

The background of the slide is an aerial photograph of a city, likely Baltimore, Maryland, showing a dense network of streets and a large body of water (the harbor) in the lower right. A semi-transparent red rectangle is overlaid on the top half of the image, containing the title text.

# A Nation of Neighborhoods: A Quantitative Understanding of US Neighborhoods and Metropolitan Areas

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# Urban Places in the United States

- Vital, walkable, traditional urban places are rare in the US.
- But they are important:
  - For fighting climate change (Schwanen et al., 2012; Lehmann, 2016).
  - For public health (Widener & Shannon, 2014; Lachapelle et al., 2011).
  - For economic development (Loh et al., 2019).
- Their recent popularity, combined with rarity, leads to gentrification.
- We need to understand them and their distribution better:
  - To make it easier to design more of them.
  - To understand how to allocate resources, such as transit service.

How do we build land-use typologies that center vital, walkable urban places?

What properties make neighborhoods and metros vital and walkable?

What can we learn about making cities more transit-friendly?

# A Nation of Neighborhoods:

A Quantitative Understanding of US Neighborhoods and Metropolitan Areas

- American metro areas, and the neighborhoods they are made up of, fall into distinct types that can be quantitatively identified.
- By developing typologies based on features relevant to public transportation and the vitality of pedestrian-oriented urban places, we can better understand these places and the cities that contain them.
- This can also help us understand where public transit is successful, and how to improve it where it currently isn't.



# How to characterize neighborhoods?

Some highlights of my techniques

# Characterizing Neighborhoods: Data

- American Community Survey (ACS) data for population and housing
  - 2018 vintage
  - Available by block group
- Longitudinal Employer-Household Dynamics (LEHD) data for jobs
  - 2017 vintage for private and state jobs; 2015 vintage for Federal jobs
  - Available by block
- National Land Cover Database (NLCD) data to identify developed land
  - 2016 vintage
  - Available as 30-meter resolution rasters
- OpenStreetMap road network data to calculate road connectivity
  - 2020 vintage
  - Required some pre-processing to remove freeways



# Characterizing Neighborhoods: Hexagonal Cells

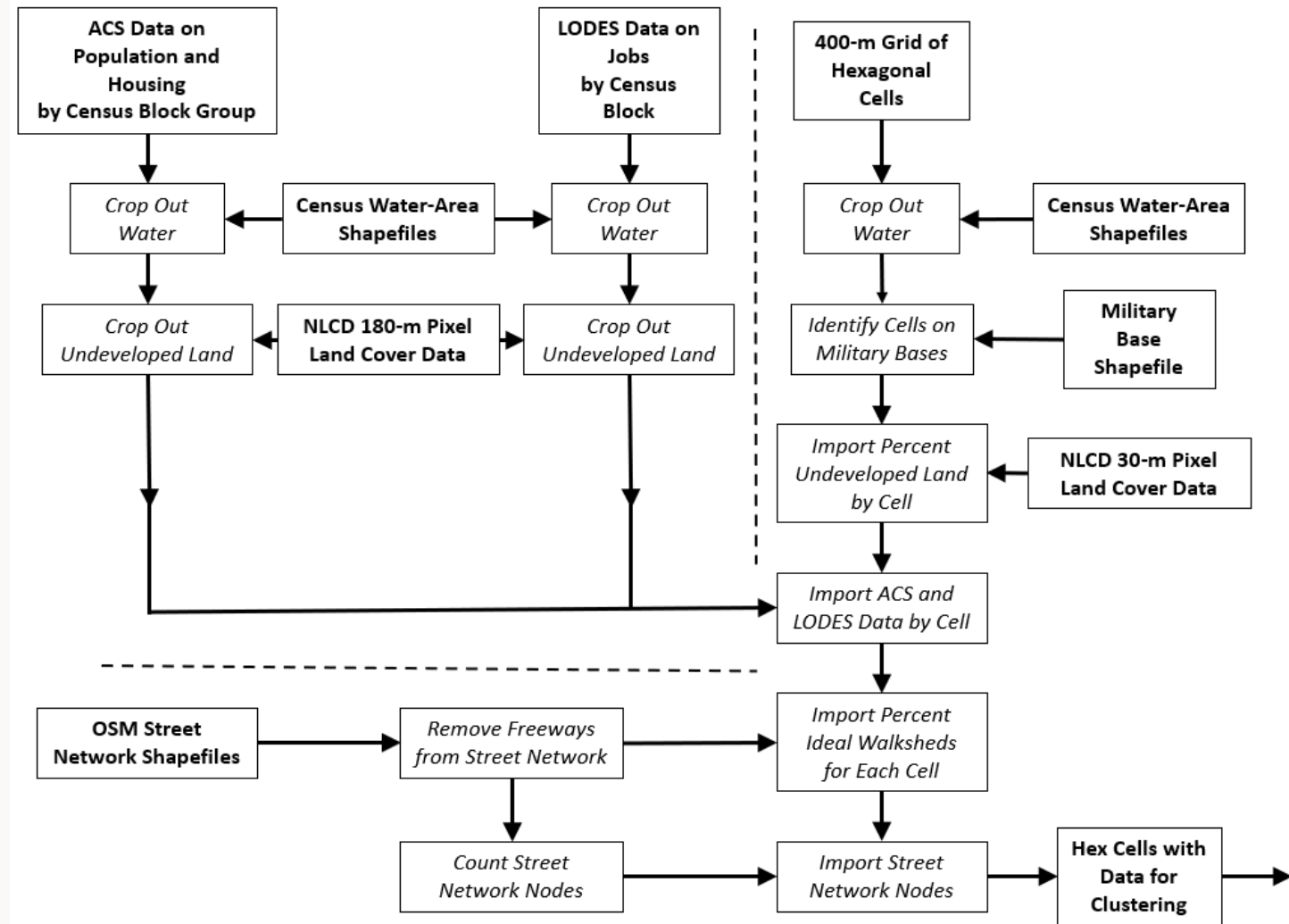
- Each metro area is divided into  $\frac{1}{4}$ -mile radius hexagonal “neighborhoods.”
- Water areas were removed.
- All data was assigned to these hexes using area-weighted integration.
- This allows combining data with different original geographies.
- This provides similar-sized geographies everywhere.
- Helps reduce the modifiable areal unit problem (MAUP).



Hex Cells in Baltimore

Procedure for  
collecting the  
various data  
sources into hex cell  
neighborhoods.

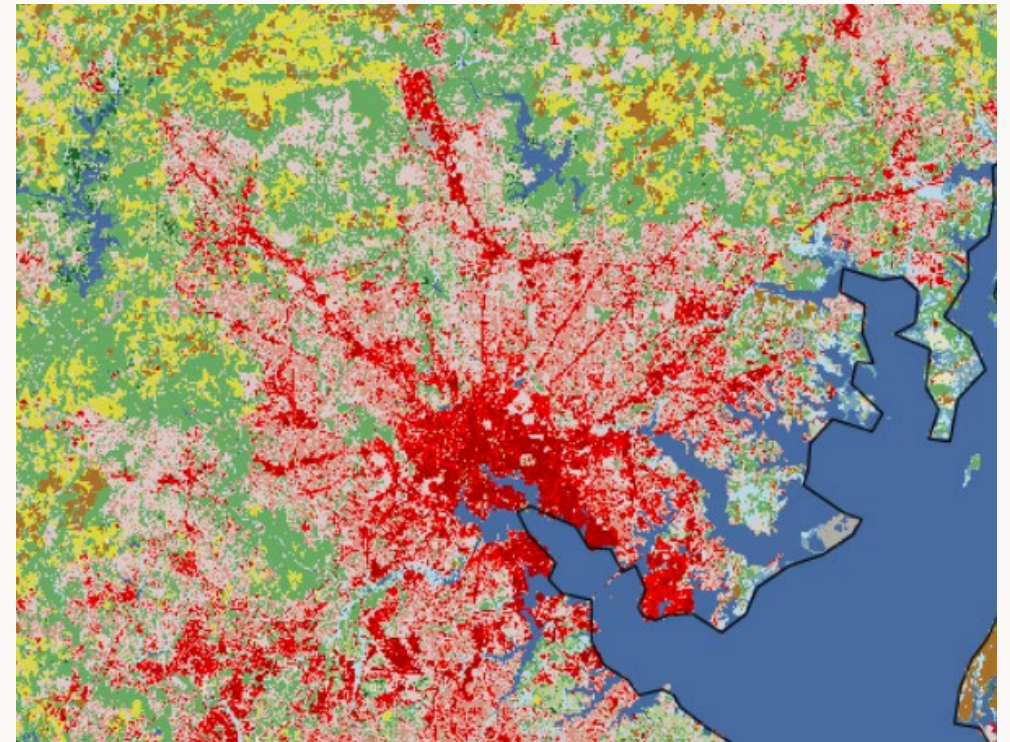
This took the majority  
of the time spent  
on the project.





# Characterizing Neighborhoods: Cropping Data with NLCD Rasters

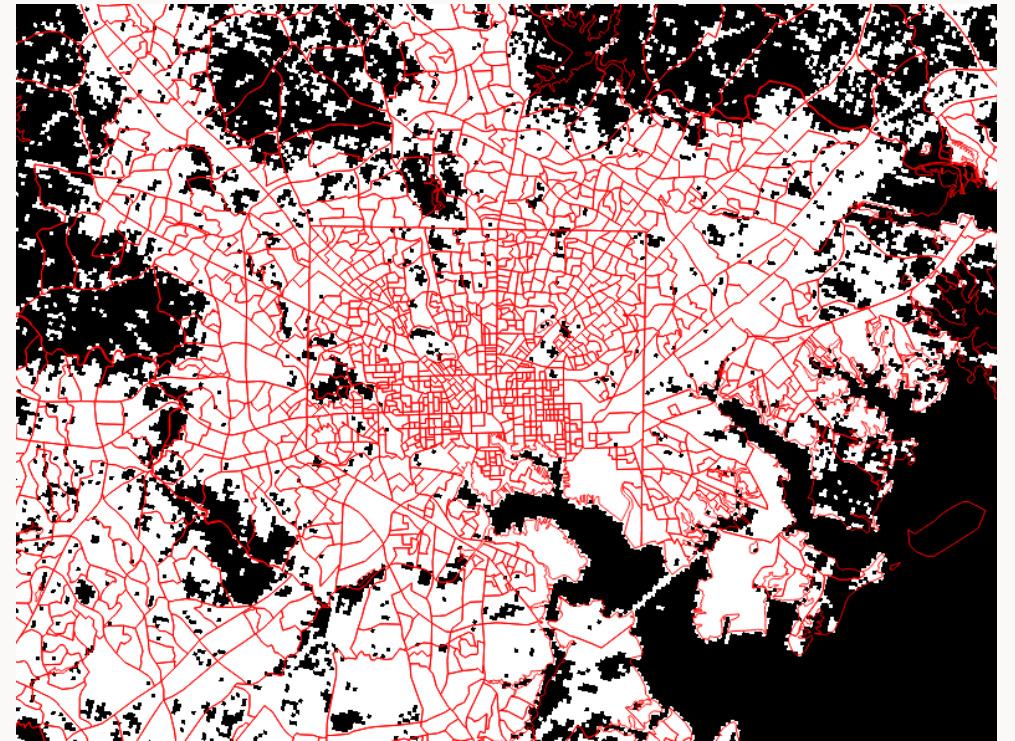
- NLCD rasters are produced by analyzing remote-sensing data.
- 30-m by 30-m pixels
- Used to identify “developed” land.
  - For my purposes, >20% artificial surface.
  - Much higher resolution than Census data.
- I used this for two purposes:
  - To identify fraction developed land in each neighborhood cell.
  - More important, to crop Census geographies to developed land.



NLCD Raster of Baltimore

# Characterizing Neighborhoods: Cropping Data with NLCD Rasters

- For cropping purposes, I reduced the resolution to 180-m by 180-m pixels.
- I counted a pixel as developed if *any* of the 36 pixels combined to form it was developed.
- This avoids over-cropping due to data errors.
- It also made converting the rasters to vector objects for cropping tractable.



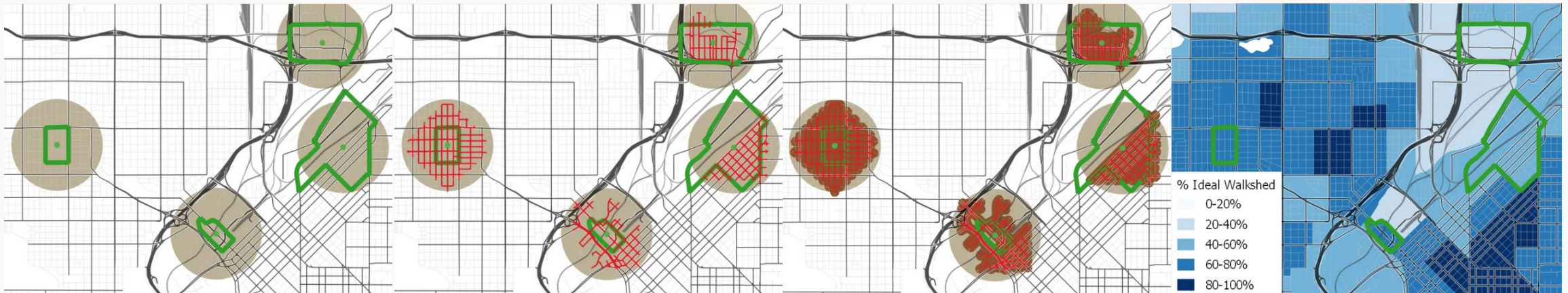
Cropping Raster for Baltimore



# Characterizing Neighborhoods: Percent Ideal Walkshed

My “percent ideal walkshed” measure:

- Is the fraction of a ½-mile radius circle reachable by walking a half mile.
- Can be multiplied by density to measure adjusted or “experienced” density.
- Is calculated for each hex cell with these steps:
  - Identify the centroid of each hex cell.
  - Identify all streets within a half-mile walk.
  - Create a buffer to represent the depth of lots.
  - Divide buffer area by area of a half-mile circle.



# What does this look like in practice?

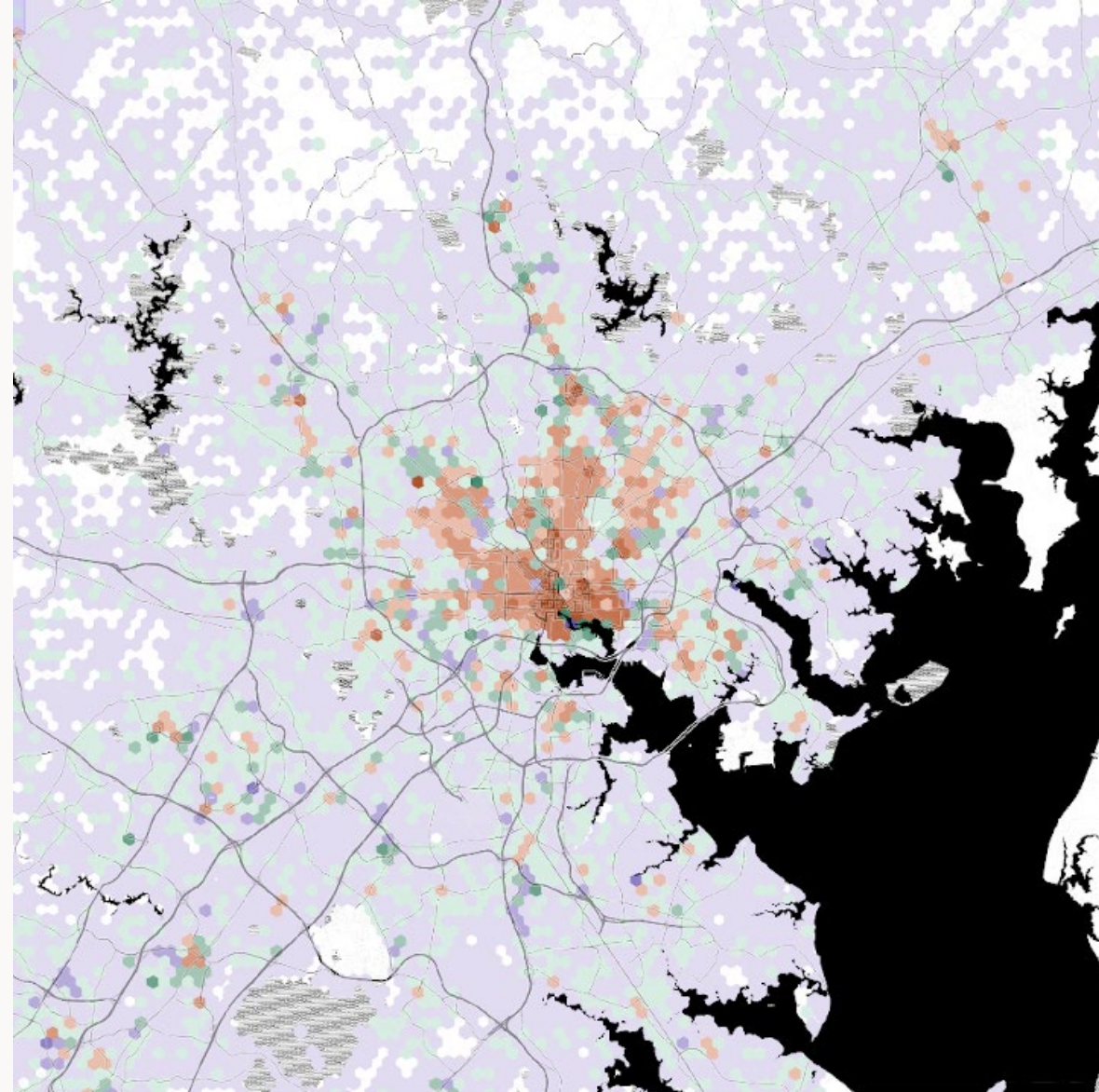
Several ways to map cities



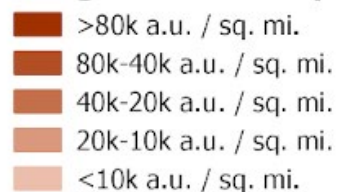
# Activity Density and Road Connectivity in Baltimore

Density of Jobs + Population

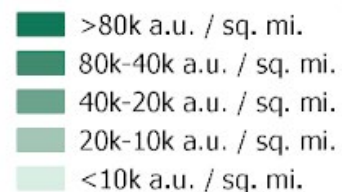
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



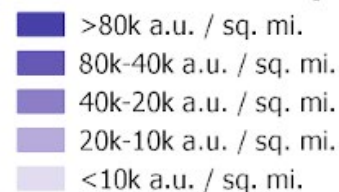
## High Connectivity



## Medium Connectivity



## Low Connectivity

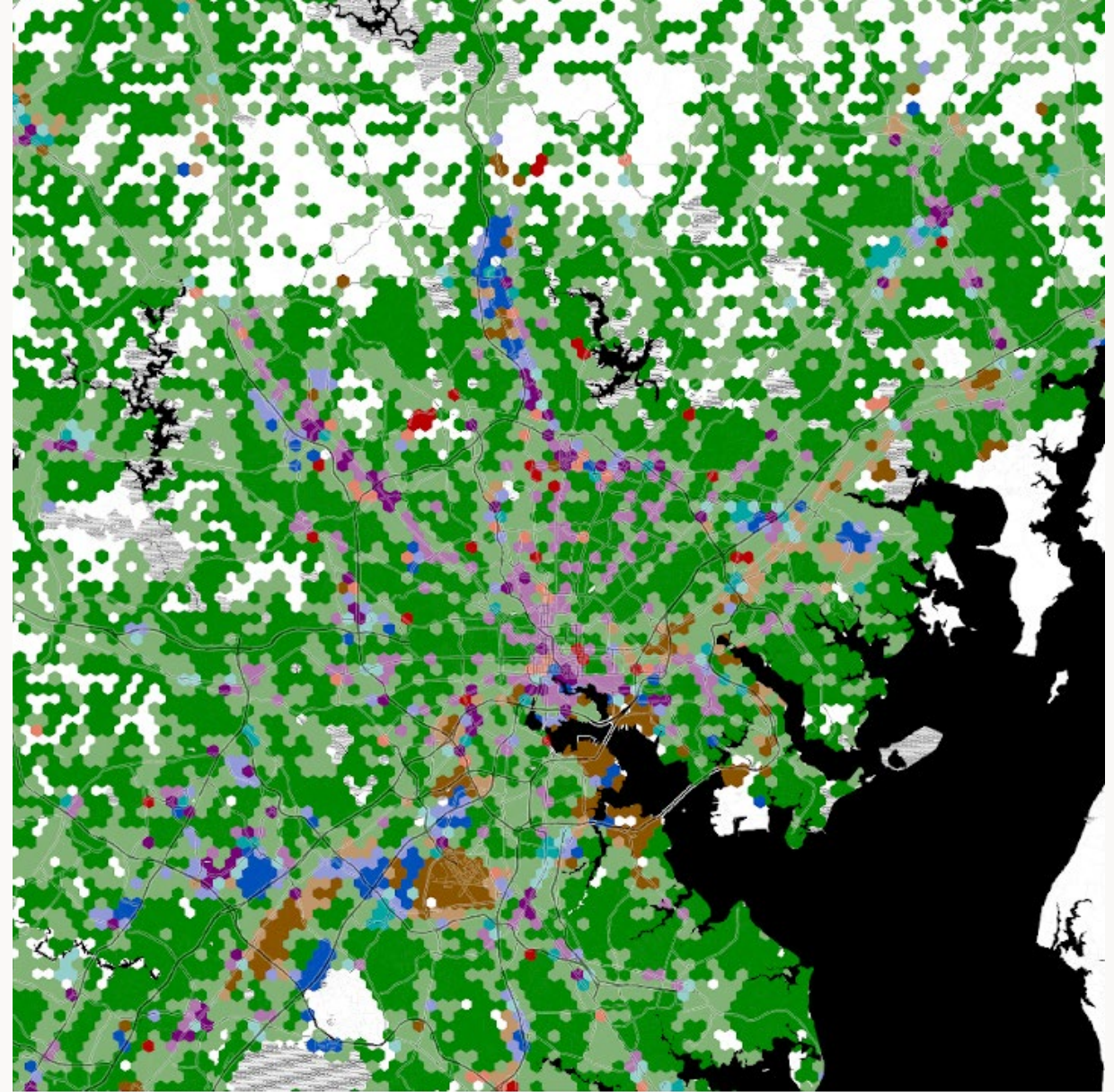


# Activity Density and Road Connectivity in Baltimore

Density ( / Sq. Mi.)	Number of Hexes	Percent of Population	Percent of Jobs
> 80,000	3	0.2%	4.8%
40,000 – 80,000	13	0.9%	5.3%
20,000 – 40,000	60	4.5%	11%
10,000 – 20,000	375	19%	22%
5,000 – 10,000	1,037	29%	29%
2,500 – 5,000	1,440	23%	16%
< 2,500	7,525	24%	12%
Percent Ideal Walkshed	Number of Hexes	Percent of Population	Percent of Jobs
> 65%	84	5.9%	7%
55% – 65%	307	13.3%	16%
45% – 55%	649	16%	17%
35% – 45%	1,498	19%	21%
25% – 35%	3,004	23%	19%
15% – 25%	3,721	18%	15%
< 15%	1,199	5.7%	5.4%



# Land Use Types in Baltimore



## Land Use Type

- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

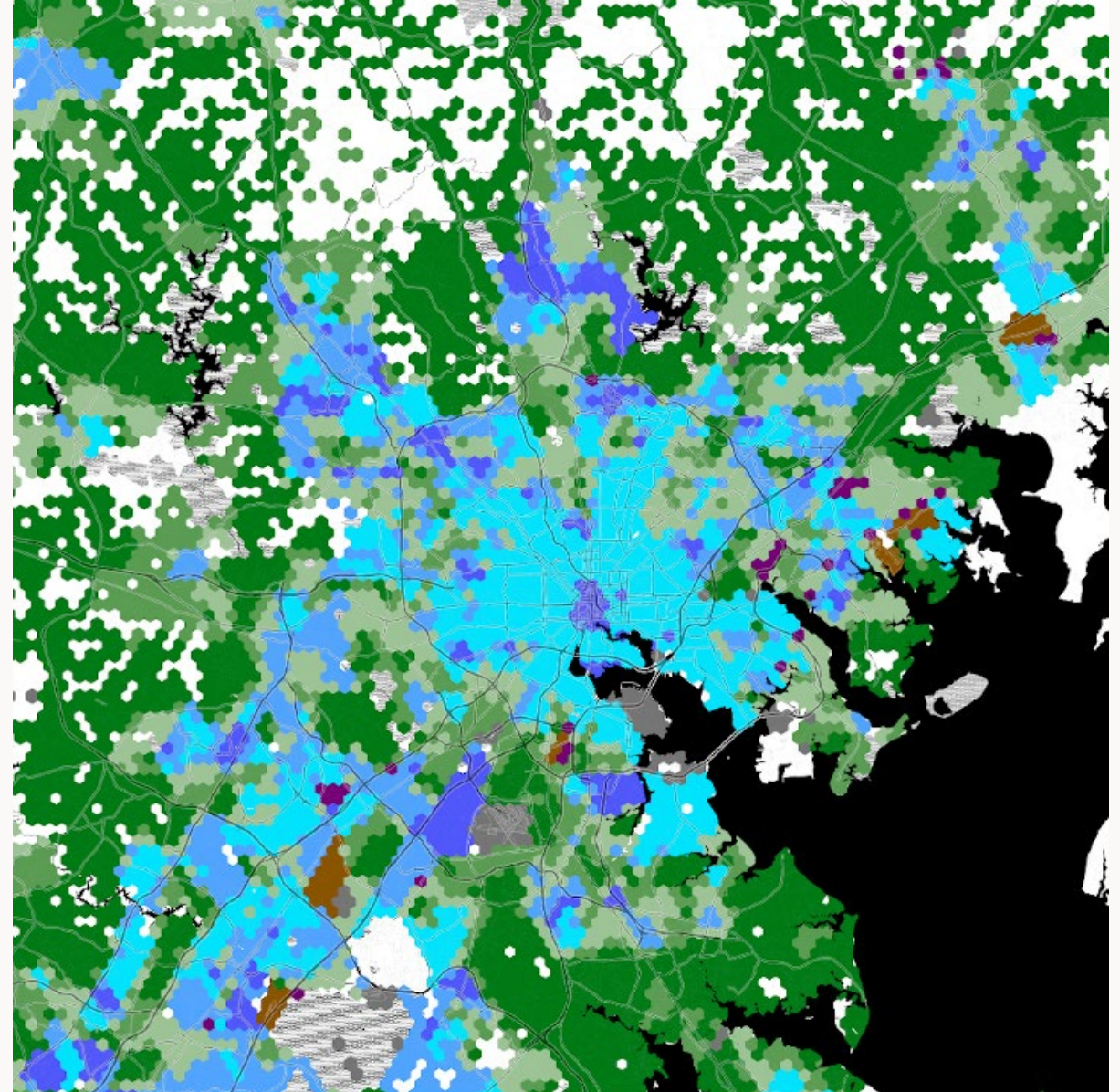
- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



Land Use Types  
in  
Baltimore

Use Type	Number of Hexes	Percent of Population	Percent of Jobs
Pure Residential	5,453	52%	5.2%
Residential	3,748	29%	21%
Walkable Residential	224	10%	9.6%
Mixed Use	106	2.2%	11%
Retail	79	0.5%	5.1%
Retail Mix	112	1.0%	4.7%
Eds/Meds	46	0.7%	6.1%
Eds/Meds Mix	56	1.0%	5.7%
Office	117	0.6%	12%
Office Mix	143	1.3%	7.1%
Industrial	219	0.6%	7.4%
Industrial Mix	150	0.9%	5.1%

# Housing Types in Baltimore



## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data

Housing Types  
in  
Baltimore

Housing Type	Number of Hexes	Fraction of Population	Fraction of Jobs
Pure Single-Family	4,911	18%	9.3%
Single-Family	1,742	11%	8.6%
Mixed Single-Family	1,454	17%	16%
Multi-Family: Small Buildings	980	31%	26%
Multi-Family: Large Buildings	261	5.7%	20%
Multi-Family: Mixed Types	817	15%	17%
Mobile Homes	131	0.5%	1.3%
Mixed Housing Types	47	0.5%	0.8%
Few Housing Units	110	0.1%	1.1%



Can we simplify this with a  $k$ -means typology?

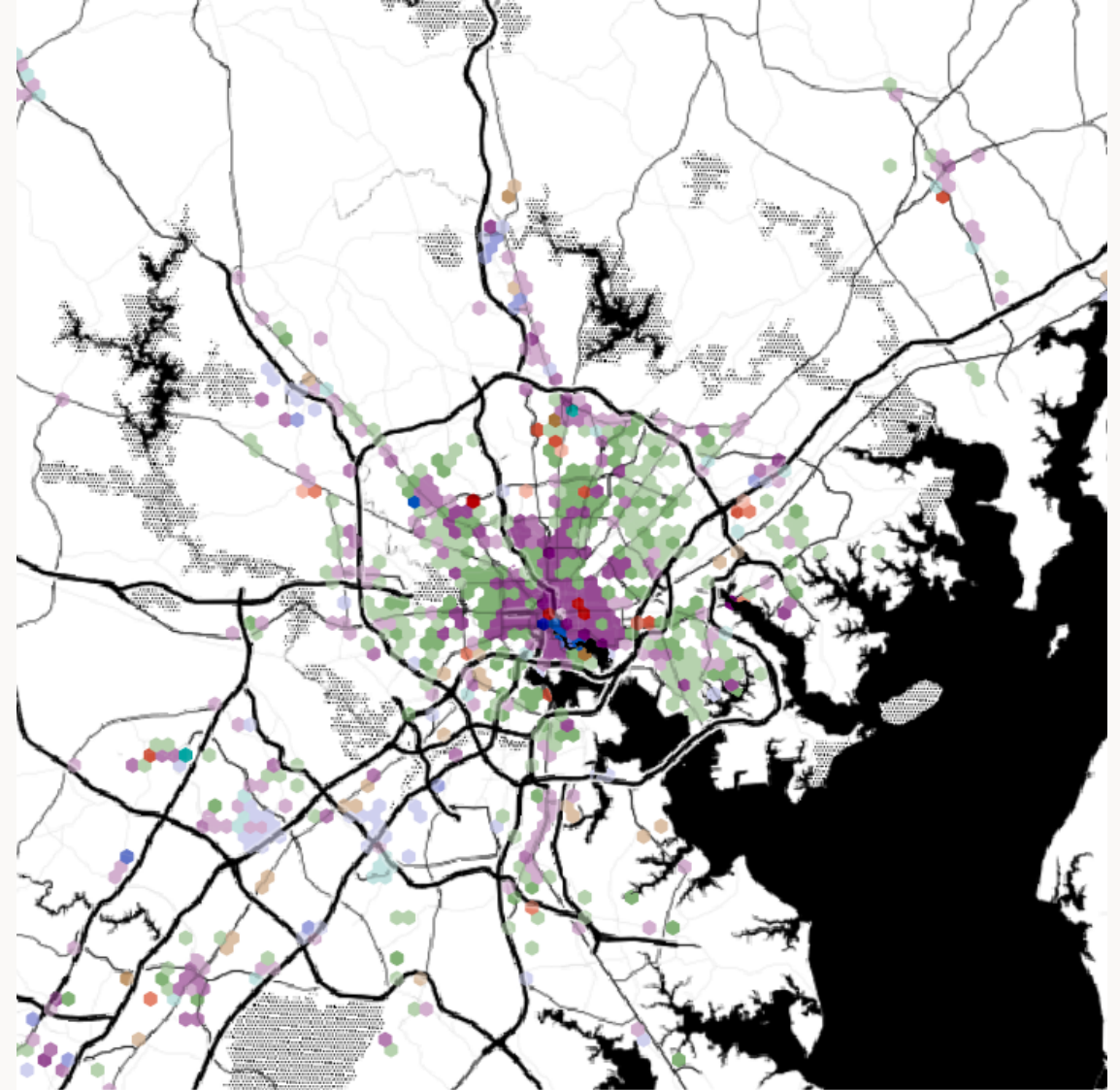
Identifying distinct neighborhood “types”

Making a k-means typology of neighborhoods...but k is very large

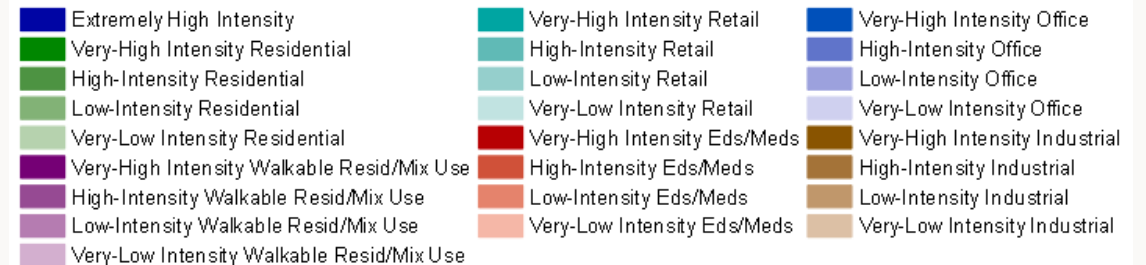
- k-means clustering divides a dataset into k clusters based on distances in vector space.
- The investigator picks the value of k; I used 600:
  - This follows a rule-of-thumb estimate for k based on dataset size.
  - Also was roughly the number necessary to get reasonable clusters.
  - But still fails at very high densities: there are few neighborhoods at high densities, so they get classified by density alone.
- This is far too many to work with, so I classified them by density, connectivity, use, and housing type.
- This lets me map neighborhood types in different metro areas.

