FEHR PEERS

MEMORANDUM

Date: December 11, 2014

To: Claire Phillips

From: Dana Weissman and Meghan Mitman, Fehr & Peers

Subject: San Francisco Streetscape Prioritization: Scenario Planning Technical Memorandum

SF14-0765

INTRODUCTION

The San Francisco Streetscape Prioritization project aims to prioritize improvements on the 133 miles of roadway that comprise the City's Streetscape Street Network. The effort provides the City with a technical and data-driven strategy to identify its priorities on streetscape streets, rank its streetscape projects, and move those projects forward for funding. The prioritized list of streetscape capital project locations will inform the City's pursuit of specific funding sources focused on streetscape/public realm improvements for key walking (streetscape) streets. An actionable and vetted capital improvement list for streetscape enhancements will also improve inter-departmental coordination for plans and programs, which will enhance the City's efficiency in implementing streetscape improvements.

The Streetscape Prioritization project builds off the previous work of WalkFirst Phase 2, which created a prioritized pedestrian safety capital improvement project list to meet the safety benchmarks outlined in the Pedestrian Strategy. Similar to WalkFirst Phase 2, the Streetscape Prioritization effort includes a broad range of stakeholders, such as City staff and decision-makers, customers/users, community groups, and the general public.

This memorandum summarizes the Streetscape Prioritization project's scenario planning methodology. The approach was developed by the project team, consisting of Fehr & Peers and City staff from San Francisco Planning Department (Planning), San Francisco Department of Public Health (SFDPH), San Francisco Department of Public Works (SFDPW), San Francisco Municipal

Transportation Agency (SFMTA), San Francisco Office of Economic and Workforce Development (OEWD), San Francisco Public Utilities Commission (SFPUC), and San Francisco Office of the Controller (Controller's Office). Scenario planning was used to define and assess the outcomes of three potential streetscape investment strategies, gather feedback from City decision-makers on the three strategies, and develop a selected investment strategy based on that feedback to guide the prioritization of streetscape projects on the City's Streetscape Street Network. To support this process, the project team collected or assembled data on the pedestrian experience and features of the surrounding environment for each block on the City's Streetscape Street Network. The data informed the creation and evaluation of the three investment strategies.

SCENARIO PLANNING PROCESS OVERVIEW

The scenario planning process began at the completion of the WalkFirst Phase 2 project with the identification of three investment strategies that highlighted three distinct sets of priorities for identifying the most important locations for streetscape improvements on the City's Streetscape Street Network. Strategy definitions were refined to match available data and were modified and vetted until the set of prioritized blocks appropriately reflected the goals of each investment strategy. Outcome metrics were also determined at the onset of this process to facilitate an informed comparison of the three investment strategies using available data. Metrics were selected from a range of variables not included in the strategy definition datasets.

The three investment strategies were presented, via a series of maps and infographics, to a group of key stakeholders from selected City agencies to solicit feedback on the scenario planning approach and analysis results. The presentation and ensuing discussion took place during a two-hour charrette in which the project team shared the goals of the three strategies, the data that were used to identify selected blocks within the strategies, and the set of evaluation criteria that were analyzed for the three strategies and used to compare them.

Feedback from the scenario planning charrette helped guide the project team in its identification of a selected investment strategy. The selected strategy highlights a set of blocks on the City's Streetscape Street Network that will be prioritized for streetscape improvements, as the project turns its focus from blocks to corridors and candidate segments to potential project locations.

INVESTMENT STRATEGY DEFINITION

The following three investment strategies were selected to be simple and wholly discrete from one another to allow for a straightforward assessment and comparison:

1. **Invest Where People Walk:** This strategy focuses investment on locations with a high level of pedestrian activity.
2. **Tap into Economic Potential:** This strategy focuses investment on locations with a large number of underutilized buildings yet a high level of recent business growth.
3. **Target Physical Deficiencies:** This strategy focuses investment on locations with poor pedestrian infrastructure and environment, based on an approximated version of SFDPH's Pedestrian Environmental Quality Index (PEQI).

DATA COMPILATION

The project team compiled a list of the primary variables that would be used to define and evaluate the outcomes of the three investment strategies. Redundancy between the defining variables and the evaluation variables was avoided to ensure that each outcome metric presented an unbiased portrait of the three investment strategies. The availability of data was strongly considered when determining which variables to include in the scenario planning analysis.

City staff from Planning, SFDPH, and SFMTA provided the input data used to create the scenario planning variables. Fehr & Peers compiled the inputs into a master database with information attributed to every block (or street segment) in the City's Streetscape Street Network. The master database was analyzed during the scenario planning process to create the three investment strategies and evaluate their outcomes. The master database is an ESRI File Geodatabase containing four feature classes with the variables considered for the three candidate investment strategies and the selected strategy, as well as a fifth feature class with the variables considered for outcome metrics. The full set of variables used in the scenario planning analysis, including their definitions and sources, is listed in **Appendix A**.

INVESTMENT STRATEGY VISUALIZATION

To determine which blocks would be prioritized under each of the three investment strategies, every block on the City's Streetscape Street Network was assigned one score under each strategy. Scores were calculated by adding together the values of the input variables selected to define the

investment strategies. Blocks with the highest scores under a given investment strategy were designated the "prioritized" project locations for that strategy. The set of prioritized locations differed for each investment strategy, since each strategy was defined by a distinct set of variables.

The values of the input variables had widely different ranges, so a "normalized" version of every variable was created with values on a common scale between zero and one. Normalized variables (z) were calculated from the original variables (x) using the following formula:

$$z = \frac{x - \min(x)}{\max(x) - \min(x)}$$

This transformation made the values of the input variables comparable to one another and allowed them to be combined equitably.

The project team decided that some input variables should be more influential than others within a given investment strategy. Those variables were weighted more strongly in the score calculation by multiplying their values by a fixed integer greater than one, which increased the range of their potential contribution to the composite score.

The project team went through an iterative process to determine the unique set of input variables and relative weights that would be used to define each investment strategy. Various variable combinations were examined, revised and re-examined until the following definitions were selected for the three investment strategies:

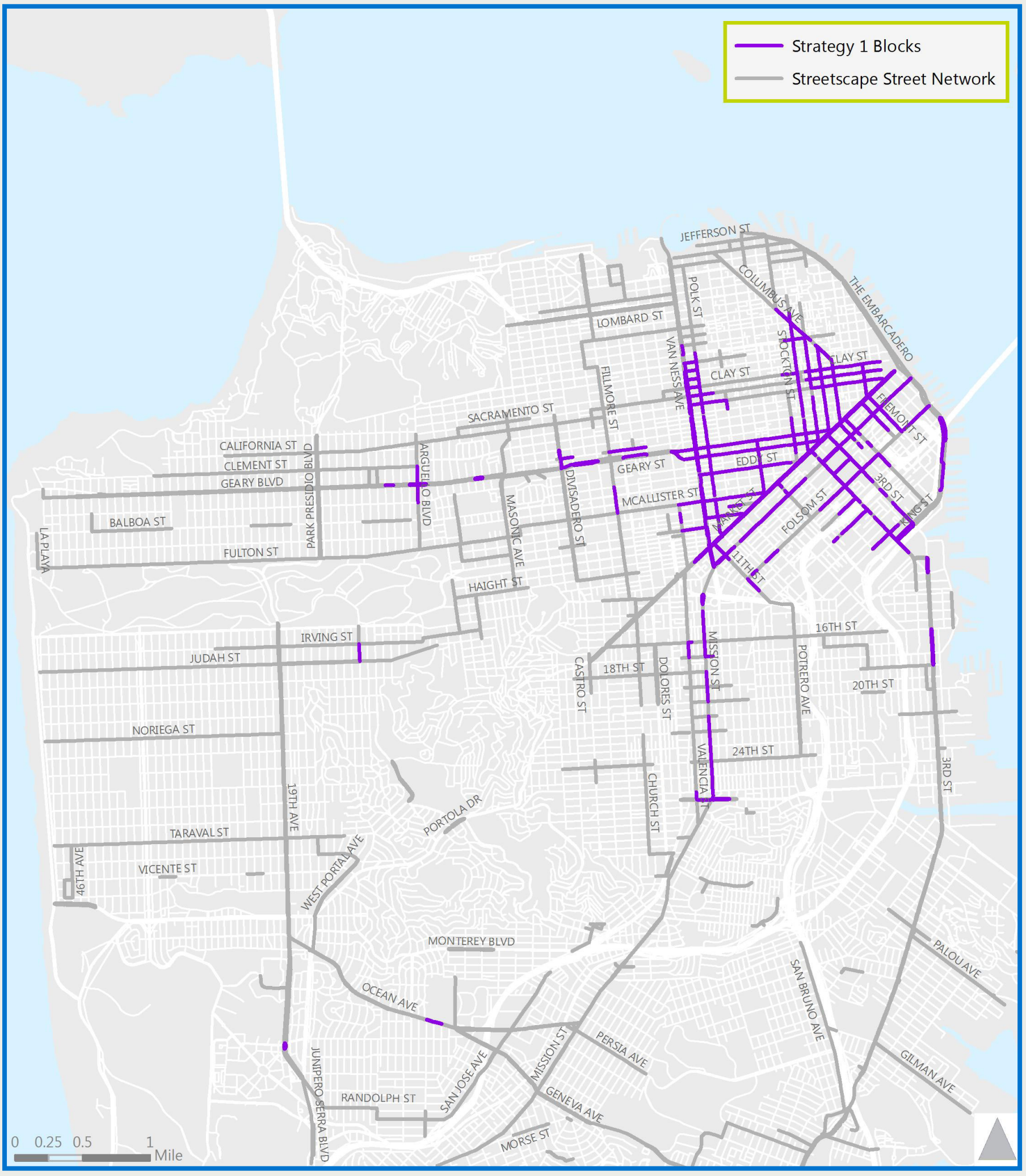
1. **Invest Where People Walk:** 2030 forecasted pedestrian volumes * 5 + Transit ridership at nearby stations
2. **Tap into Economic Potential:** Presence of vacant storefronts and lots * 3 + Number of change of use permits, miscellaneous permits, and new business licenses
3. **Target Physical Deficiencies:** PEQI-light score

The three investment strategies were visualized on a map of the City's street network, where blocks with the highest scores (i.e., top 20%) were highlighted as top-priority locations against the full Streetscape Street Network. This allowed the prioritized locations to be identified at a quick glance. See **Figure 1**, **Figure 2**, and **Figure 3** for maps of the three investment strategies. Every input variable was also visualized individually on a map of the City's Streetscape Street Network. For a given input variable, blocks were classified into quintiles based on their values for the given

variable, where the top 20% of blocks comprised the first quintile, the next 20% the second, and so on. This resulted in an equal number of blocks being assigned to each quintile class. All of the blocks on the City's Streetscape Street Network were displayed based on their quintile classifications. Maps of the investment strategy input variables can be found in **Appendix B**.

