		11	96	216
Red Pine Blvd	A					
S 47th St	D	✓	✓	2	84	216
S 51st St	D	✓			72	192
S 54th St	D	✓			72	192
S 58th St	A	✓			24	144
S 63rd St	B	✓			36	168
S 64th St	B	✓			36	168
S 66th St	C	✓			36	144
S 67th St	A					
S 68th St	A					

County Maintained Roads	Delaney/Archie Creek FLOS November 2016	FEMA Flood Maps	Exposure (inches)			
			2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
S 69th St	A					
S 70th St	D	✓				120
S 71st St	A					
S 72nd St	D					
S 73rd St	A					60
S 74th St	C					60
S 75th St	A					48
S 76th St	D					60
S 78th St	A	✓				84
S 79th St	B					96
S 80th St	A					72
S 81st St	C					84
S 82nd St	D					84
S 83rd St	D					96
S 84th St	D					84
S 85th St	C					84
S 86th St	D	✓				72
S 87th St	C	✓				84
S 88th St	D					84
S 90th St	A	✓				
S Falkenburg Rd	D					48
Sagasta St	D	✓			72	204
Saint Paul St	C	✓			60	180
Sample Ct	D	✓				12
Sample Loop	D					

County Maintained Roads	Delaney/Archie Creek FLOS November 2016	FEMA Flood Maps	Exposure (inches)			
			2050 Intermediate SLR	2050 High SLR	Category 1 Hurricane	Category 3 Hurricane
San Marco Pl	C					
Sanderling Shores Dr		✓				
Santa Fe Rd	C	✓				204
Saturn Ct	A					
Seeger Lake Ct	A					24
Stumble Journey Ln						84
Towaway Ave	D	✓			72	204
Tradewater Oaks Ct						24
Trammell Trl	B	✓				24
Trenton St	D	✓			72	204
Tuscany Ridge Dr		✓				36
Ventura Ave	D					
Wabash Pl						12
Water Park Ct	A					
Water Tower Dr	A	✓				36
Waterbird Dr	A					
Watercove Dr	B					
Welborn Way	A	✓				48
Wes Kearney Way	A					
Wichita Way	D	✓				36
Wild Senna Blvd		✓				84
Woods Landing Ln	A					72
US-41		✓			84	216


TOUCHSTONE

Section 5

Recommended Improvements

Recommended Improvements

Recommended improvements are identified for the study area based on the infrastructure assessments documented in this report. The assessment measures are used to identify locations for improvements and prioritize improvements based on an overlay of all measures to identify the highest areas of need. The recommended improvements are prioritized based on the following assessment measure categories to prioritize locations and prioritize improvements. A map of all projects is shown in **Figure 23** and the recommended improvement matrix is shown in **Appendix A**.

Assessment Measures

- Congestion and Mobility measures identify locations that should be prioritized based on high travel time index or volume to capacity ratio, fair to serious pavement condition, incomplete or missing user facilities based on the roadway's context classification, and locations on truck routes or HART routes.
- Safety measures identify locations that should be prioritized based on correctable crash patterns or severe crashes including fatal and injury crashes, and roadways with a posted speed greater than the context classification target speed.
- Utility measures identify locations where water or sewer mains should be replaced due to its useful life or locations where a new water or sewer connection would promote redevelopment.
- Flood Exposure measures identify locations where there is vulnerability to flooding due to storm events or sea level rise.
- Land Use measures identify locations that are or connect into Competitive Sites, Redevelopment Sites, or community amenities including schools, fire stations, and hospitals.

Improvement Benefit

Improvement Benefit factors are indicated for each recommended improvement based on the project's ability to improve Mobility, Safety, Resiliency, or Site Redevelopment.

- **Mobility:** project improves conditions for pedestrians, cyclists, passenger cars, or trucks on roadway facilities
- **Safety:** project improves conditions for vulnerable users accessing community amenities including schools or using roadway facilities
- **Resiliency:** project improves potential flooding conditions at community amenities, utility connections, or roadways
- **Site Redevelopment:** project improves redevelopment opportunities at Competitive Sites or Redevelopment Sites identified by the county, or provides opportunity for new development due to new infrastructure connections and help achieve Target Redevelopment goals

Recommended Actions

Based on the infrastructure assessment and an overlay of all measures, improvements and the highest areas of need are identified. The following locations are recommended focus areas to improve existing critical infrastructure based on the current conditions. The improvements are recommended to serve community amenities and encourage redevelopment of competitive sites, redevelopment sites, and existing industrial and vacant properties.

