

Mapping Different Definitions of Sensitive Communities

Methodology

This document describes the methodology and assumptions used to perform the analysis for the research brief, “Defining Sensitive Communities Under SB 50,” and the spatial layers used in the interactive map [“Mapping Different Definitions of Sensitive Communities”](#).

Part One: Determination of Transit-Rich Areas

SB 50 establishes that residential housing projects for which all parcels are located in the following areas following qualify as “transit-rich”¹:

1. Within a one-half mile radius of a “major transit stop”, where “major transit stop” is defined as “a rail transit station or a ferry terminal that is a major transit stop pursuant to subdivision (b) of Section 21155 of the Public Resources Code.”
2. Within a quarter-mile radius of a stop on a high-quality bus corridor, where “high-quality bus corridor” is satisfying as meeting a number of frequency-based criteria during selected hours of the day and days of the week.

Determining “transit-rich” areas requires the following data:

1. Station and stop locations
2. Rail, ferry, and bus transit schedules

Transit schedules were accessed via API from <https://transitfeeds.com>, which provides this data for most but not all of the transit operators in the state. The data is stored in the [General Transit Feed Specification \(GTFS\)](#) format, which provides a wealth of information including agencies’ routes, trips, stops, schedules, and vehicle arrivals. Because all rail and ferry stations qualify, I used the locations provided in the GTFS data. For the bus corridors, I performed by headway analysis in Python in a Jupyter Notebook, which can be accessed on [GitHub](#).

I determined the combined headways for each bus stop in the state for which data is available.² To do this, I selected three arbitrary dates to investigate. After determining which schedules were in effect on the study days, I counted the number of vehicle arrivals for the time periods given by the bill. SB 50 lists four time periods for determining whether or not the bus corridor is to be considered “high-quality”:

- 6 AM to 10 AM on Monday through Friday
- 3 PM to 7 PM on Monday through Friday

¹ https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB50

² Transit routes, such as [AC Transit’s 65](#), sometimes vary in terms of which stops they serve, even if riders commonly understand the bus to be serving a single route. To eliminate a situation where the a terminal would be upzoned while having only 30 minute peak headways, I examined headways on a stop-by-stop basis. Assuming that passengers experience frequency by the number of vehicles stopping at a given stop, I elected to use combined headways, or the frequency of arrivals regardless of line, for this analysis.

- 6 AM to 10 PM on Monday through Friday
- 8 AM to 10 PM on Saturday and Sunday

By dividing the duration of a time period in minutes by the number of bus arrivals within that time period, I then determined an average service interval for that stop during that time period. If a stop had low enough headways during each time period, it qualified as a “high-quality” transit stop. I performed this analysis for every agency at every stop, and output the list of stops to a comma-separated values file. The file for [high-quality transit bus stops](#) can be found on GitHub, as can files for [rail stops](#) and [ferry stops](#).

Once the qualifying stops were identified, I used the GeoPandas Python package to create buffers around each point. Buffer radii vary by transit mode, with rail and ferry stops triggering different types of upzoning within a half-mile radius than they do within a quarter-mile radius. Qualifying bus stops have a radius of a quarter-mile in which parcels must be located to be eligible for the density bonuses provided by SB 50.

There are a number of limitations with this approach. They are discussed in detail below:

1. Using <https://transitfeeds.com> as a data source greatly simplifies the accessing and updating of the GTFS files. The website provides a clearinghouse of transit schedule data that can be queried by agency or location. However, not all agencies in California are represented in TransitFeeds, which means the analysis could be missing stops that would have otherwise qualified.
2. Determining headways on a per-stop level deviates slightly from the text of the bill, which is focused on “high-quality bus corridors.” More clarification is required from the bill’s authors to make explicit how “bus corridors” are to be considered and how headways are to be calculated.
3. My combined headway analysis is conducted one agency at a time, so inter-agency combined headways -- the headways between arrivals of buses from different transit operators at the same stop -- are not considered. This is an area of improvement for future versions of this tool.

Part Two: Determination of Sensitive Communities

SB 50 Sensitive Communities Definition

For the majority of the state, per the March 2019 version of SB 50, “sensitive communities” are those in which the following characteristics are true³:

- “Thirty percent or more of the census tract lives below the poverty line, provided that college students do not compose at least 25 percent of the population.”
- “The location quotient of residential racial segregation in the census tract is at least 1.25 as defined by the Department of Housing and Community Development.”