STRATEGY 1 INVEST WHERE PEOPLE WALK

BLOCKS WITH MOST PEDESTRIAN ACTIVITY



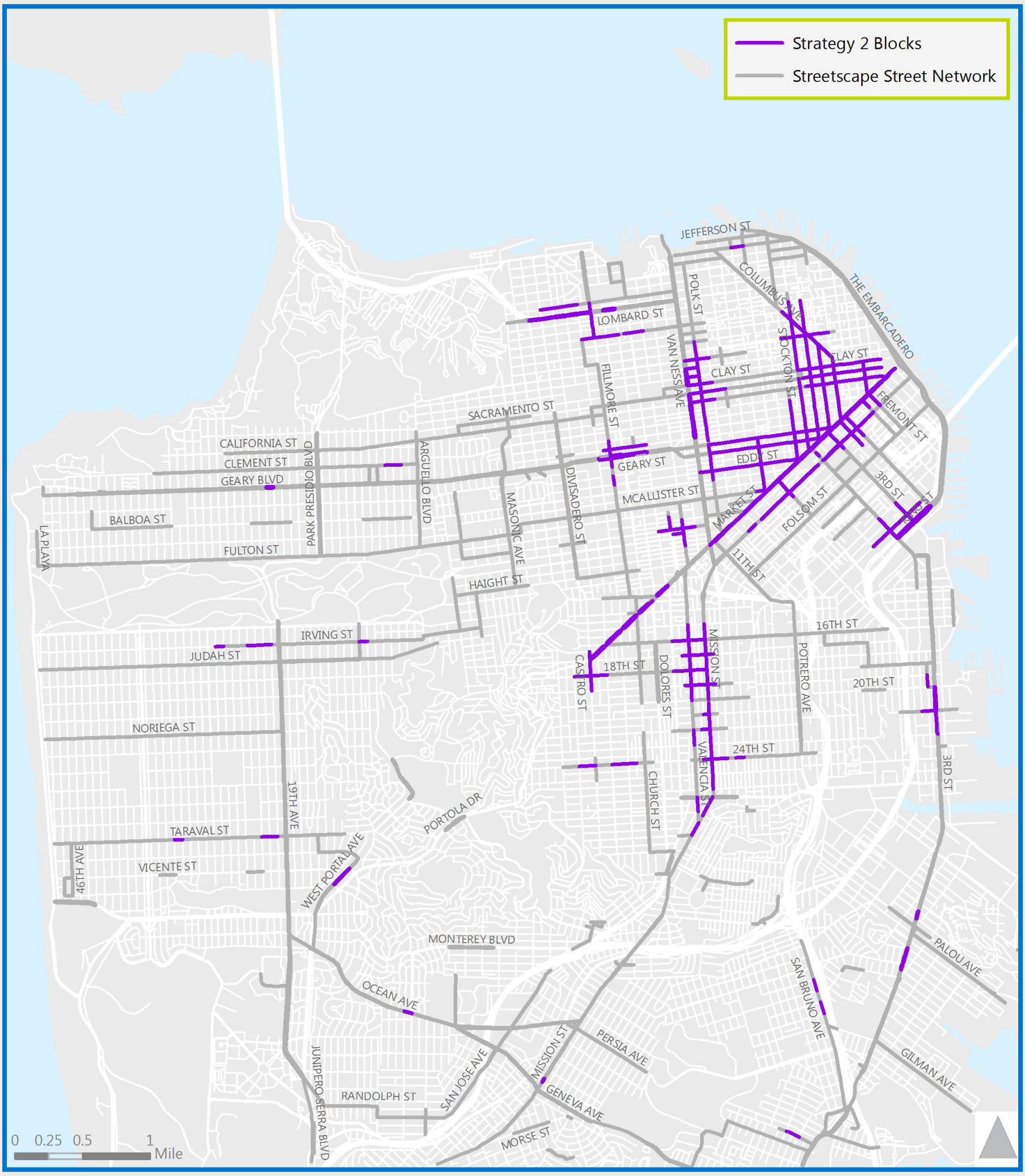
Strategy Goal:
Prioritize locations with high levels of pedestrian activity (top 20%).

Data Inputs:
- Pedestrian volumes: current + forecasted growth (x5)
- Transit ridership at nearby stations

Figure 1
Map of Strategy 1 Prioritized Locations

STRATEGY 2 TAP INTO ECONOMIC POTENTIAL

BLOCKS WITH MOST VACANCIES AND RECENT BUSINESS GROWTH



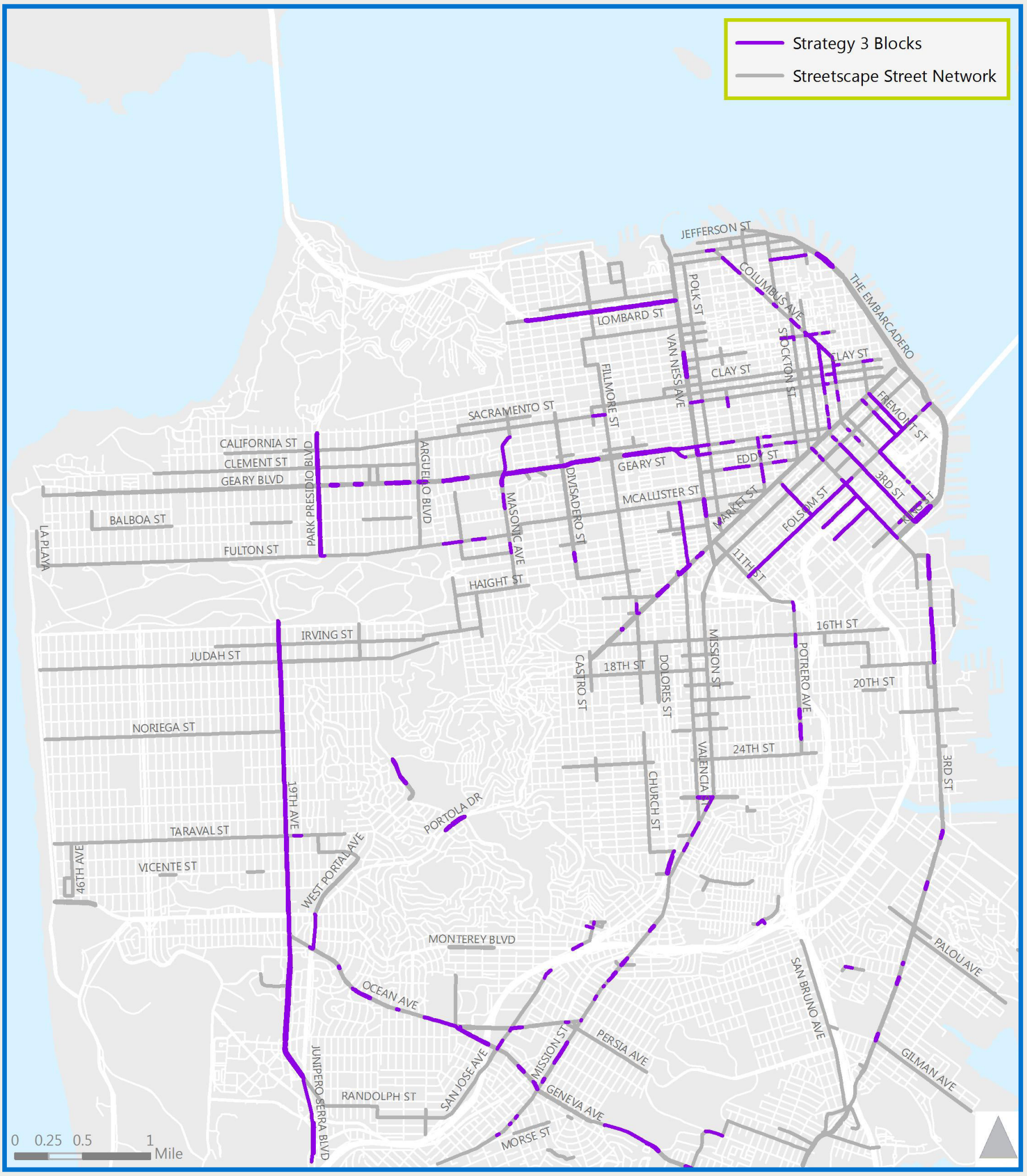
Strategy Goal:
Prioritize locations with underutilized buildings yet actively growing businesses (top 20%).

Data Inputs:
- Presence of vacant storefronts and lots (x3)
- Number of change of use permits, miscellaneous permits, and new business licenses

Figure 2
Map of Strategy 2 Prioritized Locations

STRATEGY 3 TARGET PHYSICAL DEFICIENCIES

BLOCKS WITH WORST PEDESTRIAN INFRASTRUCTURE AND ENVIRONMENT



Strategy Goal:

Prioritize locations with poor pedestrian infrastructure and/or surrounding environment conditions (top 20%).

Data Inputs:

- Score on SFDPH's Pedestrian Environmental Quality Index (PEQI), approximated version
  - Including traffic volume; speed limit; street/sidewalk width; presence of buffers, street trees, pedestrian plazas, parks, empty lots

Figure 3
Map of Strategy 3 Prioritized Locations

INVESTMENT STRATEGY EVALUATION

The three investment strategies were evaluated and compared based on the following four categories of outcome metrics:

- Targeted Population
- Stewardship
- Safety
- Efficiency

Under each category, three to five outcome metrics were analyzed. The evaluation of investment strategies included only the top-priority blocks (i.e., top 20% of blocks) within each strategy in order to assess the impacts of selecting one set of blocks for prioritization over another across the three strategies.

To conduct the evaluation analysis, Fehr & Peers built a GIS model that generated statistics from the master database. The model first identified the top-priority blocks for a given investment strategy, then it joined the information from the outcome metrics feature class to those blocks, calculated a set of statistics for the top-priority blocks within the strategy, and exported the results to a table in Excel.

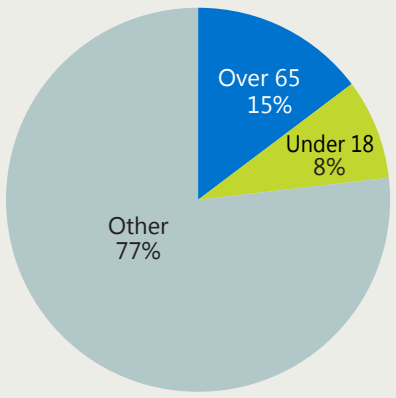
Evaluation results were displayed in a summary infographic using charts and figures. This allowed for a straightforward, visual comparison of the performance of each investment strategy to that of the others using designated outcome metrics. See **Figure 4**, **Figure 5**, and **Figure 6** for infographics of the three investment strategies.

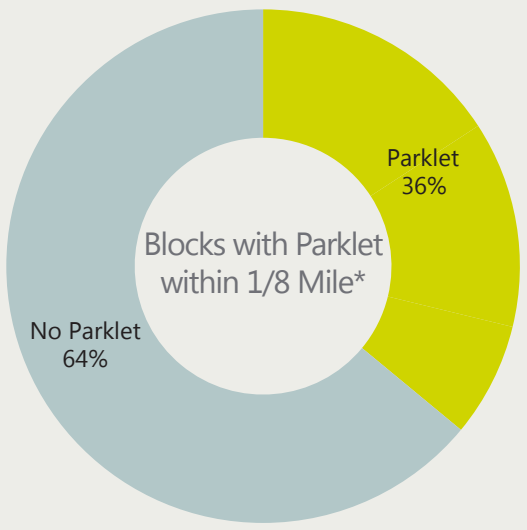
STRATEGY 1 INVEST WHERE PEOPLE WALK

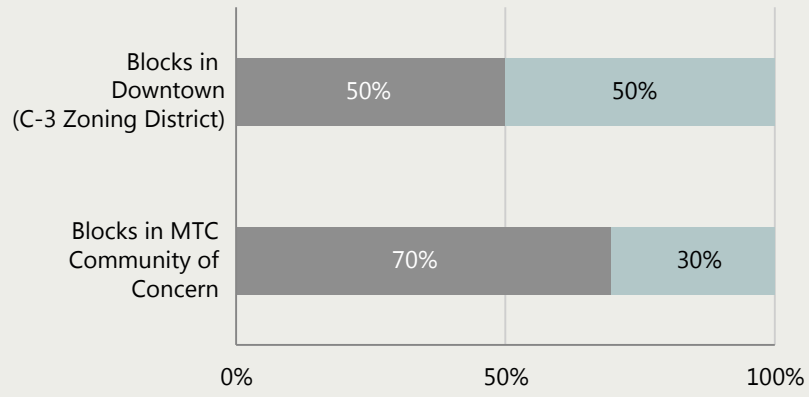
BLOCKS WITH MOST PEDESTRIAN ACTIVITY

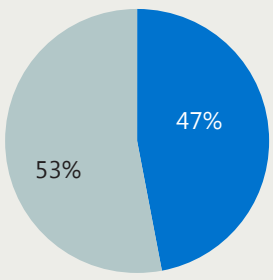
Total Population in Adjacent Census Blocks: 204,866