# Neighborhood Types in Baltimore

Intensity =  
Walkshed-Adjusted Density



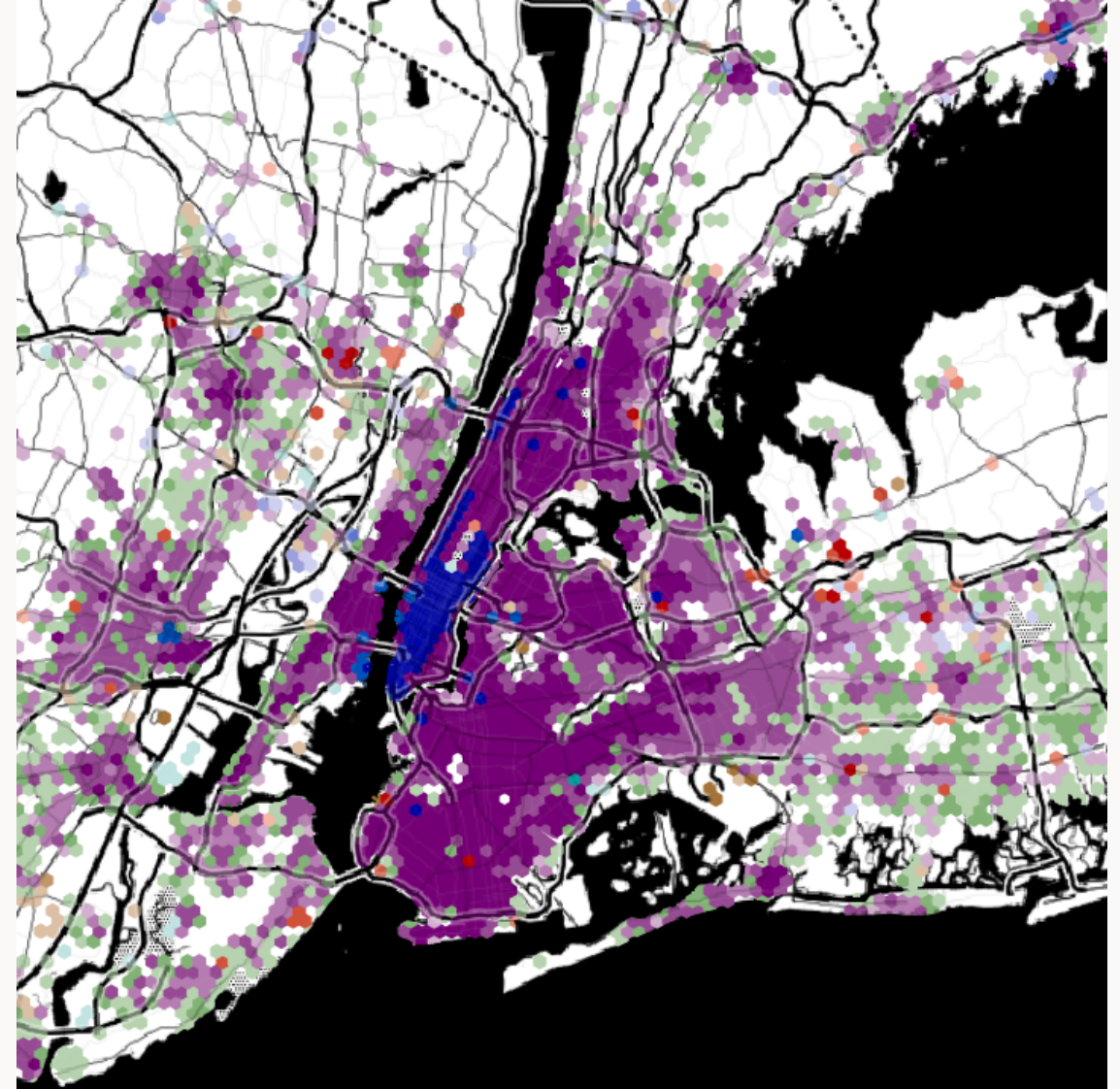
**Land Use and Intensity**





# Neighborhood Types in New York

The Baltimore Beltway  
fits inside New York's  
very-high intensity area!

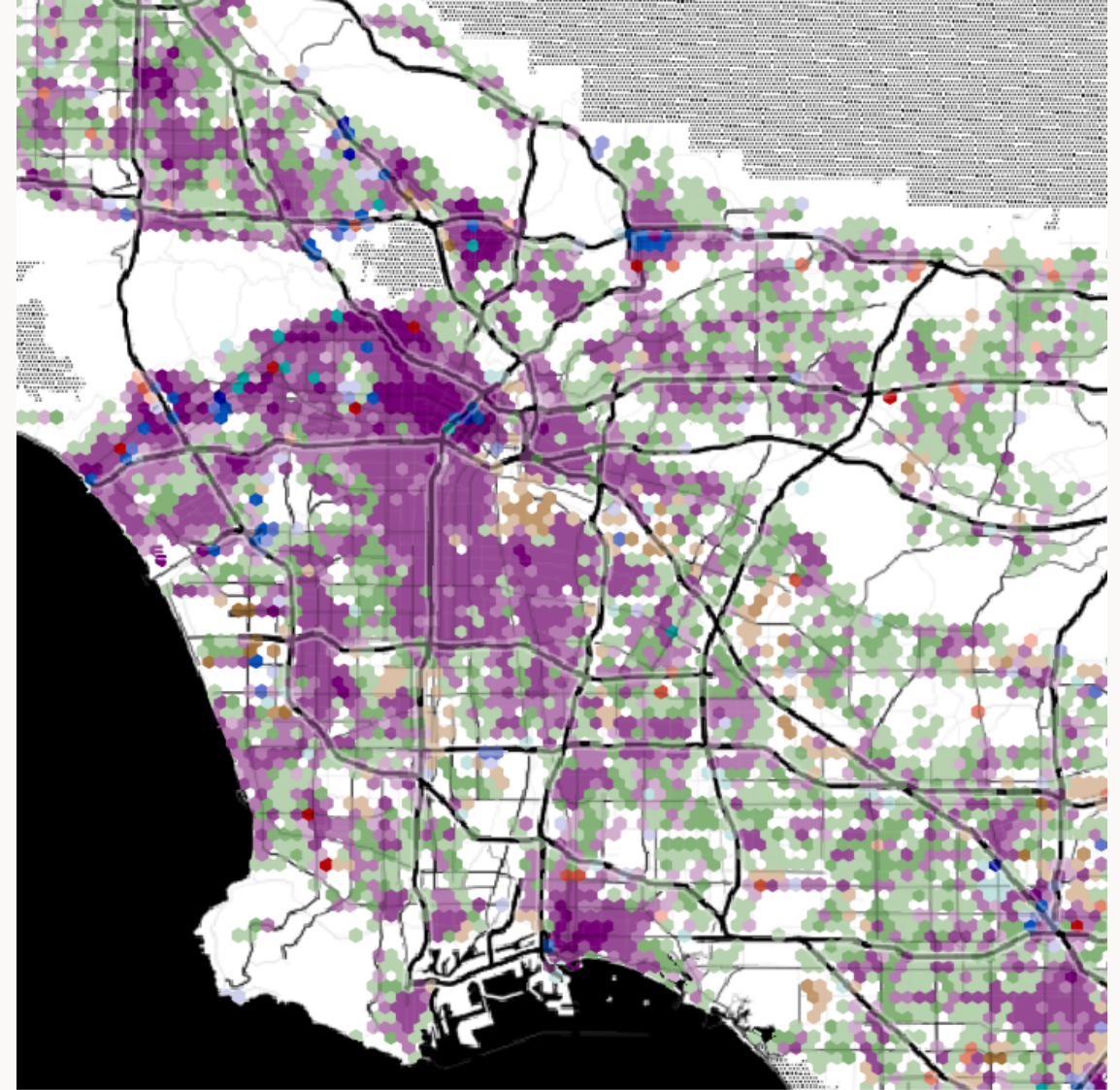


## Land Use and Intensity

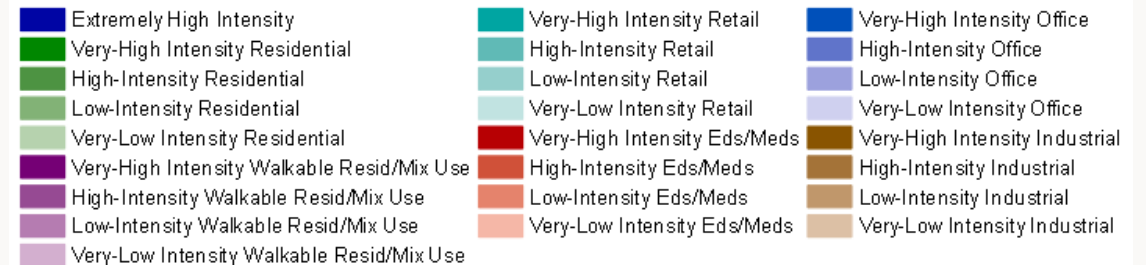
Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
Very-High Intensity Walkable Resid/Mix Use	High-Intensity Eds/Meds	High-Intensity Industrial
High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

# Neighborhood Types in Los Angeles

Broad, moderate density,  
but a very weak core



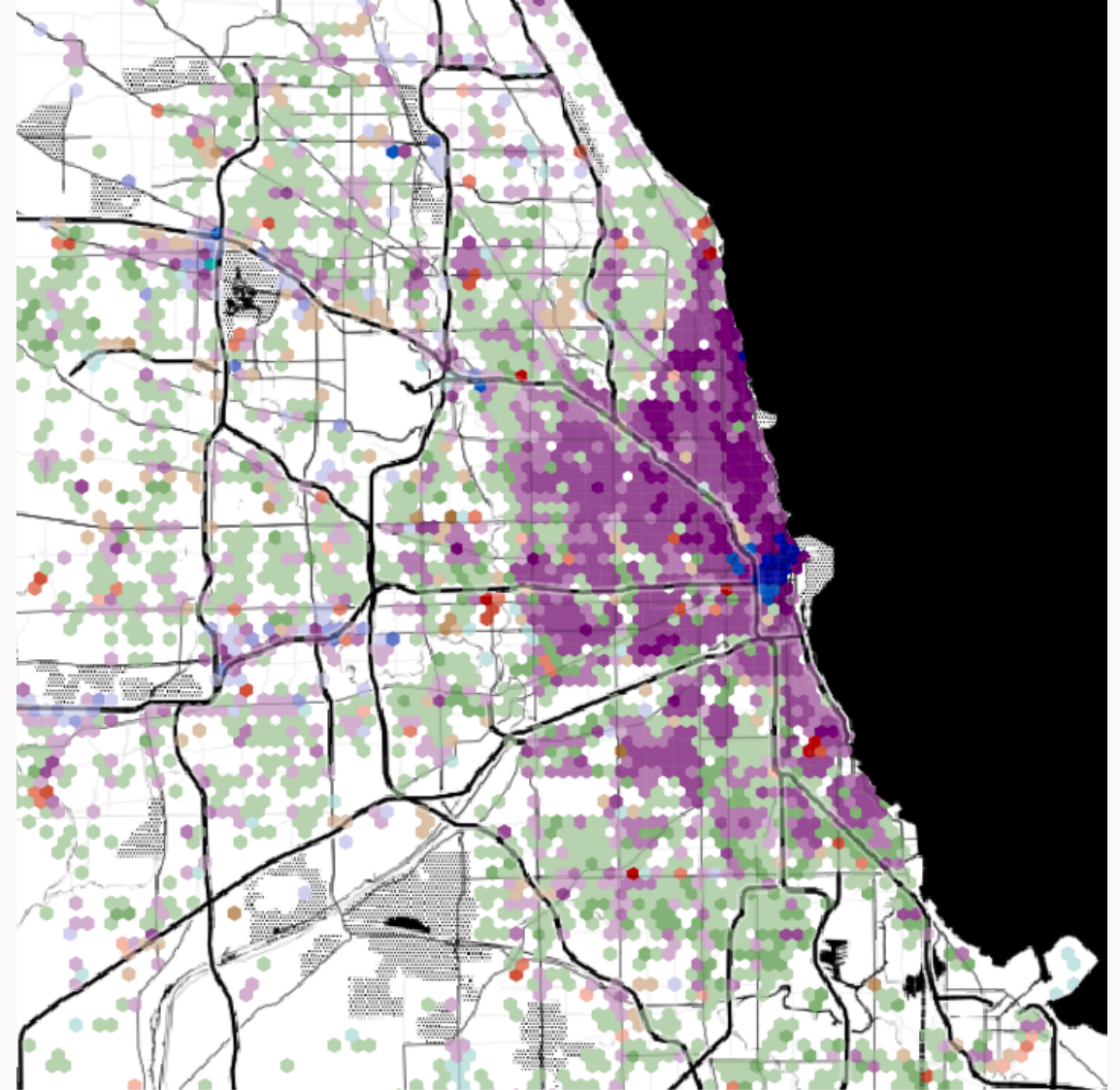
## Land Use and Intensity





# Neighborhood Types in Chicago

A monocentric region  
with a strong core but less  
outlying density



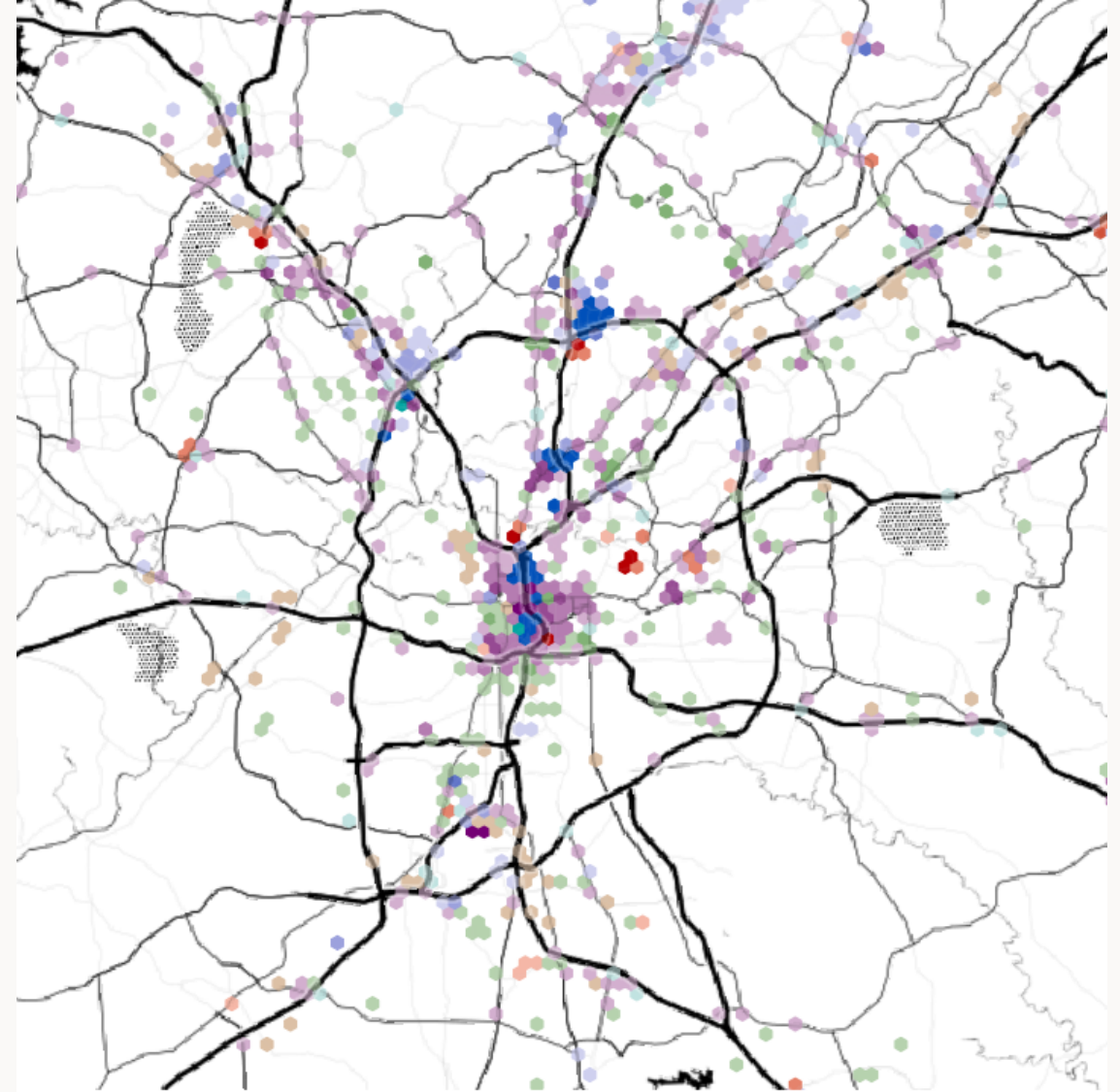
## Land Use and Intensity

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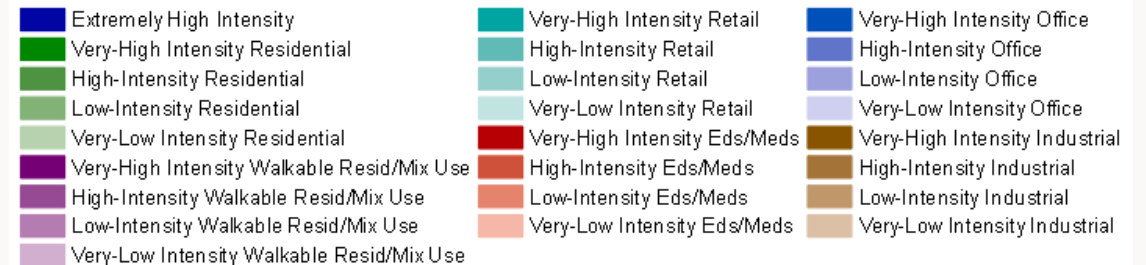


# Neighborhood Types in Atlanta

An archipelago of  
“edge cities”  
in a sea of  
exurban densities

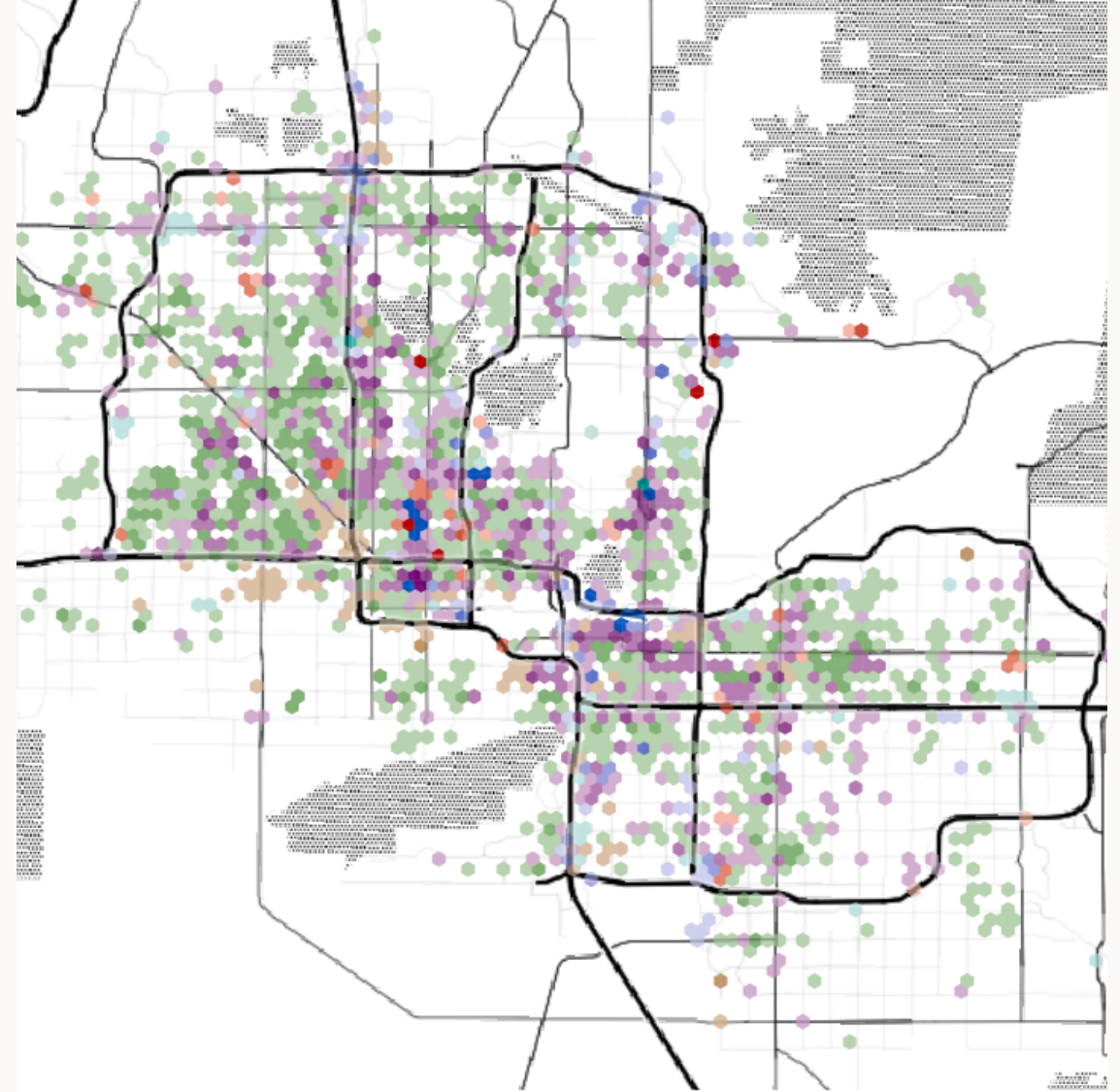


**Land Use and Intensity**



# Neighborhood Types in Phoenix

Higher density than Atlanta,  
but less nucleation

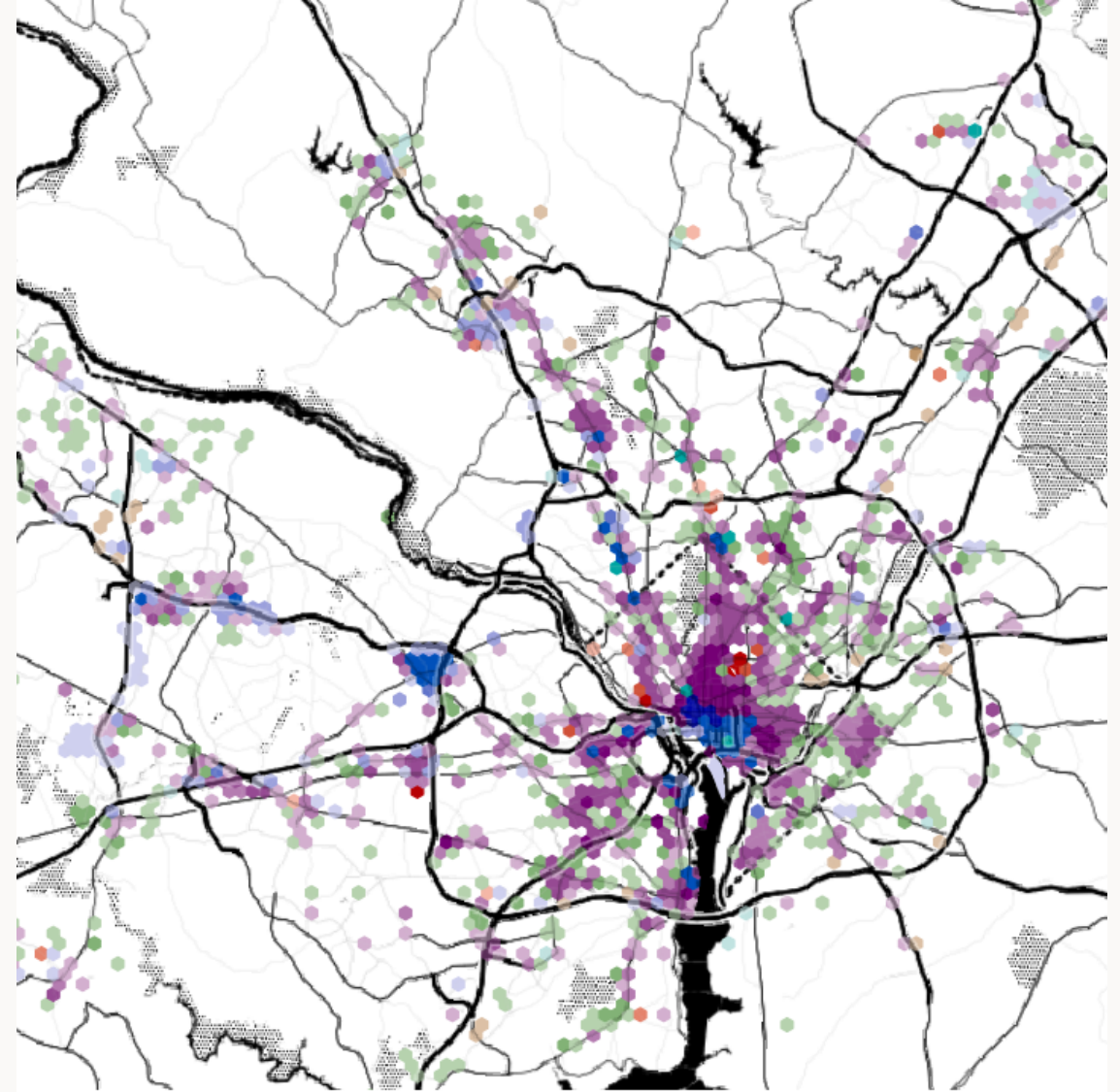


## Land Use and Intensity

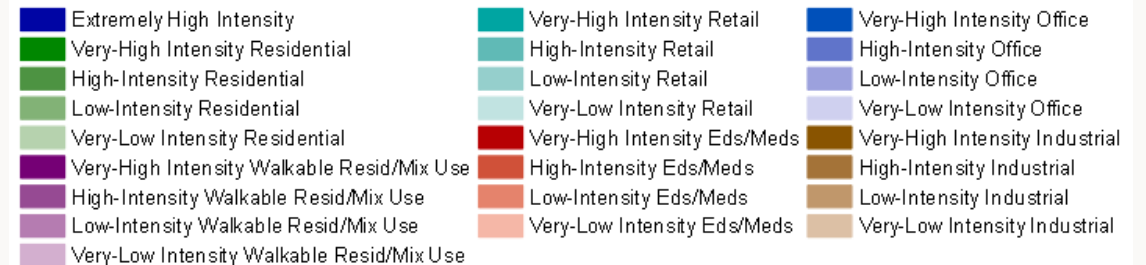
Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
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Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

# Neighborhood Types in Washington

Our neighbor to the south  
is a hybrid of types



## Land Use and Intensity





# What does this tell us about metro areas?

Metro area types based on population and job distributions

## Typologizing metro areas requires simplified neighborhood types

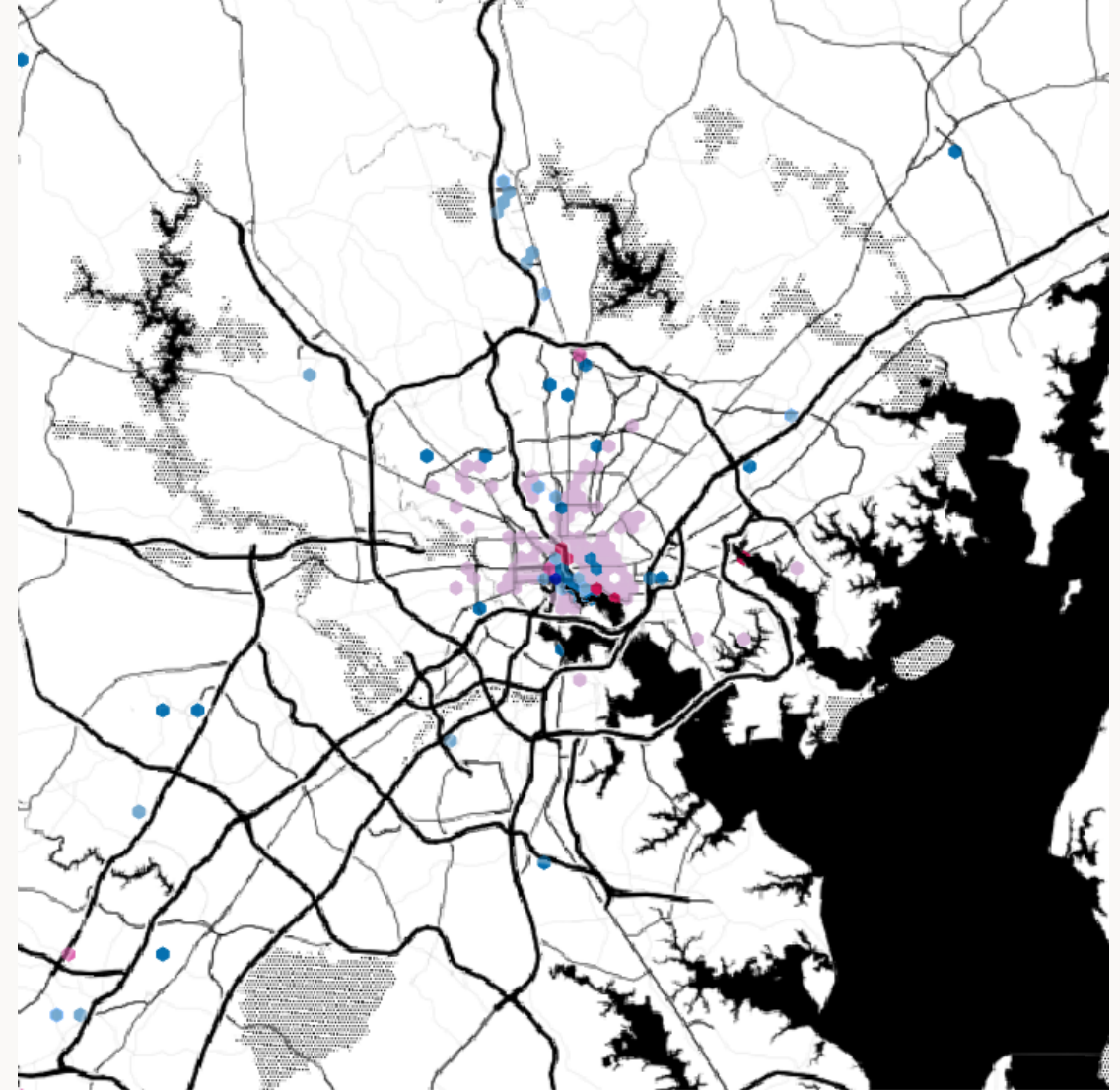
- To generate reasonable k-means clusters for metro areas, the number of neighborhood types was reduced to six.
- Focus was on the highest-density neighborhoods (above 11,000 activity units per square mile) as most relevant to vital urban places.
- Clusters created in two steps:
  - First step based on highest-density neighborhoods only.
  - Initial clusters divided into sub-clusters based on other neighborhoods.
- Two separate sets of clusters created:
  - One primarily based on population distribution.
  - One primarily based on job distribution.