³ https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200SB50

This definition is nearly identical to that used by the California Tax Credit Allocation Committee to determine “High Segregation and Poverty tracts” for the Opportunity Mapping project.⁴ I used American Community Survey 5-Year Estimates (2012-2016) to calculate poverty rates, proportion of the tract considered students, and the location quotients of residential racial segregation. Poverty rates is a percentage representing the number of people living in poverty divided by the total number of people within the census tract for whom poverty status is calculated. The proportion of students is calculated as the number of students in the tract divided by the tract’s total population.

Location quotients measure the proportion of a given population in a census tract relative to the proportion of that population in a larger geography, like the county. A location quotient of 1 means that the proportion of that population within a census tract is the same as the proportion of that population in the county as a whole. Location quotients greater than one indicate a disproportionately high concentration of that population within a tract; location quotients less than one indicate a disproportionately lower concentration. In this analysis, I calculated location quotients for each tract for the following races and ethnicities: Black, Asian, Hispanic, Native Hawaiian-Pacific Islander, and Non-Hispanic White. If the location quotients any of the first four populations was greater than or equal to 1.25, I considered that tract to have met that criteria.

In the Bay Area region, the draft SB 50 bill defers to the “sensitive communities” identified by the Metropolitan Transportation Commission and the San Francisco Bay Conservation and Development Commission as a part of the CASA Compact. This definition determines “sensitive communities” at the census block group level, rather than at the tract level used by the rest of the state. I obtained a shapefile of these areas, and overlaid it on a TIGER census block group boundary file to identify which block groups were to be included as “sensitive communities.” This process was conducted manually in QGIS, and there resultant block groups may differ slightly from the areas identified in the CASA process.

California HCD High Segregation and Poverty Tracts

Each tract’s categorization in the 2019 Opportunity Maps is included in a summary table found on the CTCAC website.⁵ I joined this spreadsheet to my existing travel-level dataset and created a dummy variable representing whether or not a tract qualified as “High Segregation and Poverty Tract” for the 2019 Opportunity Maps.

SB 535 Disadvantaged Communities

The California Office of Environmental Health Hazard Assessment (OEHHA) provides an updated list of the worst-scoring 25 percent of census tracts according to the state’s CalEnviroScreen tool. Per SB 535, these tracts are identified as Disadvantaged Communities. I accessed an Excel document with the list of tracts from the OEHHA’s SB 535 website, and joined this data to TIGER census tract shapes to create a spatial layer of Disadvantaged Communities.

⁴ <https://www.treasurer.ca.gov/ctcac/opportunity/opportunity-mapping-methodology.pdf>, p. 8

⁵ <https://www.treasurer.ca.gov/ctcac/opportunity/final-opportunity-map-statewide-summary-table.xlsx>

HUD R/ECAP

I accessed a shapefile of HUD-defined Racially/Ethnically Concentrated Areas of Poverty via the agency's online GIS portal.⁶ Because the data was only available at the national level, I loaded it into QGIS and subset it to only include areas in California. I exported the data to a comma-separated values file and later added a dummy variable indicating whether or not a tract currently qualified as a R/ECAP to dataset containing travel-level demographic, socio-economic, and built form statistics.

Defining Regions

To compare the impacts of different definitions within and across regions, I grouped each census tract (or block group, in the case of the Bay Area) into regions. To do this, I used the regions identified in the 2019 Statewide Summary Table provided by the CTCAC to accompany the 2019 Opportunity Maps.⁷ In the table, each tract is assigned to one of eight regions, or is listed as being within "Rural Areas". Because the focus of this research was on the intersection of public transit and "sensitive communities", I focused exclusively on tracts within the eight regions and did not examine tracts considered to be within "Rural Areas." The eight regions are as follows, in alphabetical order:

- Bay Area Region
- Capital and Northern Region
- Central Coast Region
- Central Valley Region
- Inland Empire Region
- Los Angeles Region
- Orange County Region
- San Diego Region

⁶ https://hudgis-hud.opendata.arcgis.com/datasets/56de4edea8264fe5a344da9811ef5d6e_0/geoservice?geometry=-127.993%2C36.88%2C-117.611%2C39.894

⁷ <https://www.treasurer.ca.gov/ctcac/opportunity/final-opportunity-map-statewide-summary-table.xlsx>