Total Employment in Adjacent Census Blocks: 386,738

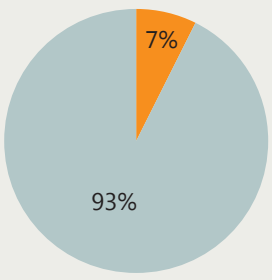






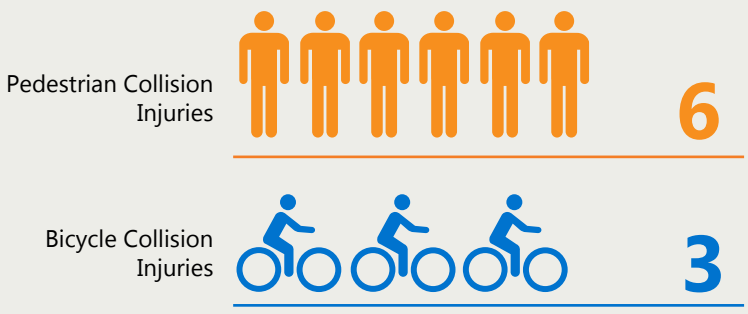


Blocks within **Community Benefit District**

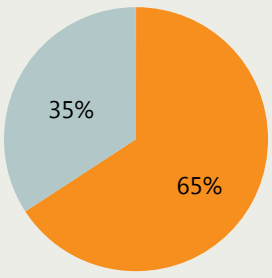


Blocks with **Sidewalk Landscaping** within 1/8 Mile*

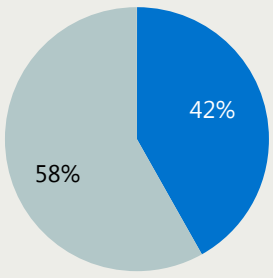
TARGETED POPULATION



Average Number of Collision Injuries per Block (2007 - 2011)



Percentage of Blocks on **Pedestrian High Injury Network**



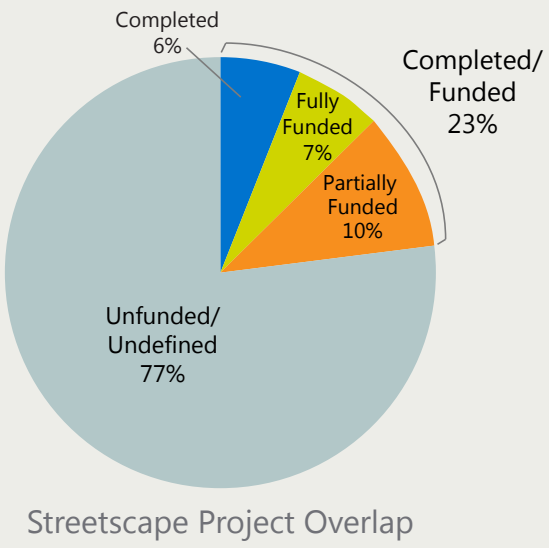
Percentage of Blocks on **Bicycle High Injury Network**

Average Prioritization Weight for Blocks on WalkFirst High Injury Network = 3.5

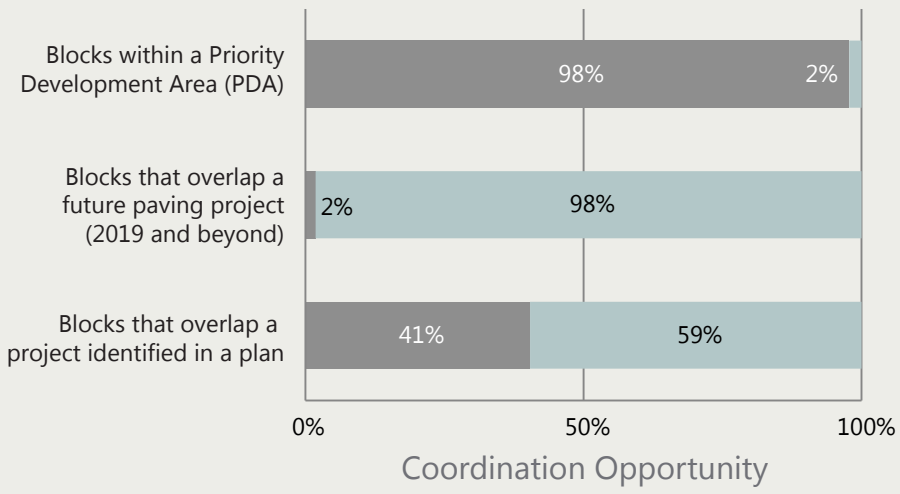
SAFETY

STEWARDSHIP

*based on permit history



Streetscape Project Overlap



Coordination Opportunity

EFFICIENCY

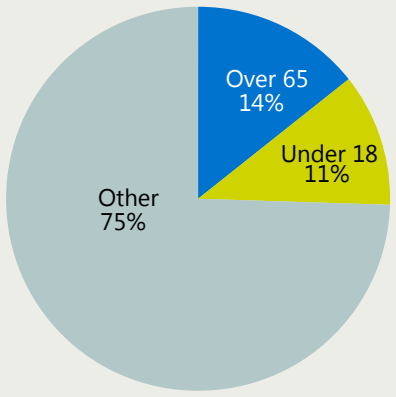
Figure 4
Evaluation Metrics Infographic of Strategy 1 Prioritized Locations

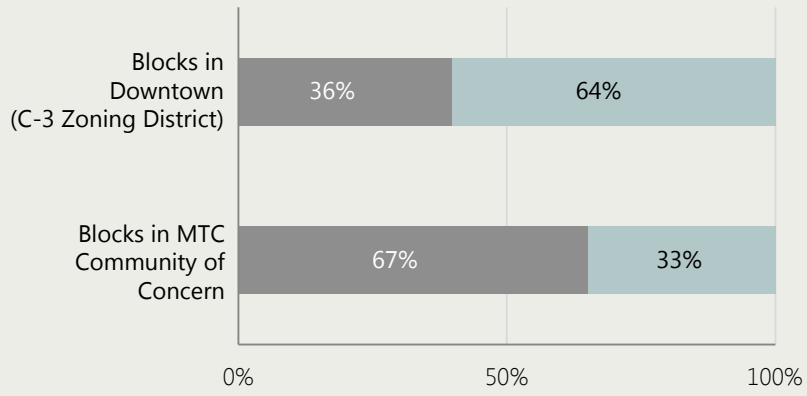
STRATEGY 2 TAP INTO ECONOMIC POTENTIAL

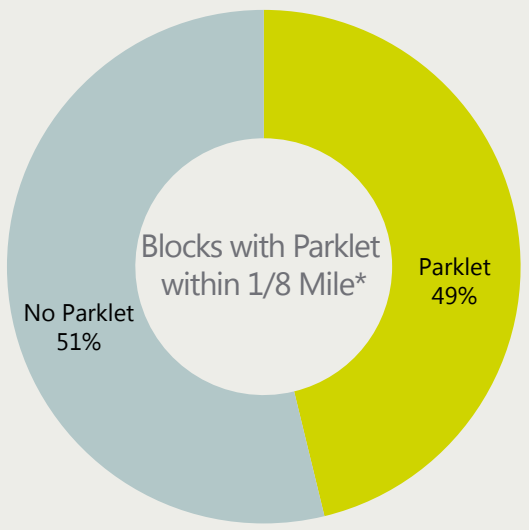
BLOCKS WITH MOST VACANCIES AND RECENT BUSINESS GROWTH

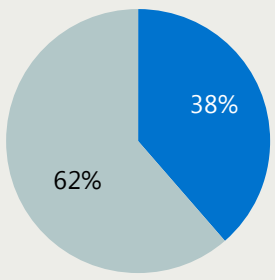
Total Population in Adjacent Census Blocks: 267,477

Total Employment in Adjacent Census Blocks: 321,469

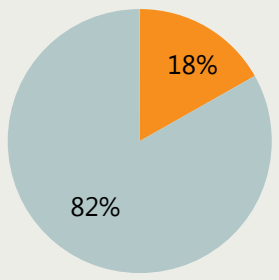








Blocks within
Community Benefit District



Blocks with
Sidewalk Landscaping
within 1/8 Mile*

TARGETED POPULATION

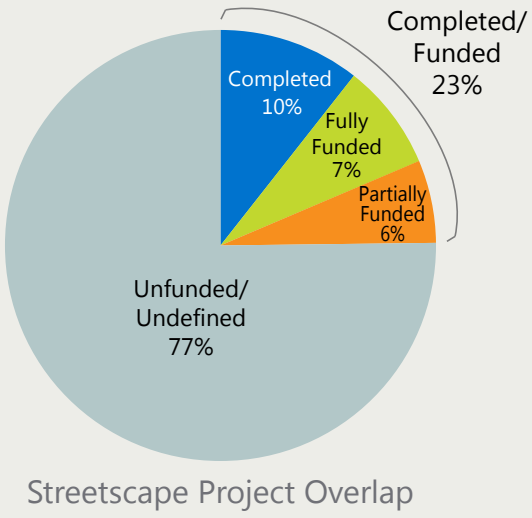
STEWARDSHIP

*based on permit history

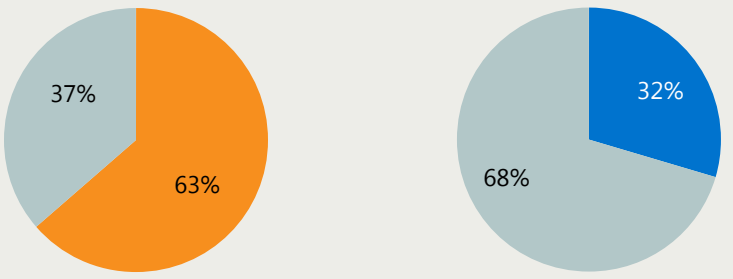
Pedestrian Collision Injuries **6**

Bicycle Collision Injuries **3**

Average Number of Collision Injuries per Block
(2007 - 2011)



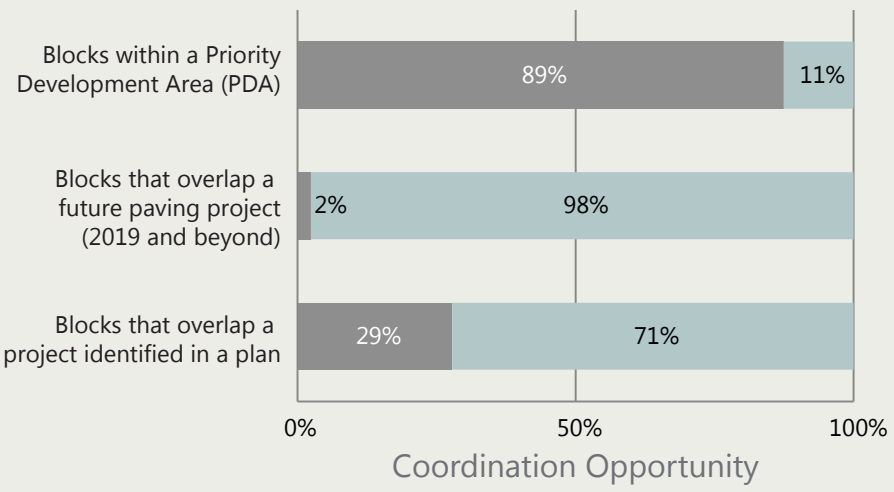
Streetscape Project Overlap



Percentage of Blocks on
Pedestrian High Injury Network

Percentage of Blocks on
Bicycle High Injury Network

Average Prioritization Weight for Blocks on WalkFirst High Injury Network = 3.5



SAFETY

EFFICIENCY

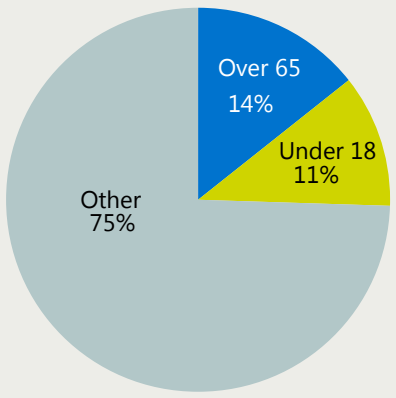
Figure 5
Evaluation Metrics Infographic of Strategy 2 Prioritized Locations