## Six Neighborhood Types Used to Typologize Metro Areas

Neighborhood Type	Description
Central Business District	<ul style="list-style-type: none"> <li>• Majority or plurality office jobs</li> <li>• &gt; 120,000 activity units / sq. mile</li> </ul>
High-Density Commercial	<ul style="list-style-type: none"> <li>• Majority commercial</li> <li>• &gt; 33,000 activity units / sq. mile</li> </ul>
Medium-Density Commercial	<ul style="list-style-type: none"> <li>• Majority commercial</li> <li>• 11,000 – 33,000 activity units / sq. mile</li> </ul>
High-Density Residential	<ul style="list-style-type: none"> <li>• Majority residential</li> <li>• &gt; 33,000 activity units / sq. mile</li> </ul>
Medium-Density Residential (Large Apartments)	<ul style="list-style-type: none"> <li>• Majority residential</li> <li>• 11,000 – 33,000 activity units / sq. mile</li> <li>• large apartment buildings</li> </ul>
Medium-Density Residential (Small Apartments)	<ul style="list-style-type: none"> <li>• Majority residential</li> <li>• 11,000 – 33,000 activity units / sq. mile</li> <li>• rowhouses / small apartment buildings</li> </ul>



# Dense Neighborhoods in Baltimore



## **Neighborhood Types for Metro Area Typology**

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

Dense Neighborhoods  
in  
Baltimore

Neighborhood Type	Number of Hexes	Fraction of Population	Fraction of Jobs
Central Business District	1	0.1%	2.0%
High-Density Commercial	24	1.0%	10%
Medium-Density Commercial	22	0.7%	5.4%
High-Density Residential	5	0.6%	0.6%
Medium-Density Residential (Large Apartments)	3	0.1%	0.3%
Medium-Density Residential (Small Apartments)	76	6.7%	3.2%

# Population Clusters

Cluster	Metro Areas
1	New York
2a	Los Angeles, San Francisco
2b	Honolulu
2c	Chicago, Philadelphia, Boston
2d	Washington
3a	San Diego, San Jose, Ann Arbor (MI), Iowa City (IA)
3b	Seattle, Madison (WI), Santa Barbara (CA)
3c	Miami, Urbana-Champaign (IL), State College (PA)
3d	Baltimore, Milwaukee, Hartford, Worcester, 11 others
3e	Minneapolis, Denver, Portland, Austin, 5 others
3f	Dallas, Atlanta, Orlando, Pittsburgh, 29 others
4a	Corvallis (OR), Mount Pleasant (MI), Butte (MT)
4b	Providence, New Orleans, Buffalo, 14 others
4c	Houston, Las Vegas, 10 others
4d	Salt Lake City, Omaha, Durham (NC), 19 others
4e	Phoenix, Riverside, Detroit, Tampa, 122 others
4f	Greenville (SC), Bakersfield (CA), 669 others



## Job Clusters

Cluster	Metro Areas
<b>1</b>	New York
<b>2a</b>	Honolulu
<b>2b</b>	Chicago, Boston, San Francisco
<b>2c</b>	Washington, Seattle
<b>3a</b>	Philadelphia, Pittsburgh
<b>3b</b>	Los Angeles, San Jose
<b>3c</b>	Minneapolis, Denver, Baltimore
<b>3d</b>	Houston, Charlotte, Austin
<b>4a</b>	Dallas
<b>4b</b>	Rochester (MN), Bloomington (IL), 3 others
<b>4c</b>	Las Vegas, Milwaukee, New Orleans, 7 others
<b>4d</b>	Atlanta, Phoenix, St. Louis, Orlando, 9 others
<b>4e</b>	Cleveland, Louisville, 21 others
<b>5a-5f</b>	Miami, Jacksonville, Sacramento, Grand Rapids, San Diego, Providence, Detroit, Tampa, Memphis, Tulsa, Virginia Beach, Raleigh, 153 others
<b>6a-6e</b>	Riverside, El Paso, Stockton, Bakersfield, 688 others

## Observations

- These clusters can reveal patterns of urban history:
  - Several population clusters are defined by high levels of medium-density, small-building residential; this correlates with Northeastern industrial cities.
  - The legacy of segregation is seen in differences in densities members of different races live at:
    - Median density for Blacks *always* above overall median for 60 largest metros.
    - Median density for whites *always* below overall median for 60 largest metros.
  - This density difference is largest in Rust Belt cities that experienced substantial “white flight” and smallest in cities in the West with Black populations below 10% of the total population.

## Observations

- Patterns of urban economics are also visible:
  - High-income jobs are almost always at higher densities than low-income jobs.
  - Effect is largest in cities with lots of jobs at relatively high densities.
  - This is reversed for several low-income cities with industrial or agricultural economies.
- Hints as to what people perceive as urban density:
  - Qualitative assessments of density track more with job density than population density.
  - Los Angeles is a stereotypically sprawled city, but has population distribution most similar to San Francisco's.



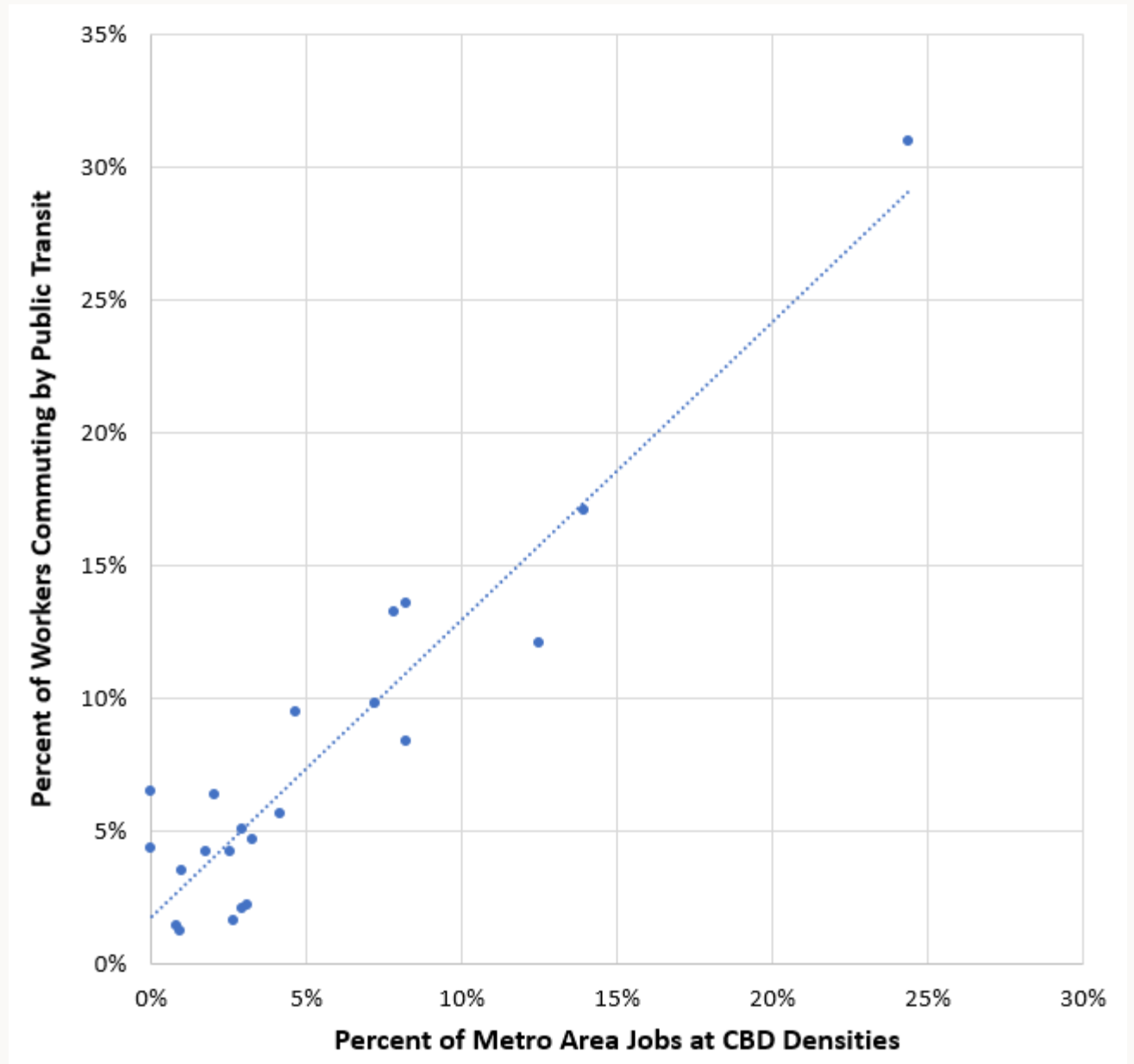
# What are the applications for public transportation?

Metro area types, neighborhood types, and transit service

# Metro Area Types and Transit Ridership

- Four types of metro areas have high transit ridership:
  - Special cases:
    - Small-to-medium college towns.
    - Tiny tourism towns.
  - Larger metros:
    - Commuter rail suburbs
    - Major urban cores.
- For major urban cores, job density and centralization drive ridership:
  - Fraction of transit commuters correlates strongly with job-based clusters.
  - Population-based clusters correlate much less strongly.

The share of commuters  
who use public transit  
and  
the share of jobs in  
dense CBDs  
are strongly related.





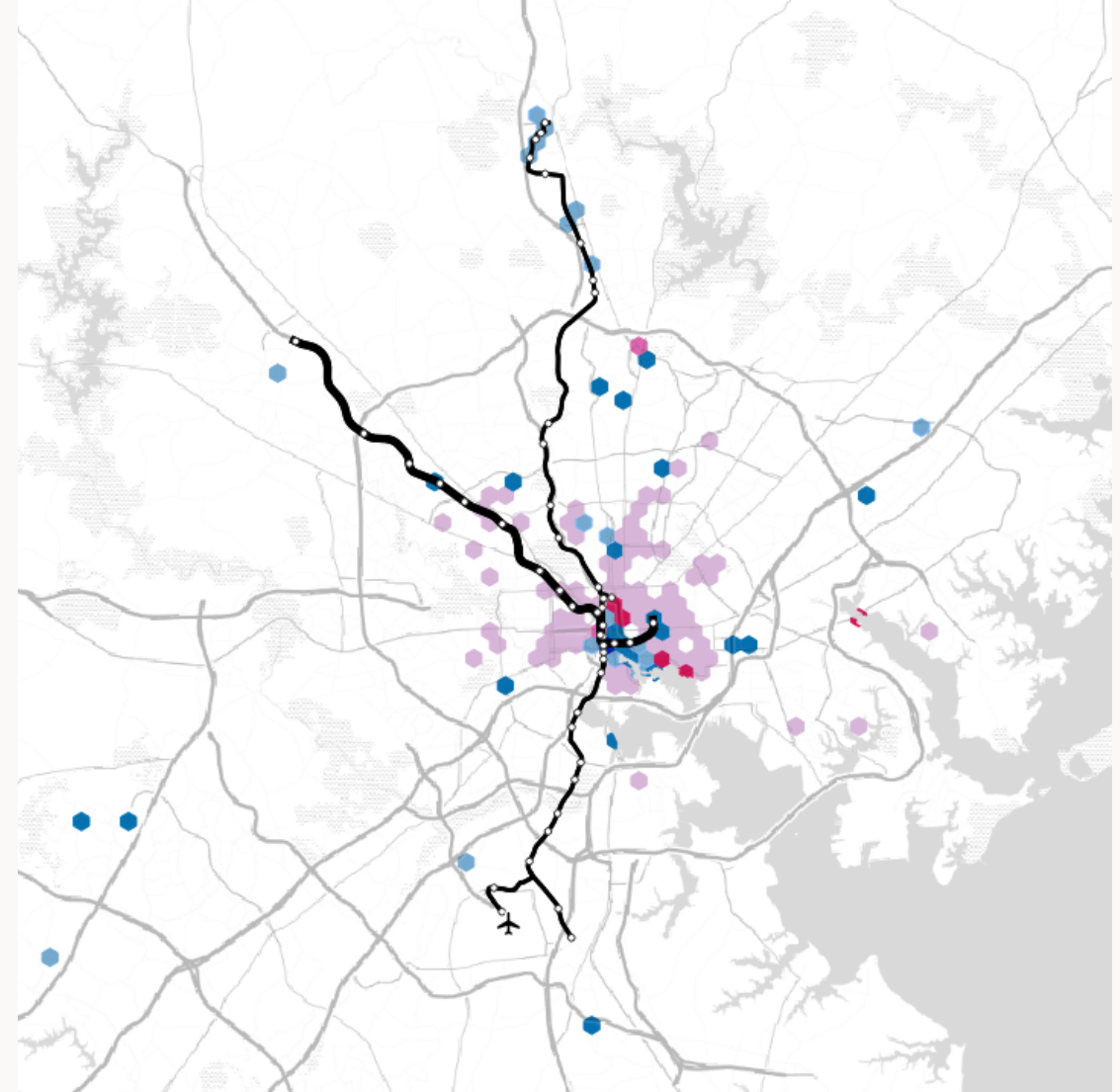
## Metro Area Types and Transit Ridership

- What is the causation here?
  - Does transit promote job density and centralization?
  - Do job density and centralization promote transit?
- What about non-commute trips?
  - Harder to measure (no Census Bureau data)
  - Important, especially for gender equity
- Quality of transit service is almost certainly relevant.

What neighborhood types are served?

- There are many aspects to good transit service:
  - Area served, frequency of service, hours of operation, affordability, and so on are important.
  - Harder-to-quantify issues of safety and equity also matter.
- One simple metric is areas served by rail transit:
  - These tend to have the highest-frequency service in a region.
  - Are indications of what routes a transit agency is investing in.
  - Need to exclude commuter rail because it rarely operates frequently and all day, and it tends to be much more expensive.

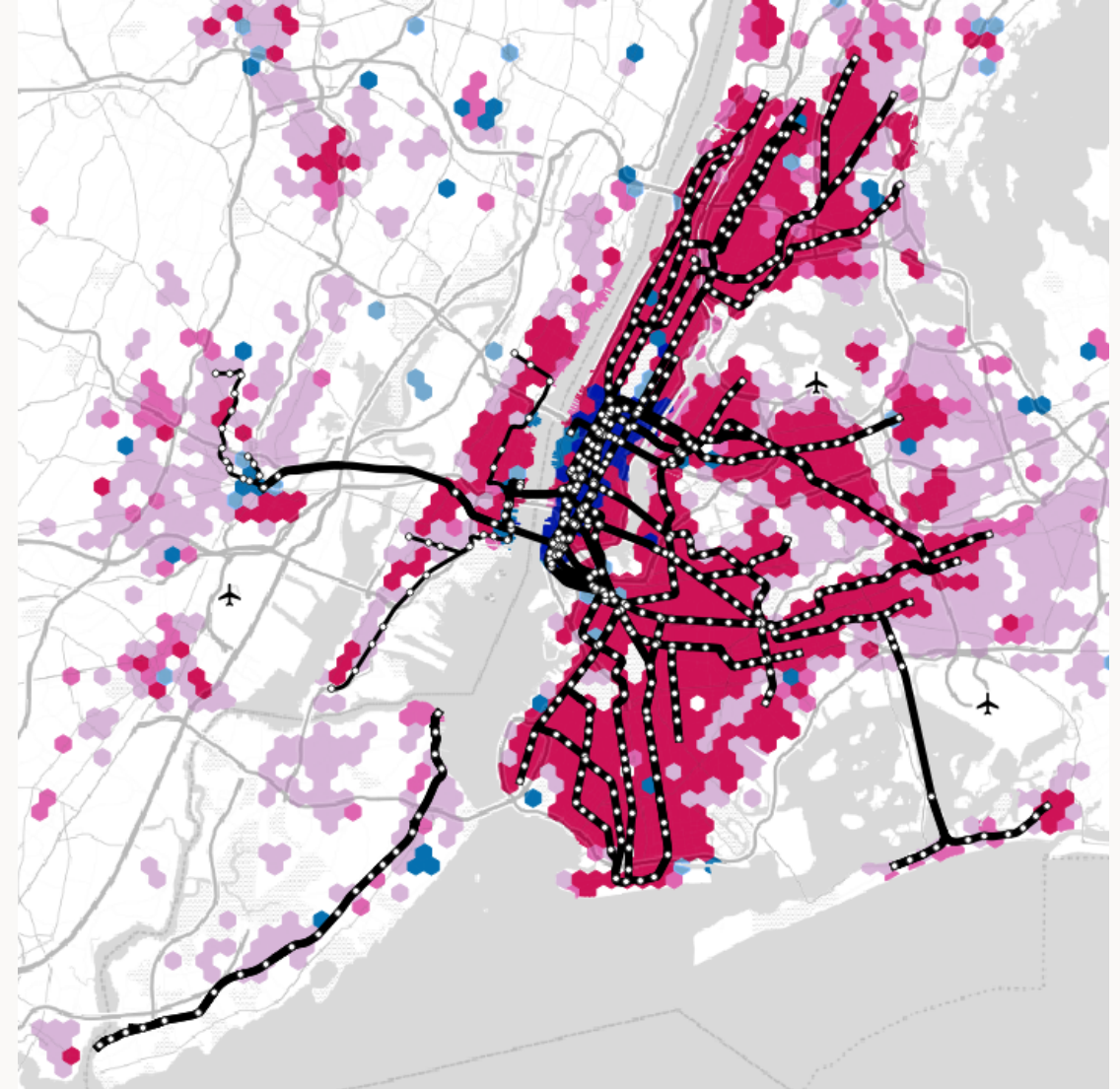
# Dense Neighborhoods and Public Transit in Baltimore



## Neighborhood Types for Metro Area Typology

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# Dense Neighborhoods and Public Transit in New York

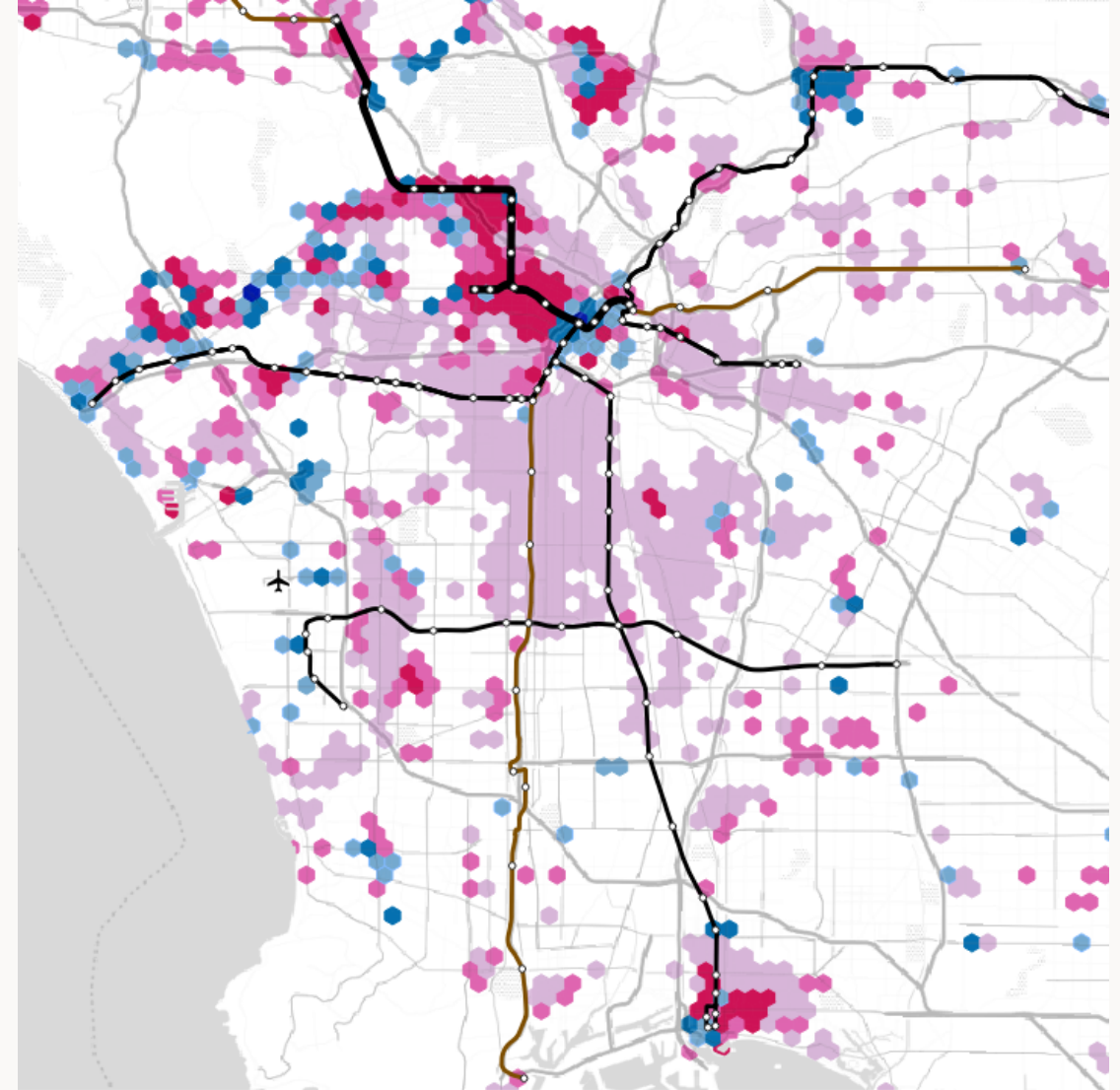


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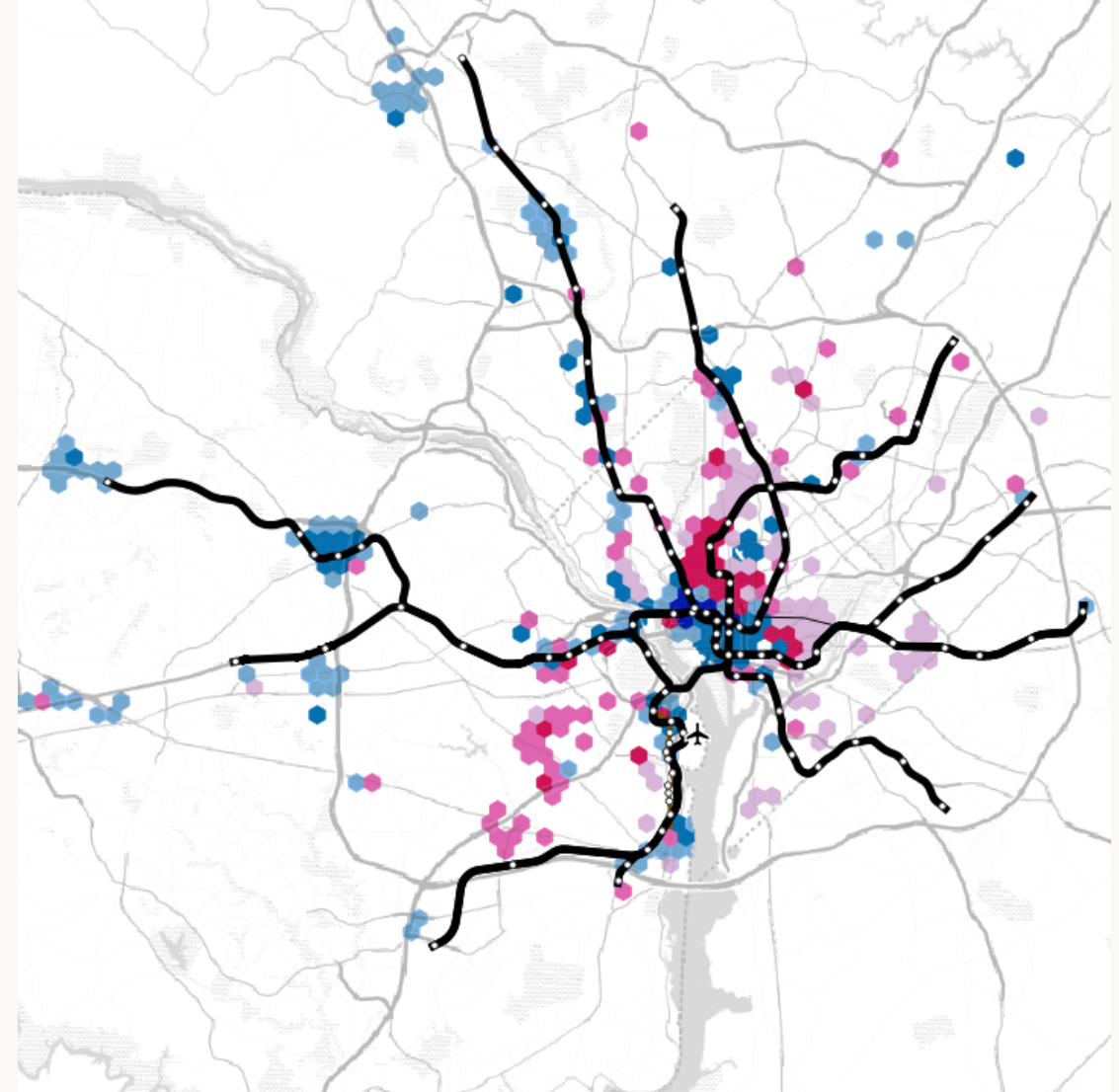
# Dense Neighborhoods and Public Transit in Los Angeles



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# Dense Neighborhoods and Public Transit in Washington



## Neighborhood Types for Metro Area Typology

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# A Nation of Neighborhoods:

A Quantitative Understanding of US Neighborhoods and Metropolitan Areas

- American metro areas, and the neighborhoods they are made up of, fall into distinct types that can be quantitatively identified.
- By developing typologies based on features relevant to public transportation and the vitality of pedestrian-oriented urban places, we can better understand these places and the cities that contain them.
- This can also help us understand where public transit is successful, and how to improve it where it currently isn't.

## Future Work

- An improved version of the study would consider spatial distribution of dense neighborhood types.
- Extending this study to world cities would be difficult, but would also be rewarding.
- Further examination of the relationships between demographics and city type is warranted.
- Further exploration of public transit service and neighborhood and city type would be quite interesting.



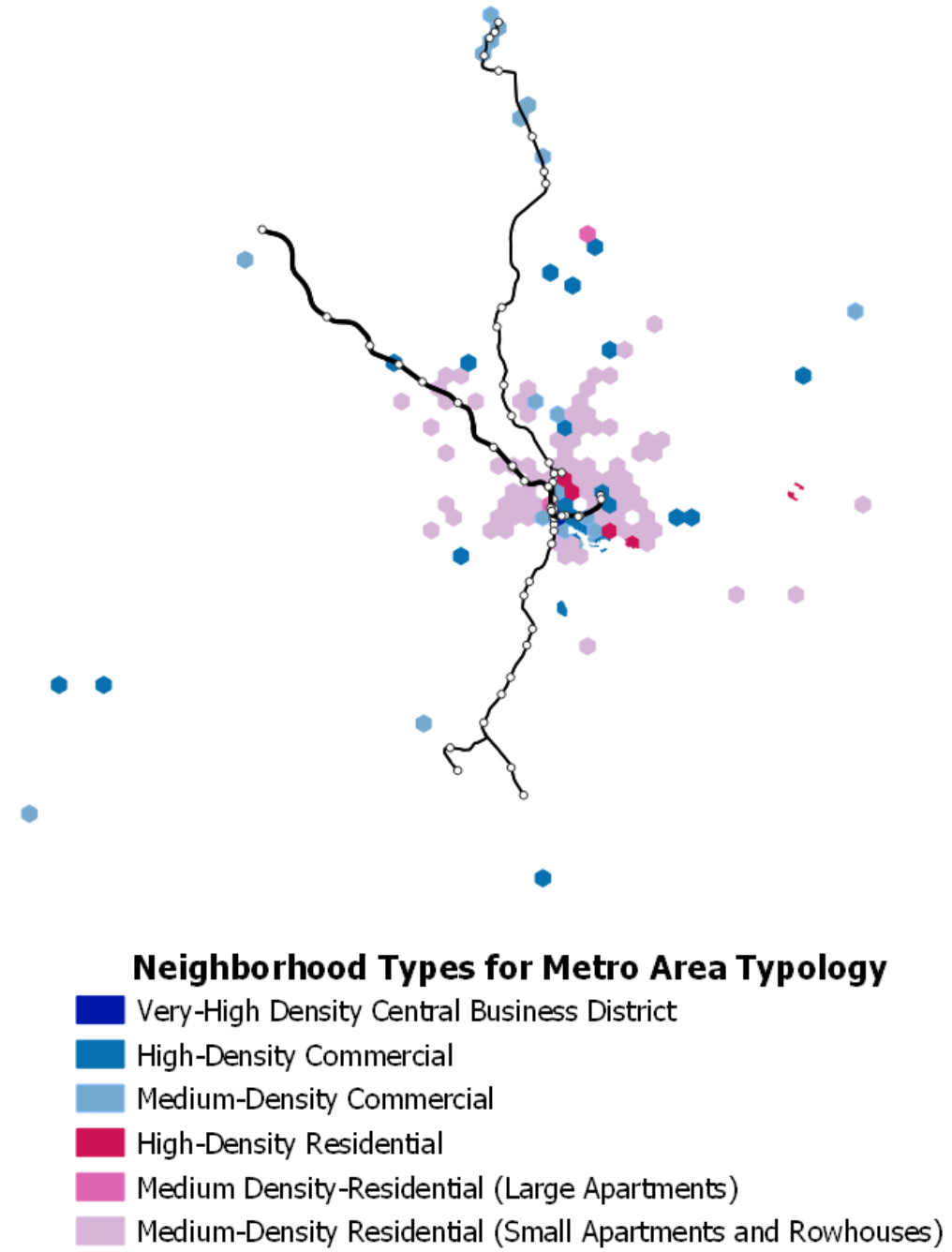
# A Nation of Neighborhoods:

A Quantitative Understanding of US  
Neighborhoods and Metropolitan Areas

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[rowlands@umbc.edu](mailto:rowlands@umbc.edu)