	Transportation Improvements	Utility Improvements	Vulnerability Improvements
Causeway Boulevard Area*	• **78th Street, US 301 and Falkenburg Road** – Intersection safety improvements (pg. 32-33)		
Falkenburg Road Area	• **Progress Boulevard to Selmon Expressway** – Complete street improvements including speed reduction and shared-use path (pg. 34-35) • **Fallen Leaf Drive to Bellewater Boulevard and US 301 to Crescent Park Drive** – Pavement repair (preventative treatment) (pg. 24-26)		• **Frost Elementary and Guinta Middle School** – Area flood exposure improvements (pg. 52) • **Sienna Moss Pump Station** – Area flood exposure improvements (pg. 51)
Hartford Street Area	• **US 41 to 70th Street** – Complete street improvements including a shared use path (pg. 34-35) • **Railroad crossing to 54th Street** – Major pavement rehabilitation (pg. 24-26)	• **US 41 to 70th Street** – Sewer system extension (septic to sewer conversion) (pg. 42-43)	• **US 41 to 70th Street** – Roadway flood exposure improvements, high criticality (pg. 53-65) • **Hartford Lake Pump Station** – Area flood exposure improvements (pg. 51)
Madison Avenue Area*	• **US 41 to 78th Street** – Complete street improvements including speed reduction and a shared use path (pg. 34-35) and intersection safety improvements at US 41 (pg. 32-33)		• **US 41 to 78th Street** – Roadway flood exposure improvements, high criticality (pg. 53-65)
36th Avenue Area	• **US 41 to 78th Street** – Complete street improvements including sidewalks and shared lane (pg. 34-35)	• **US 41 to 78th Street** – Sewer system extension (septic to sewer conversion), water system extension (pg. 42-43)	• **Bing Elementary** – Area flood exposure improvements • **US 41 to 78th Street** – Roadway flood exposure improvements, high criticality (pg. 53-65)