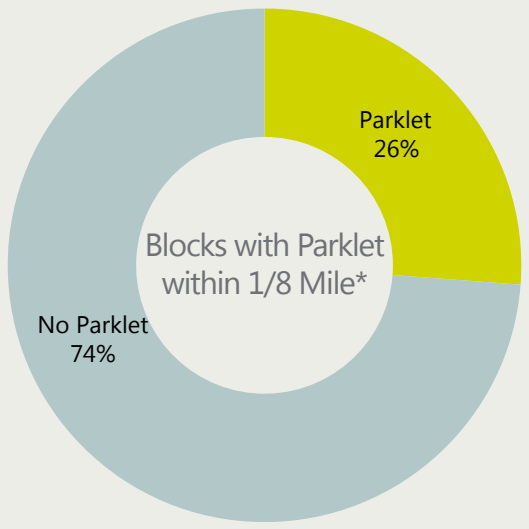
STRATEGY 3 TARGET PHYSICAL DEFICIENCIES

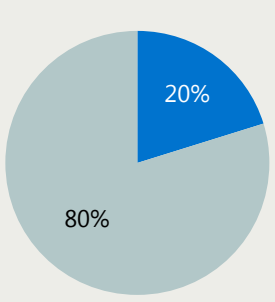
BLOCKS WITH WORST PEDESTRIAN INFRASTRUCTURE AND ENVIRONMENT

Total Population in Adjacent Census Blocks: 311,894

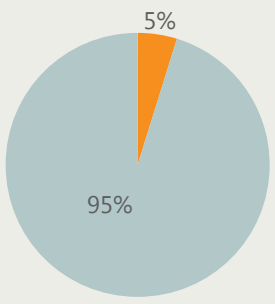
Total Employment in Adjacent Census Blocks: 388,653







Blocks within
Community Benefit District



Blocks with
Sidewalk Landscaping
within 1/8 Mile*

TARGETED POPULATION

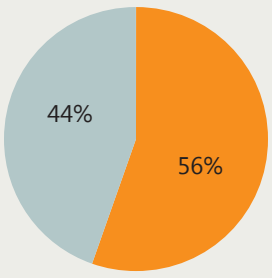
STEWARDSHIP

*based on permit history

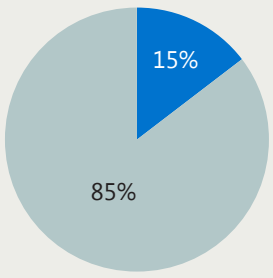
Pedestrian Collision Injuries **4**

Bicycle Collision Injuries **2**

Average Number of Collision Injuries per Block (2007 - 2011)

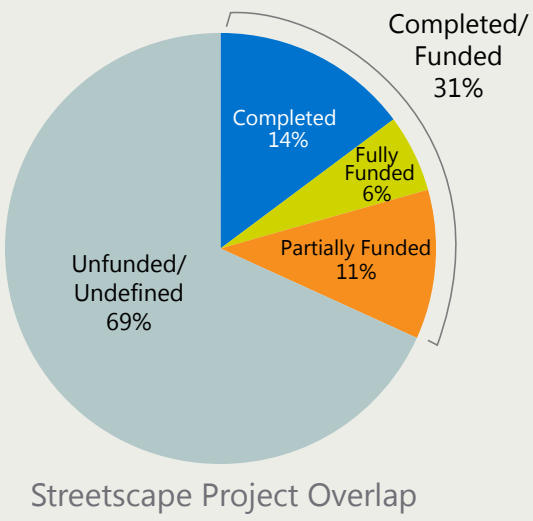


Percentage of Blocks on
Pedestrian High Injury Network

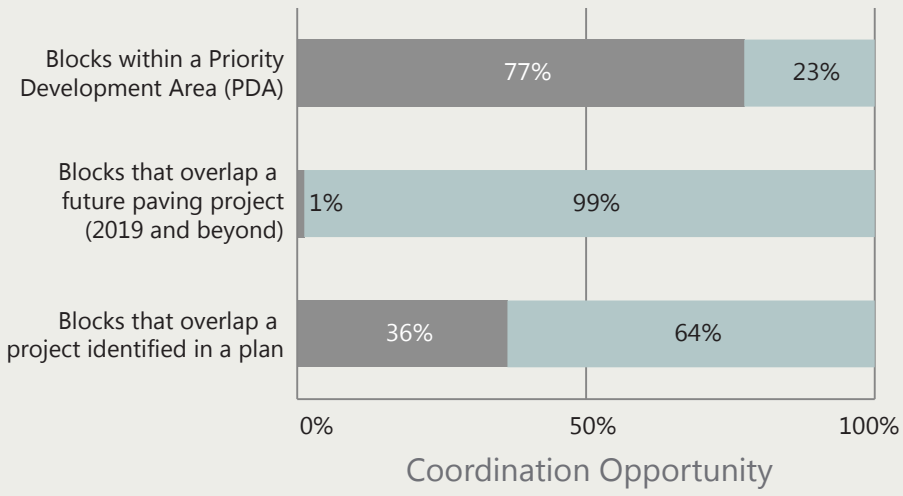


Percentage of Blocks on
Bicycle High Injury Network

Average Prioritization Weight for Blocks on WalkFirst High Injury Network = 2.6



Streetscape Project Overlap



Coordination Opportunity

SAFETY

EFFICIENCY

Figure 6
Evaluation Metrics Infographic of Strategy 3 Prioritized Locations

SCENARIO PLANNING CHARRETTE

The project team hosted a charrette with key stakeholders from selected City agencies on October 30, 2014, to solicit feedback on the three investment strategies and the overall project goals and deliverables. Reactions from decision-makers guided the project team's development of the selected investment strategy. Key discussion points are highlighted here.

- Attendees suggested that prioritized locations be differentiated by street type, since streetscape improvements can vary widely. In particular, they wanted to see neighborhood commercial corridors being highlighted.
- Attendees also recommended that streets outside of downtown be prioritized, since many downtown projects are already funded through planned development.
- Attendees strongly encouraged the project team to take advantage of opportunities to coordinate streetscape improvements with planned overlapping street projects, such as repaving, public utility, safety or transit projects.
- A preference survey conducted during the scenario planning charrette indicated that participants favor prioritizing improvements to poor pedestrian infrastructure and focusing improvements in areas with high pedestrian activity. The survey also revealed a preference for prioritizing project overlap opportunities and opportunities to address safety concerns. Survey results are summarized in **Table 1**.

TABLE 1: PREFERENCE SURVEY RESULTS FROM SCENARIO PLANNING CHARRETTE

Prioritization Criterion	Preference Score
Investment Strategy Definition	
Prioritize high pedestrian infrastructure need	23
Prioritize high pedestrian activity	17.5
Prioritize high economic potential	9
Investment Strategy Evaluation	
Prioritize coordination opportunities	42.5
Prioritize high-injury locations	32
Prioritize vulnerable populations	20.5
Prioritize exhibited stewardship	9

Source: Streetscape Prioritization scenario planning charrette, Fehr & Peers, October 2014.

SELECTED INVESTMENT STRATEGY

Based on feedback heard during the scenario planning charrette, the project team developed a selected investment strategy to guide prioritization of streetscape improvement projects on the City's Streetscape Street Network. Multiple rounds of revisions and re-evaluation were required for the project team to hone in on a selected strategy.

The following variables were identified to define the selected investment strategy:

- 2030 forecasted pedestrian volumes
- Pedestrian tourist corridors
- PEQI-light score
- Neighborhood commercial corridors

As was done previously, the variables were normalized on a common scale between zero and one, and a composite score was calculated for every block on the City's Streetscape Street Network based on the values of the "normalized" input variables. No input variable was weighted more strongly than the others in the definition of the selected investment strategy.

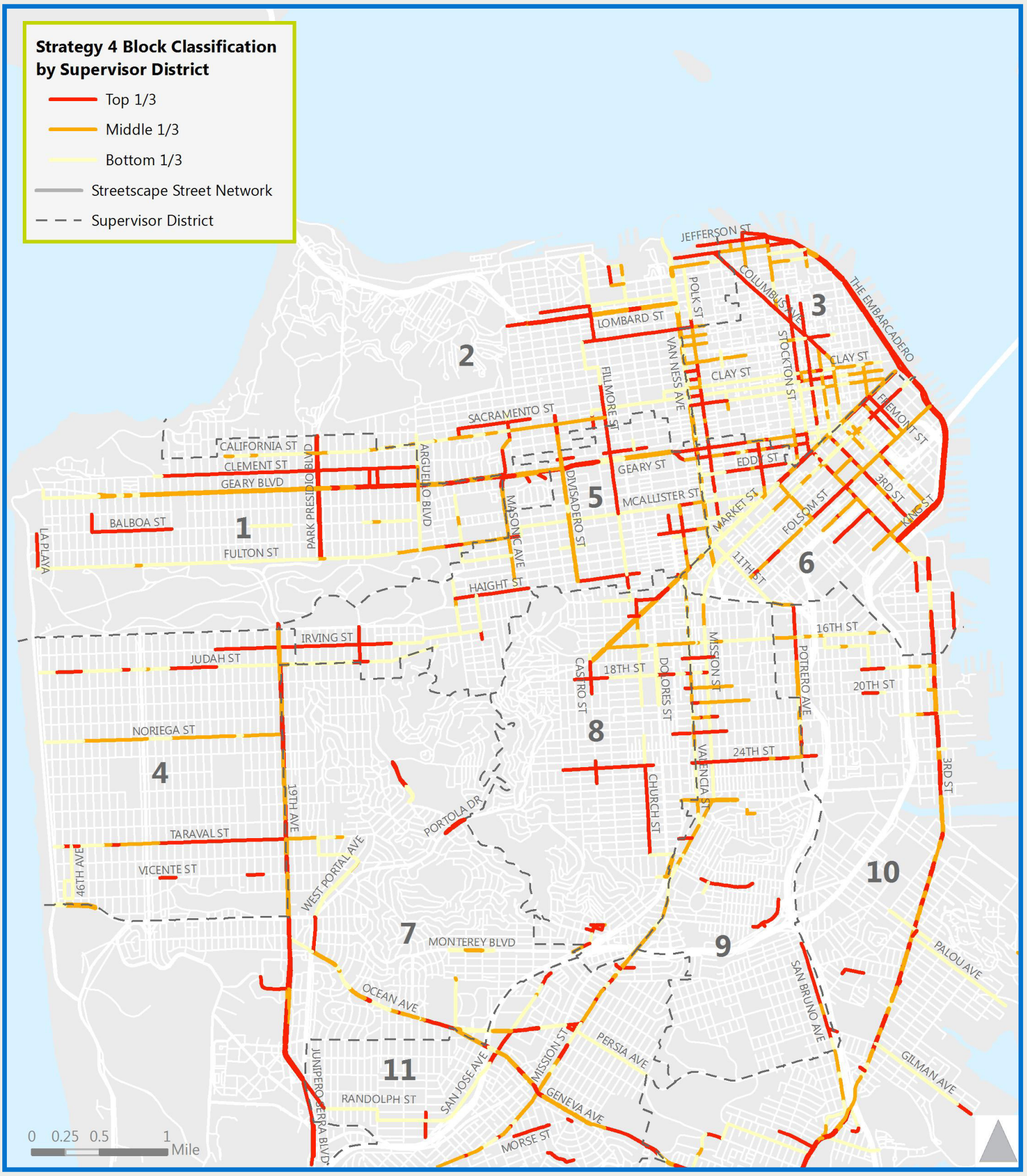
For the selected investment strategy, blocks were prioritized by Supervisor District instead of across the City's Streetscape Street Network as a whole. This was done to ensure that prioritized projects would be spread equitably across the City, and it allowed smaller neighborhood streets to compete for prioritization with major high-need arterials concentrated in the downtown area.