 @82\_Streetcar

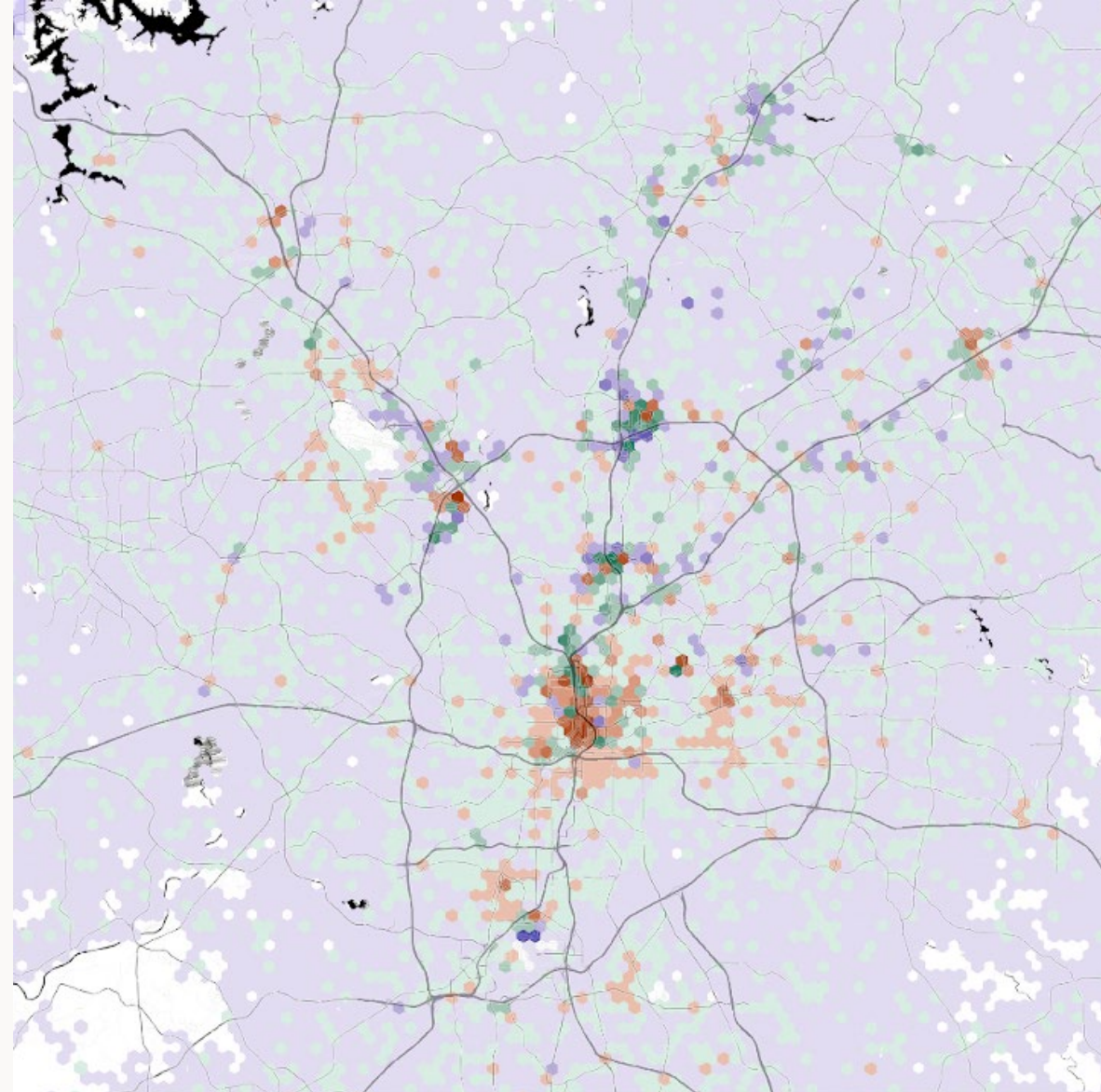


# Activity / Connectivity Maps

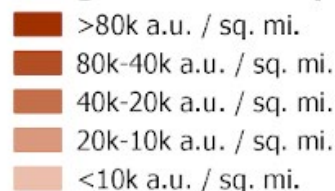
# Activity Density and Road Connectivity in Atlanta

Density of Jobs + Population

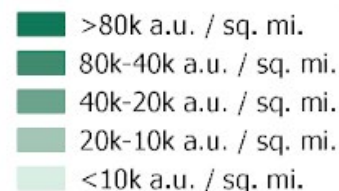
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



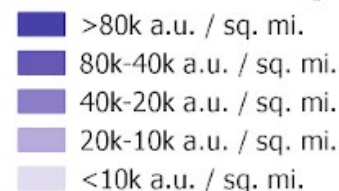
## High Connectivity



## Medium Connectivity



## Low Connectivity

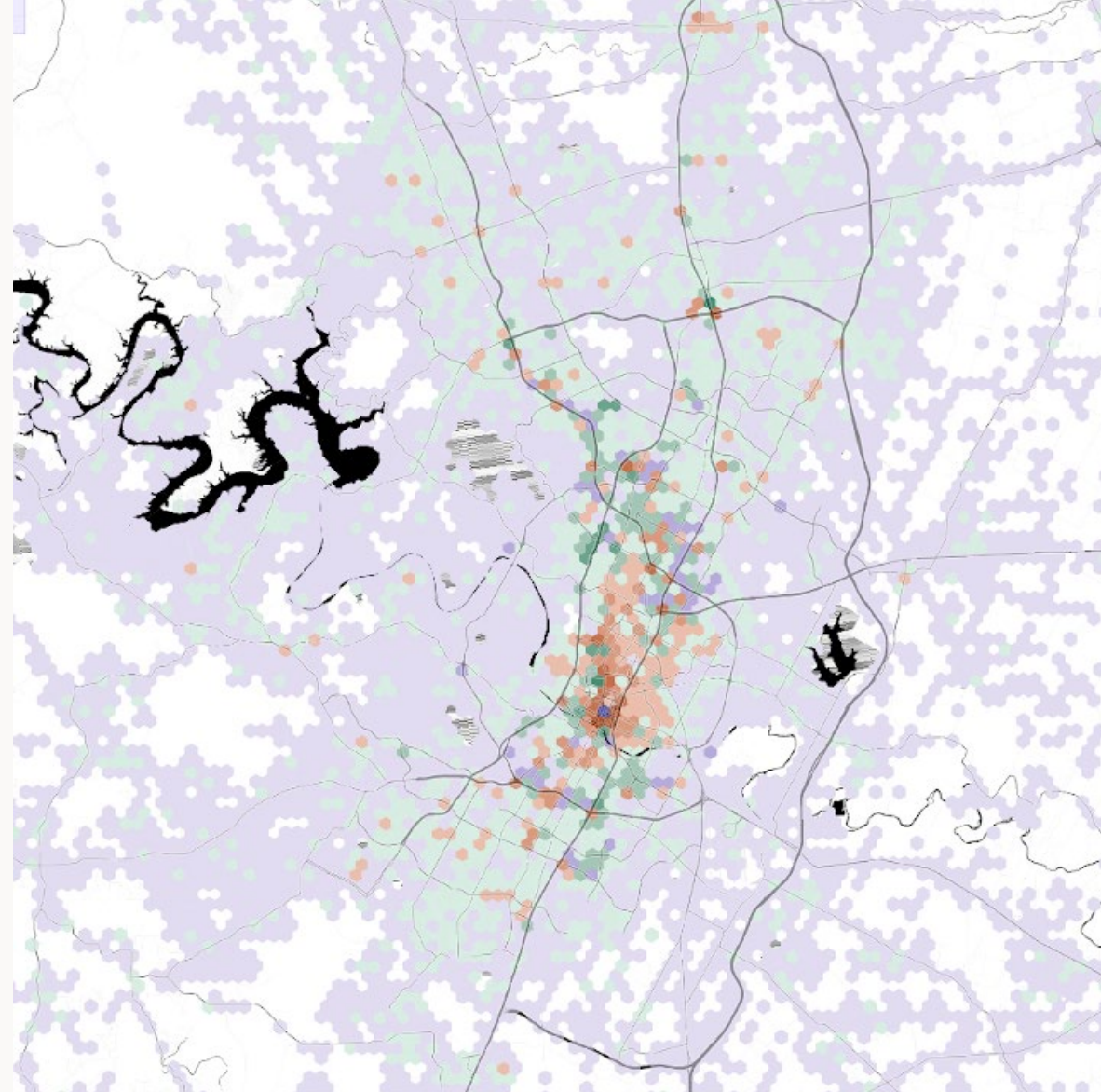




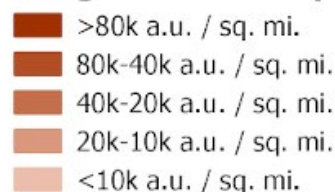
# Activity Density and Road Connectivity in Austin

Density of Jobs + Population

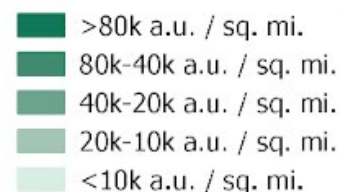
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



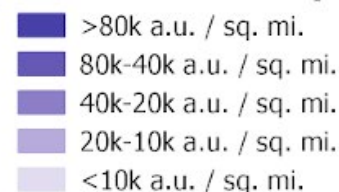
## High Connectivity



## Medium Connectivity



## Low Connectivity

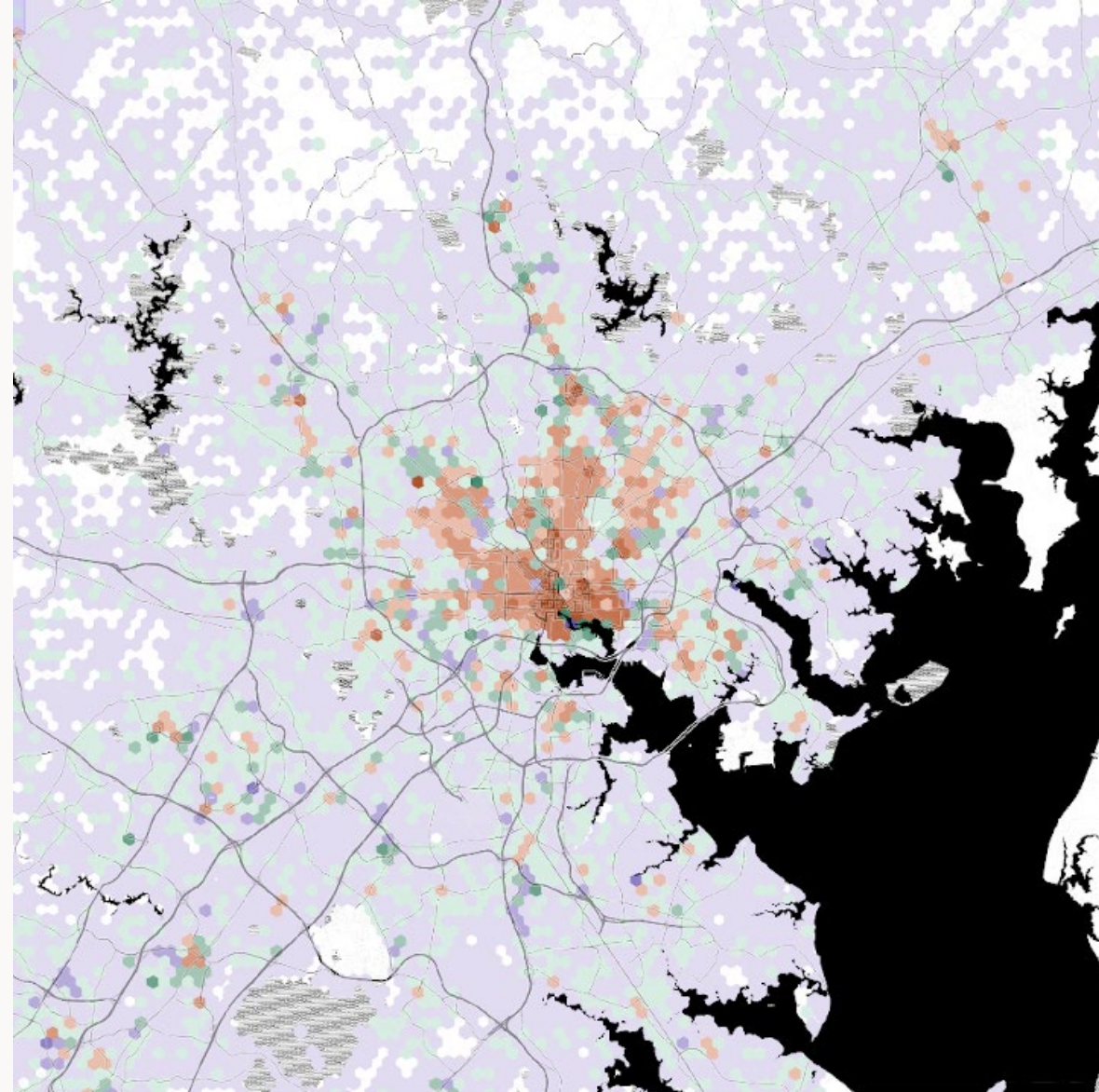




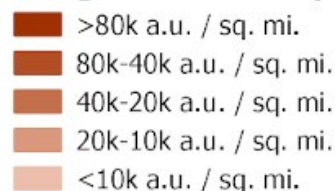
# Activity Density and Road Connectivity in Baltimore

Density of Jobs + Population

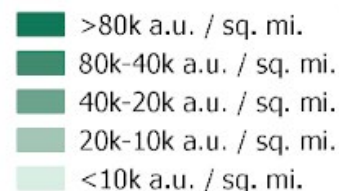
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



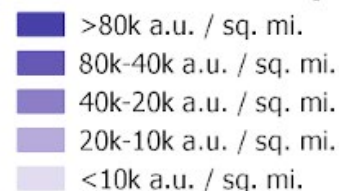
## High Connectivity



## Medium Connectivity



## Low Connectivity

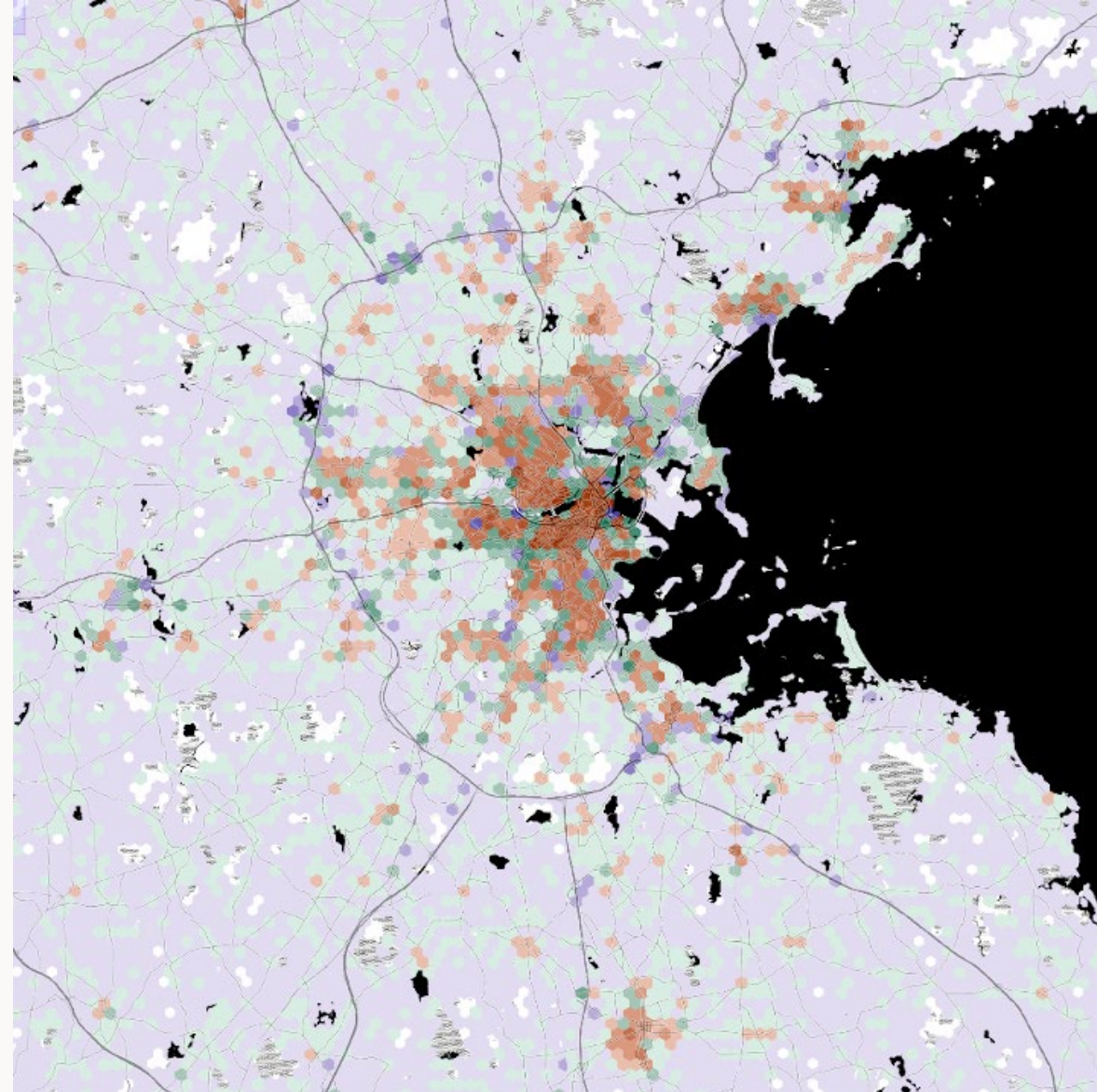




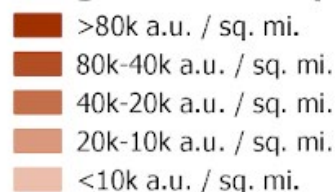
# Activity Density and Road Connectivity in Boston

Density of Jobs + Population

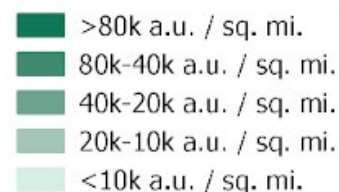
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



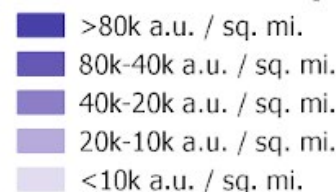
## High Connectivity



## Medium Connectivity



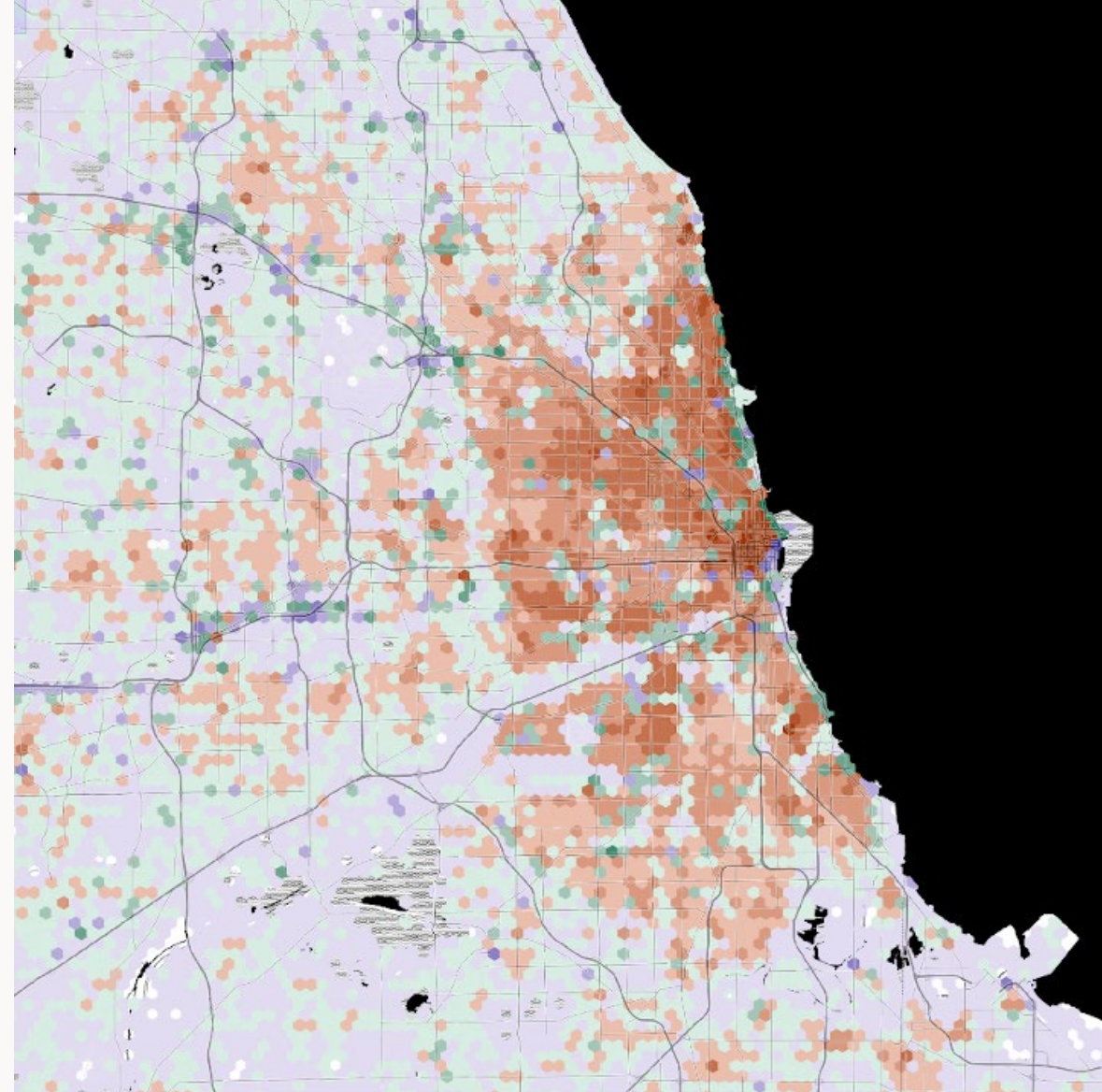
## Low Connectivity



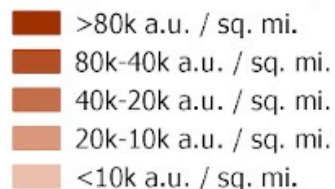
# Activity Density and Road Connectivity in Chicago

Density of Jobs + Population

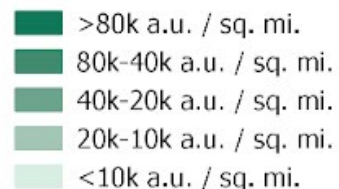
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



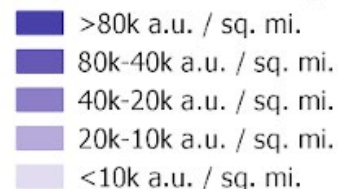
## High Connectivity



## Medium Connectivity



## Low Connectivity

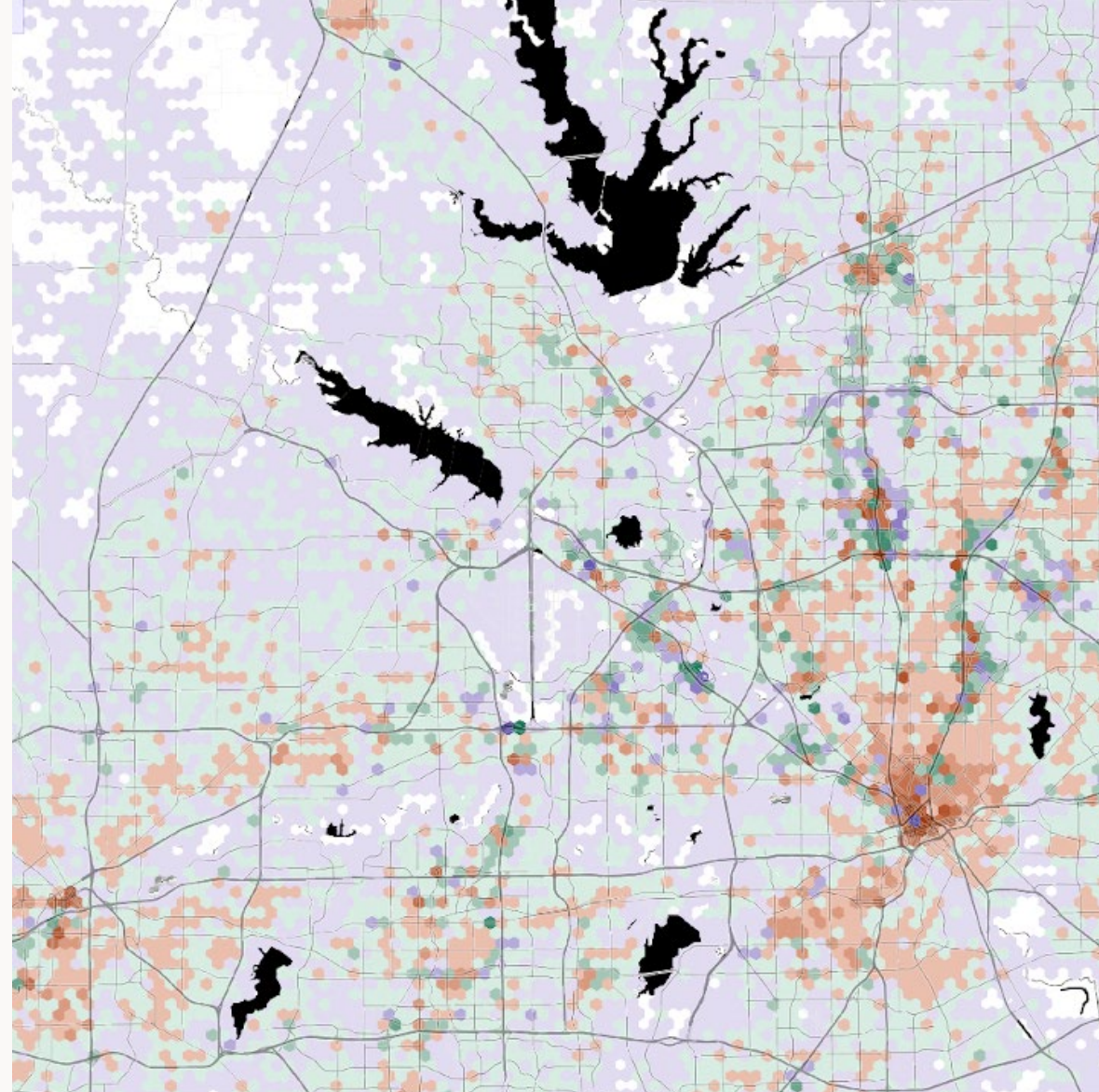




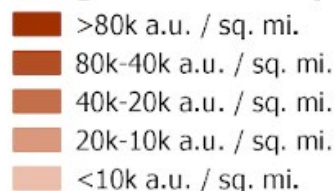
# Activity Density and Road Connectivity in Dallas

Density of Jobs + Population

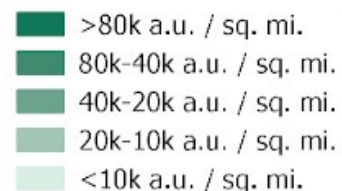
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



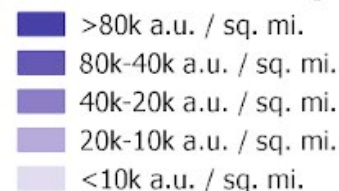
## High Connectivity



## Medium Connectivity



## Low Connectivity

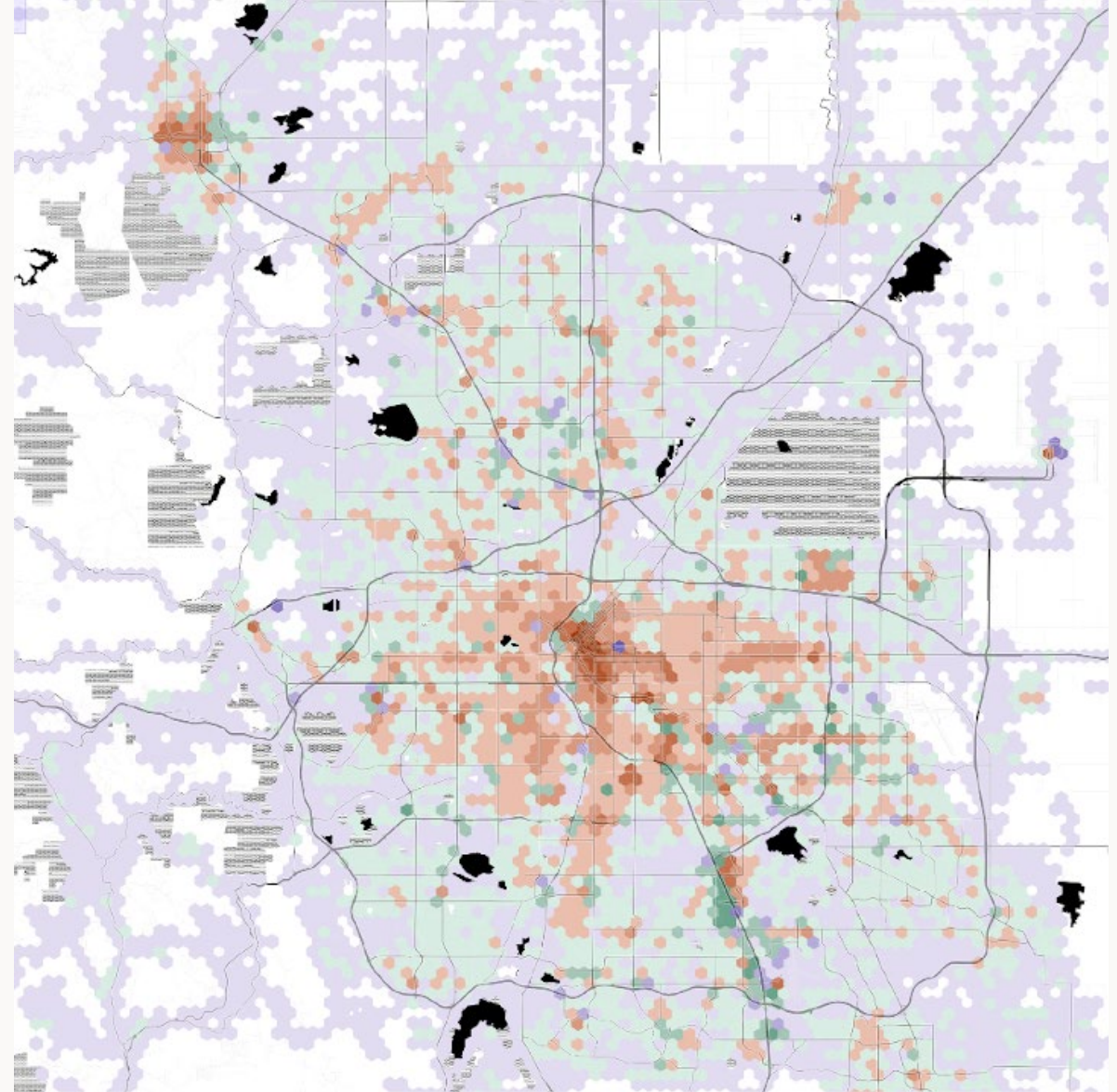




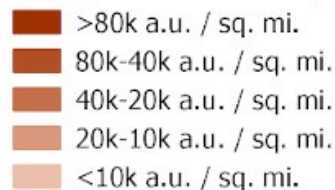
# Activity Density and Road Connectivity in Denver

Density of Jobs + Population

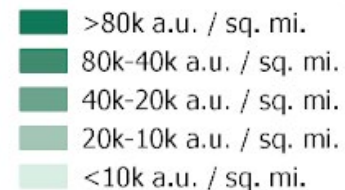
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