* Evacuation Route

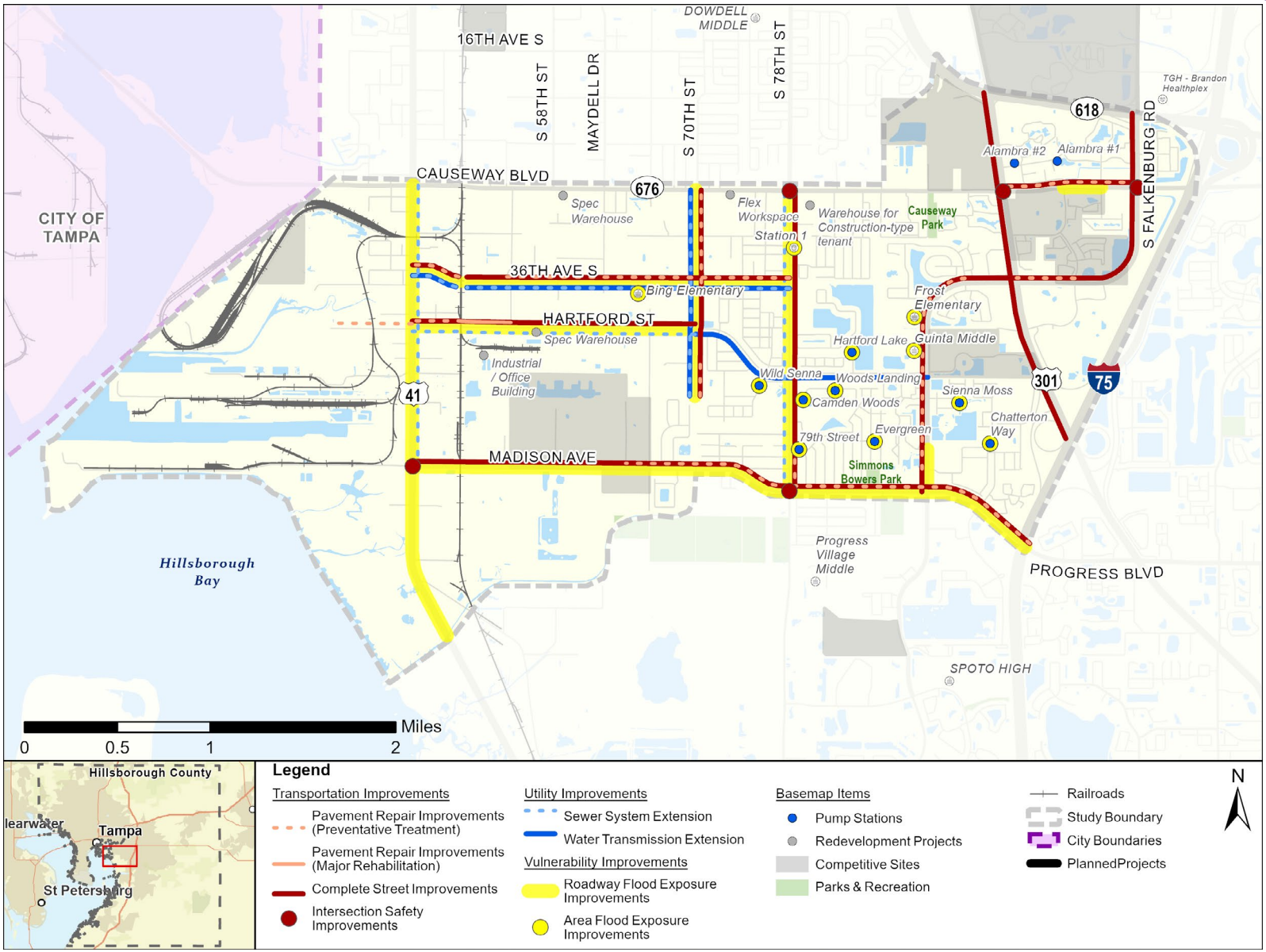
Recommended Actions

	Transportation Improvements	Utility Improvements	Vulnerability Improvements
70th Street Area	• **Causeway Boulevard to end** – Complete street improvements including sidewalks and shared lane markings (pg. 34-35), pavement repair (preventative treatment) (pg. 24-26)	• **Causeway Boulevard to end** – Sewer system extension (septic to sewer conversion), water system extension (pg. 42-43)	• **Causeway Boulevard to end** – Roadway flood exposure improvements, high criticality (pg. 53-65)
78th Street Area	• **Causeway Boulevard to Madison Avenue** – Complete street improvements including speed reduction and dedicated pedestrian and bike facilities (pg. 34-35), and pavement repair (preventative treatment) (pg. 24-26)	• **Causeway Boulevard to Madison Avenue** – Sewer system extension (septic to sewer conversion) (pg. 42-43)	• **Progress Village Fire Station** – Area flood exposure improvements • **Causeway Boulevard to Madison Avenue** – Roadway and area flood exposure improvements, high criticality (pg. 53-65)

Next Steps

- Complete detailed safety analysis of high crash areas identified in matrix
- Complete hydraulic capacity analysis of water/sewer transmission mains, including coordination with City of Tampa based on collection and transmission systems ownership
- Evaluate a combination of gray, green and blue infrastructure techniques to mitigate flood exposure
- Coordinate with County departments, including Public Works, to identified ongoing projects and plans in the area
- Further identify infrastructure project scopes and related funding sources, including public engagement and coordination with leading and coordinating agencies based on infrastructure and right-of-way ownership including:
  - Florida Department of Transportation
  - City of Tampa
  - CSX
  - Port Tampa Bay