Based on a block's calculated score, it was assigned to a ranking category within its respective District: top 33%, middle 33%, or bottom 33%. These categories were visualized on a map of the City's street network, where blocks with the highest scores (i.e., top-priority locations) were highlighted as the top 33% of the City's Streetscape Street Network.

Evaluation results for the selected investment strategy were displayed in a summary infographic using charts and figures. See **Figure 7** and **Figure 8** for a map and infographic of the selected investment strategy. Maps of the investment strategy input variables can be found in **Appendix B**.

STRATEGY 4

PRIORITIZE BLOCKS WITH HIGH PEDESTRIAN ACTIVITY, POOR PEDESTRIAN ENVIRONMENT, AND NEIGHBORHOOD COMMERCIAL STREET TYPE



Strategy Goal: Prioritize locations with high levels of pedestrian activity, poor pedestrian infrastructure and/or surrounding environment, and Neighborhood Commercial street type designation (top 33%).

Data Inputs:

- Pedestrian volumes: current + forecasted growth
- Pedestrian Tourist corridors
- Score on SFDPH's Pedestrian Environmental Quality Index (PEQI), approximated version
- Neighborhood Commercial corridors

*Neighborhood Commercial designation based on Better Streets Plan street type.

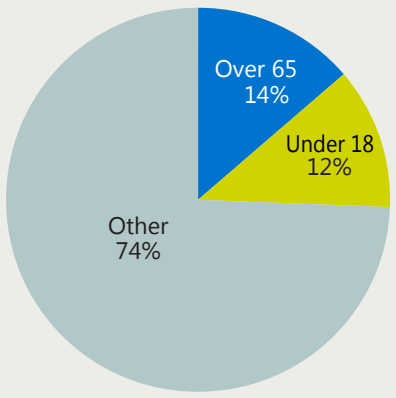
Figure 7
Map of Selected Strategy Prioritized Locations

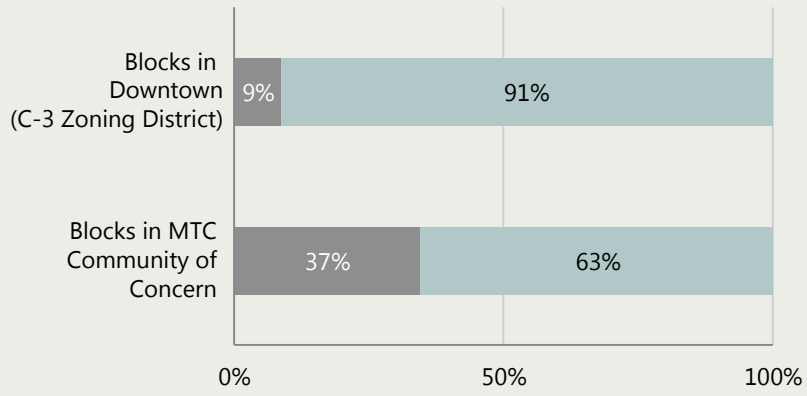
STRATEGY 4

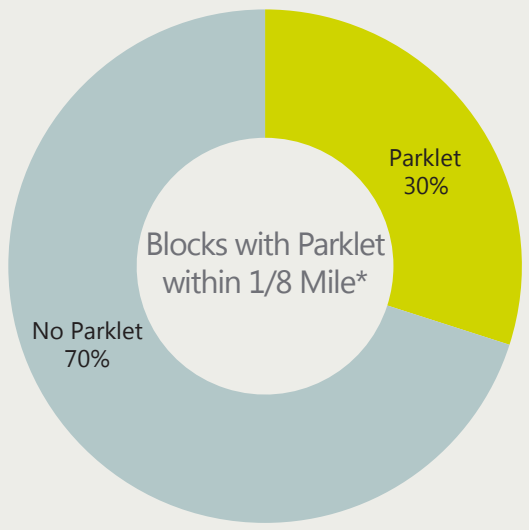
PRIORITIZE BLOCKS WITH HIGH PEDESTRIAN ACTIVITY, POOR PEDESTRIAN ENVIRONMENT, AND NEIGHBORHOOD COMMERCIAL STREET TYPE

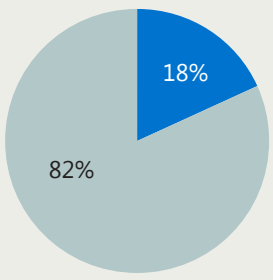
Total Population in Adjacent Census Blocks: 494,054

Total Employment in Adjacent Census Blocks: 439,056

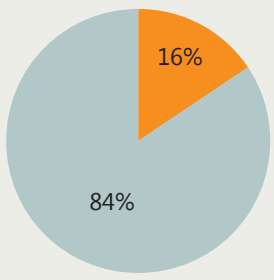








Blocks within **Community Benefit District**



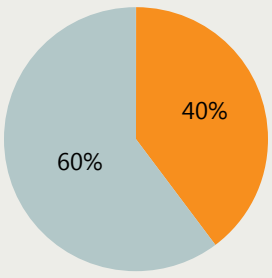
Blocks with **Sidewalk Landscaping** within 1/8 Mile*

TARGETED POPULATION

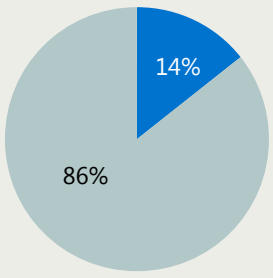
Pedestrian Collision Injuries **4**

Bicycle Collision Injuries **2**

Average Number of Collision Injuries per Block (2007 - 2011)



Percentage of Blocks on **Pedestrian High Injury Network**



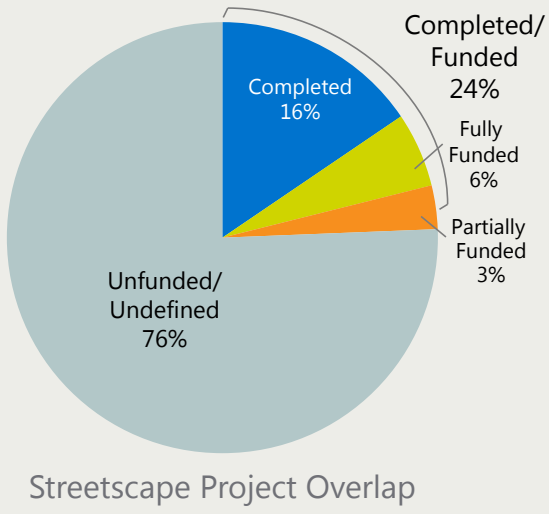
Percentage of Blocks on **Bicycle High Injury Network**

Average Prioritization Weight for Blocks on WalkFirst High Injury Network = 2.9

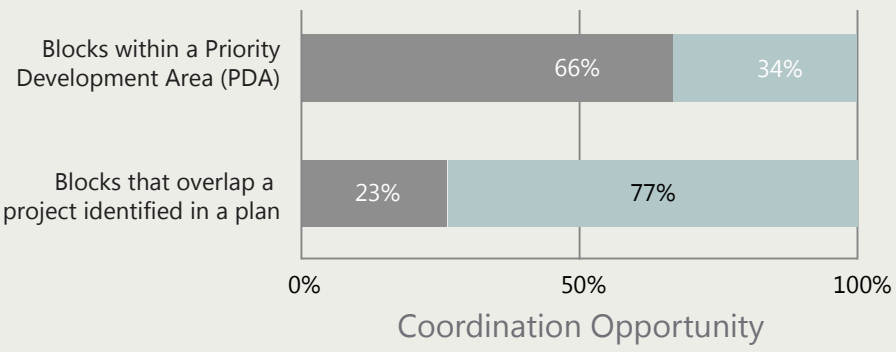
SAFETY

STEWARDSHIP

*based on permit history



Streetscape Project Overlap



Coordination Opportunity

EFFICIENCY

Figure 8

Evaluation Metrics Infographic of Selected Strategy Prioritized Locations

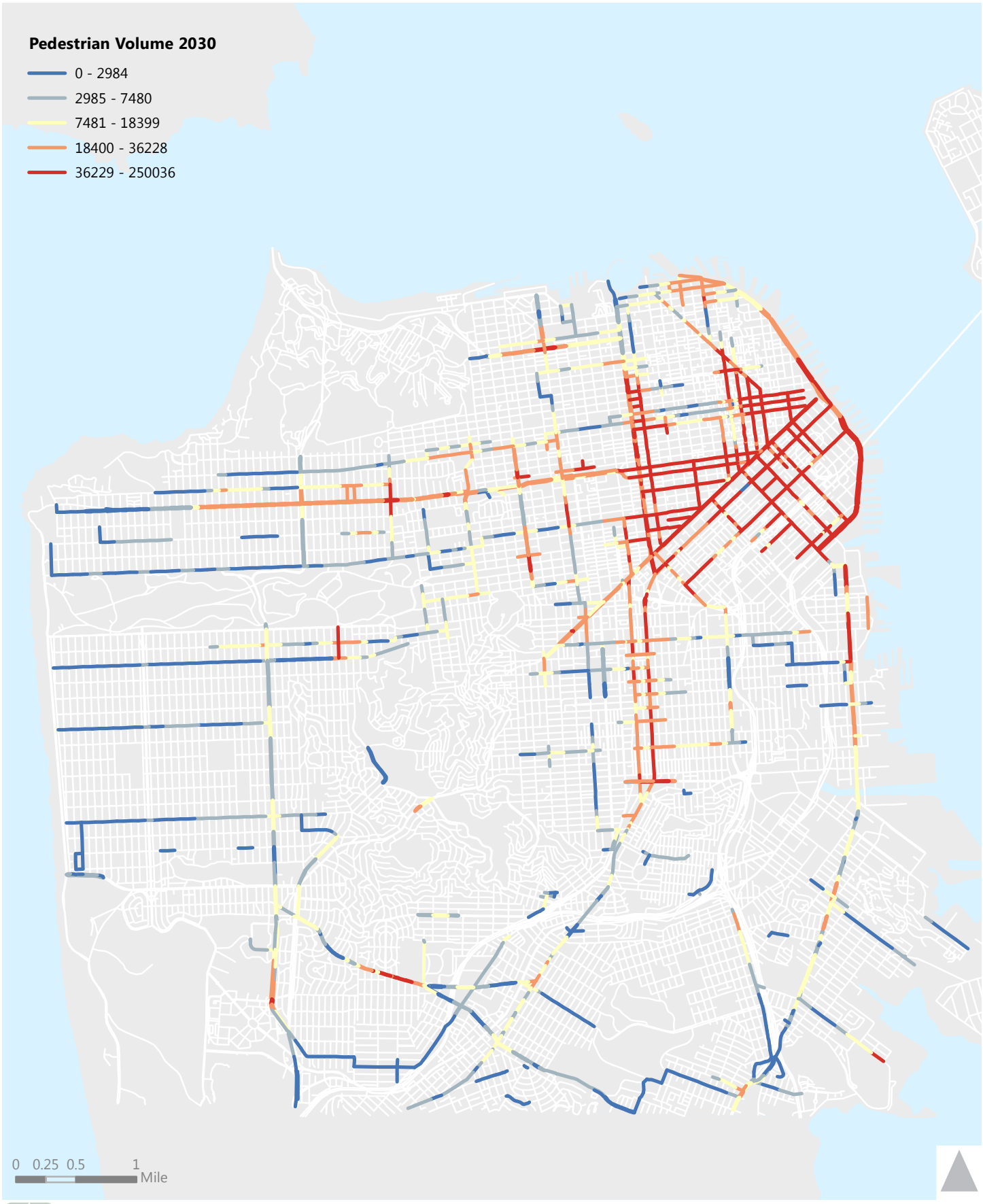
FROM SCENARIO PLANNING TO IMPLEMENTATION