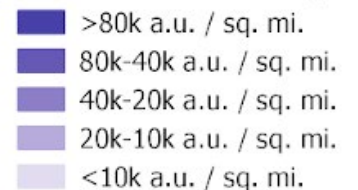
## High Connectivity



## Medium Connectivity



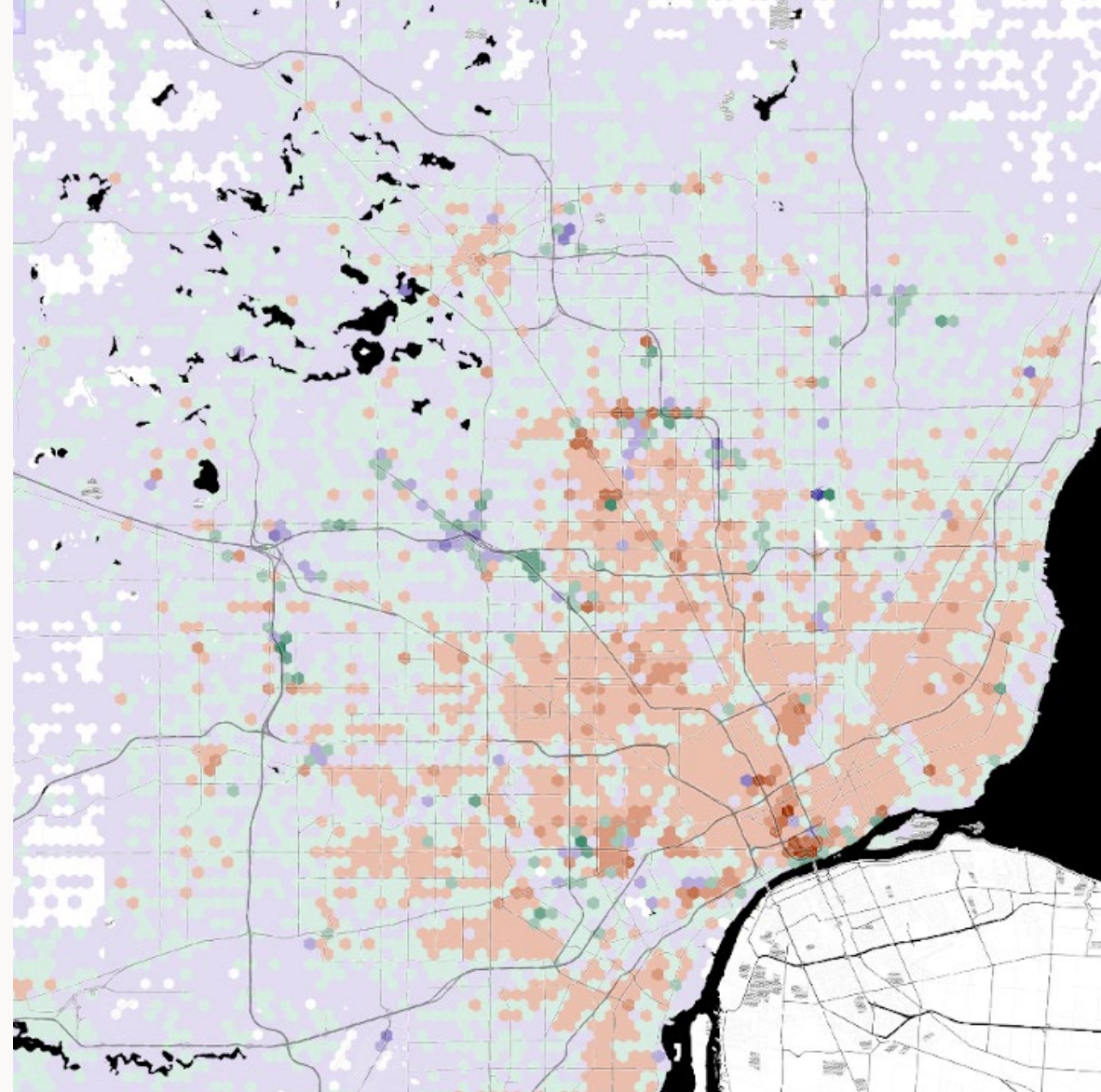
## Low Connectivity



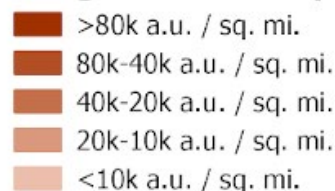
# Activity Density and Road Connectivity in Detroit

Density of Jobs + Population

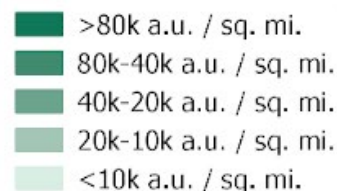
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



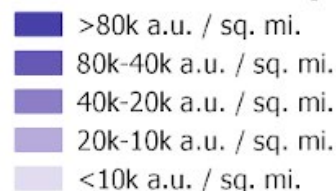
## High Connectivity



## Medium Connectivity



## Low Connectivity

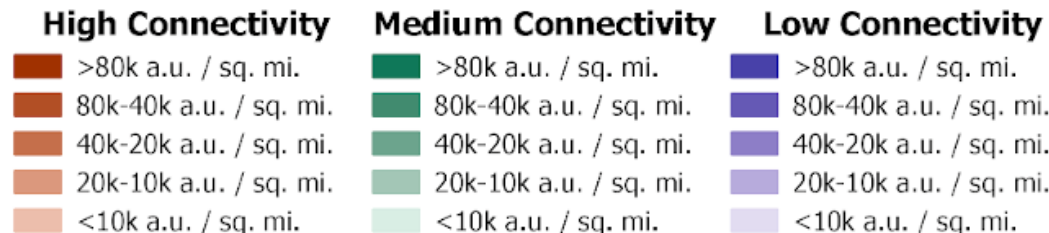
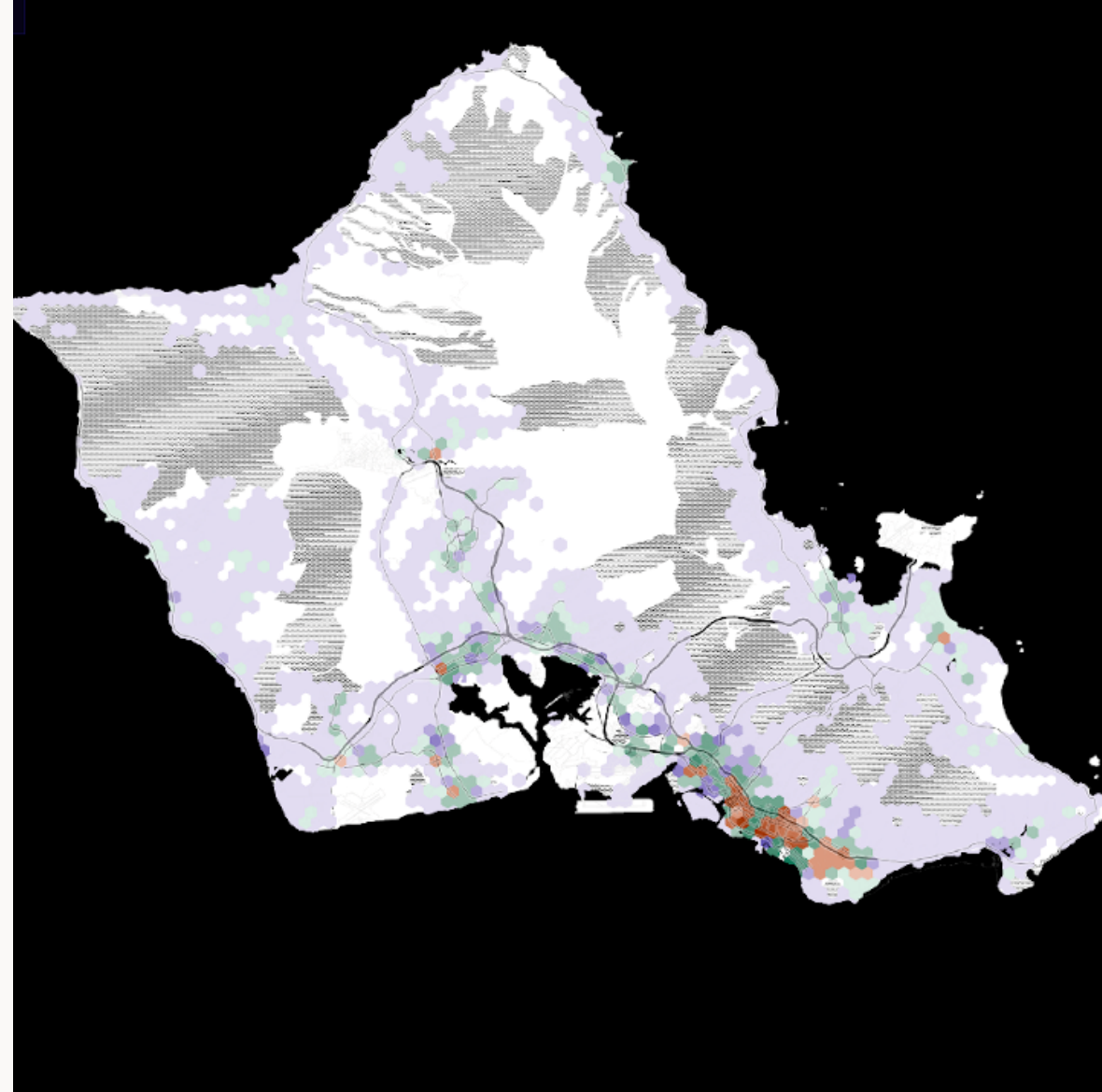




# Activity Density and Road Connectivity in Honolulu

Density of Jobs + Population

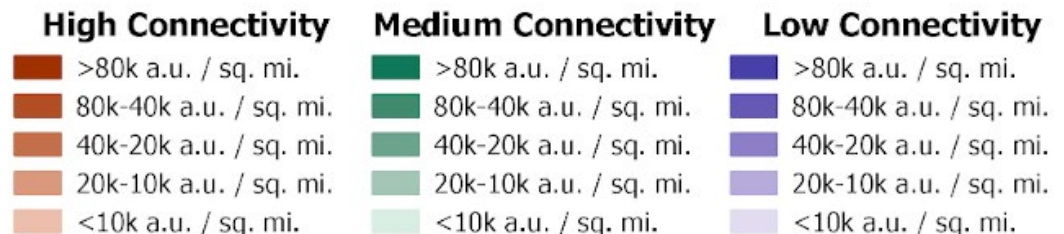
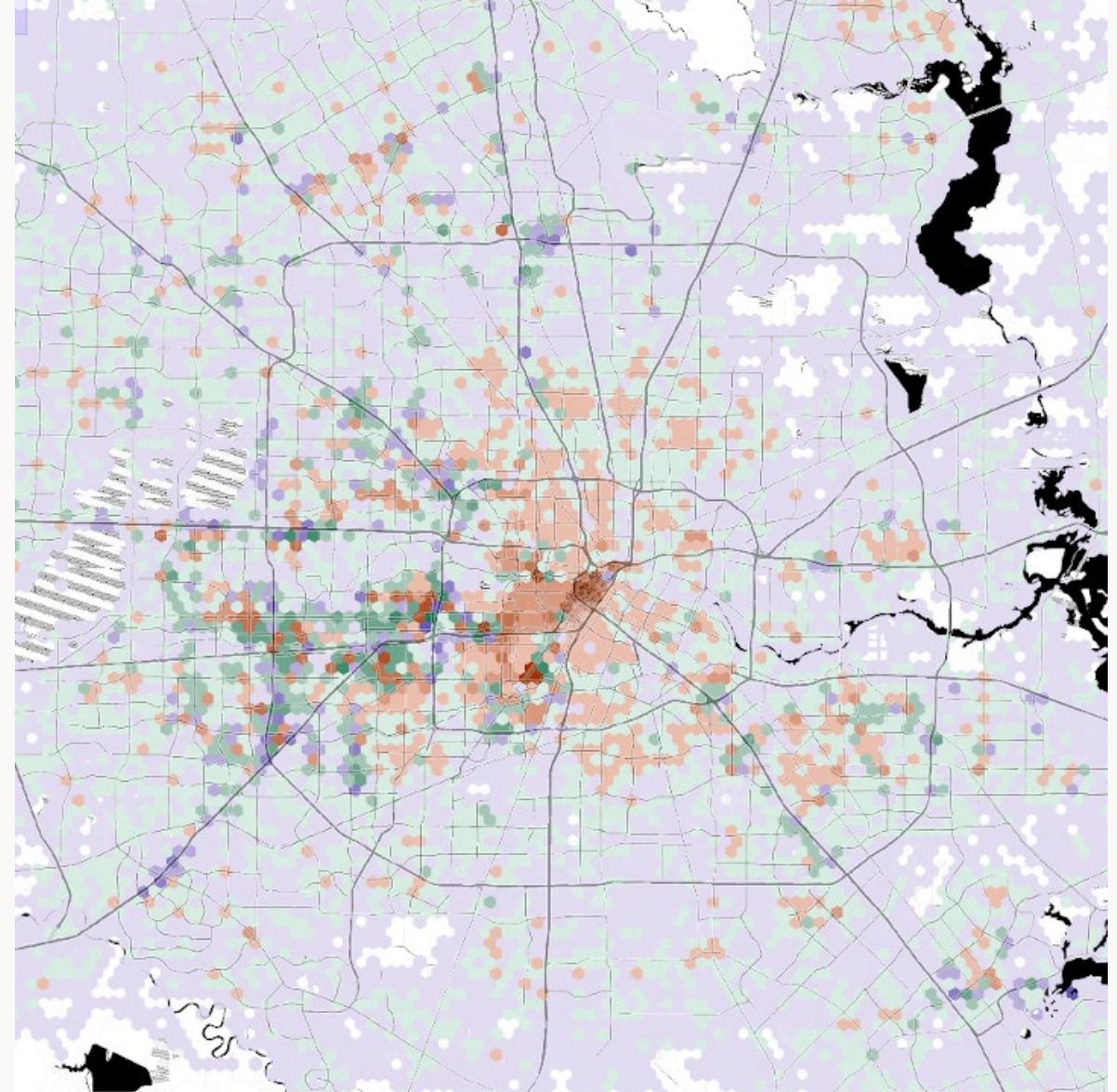
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



# Activity Density and Road Connectivity in Houston

Density of Jobs + Population

High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )

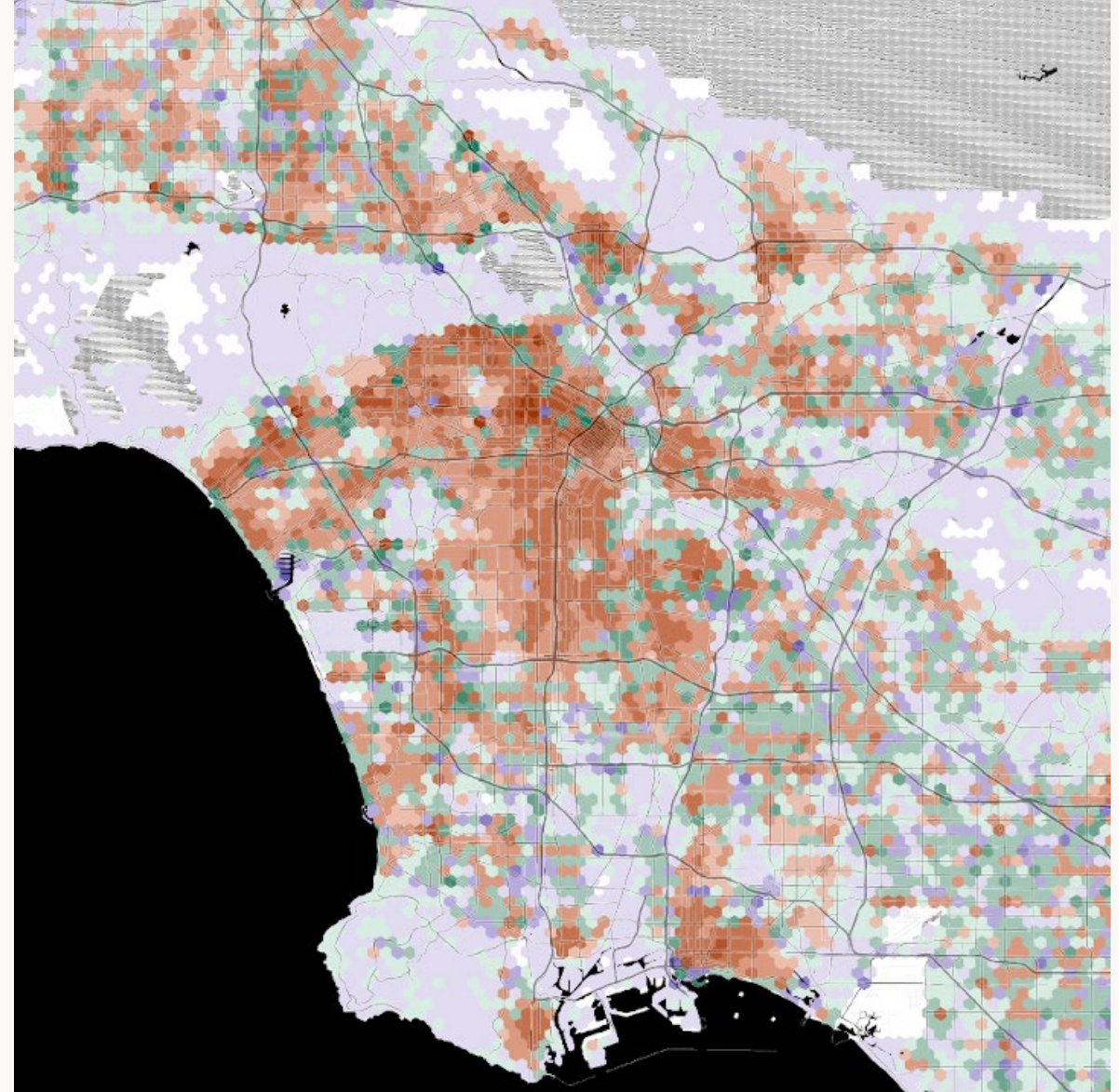




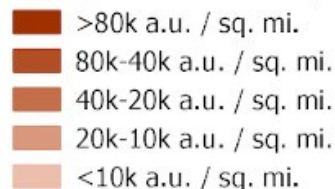
# Activity Density and Road Connectivity in Los Angeles

Density of Jobs + Population

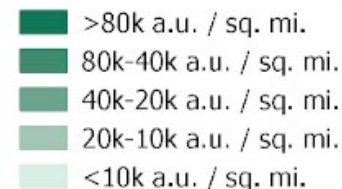
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



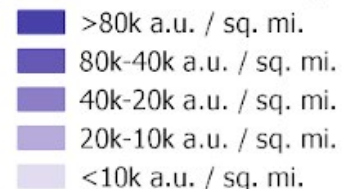
## High Connectivity



## Medium Connectivity



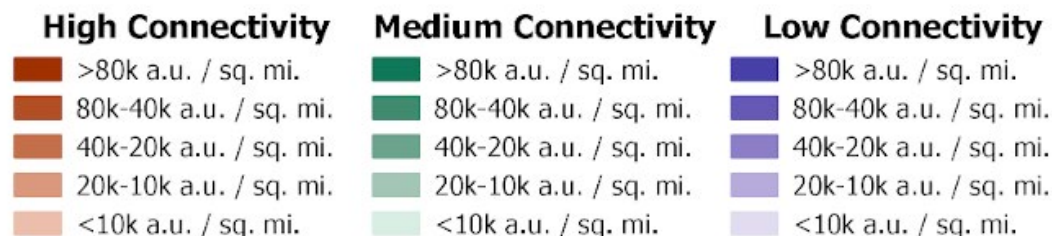
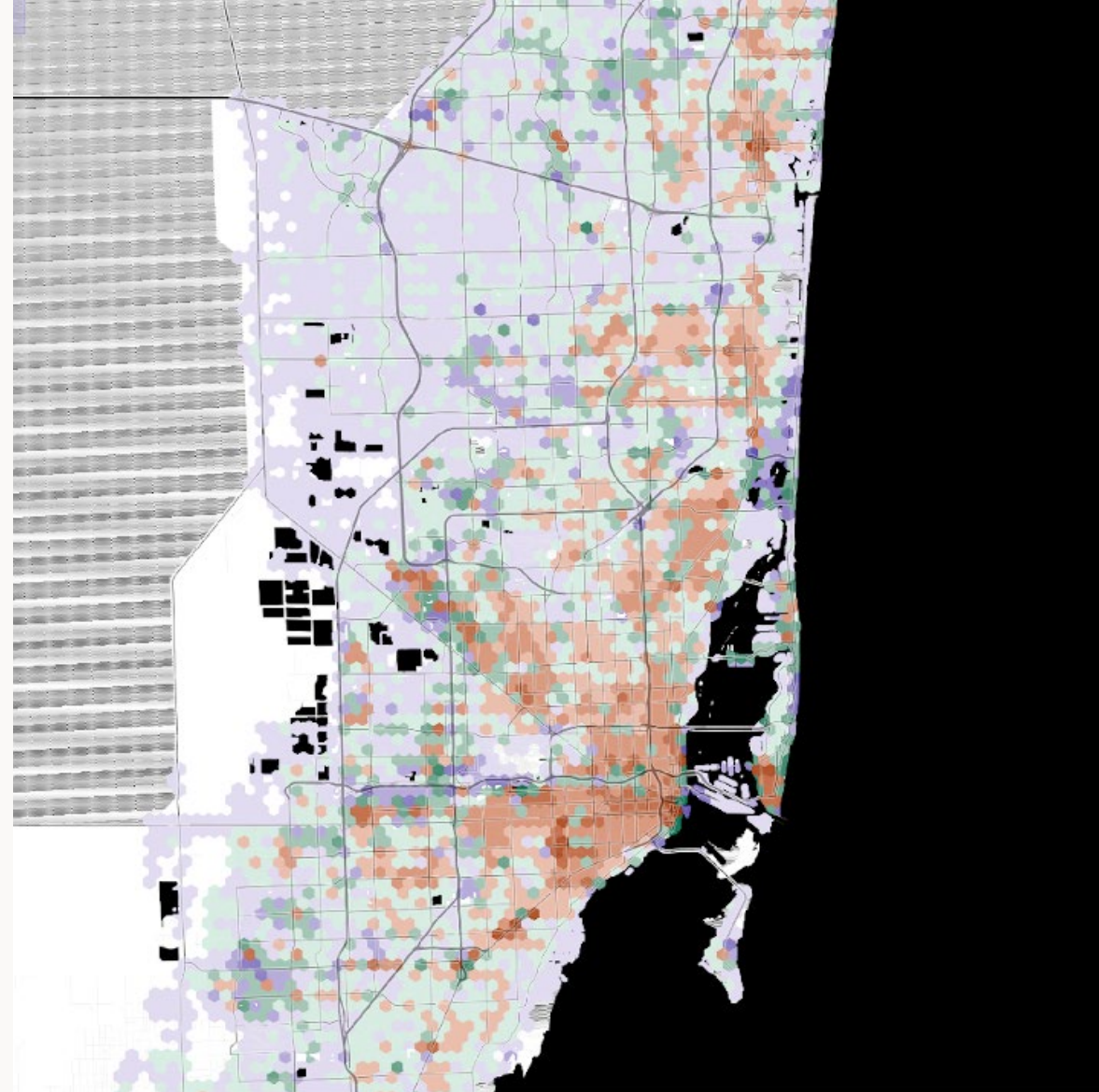
## Low Connectivity



# Activity Density and Road Connectivity in Miami

Density of Jobs + Population

High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )

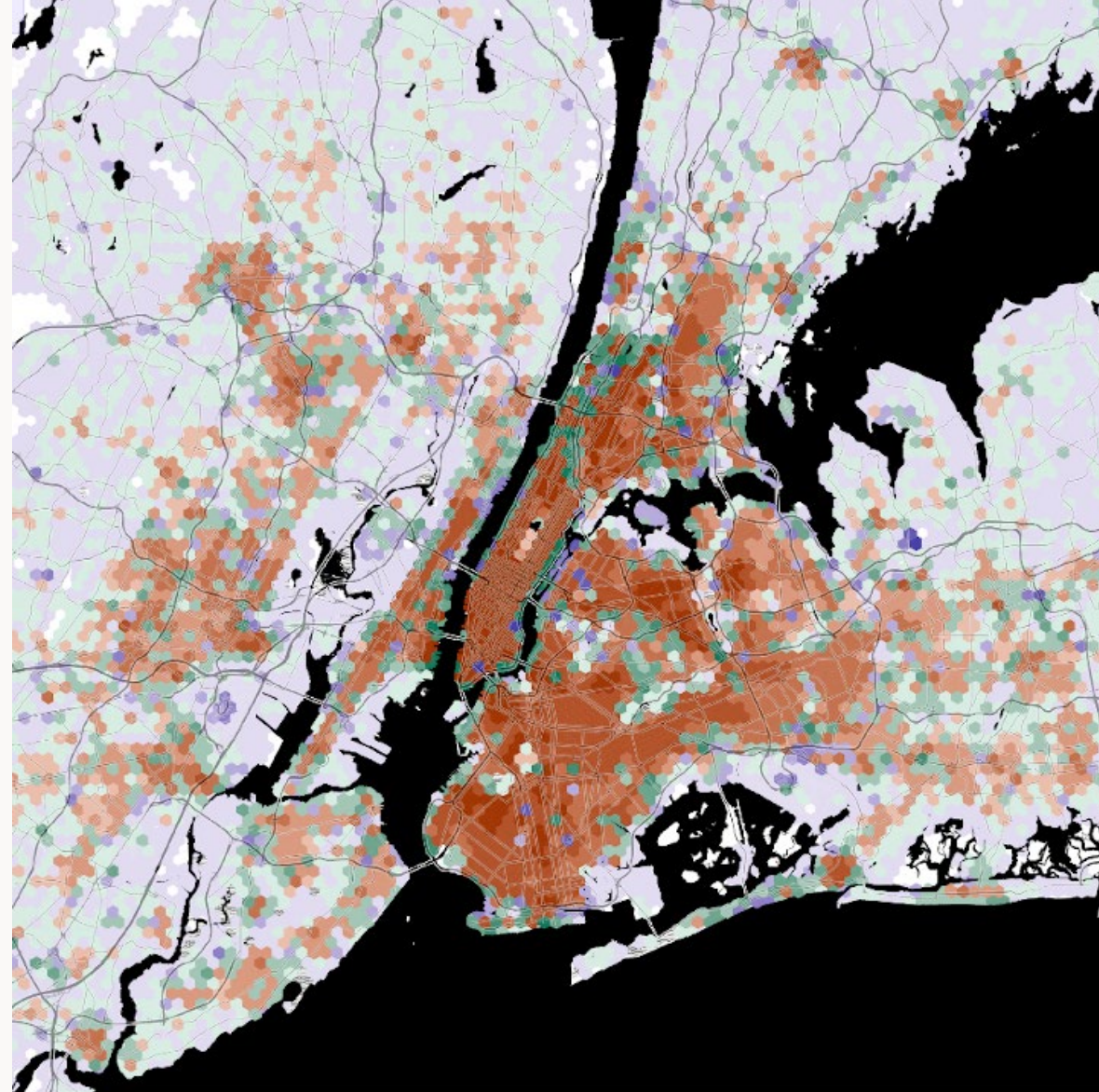




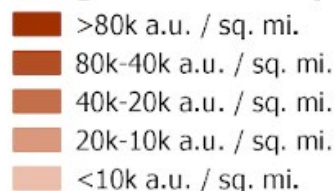
# Activity Density and Road Connectivity in New York

Density of Jobs + Population

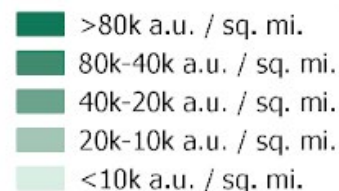
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



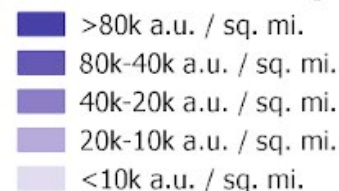
## High Connectivity



## Medium Connectivity



## Low Connectivity

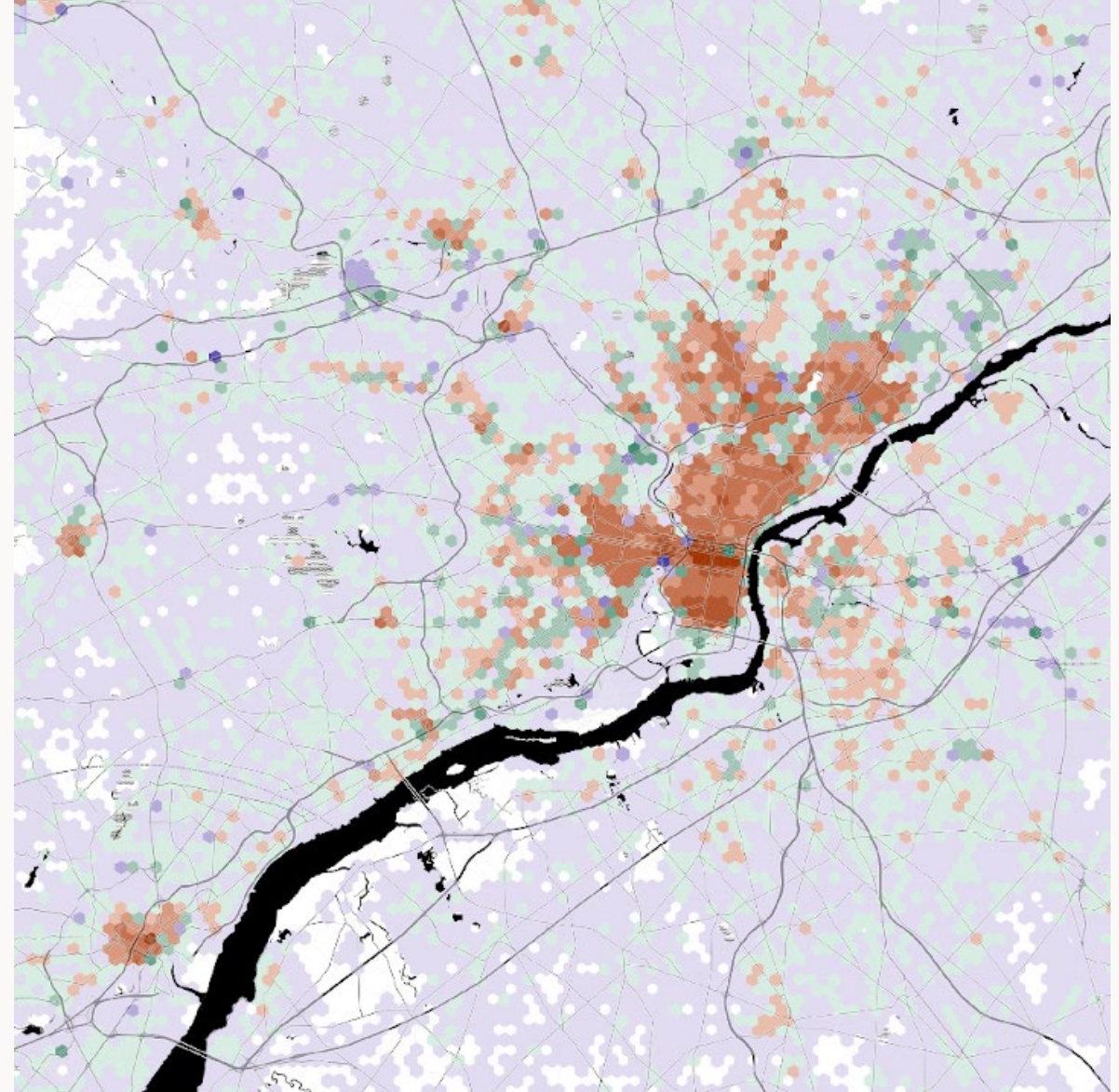




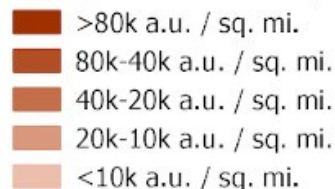
# Activity Density and Road Connectivity in Philadelphia

Density of Jobs + Population

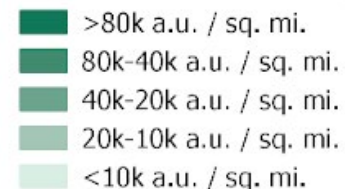
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