Figure 23. Recommended Improvement Map




TOUCHSTONE

Appendix A

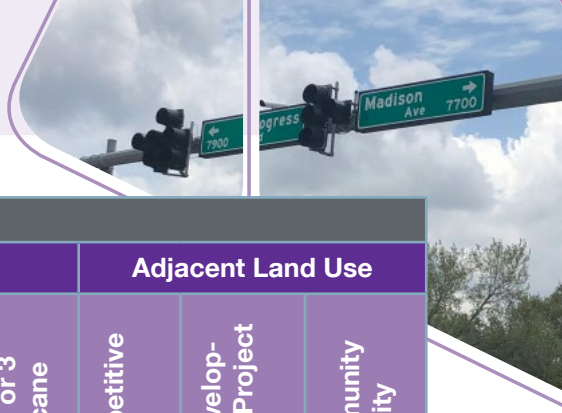
Assessment Matrix

Table 22. Assessment Matrix

Location	Recommended Improvement	Improvement Benefit				Ongoing Project or Planned Improvement	
		Mobility	Safety	Resiliency	Site Redevel-opment		
Causeway Boulevard Area							
Causeway Boulevard from US 301 to Falkenburg Road	Pavement repair - preventative treatment	✓			✓		
Causeway Boulevard from Wes Kearney Way to Marsh Harbor Way	Flood exposure improvements	✓		✓			
Causeway Boulevard & US 301	Intersection safety improvements	✓	✓		✓		
Causeway Boulevard from US 301 to I-75	Speed reduction and Shared Use Path (remove on-street bike lanes and widen sidewalk)	✓	✓				
Causeway Boulevard & 78th Street	Intersection safety improvements	✓	✓		✓		
Falkenburg Road Area							
Falkenberg Road from Progress Boulevard to Selmon Expressway	Speed reduction and Shared Use Path (remove on-street bike lanes and widen sidewalk)	✓	✓		✓		
Falkenburg Road from Fallen Leaf Drive to Bellewater Boulevard	Pavement repair - preventative treatment	✓			✓		
Falkenburg Road from US 301 to Crescent Park Drive	Pavement repair - preventative treatment	✓					
Falkenberg Road & Causeway Boulevard	Intersection safety improvements	✓	✓				
Falkenberg Road from Progress Boulevard to Turnstone Haven	Flood exposure improvements	✓		✓			
Frost Elementary	Flood exposure improvements		✓	✓			
Guinta Middle	Flood exposure improvements		✓	✓			
Sienna Moss Pump Station	Flood exposure improvements			✓	✓		

	Assessment Measure																
	Congestion and Mobility						Safety		Utilities		Exposure				Adjacent Land Use		
	High TTI or V/C	Serious/Poor Pavement Condition	Fair Pavement Condition	Incomplete User Facilities	Truck Routes	HART Route	Crash Pattern	Above Target Speed	Water Connection	Sewer Connection	100-Year Flood	FEMA Flood Zone	High Sea Level Rise	CAT 1 or 3 Hurricane	Competitive Site	Redevelop-ment Project Site	Community Amenity
	✓		✓	✓	✓	✓		✓			✓						
	✓		✓	✓	✓	✓		✓			✓						
	✓		✓	✓	✓	✓	✓	✓							✓		
	✓			✓	✓	✓		✓			✓						
	✓				✓		✓									✓	
	✓																
	✓		✓	✓	✓			✓							✓		✓
	✓		✓	✓				✓							✓		✓
	✓		✓	✓	✓			✓									
	✓			✓	✓		✓	✓									
	✓		✓	✓				✓						✓			
	✓		✓	✓				✓						✓			✓
	✓		✓	✓				✓				✓		✓			✓
	✓		✓	✓				✓						✓	✓		