The project team will build off the selected investment strategy map developed through the scenario planning process to move from high-level planning to on-the-ground implementation. Blocks will be aggregated into corridors, which are more meaningful geographic units for project construction. Project corridors will be removed if streetscape improvements have already been completed or if planned streetscape improvements are fully funded. Every remaining project corridor will be assigned a prioritization score based on the scores of its blocks in the selected investment strategy, and project corridors will be ranked by geography and type. The City will use this ranked list of corridors to identify top-priority streetscape projects to receive funding for planning and construction when opportunities arise. Key overlap opportunities and extensions of current or completed projects ("gap closure") will also be noted.

APPENDIX A:
Scenario Planning Master Database Variables

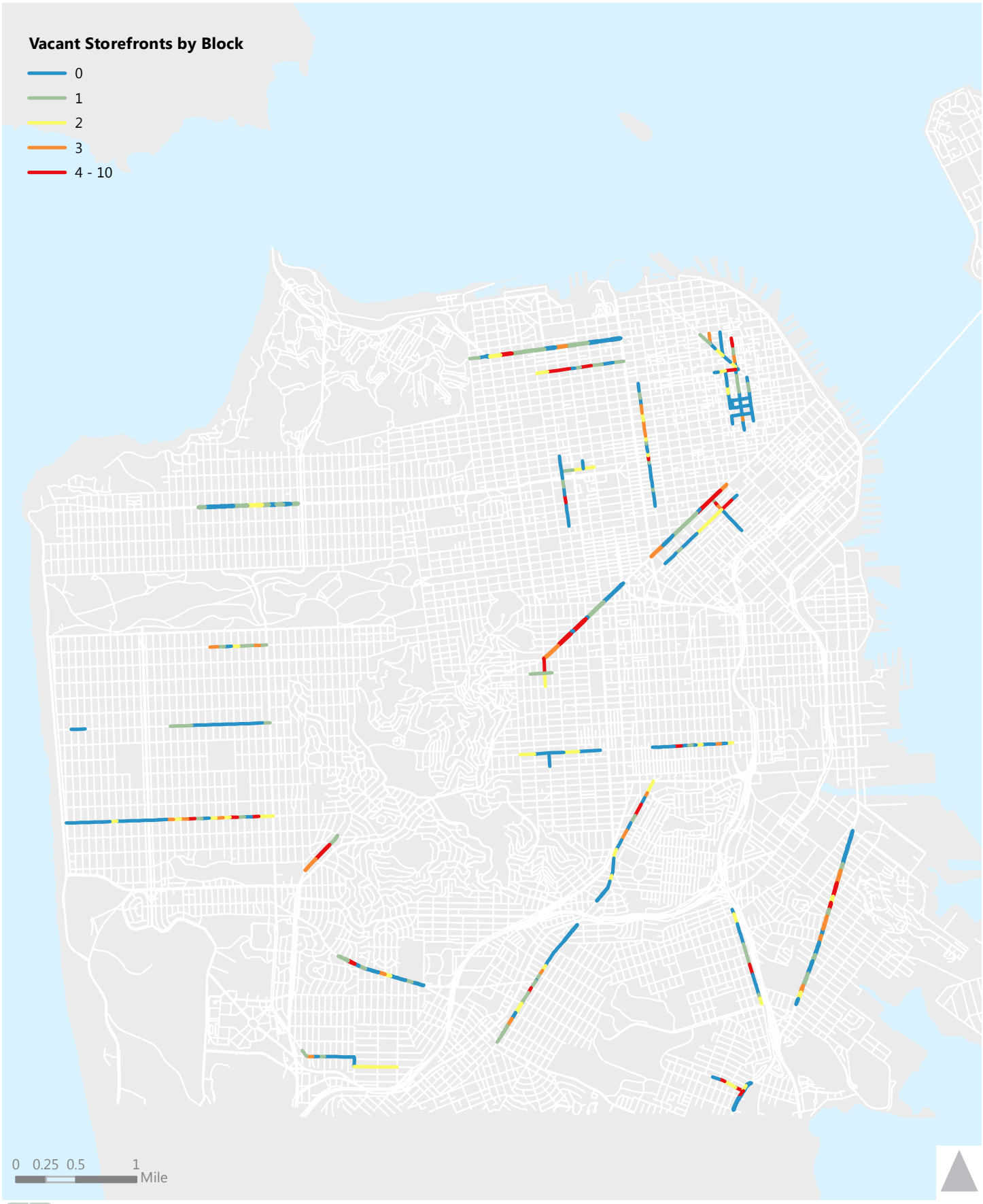
Scenario Planning Master Database Variables		
Variable	**Source**	**Year**
Investment Strategy 1: Invest Where People Walk		
Forecasted pedestrian volume based on SFMTA pedestrian volume model and SF-CHAMP model pedestrian growth %	SFMTA Model 6 / SFCTA SF-CHAMP model	2010 / 2030
Daily MUNI transit ridership w/in 1/4 mile	TransBASE	2012
Investment Strategy 2: Tap into Economic Potential		
# vacant storefronts by block	Invest in Neighborhoods	2013
# vacant lots by block	Invest in Neighborhoods	2013
# change of use permits recently requested w/in 1/8 mile	SF Planning	2010-2014
# miscellaneous permits recently requested w/in 1/8 mile	SF Planning	2010-2014
# new business licenses recently requested w/in 1/8 mile	SF Controller	2010-2014
Investment Strategy 3: Target Physical Deficiencies		
PEQI Light score	SFDPH	2014
Investment Strategy 4: Selected Strategy		
Forecasted pedestrian volume based on SFMTA pedestrian volume model and SF-CHAMP model pedestrian growth %	SFMTA Model 6 / SFCTA SF-CHAMP model	2010 / 2030
PEQI Light score	SFDPH	2014
Pedestrian tourist corridor flag	SF Planning	2014
Neighborhood Commercial corridor flag	SF Planning	2014
Evaluation Criteria		
Census tract service population	SFDPH	2010
Census tract senior population (+65)	SFDPH	2010
Census tract child population (<18)	SFDPH	2010
Downtown flag	SF Planning	2014
MTC Community of Concern flag	SFMTA	2013
Parklet permit recently issued w/in 1/8 mile	SF Planning	2014
Sidewalk landscaping permit recently issued w/in 1/8 mile	SFDPW	2014
Community Benefit District flag	SF Planning	2014
Pedestrian collision injuries	TransBASE	2007-2011
Bicycle collision injuries	TransBASE	2007-2011
Pedestrian High Injury Network flag	SFDPH	2014
Bicycle High Injury Network flag	SFDPH	2014
WalkFirst prioritization weight	WalkFirst	2013
Overlap with other completed or funded streetscape projects	SF Planning	2014
Priority Development Area flag	SF Planning	2014
Overlap with future paving project (2019 and beyond)	SF Planning	2014
Overlap with project identified in plan	SF Planning	2014