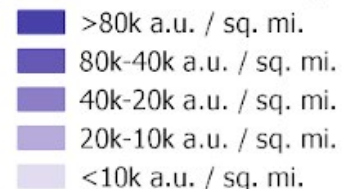
## High Connectivity



## Medium Connectivity



## Low Connectivity

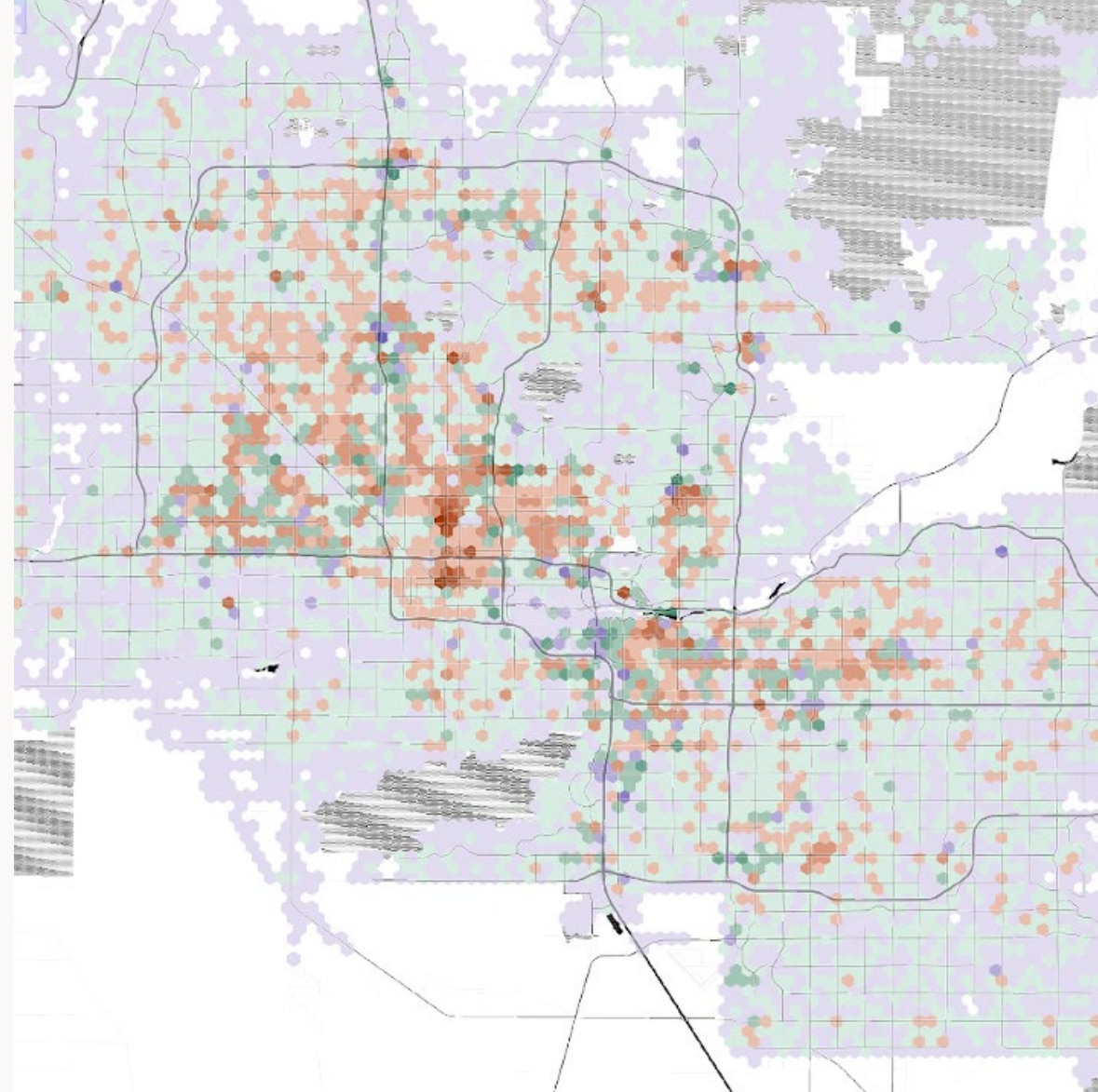




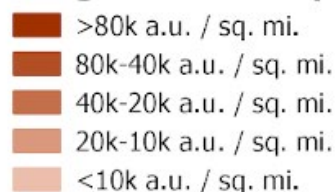
# Activity Density and Road Connectivity in Phoenix

Density of Jobs + Population

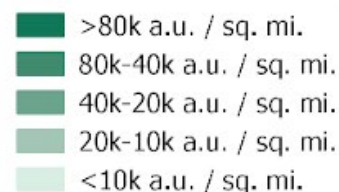
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



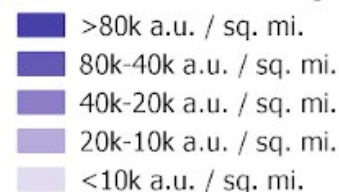
## High Connectivity



## Medium Connectivity



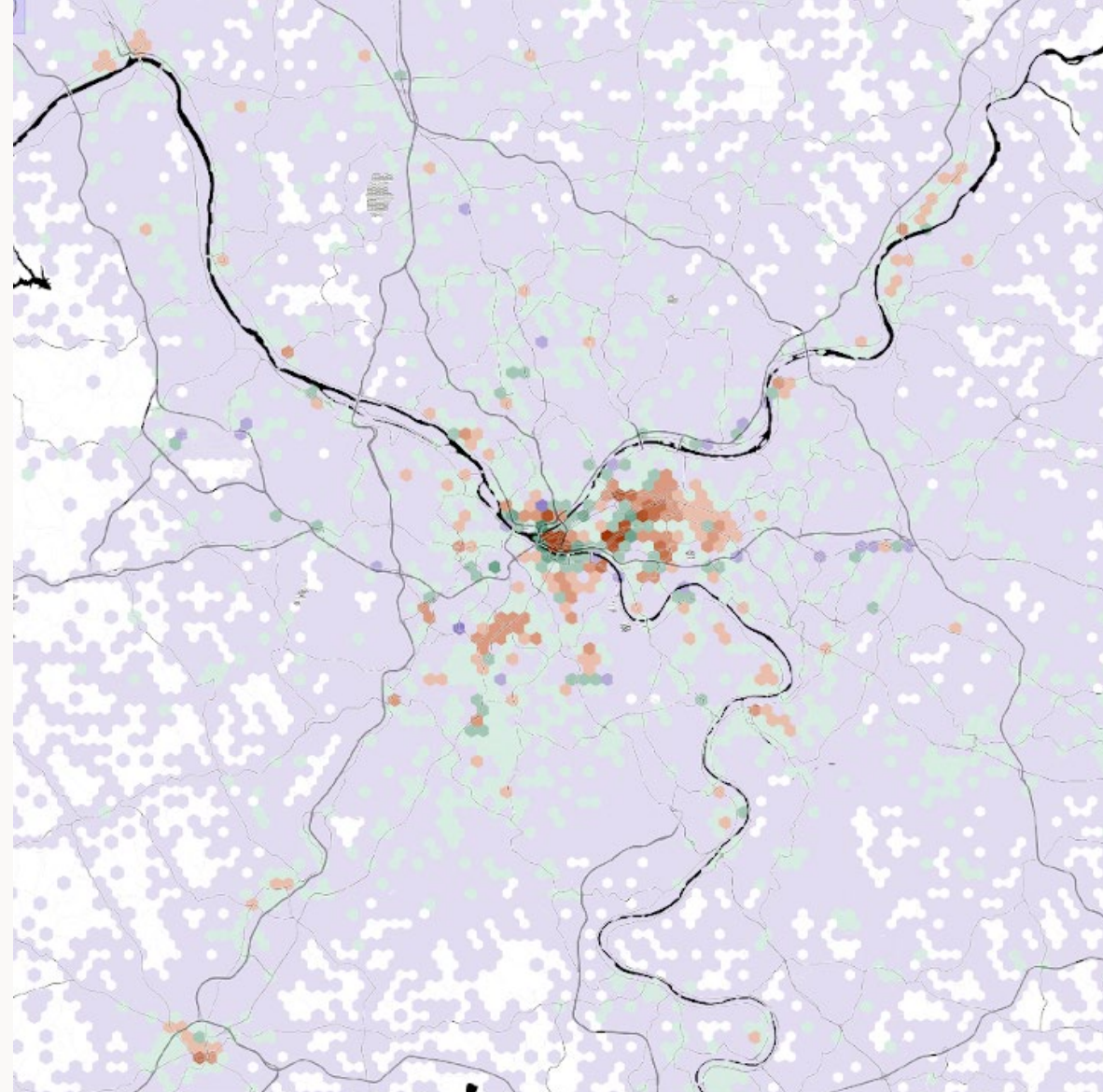
## Low Connectivity



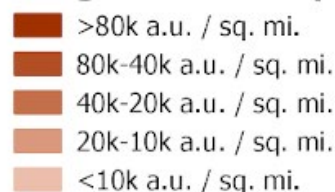
# Activity Density and Road Connectivity in Pittsburgh

Density of Jobs + Population

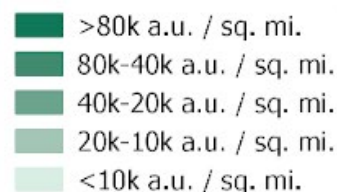
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



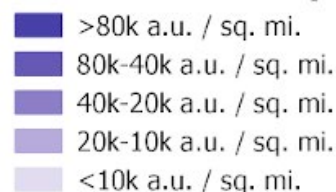
## High Connectivity



## Medium Connectivity



## Low Connectivity

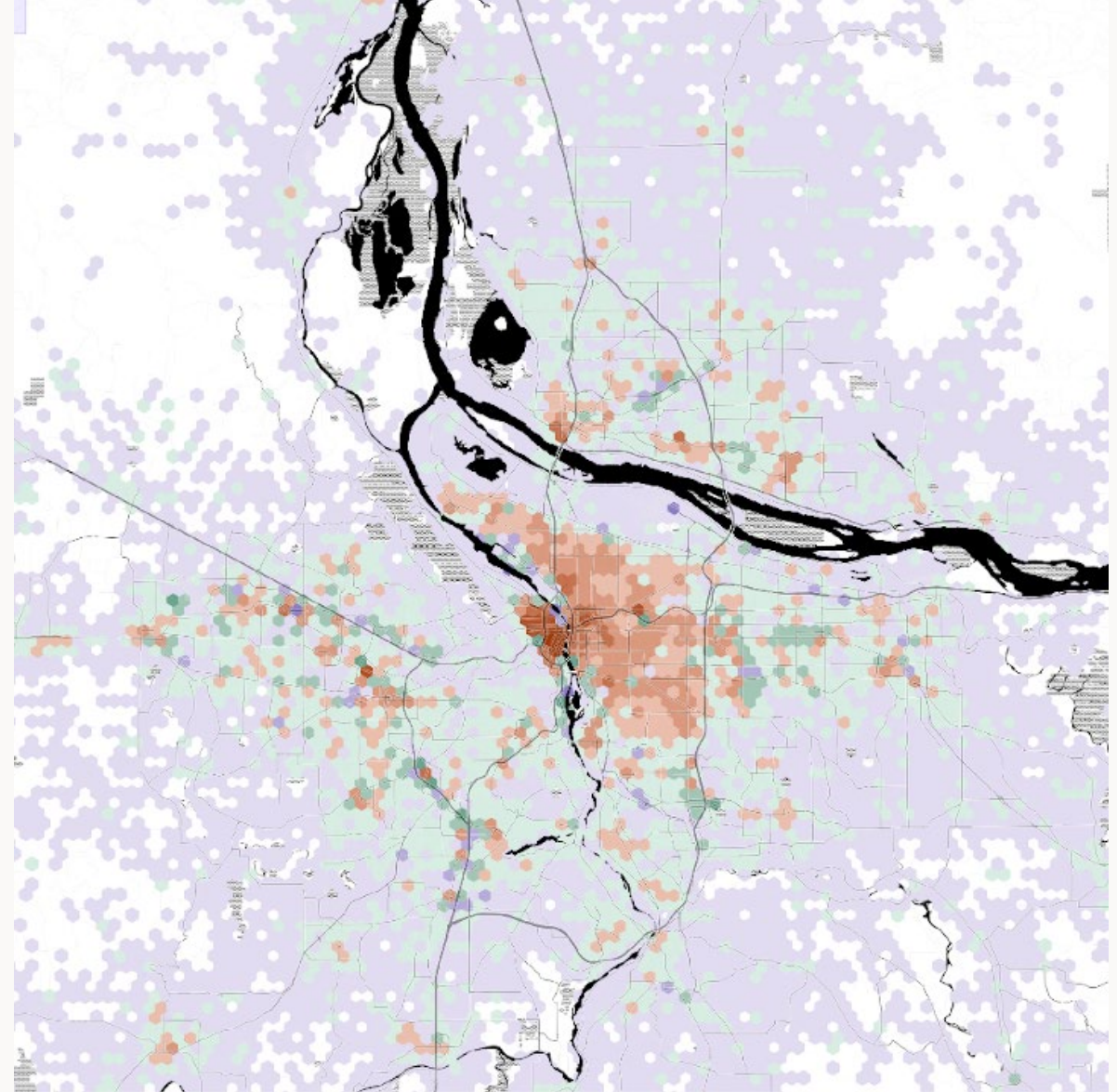




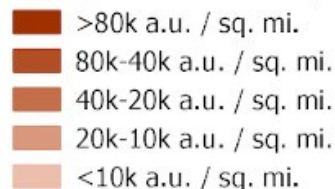
# Activity Density and Road Connectivity in Portland

Density of Jobs + Population

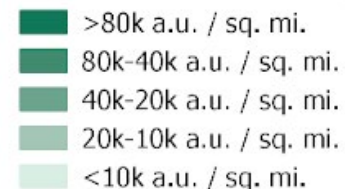
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



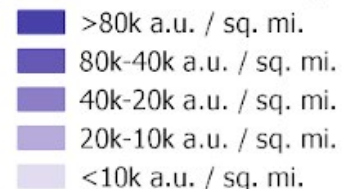
## High Connectivity



## Medium Connectivity



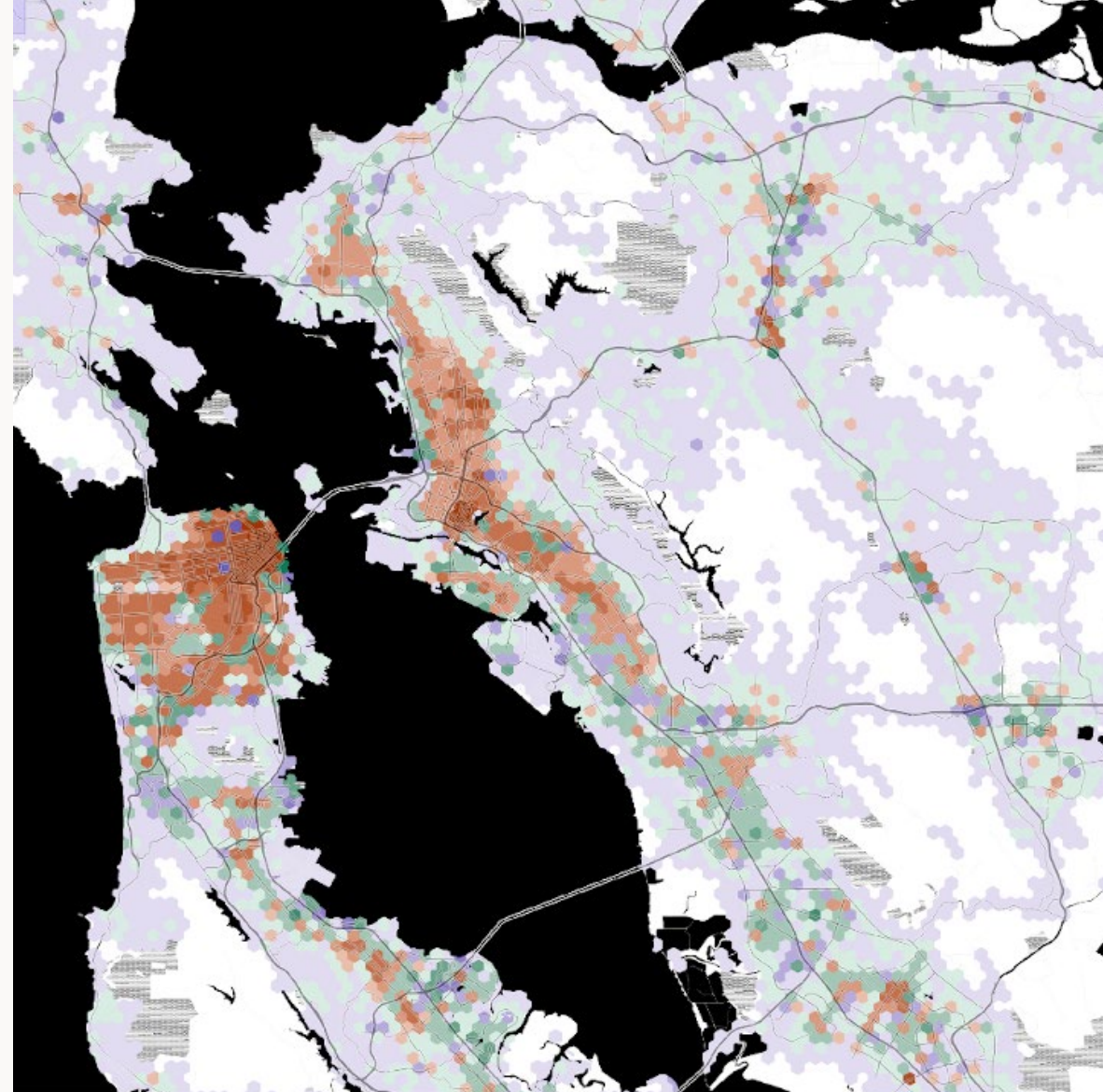
## Low Connectivity



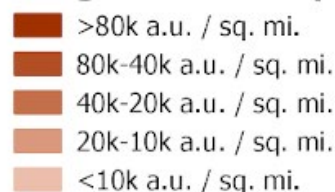
# Activity Density and Road Connectivity in San Francisco

Density of Jobs + Population

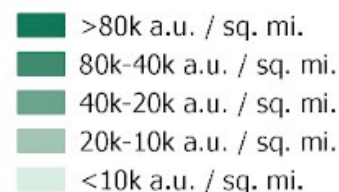
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



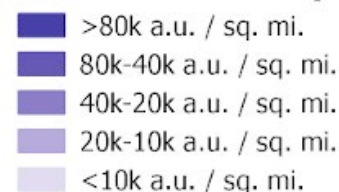
## High Connectivity



## Medium Connectivity



## Low Connectivity

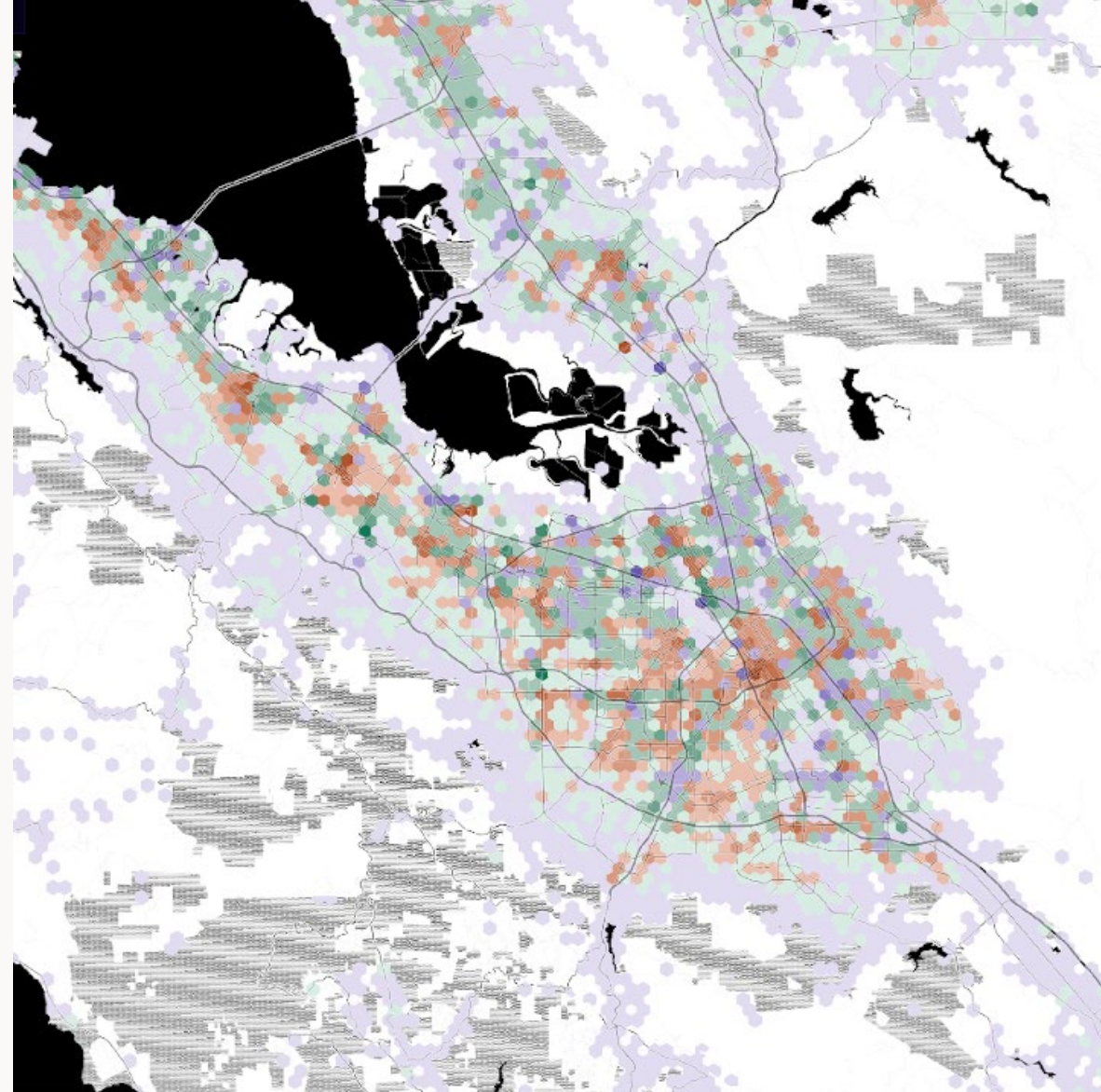




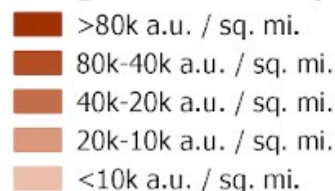
# Activity Density and Road Connectivity in San Jose

Density of Jobs + Population

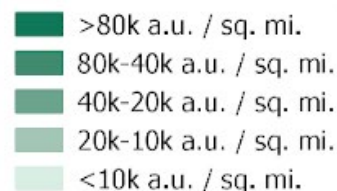
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



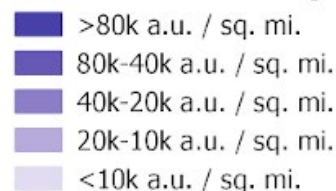
## High Connectivity



## Medium Connectivity



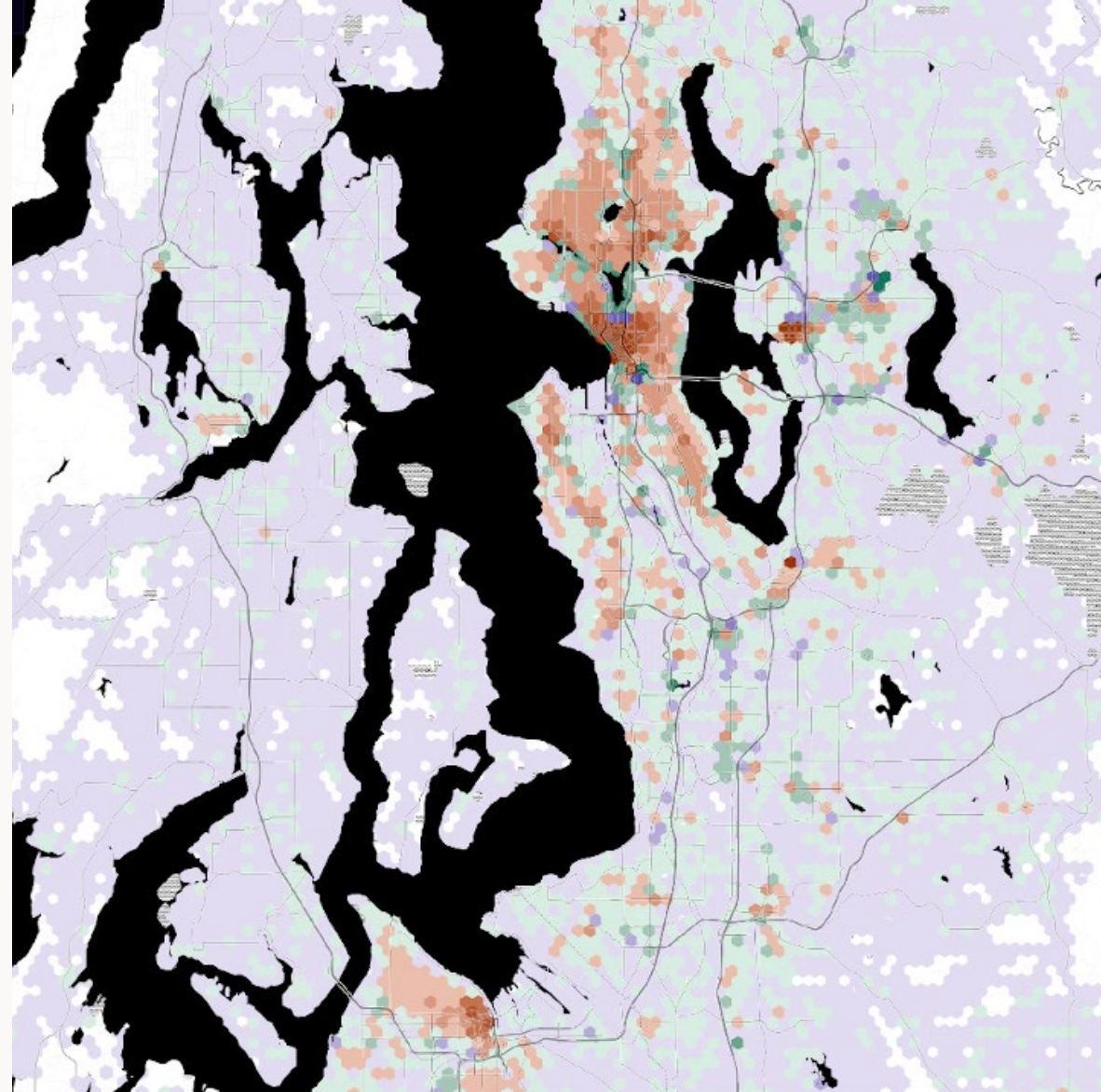
## Low Connectivity



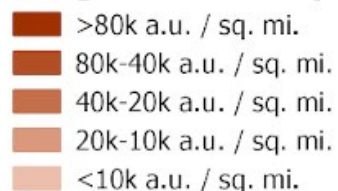
# Activity Density and Road Connectivity in Seattle

Density of Jobs + Population

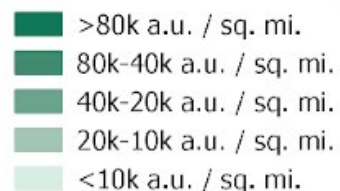
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



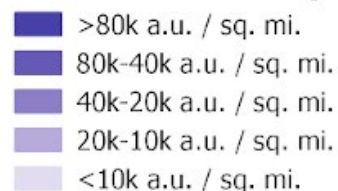
## High Connectivity



## Medium Connectivity



## Low Connectivity

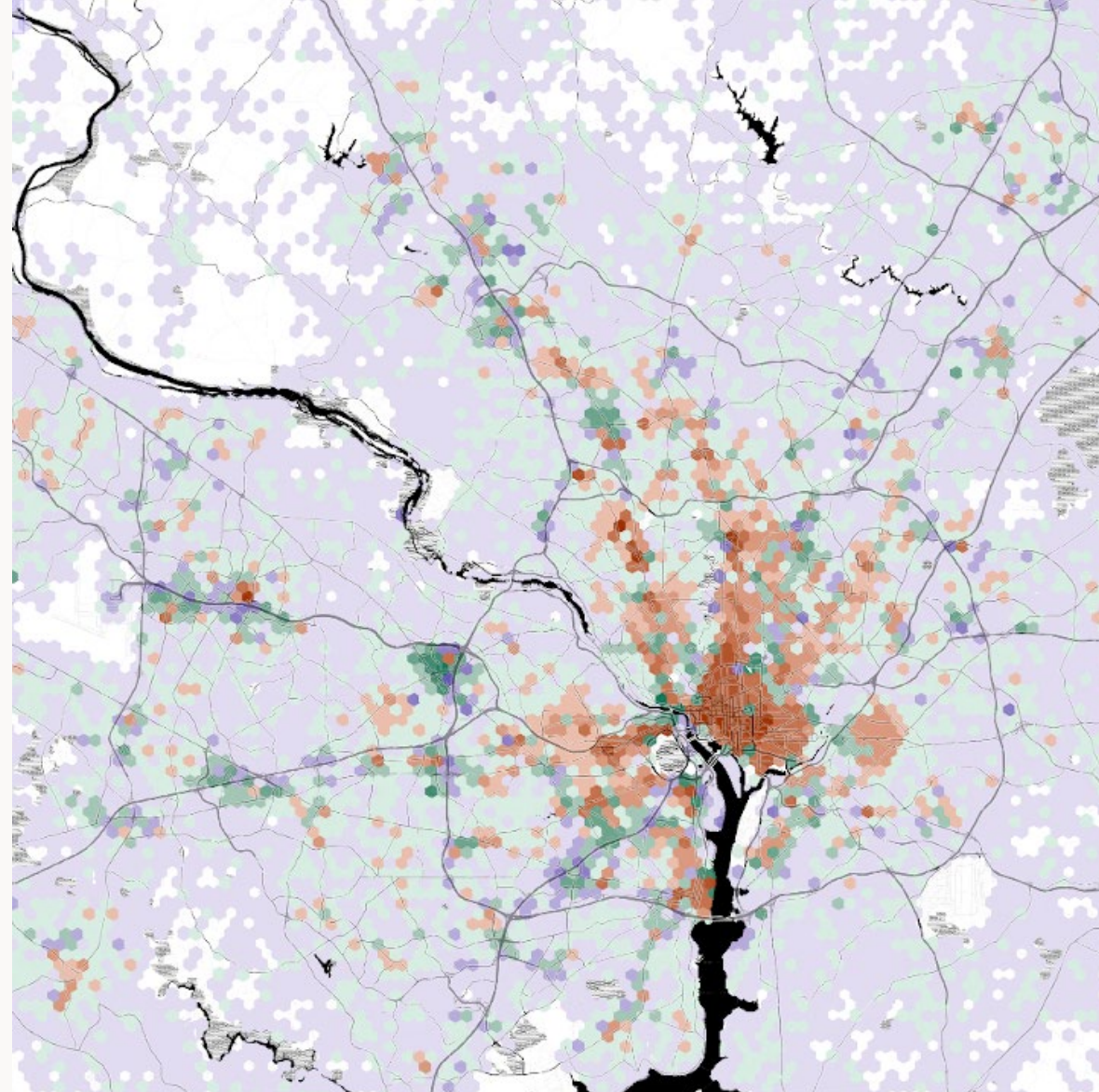




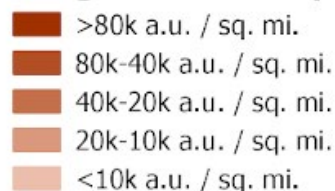
# Activity Density and Road Connectivity in Washington

Density of Jobs + Population

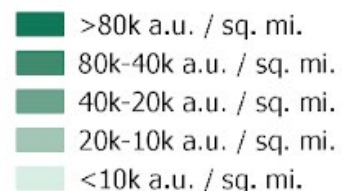
High Connectivity =  
Well-Connected Street Grid  
( > 55% Ideal Walkshed )