Location	Recommended Improvement	Improvement Benefit				Ongoing Project or Planned Improvement	
		Mobility	Safety	Resiliency	Site Redevelopment		
Hartford Street Area							
Hartford Street from US 41 to 70th Street	Shared use path	✓	✓		✓		
Hartford Street from US 41 to 70th Street	Flood exposure improvements	✓		✓	✓		
Hartford Street from US 41 to 70th Street	Sewer collection/transmission system extension (septic to sewer conversion)				✓		
Hartford Street from railroad to South 54th Street	Pavement repair - major rehabilitation	✓		✓	✓		
Camden Field Parkway from 70th Street to Falkenburg Road	Water transmission extension				✓		
Hartford Street west of railroad	Pavement repair - preventative treatment	✓					
Hartford Lake Pump Station	Flood exposure improvements			✓			
Madison Avenue Area							
Madison Avenue from US 41 to 78th Street	Speed reduction and shared use path	✓	✓		✓	CIP 6115000	
Madison Avenue from US 41 to 78th Street	Flood exposure improvements	✓		✓	✓		
Madison Avenue & US 41	Intersection safety improvements	✓	✓				
Madison Avenue from Joann Kearney Boulevard to 78th Street	Pavement repair - preventative treatment	✓			✓	Unfunded - Resurfacing from US 41 to 78th Street	
Progress Boulevard Area							
Progress Boulevard from 78th Street to I-75	Pavement repair - preventative treatment	✓					
Progress Boulevard from 78th Street to I-75	Shared use path	✓	✓				
Progress Boulevard from 78th Street to I-75	Flood exposure improvements	✓		✓			
Progress Boulevard from Falkenburg Road to I-75	Roadway capacity and congestion improvements	✓					
Progress Boulevard & 78th Street	Intersection safety improvements	✓	✓				
Chatterton Way Pump Station	Flood exposure improvements			✓			
Evergreen Pump Station	Flood exposure improvements			✓			



	Assessment Measure																
	Congestion and Mobility						Safety		Utilities		Exposure				Adjacent Land Use		
	High TTI or V/C	Serious/Poor Pavement Condition	Fair Pavement Condition	Incomplete User Facilities	Truck Routes	HART Route	Crash Pattern	Above Target Speed	Water Connection	Sewer Connection	100-Year Flood	FEMA Flood Zone	High Sea Level Rise	CAT 1 or 3 Hurricane	Competitive Site	Redevelop-ment Project Site	Community Amenity
			✓	✓						✓	✓					✓	✓
			✓	✓						✓	✓					✓	✓
										✓							
		✓		✓						✓	✓					✓	
									✓								
			✓	✓							✓	✓					
		✓							✓		✓	✓		✓			
	✓		✓	✓	✓			✓			✓	✓			✓		
	✓		✓	✓	✓			✓			✓	✓		✓	✓		
	✓			✓	✓		✓	✓			✓	✓		✓			
	✓		✓	✓	✓			✓							✓		
	✓		✓	✓					✓	✓	✓	✓		✓			✓
	✓		✓	✓					✓	✓	✓	✓		✓			
	✓		✓	✓					✓	✓	✓	✓		✓			✓
	✓		✓	✓					✓	✓	✓	✓		✓			✓
	✓		✓	✓					✓	✓	✓	✓		✓			
	✓		✓	✓					✓	✓	✓	✓		✓			
	✓		✓	✓					✓	✓		✓		✓			✓

Location	Recommended Improvement	Improvement Benefit				Ongoing Project or Planned Improvement	
		Mobility	Safety	Resiliency	Site Redevelopment		
36th Avenue Area							
36th Avenue from US 41 to 78th Street	Sidewalks and shared lane markings	✓	✓				
36th Avenue from US 41 to 78th Street	Flood exposure improvements	✓		✓			
36th Avenue from US 41 to 78th Street	Sewer collection/transmission system extension (septic to sewer conversion)				✓		
36th Avenue from US 41 to 78th Street	Water transmission extension				✓		
36th Avenue from 54th Street to 78th Street	Pavement repair - preventative treatment	✓					
36th Avenue from US 41 to railroad	Pavement repair - preventative treatment	✓					
Bing Elementary	Flood exposure improvements		✓	✓			
70th Avenue Area							
70th Street from Causeway Boulevard to end	Sidewalks and shared lane markings	✓	✓				
70th Street from Causeway Boulevard to end	Flood exposure improvements	✓		✓			
70th Street from Causeway Boulevard to end	Sewer collection/transmission system extension (septic to sewer conversion)				✓		
70th Street from Causeway Boulevard to end	Water transmission extension				✓		
70th Street south of Chattin Road	Pavement repair - preventative treatment	✓					
70th Street from Causeway Boulevard to 36th Avenue	Pavement repair - preventative treatment	✓					