APPENDIX B:
Maps of Investment Strategy Input Variables

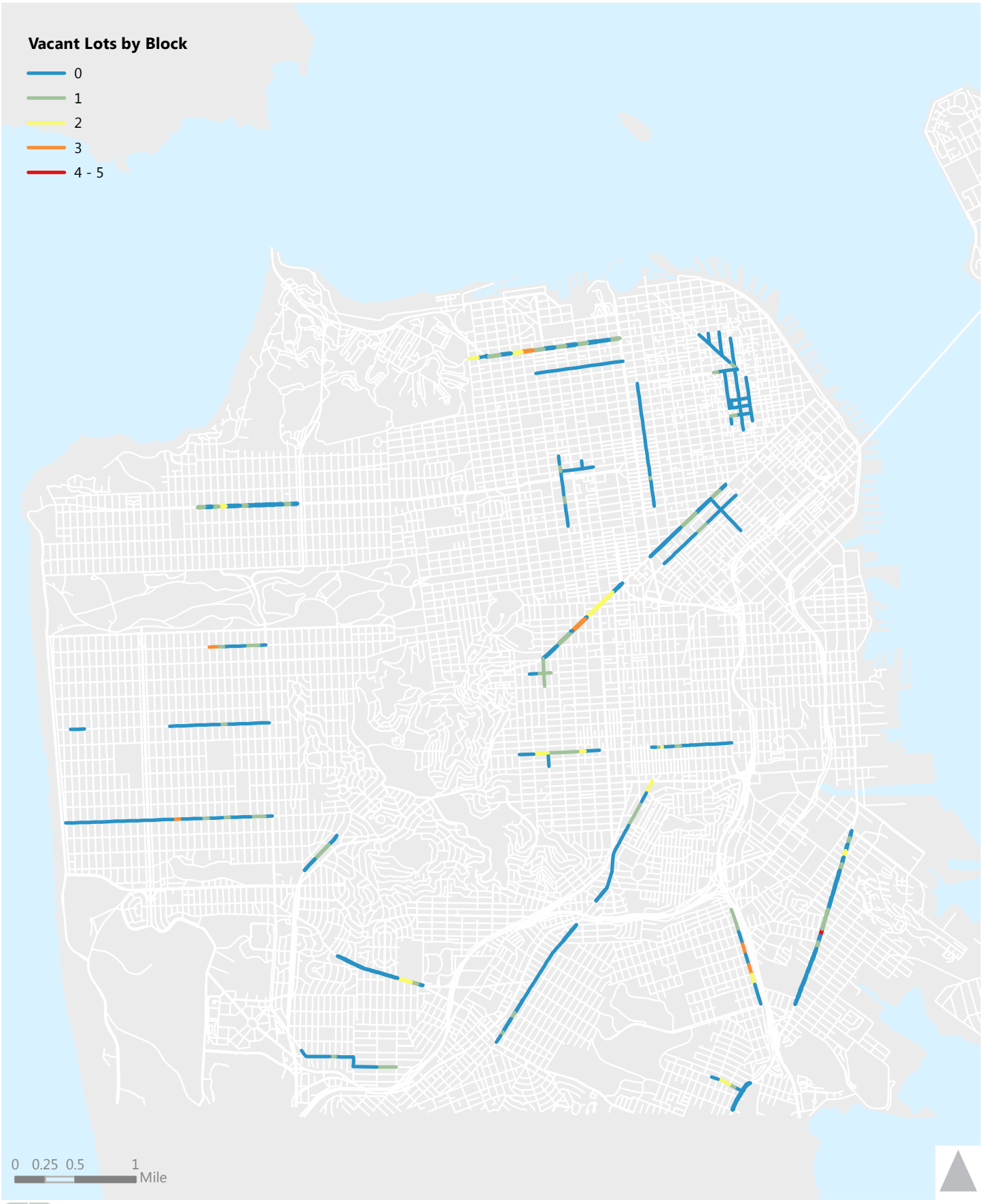


2030 Forecasted Pedestrian Volumes

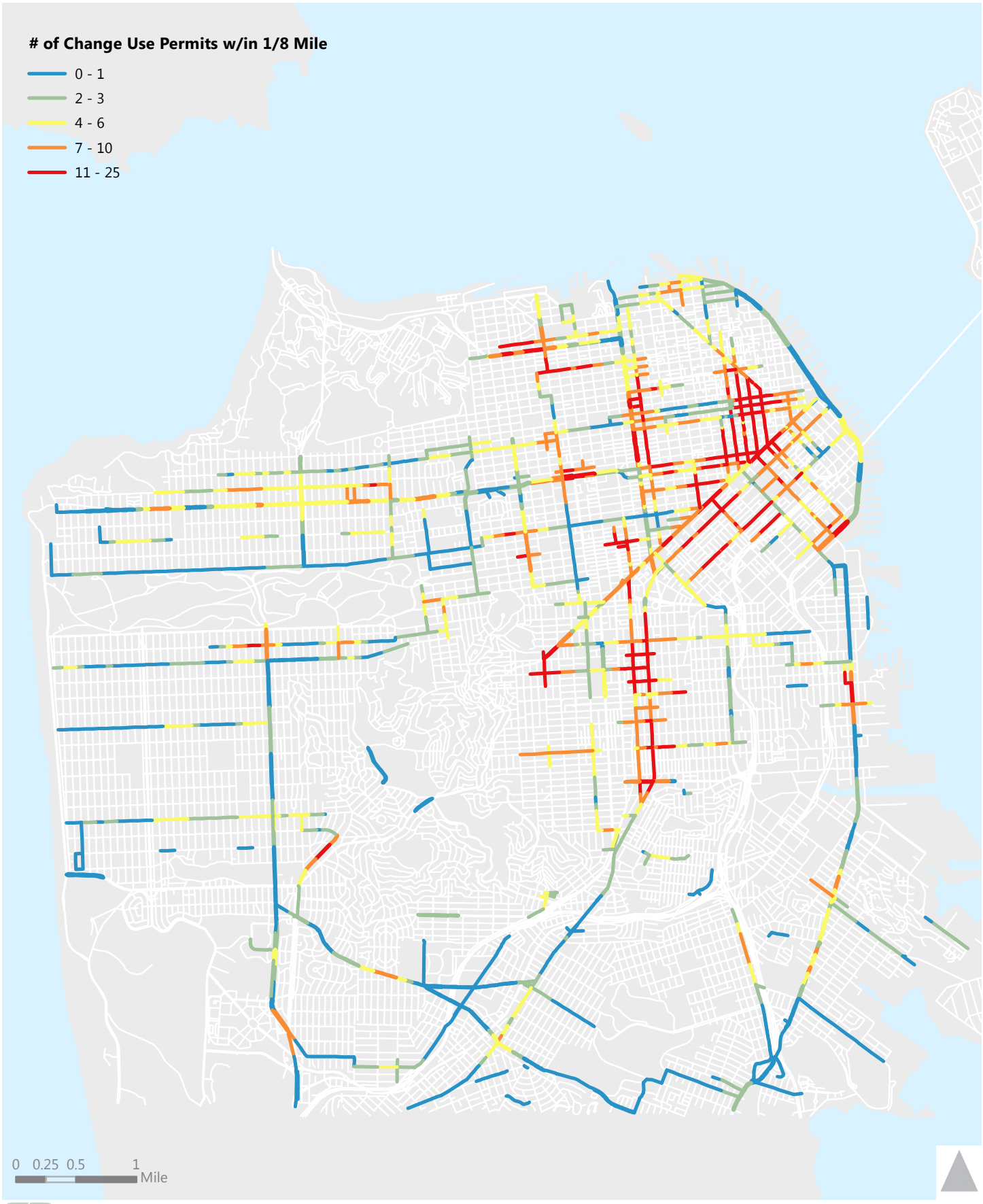
Transit Ridership



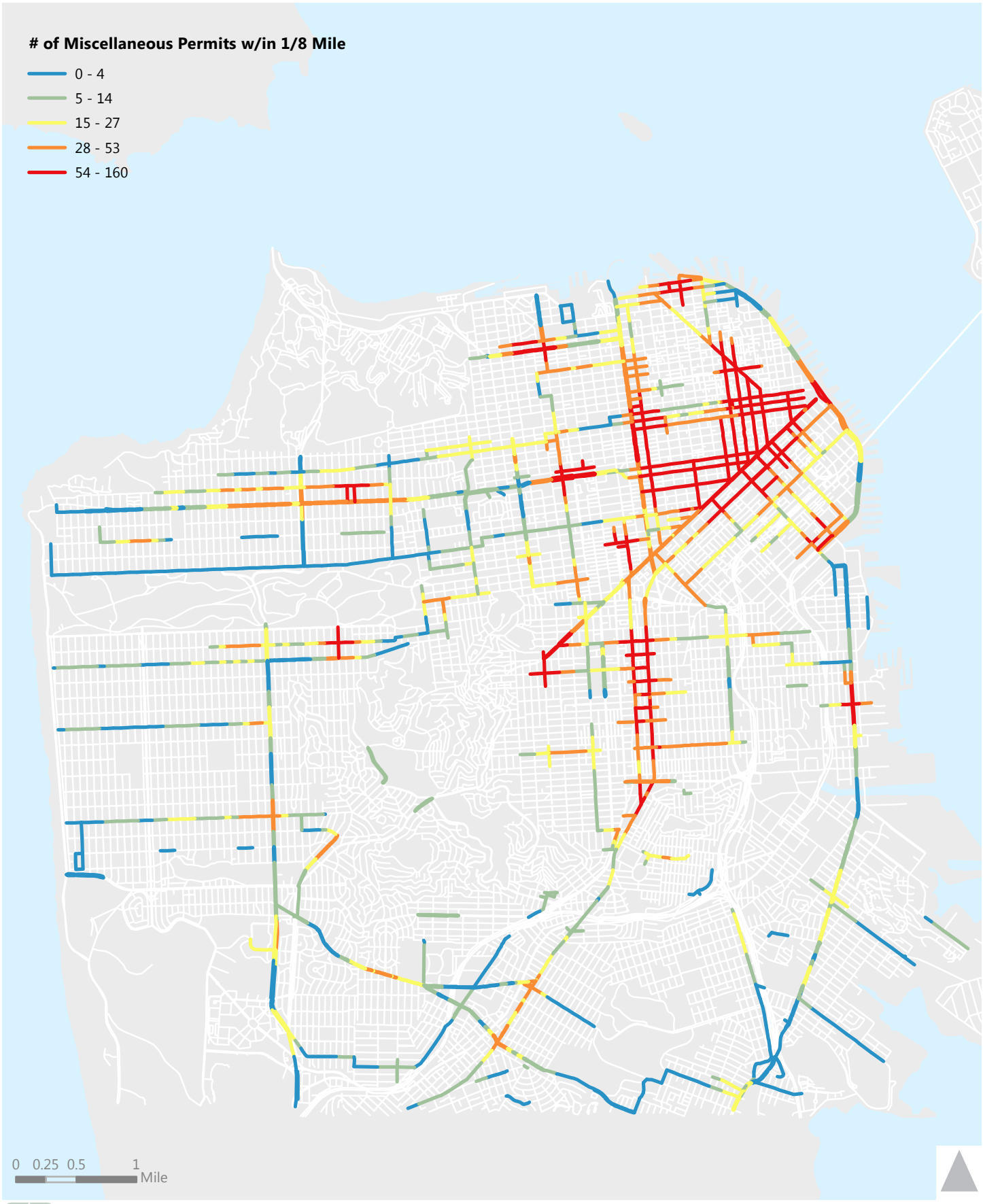
Presence of Vacant Storefronts



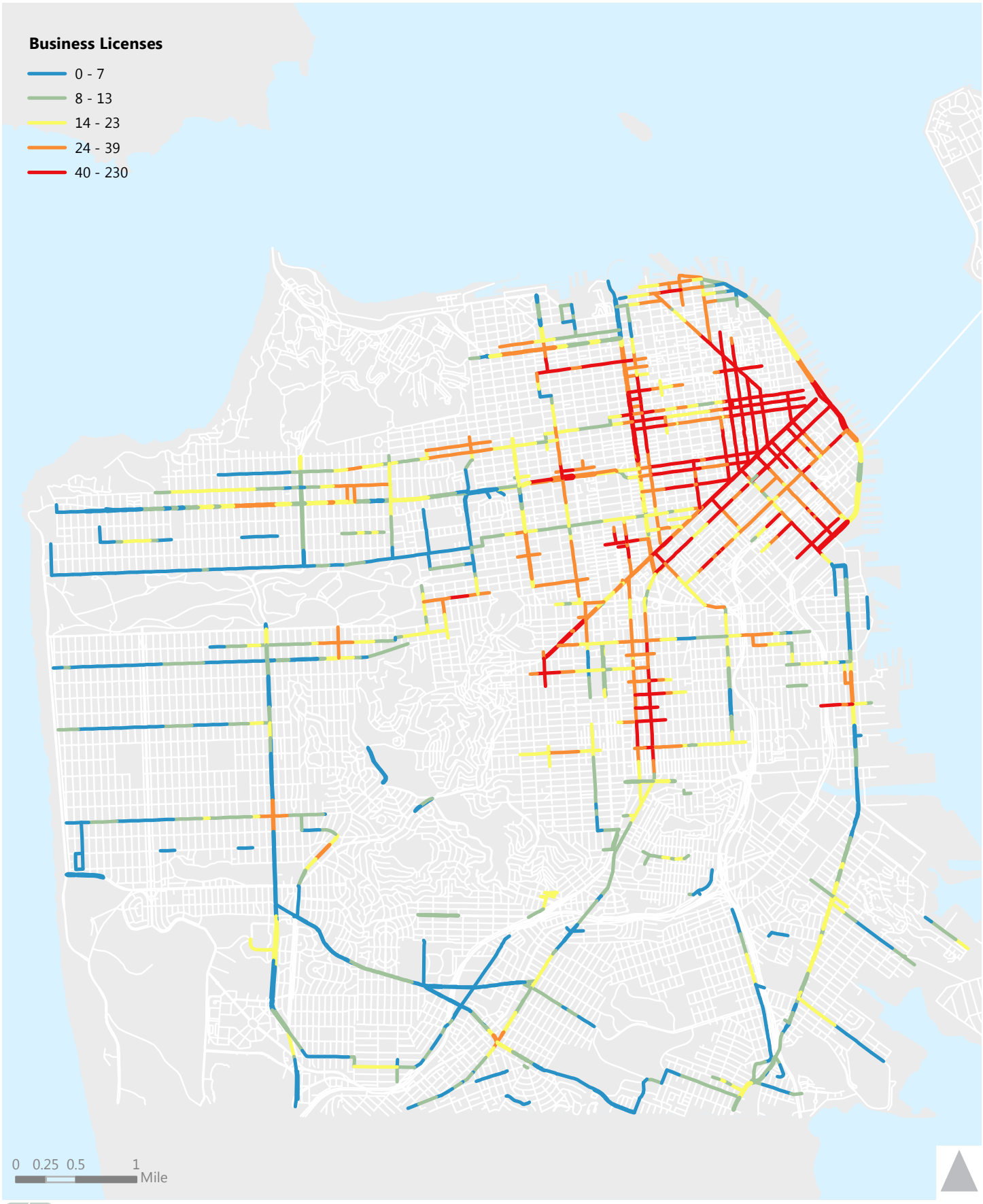