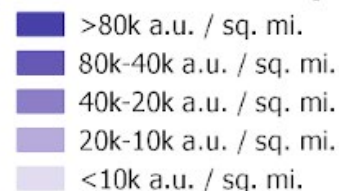
## High Connectivity



## Medium Connectivity



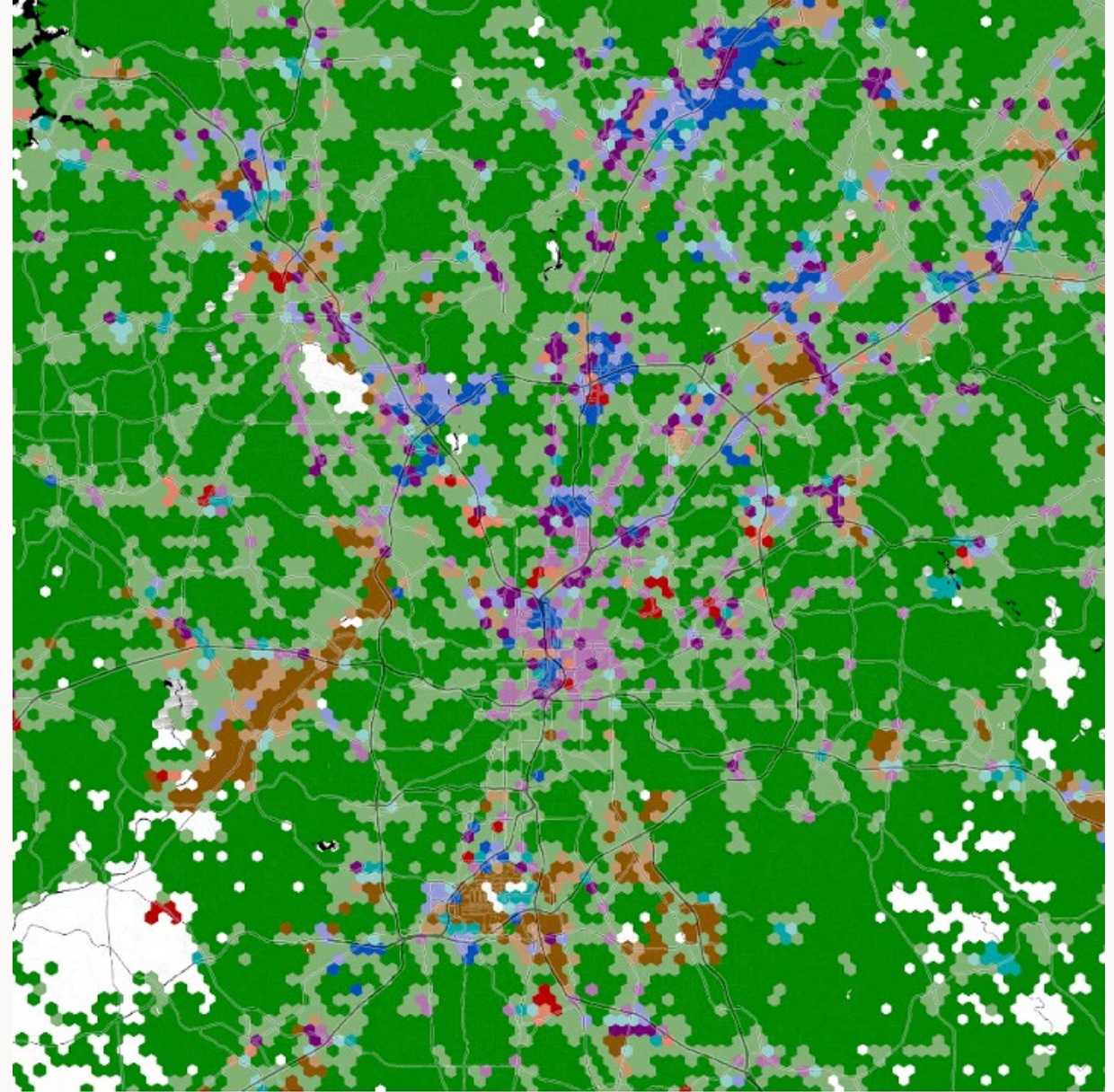
## Low Connectivity





Use Type  
Maps

# Land Use Types in Atlanta



## Land Use Type

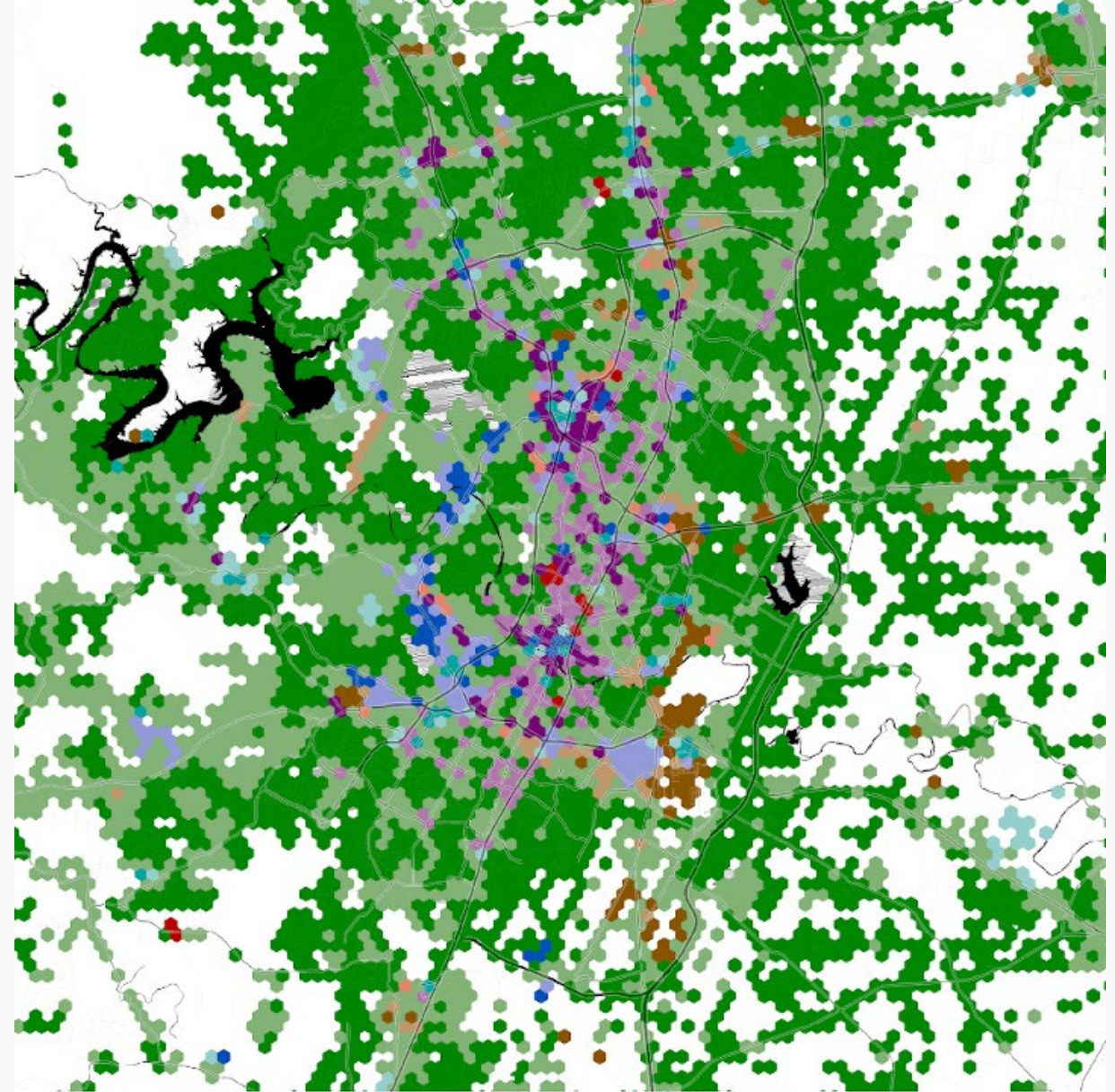
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Austin



## Land Use Type

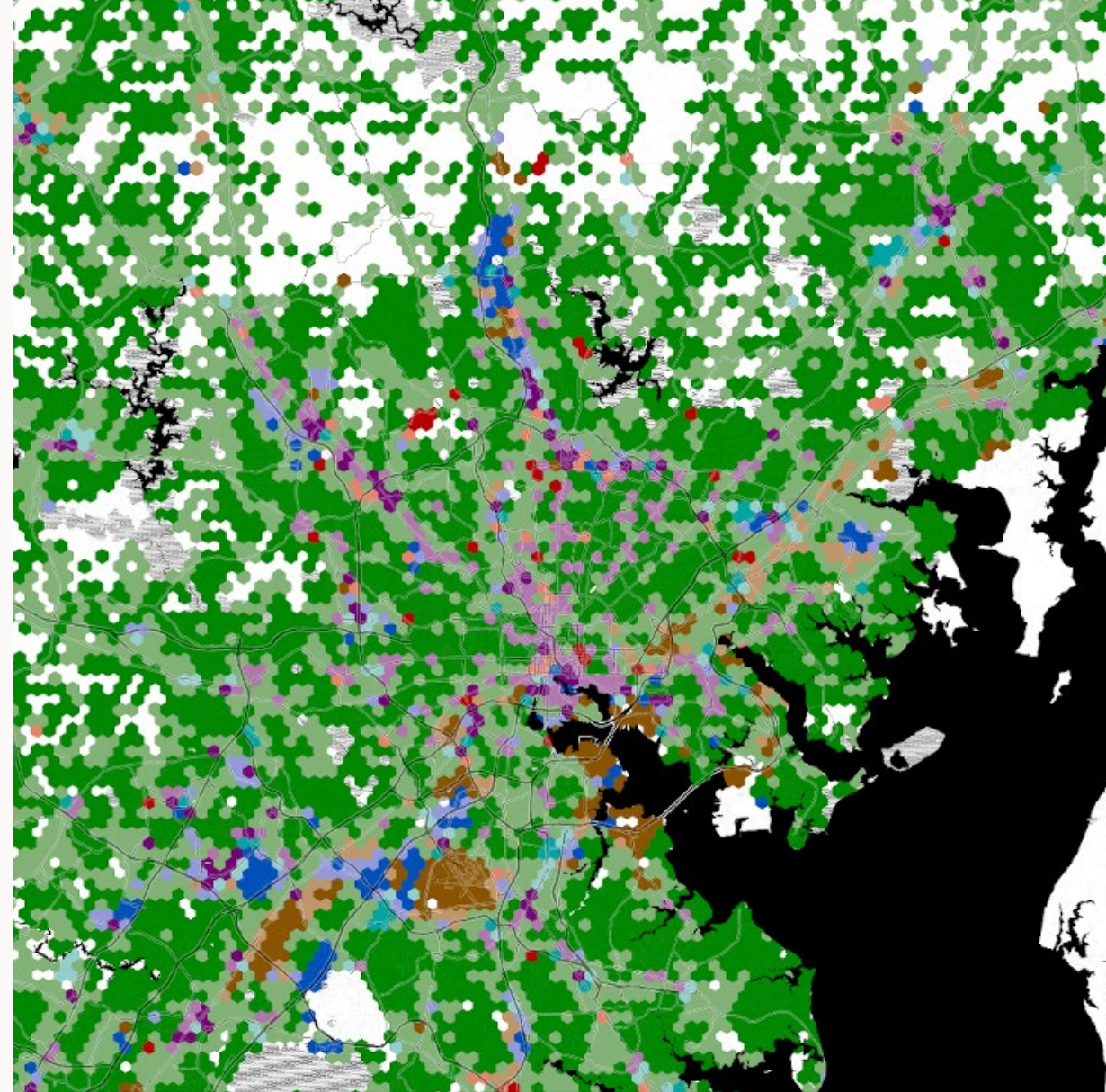
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Baltimore



## Land Use Type

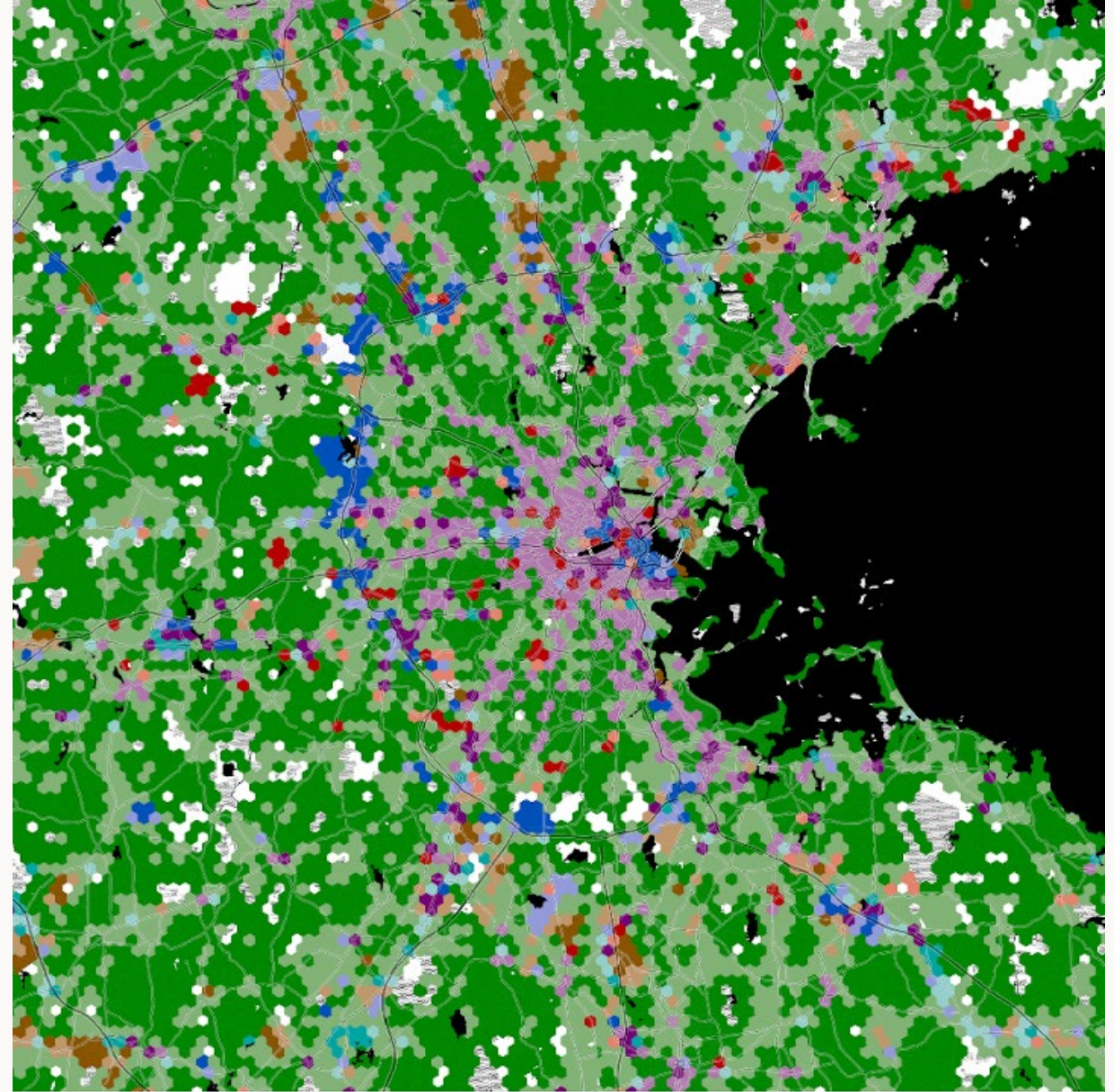
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Boston



## Land Use Type

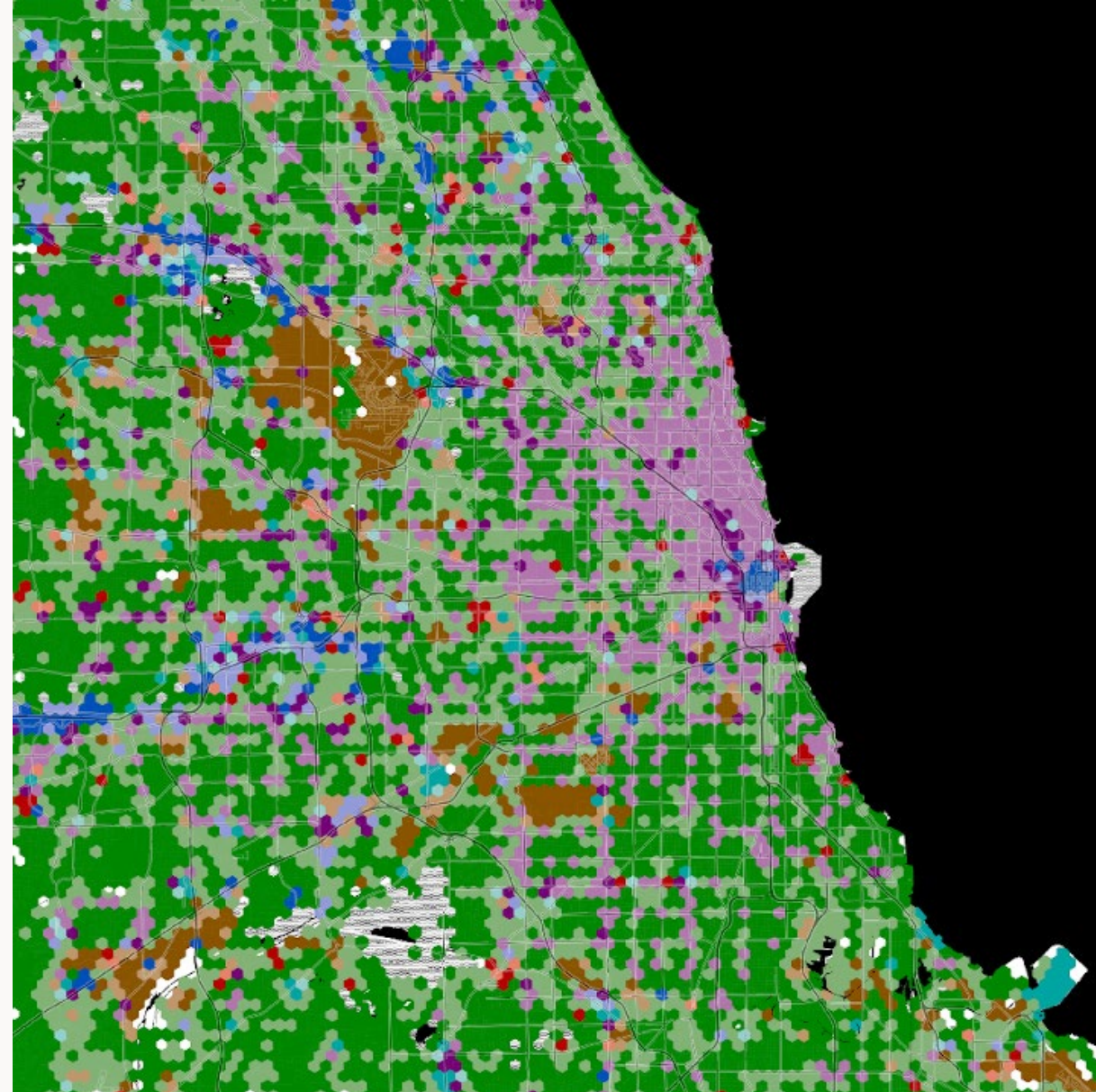
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Chicago



## Land Use Type

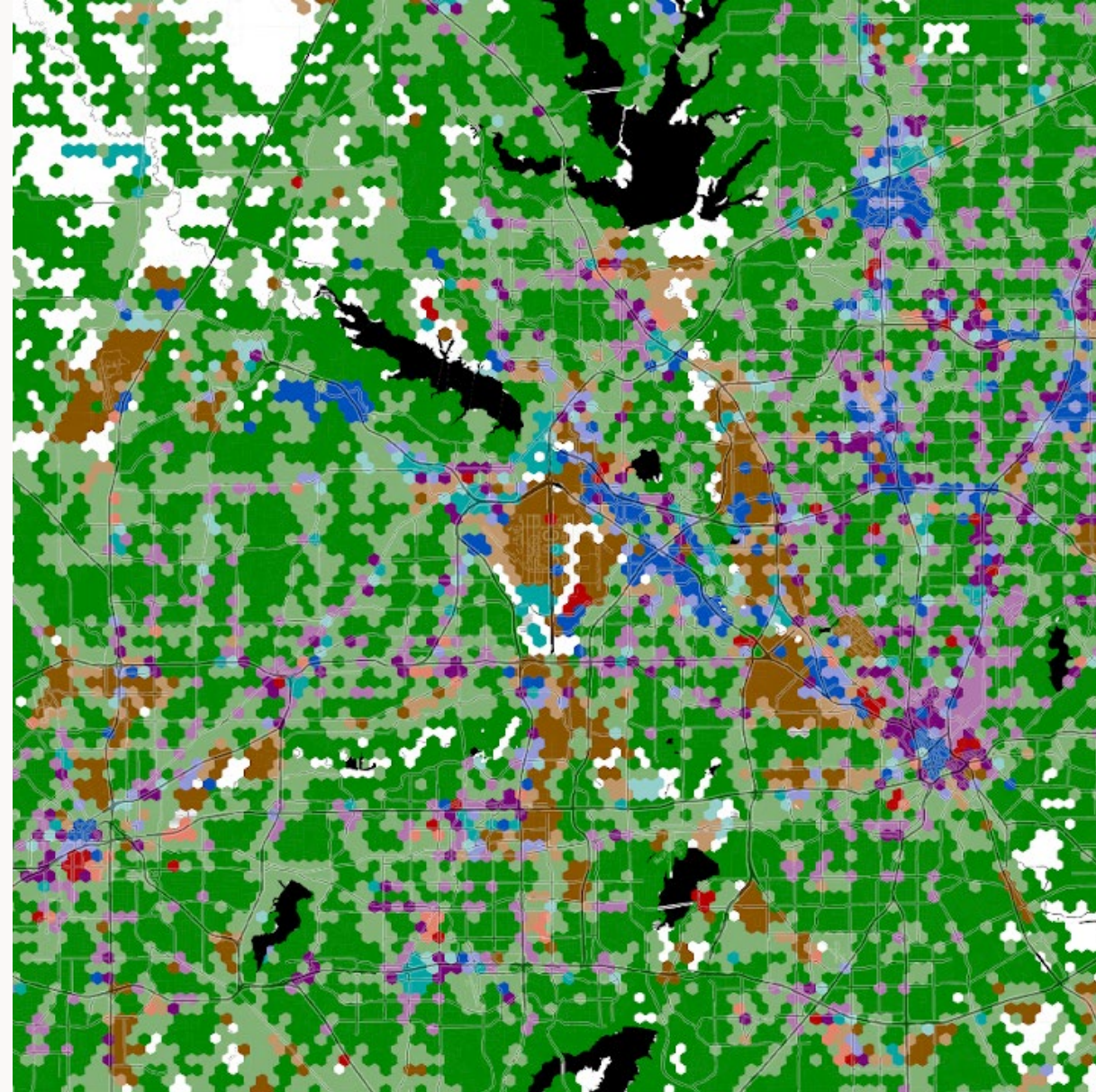
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial

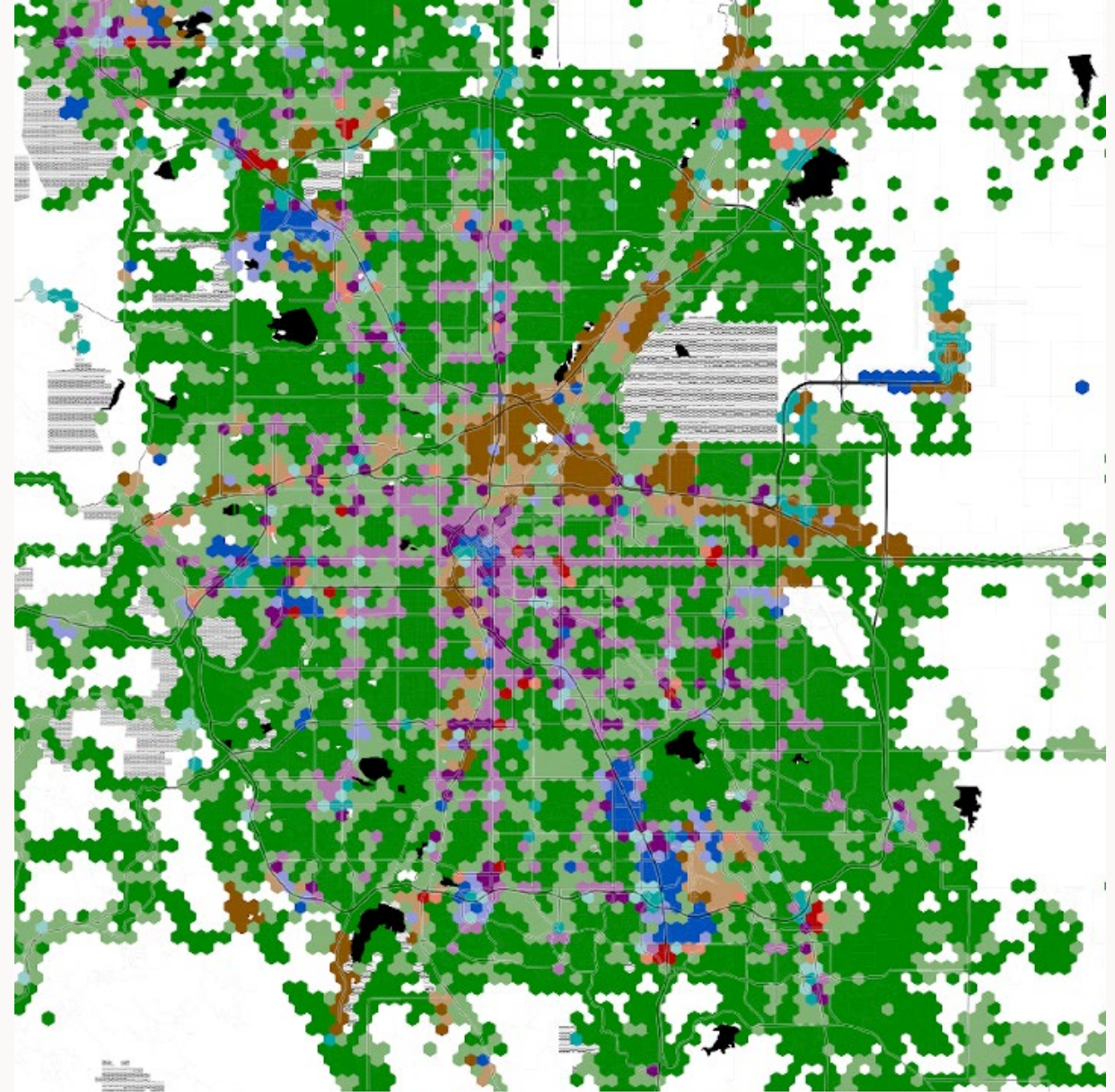


# Land Use Types in Dallas





# Land Use Types in Denver



## Land Use Type

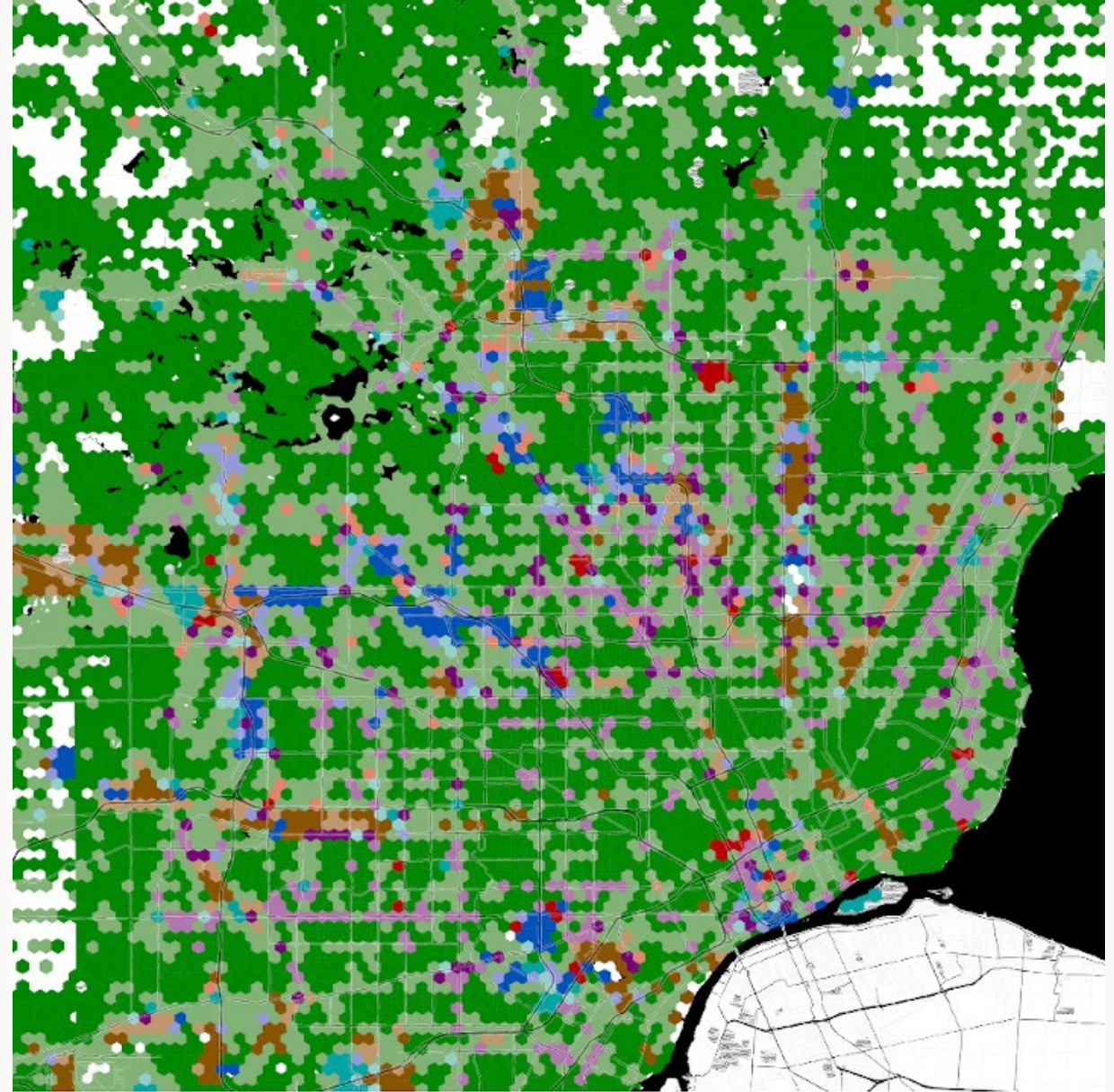
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Detroit



## Land Use Type

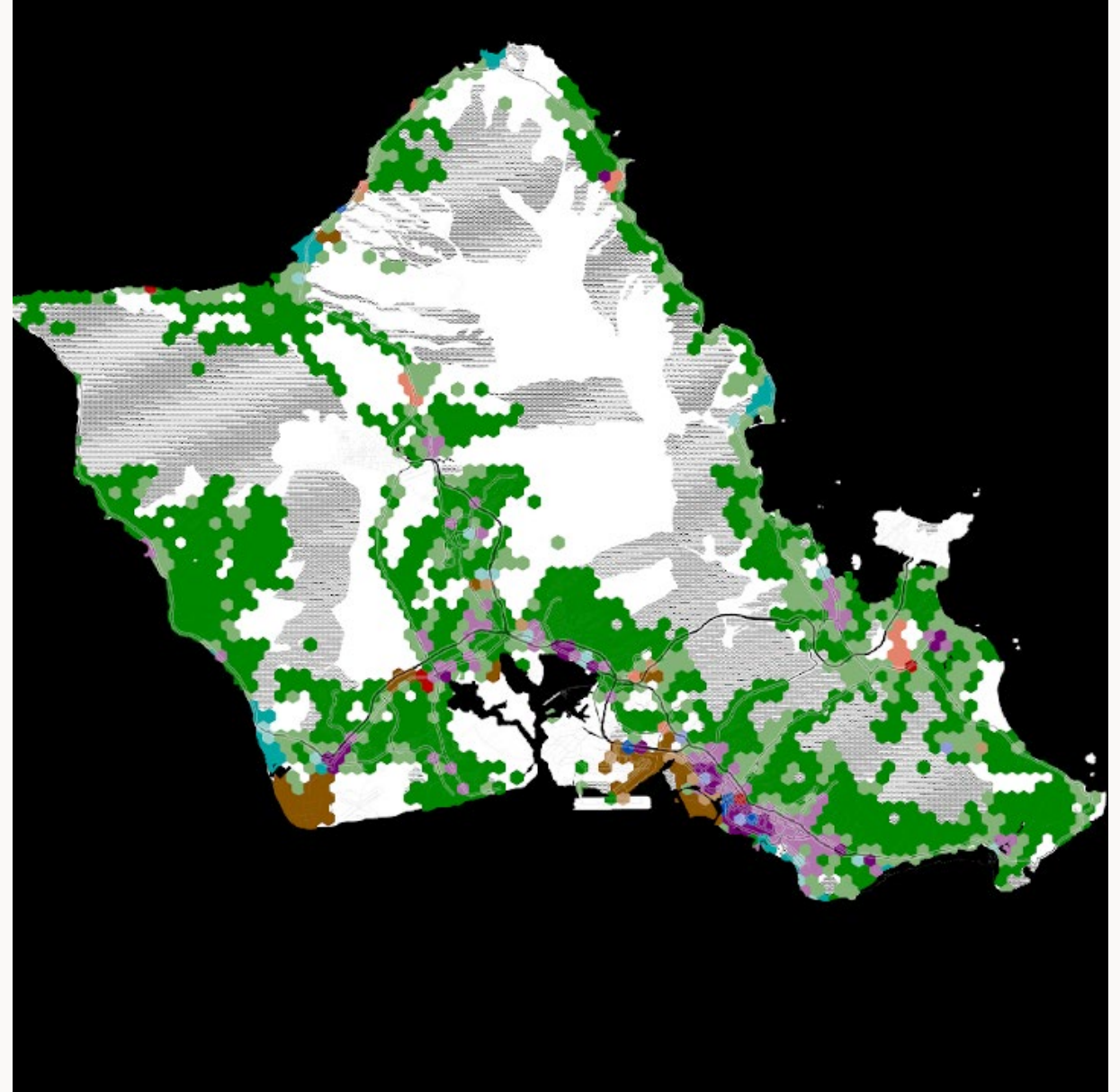
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Honolulu