	Assessment Measure																
	Congestion and Mobility						Safety		Utilities		Exposure				Adjacent Land Use		
	High TTI or V/C	Serious/Poor Pavement Condition	Fair Pavement Condition	Incomplete User Facilities	Truck Routes	HART Route	Crash Pattern	Above Target Speed	Water Connection	Sewer Connection	100-Year Flood	FEMA Flood Zone	High Sea Level Rise	CAT 1 or 3 Hurricane	Competitive Site	Redevelop-ment Project Site	Community Amenity
			✓	✓					✓	✓	✓	✓		✓			✓
			✓	✓					✓	✓	✓	✓		✓			✓
			✓	✓					✓	✓	✓	✓		✓			
			✓	✓					✓	✓	✓	✓		✓			
			✓	✓					✓	✓	✓	✓		✓			✓
			✓	✓					✓	✓	✓	✓		✓			
			✓	✓					✓	✓		✓		✓			✓
			✓	✓					✓	✓	✓			✓			
			✓	✓					✓	✓	✓			✓			
			✓	✓					✓	✓	✓			✓			
			✓	✓					✓	✓	✓						
			✓	✓					✓	✓	✓			✓			
			✓	✓					✓	✓	✓	✓		✓			

Location	Recommended Improvement	Improvement Benefit				Ongoing Project or Planned Improvement	
		Mobility	Safety	Resiliency	Site Redevelopment		
78th Street Area							
78th Street from Causeway Boulevard to Madison Avenue	Speed reduction and dedicated pedestrian and bike facilities	✓	✓			CIP 69666000	
78th Street from Causeway Boulevard to Madison Avenue	Flood exposure improvements	✓		✓			
78th Street from Causeway Boulevard to Madison Avenue	Sewer collection/transmission system extension (septic to sewer conversion)				✓		
78th Street from 50th Avenue to Madison Avenue	Pavement repair - preventative treatment	✓					
Progress Village Fire Station	Flood exposure improvements			✓	✓		
79th Street Pump Station	Flood exposure improvements			✓			
Camden Woods Pump Station	Flood exposure improvements			✓			
Woods Landing Pump Station	Flood exposure improvements			✓			
Wild Senna Pump Station	Flood exposure improvements			✓			
US 41 / 50th Street Area							
US 41 from Madison Avenue to Port Sutton Road	Roadway capacity and congestion improvements	✓				FDOT Work Plan - road widening from 4 lanes to 6 lanes	
US 41 from Causeway Boulevard to Archie Creek	Flood exposure improvements	✓		✓			
US 41 from Causeway Boulevard to Madision Avenue	Sewer collection/transmission system extension (septic to sewer conversion)				✓		
US 301 Area							
US 301 from I-75 to Selmon Expressway	Roadway capacity and congestion improvements	✓			✓		

	Assessment Measure																
	Congestion and Mobility						Safety		Utilities		Exposure				Adjacent Land Use		
	High TTI or V/C	Serious/Poor Pavement Condition	Fair Pavement Condition	Incomplete User Facilities	Truck Routes	HART Route	Crash Pattern	Above Target Speed	Water Connection	Sewer Connection	100-Year Flood	FEMA Flood Zone	High Sea Level Rise	CAT 1 or 3 Hurricane	Competitive Site	Redevelop-ment Project Site	Community Amenity
	✓			✓	✓	✓		✓		✓	✓			✓			✓
	✓			✓	✓	✓		✓		✓	✓			✓			✓
	✓			✓	✓	✓		✓		✓	✓						
	✓		✓	✓	✓	✓		✓		✓	✓			✓			
	✓		✓	✓	✓	✓		✓		✓				✓		✓	
	✓		✓	✓	✓	✓		✓		✓				✓			
	✓		✓	✓	✓	✓		✓		✓				✓			
	✓		✓	✓	✓	✓		✓		✓				✓			
	✓		✓	✓	✓	✓		✓		✓				✓			
	✓				✓				✓	✓	✓	✓		✓			
	✓				✓				✓	✓	✓	✓		✓			
	✓				✓				✓	✓	✓	✓		✓			
	✓				✓										✓