Presence of Vacant Lots



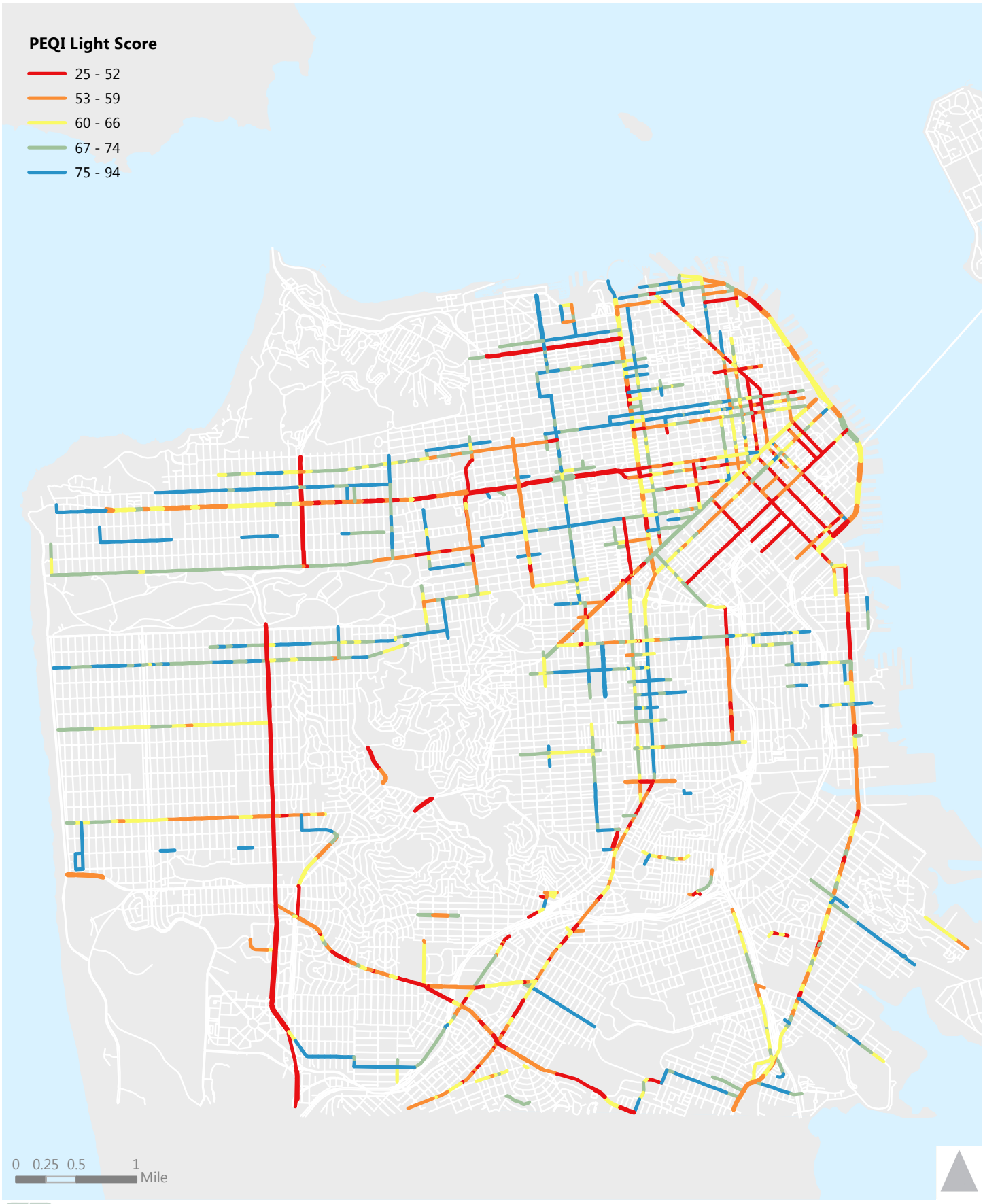
Change of Use Permits



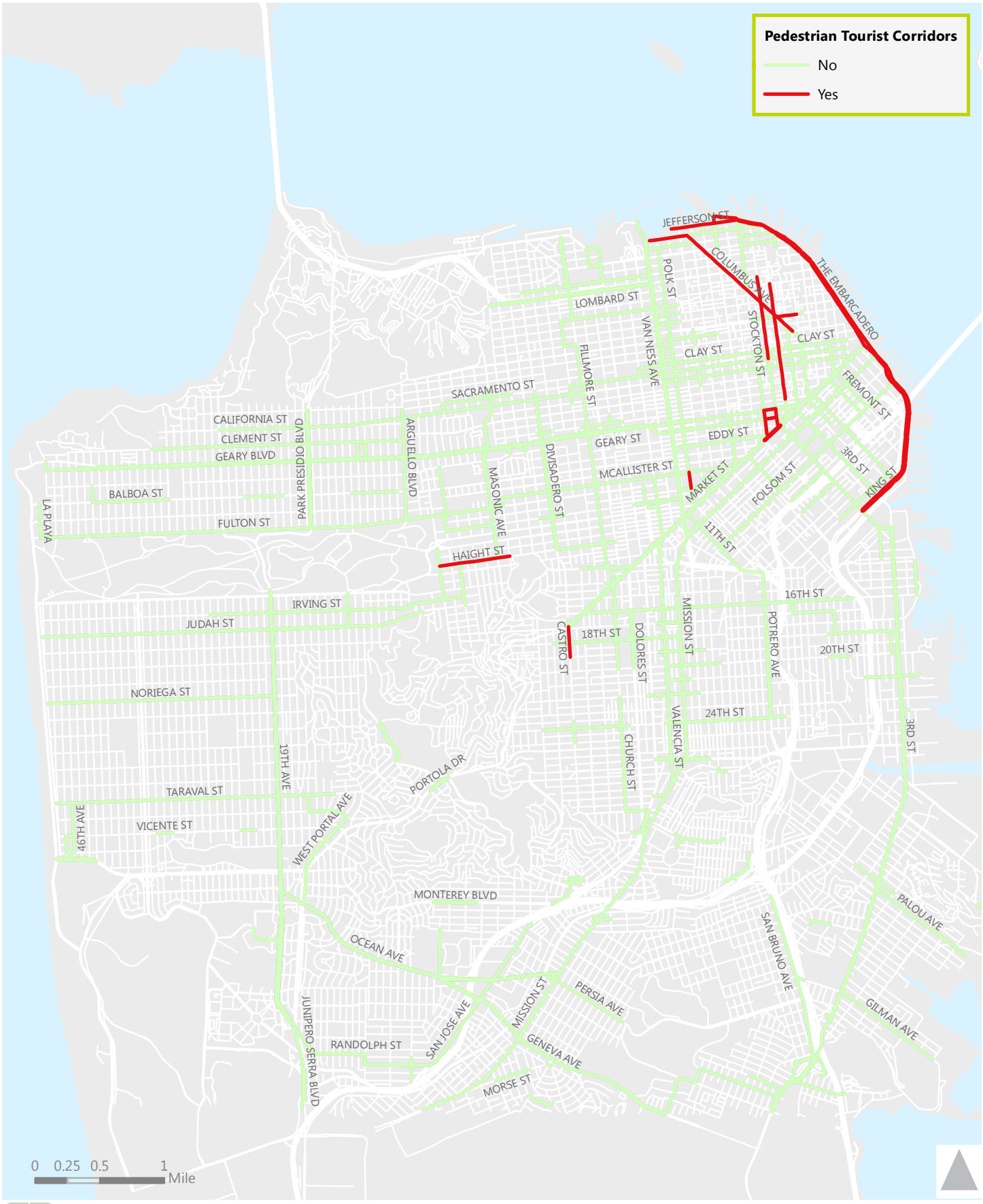
Miscellaneous Permits



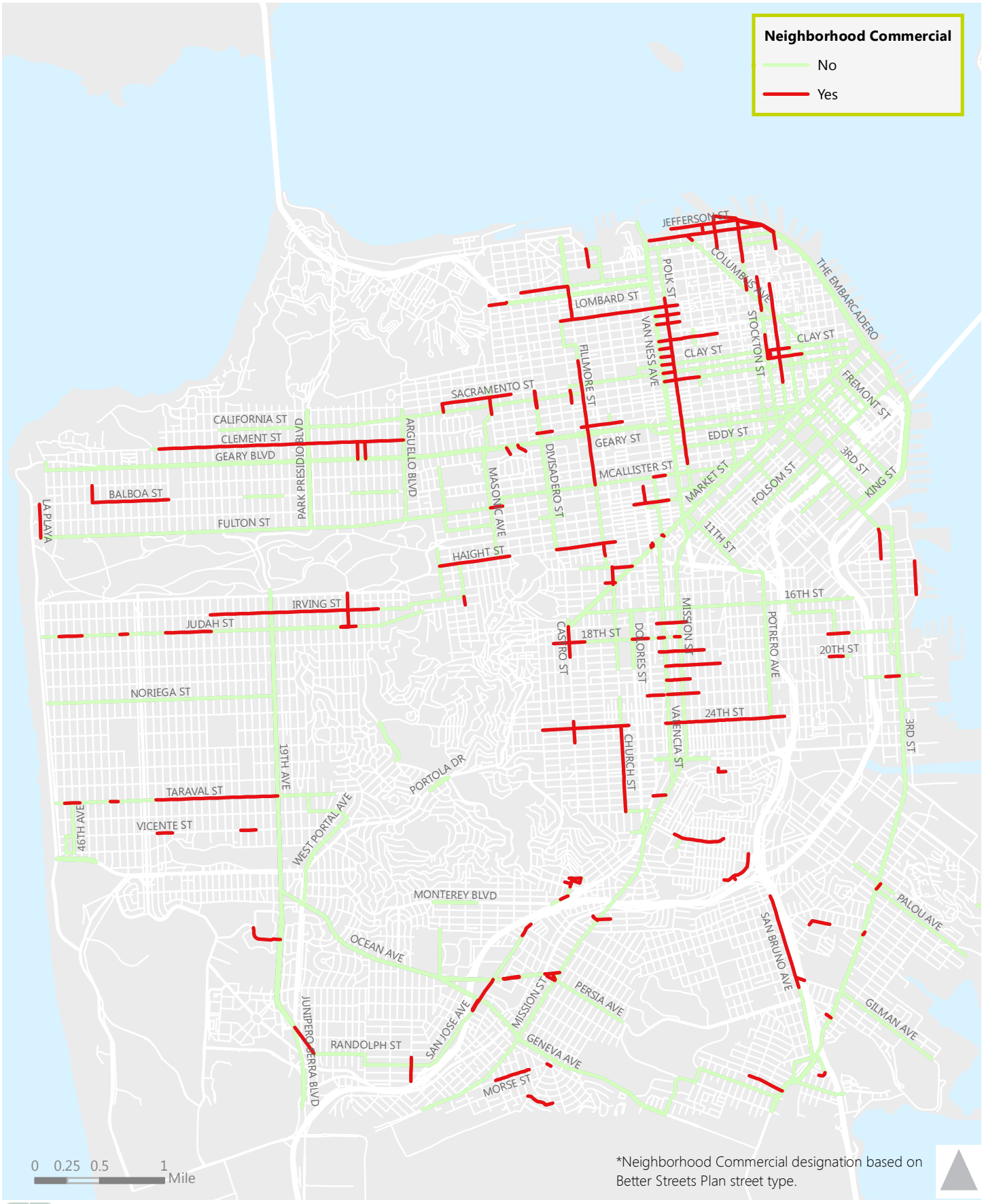
New Business Licenses



PEQI-Light Score



Pedestrian Tourist Corridors



Neighborhood Commercial Corridors