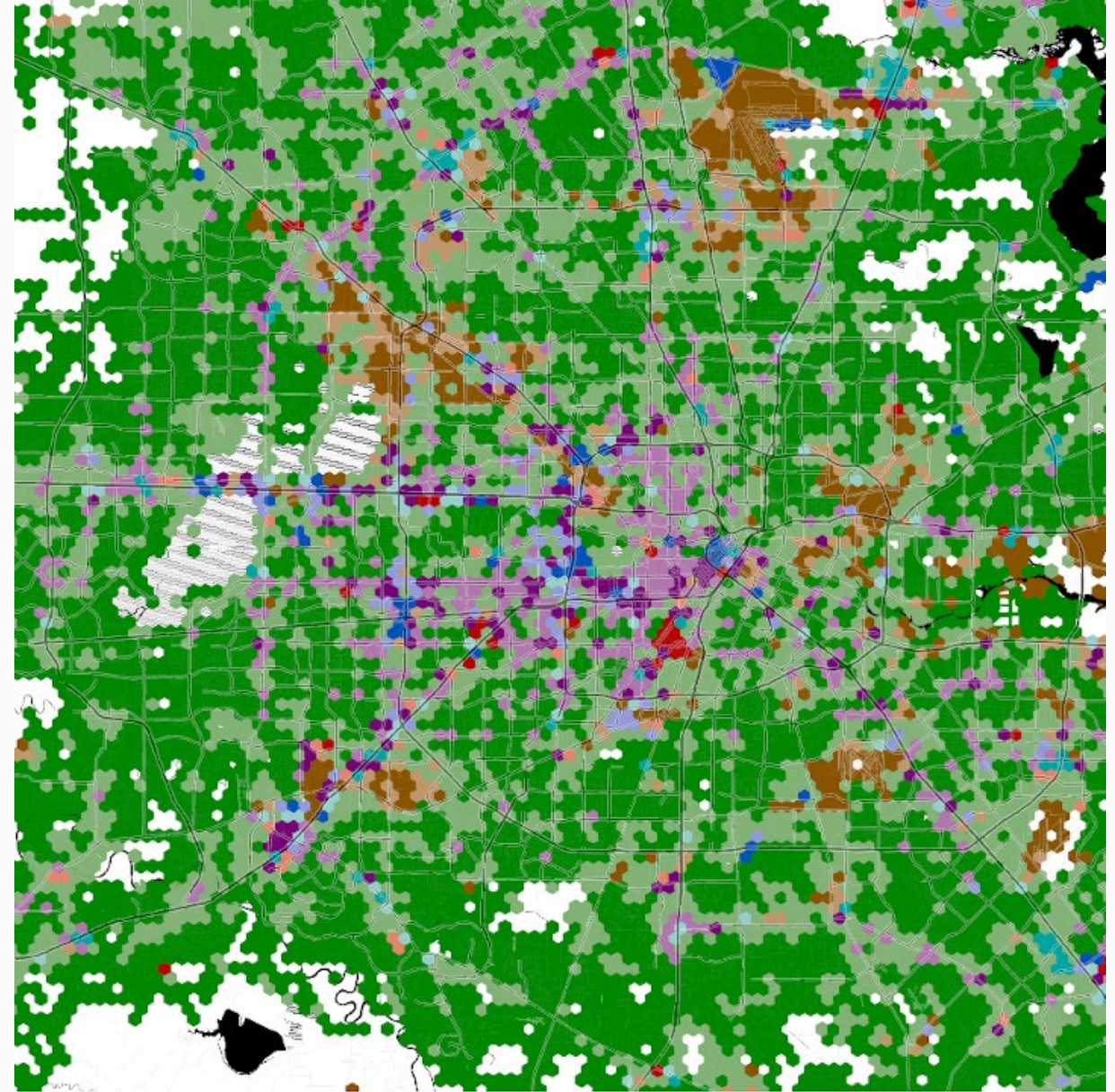
## Land Use Type

- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial

# Land Use Types in Houston



## Land Use Type

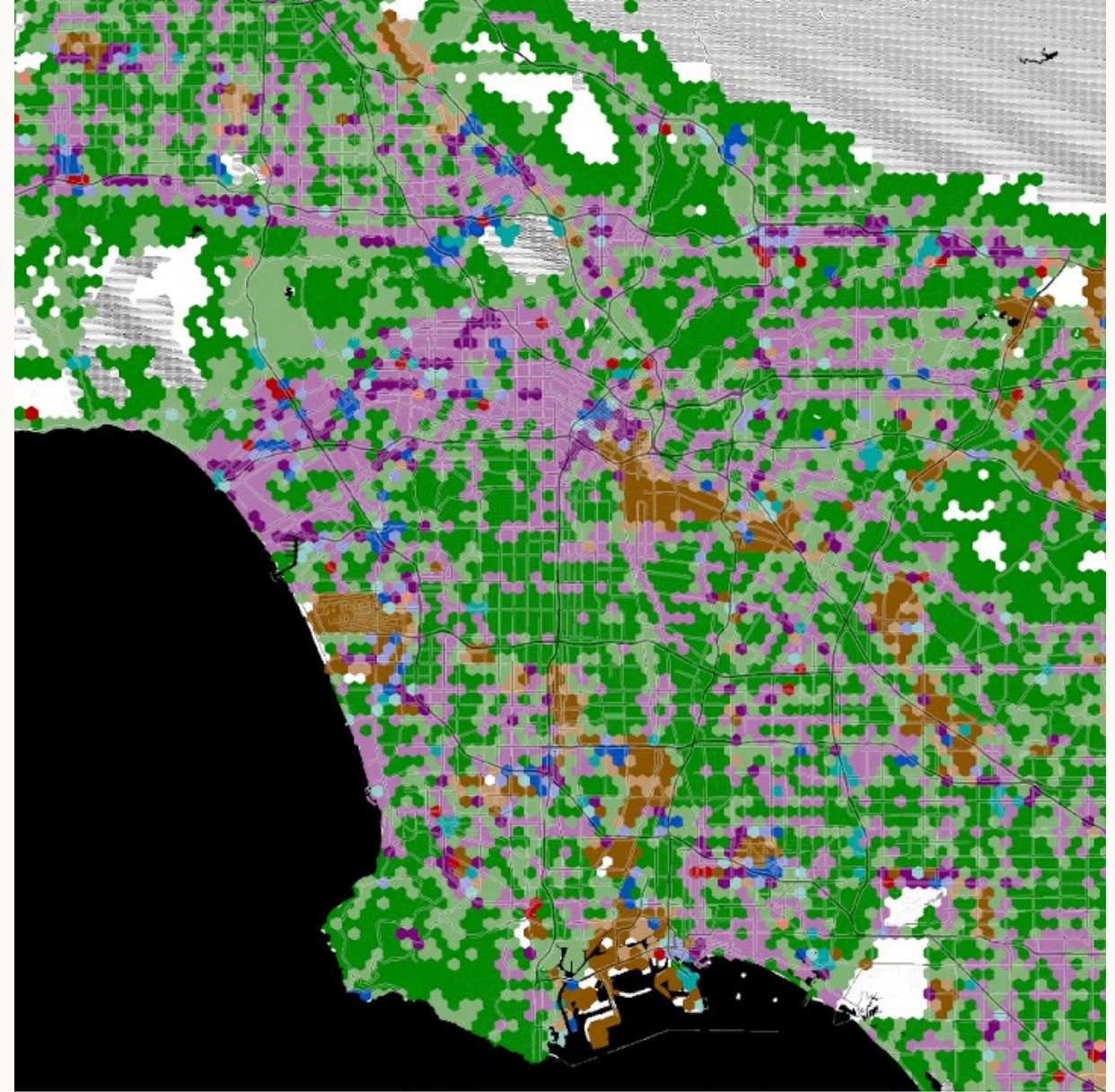
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Los Angeles



## Land Use Type

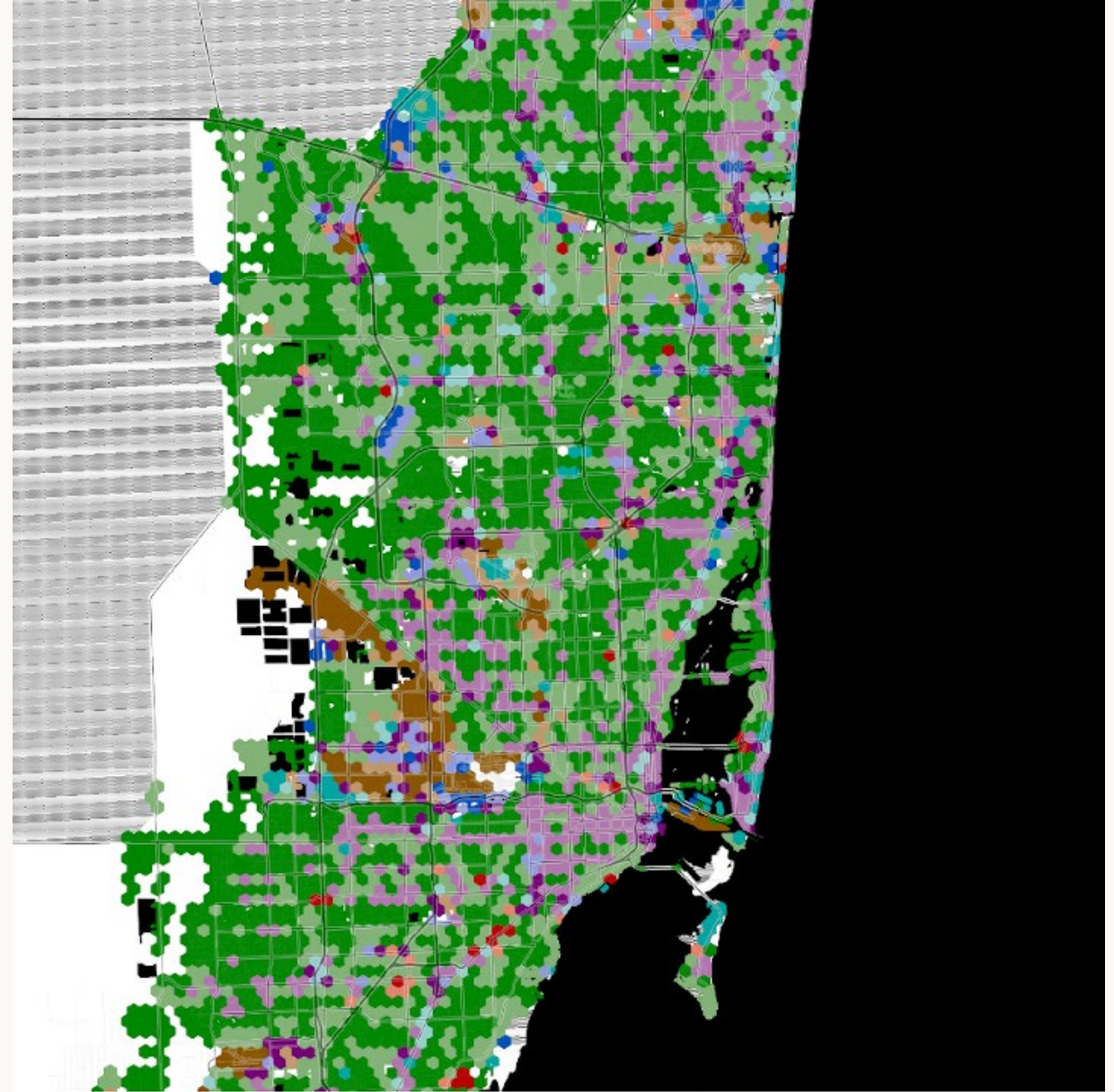
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Miami

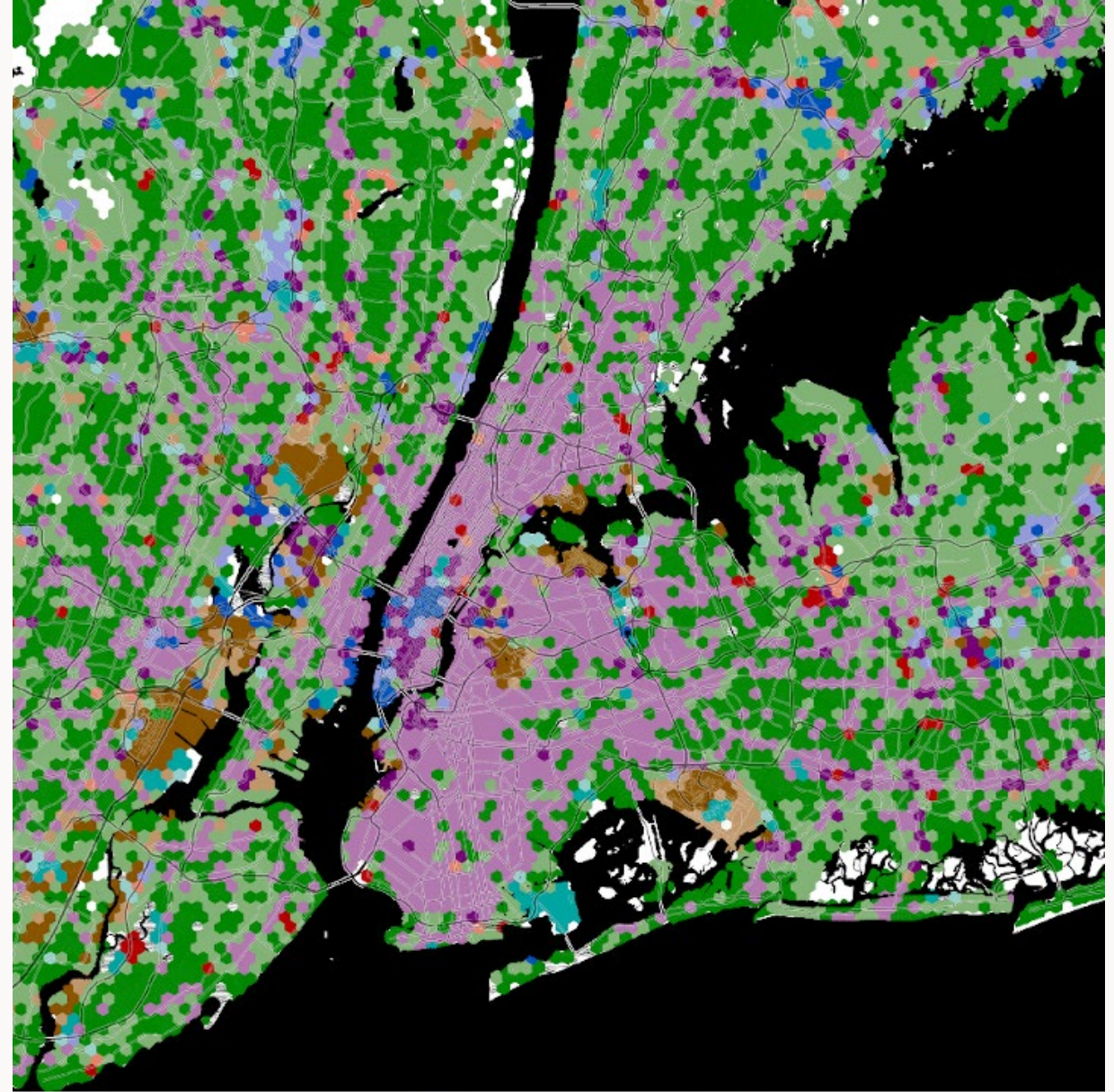


## Land Use Type

- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds
- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial

# Land Use Types in New York



## Land Use Type

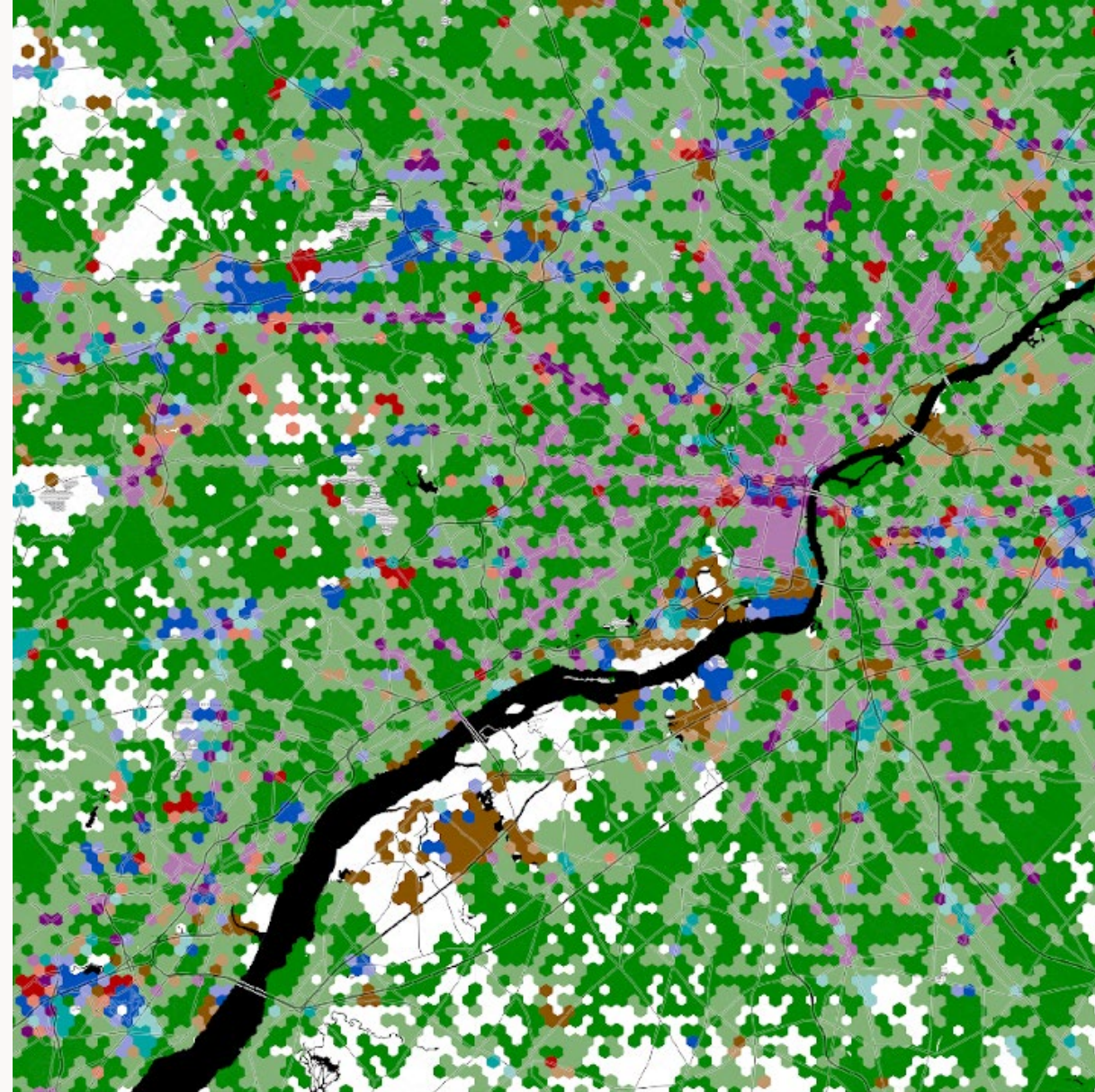
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Philadelphia



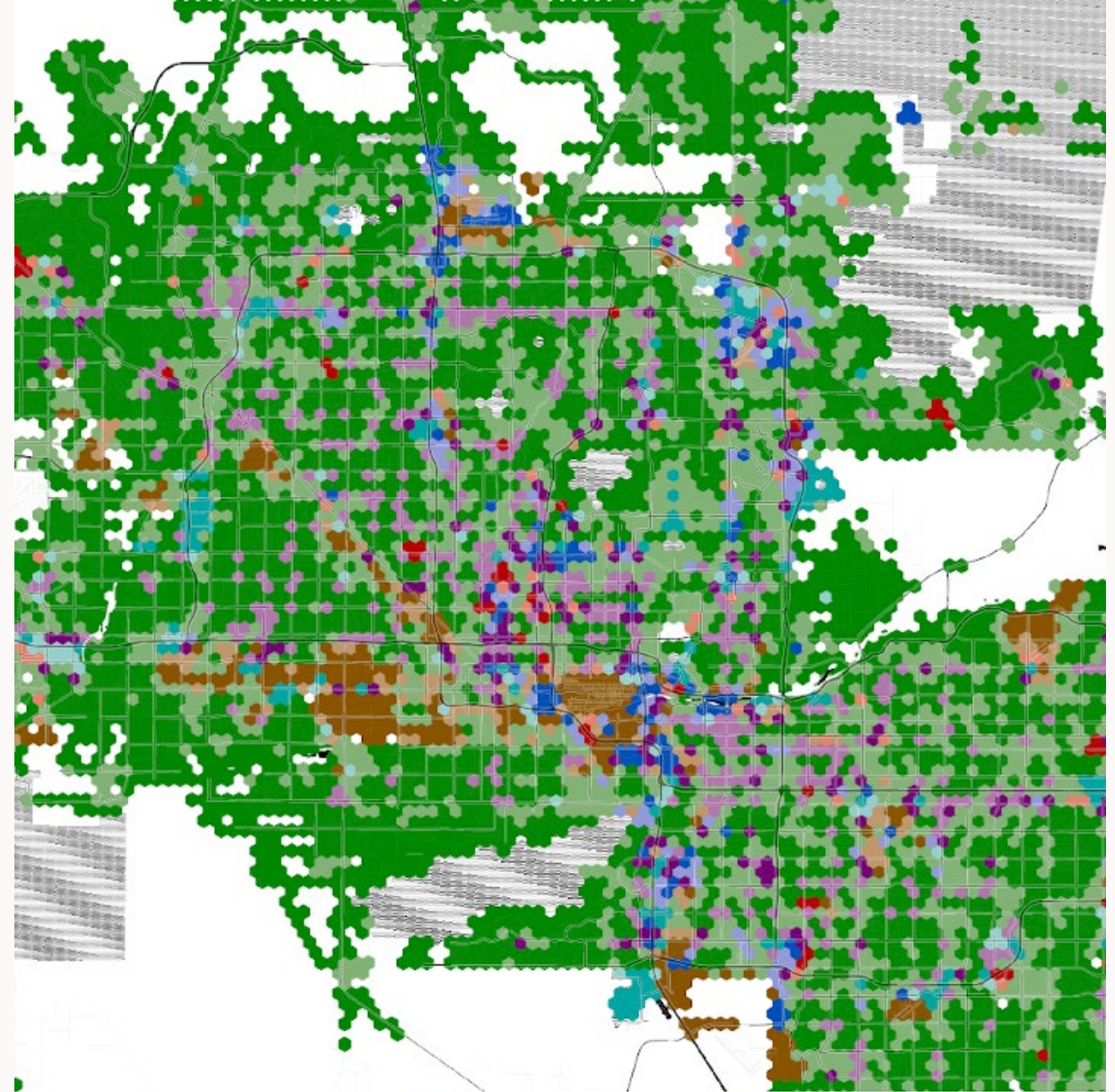
## Land Use Type

- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds
- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial

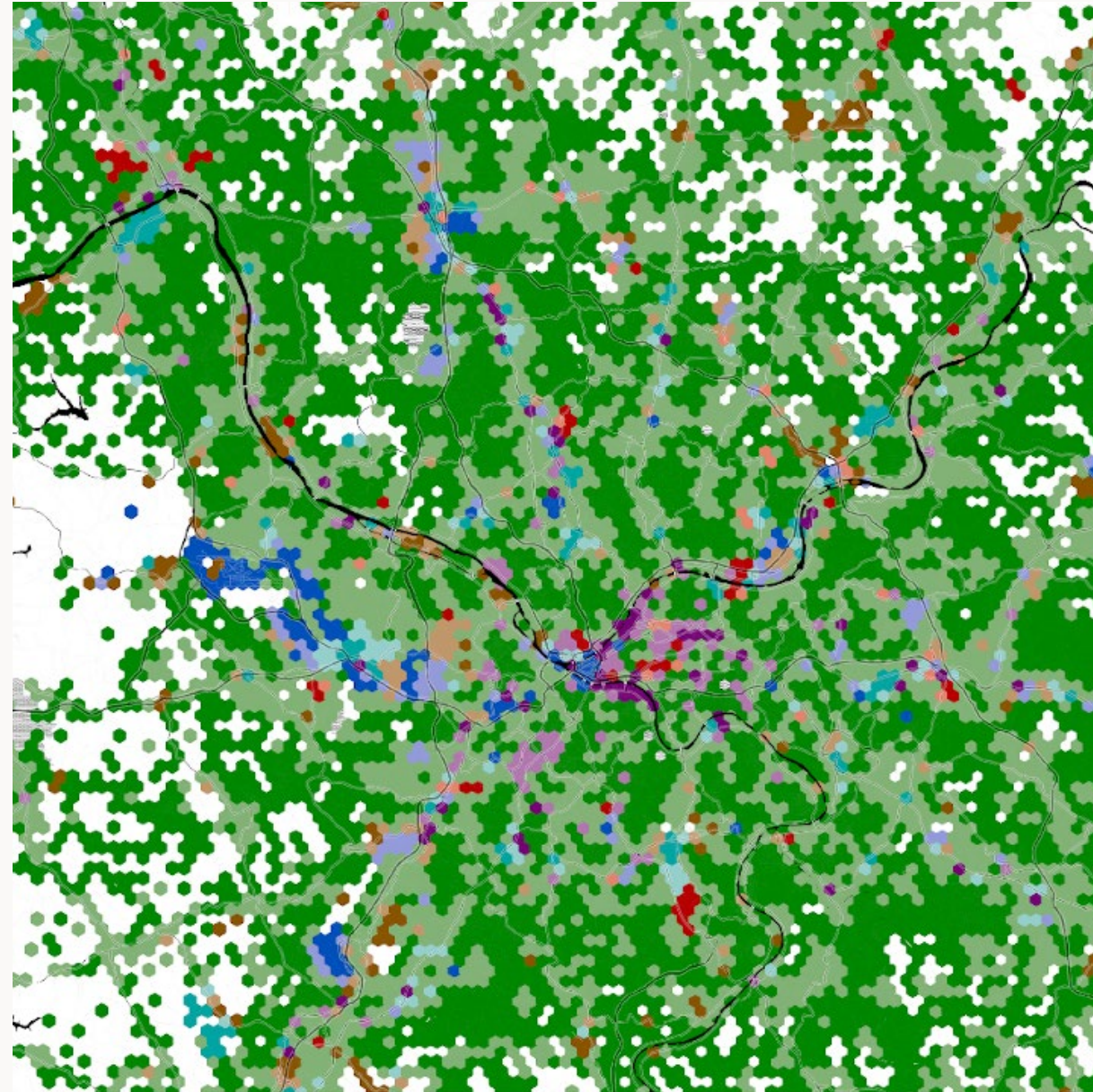


# Land Use Types in Phoenix





# Land Use Types in Pittsburgh



## Land Use Type

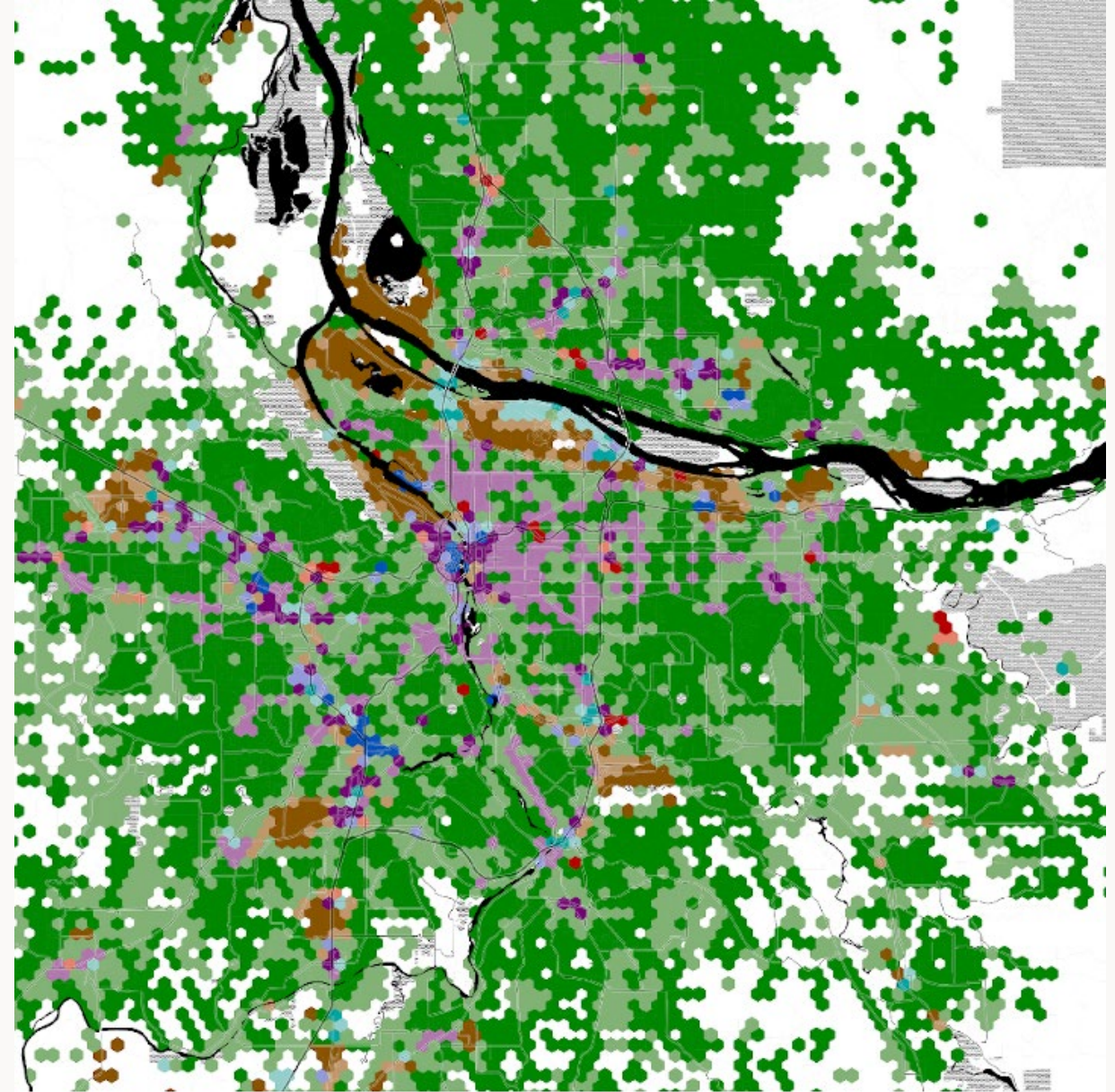
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Portland



## Land Use Type

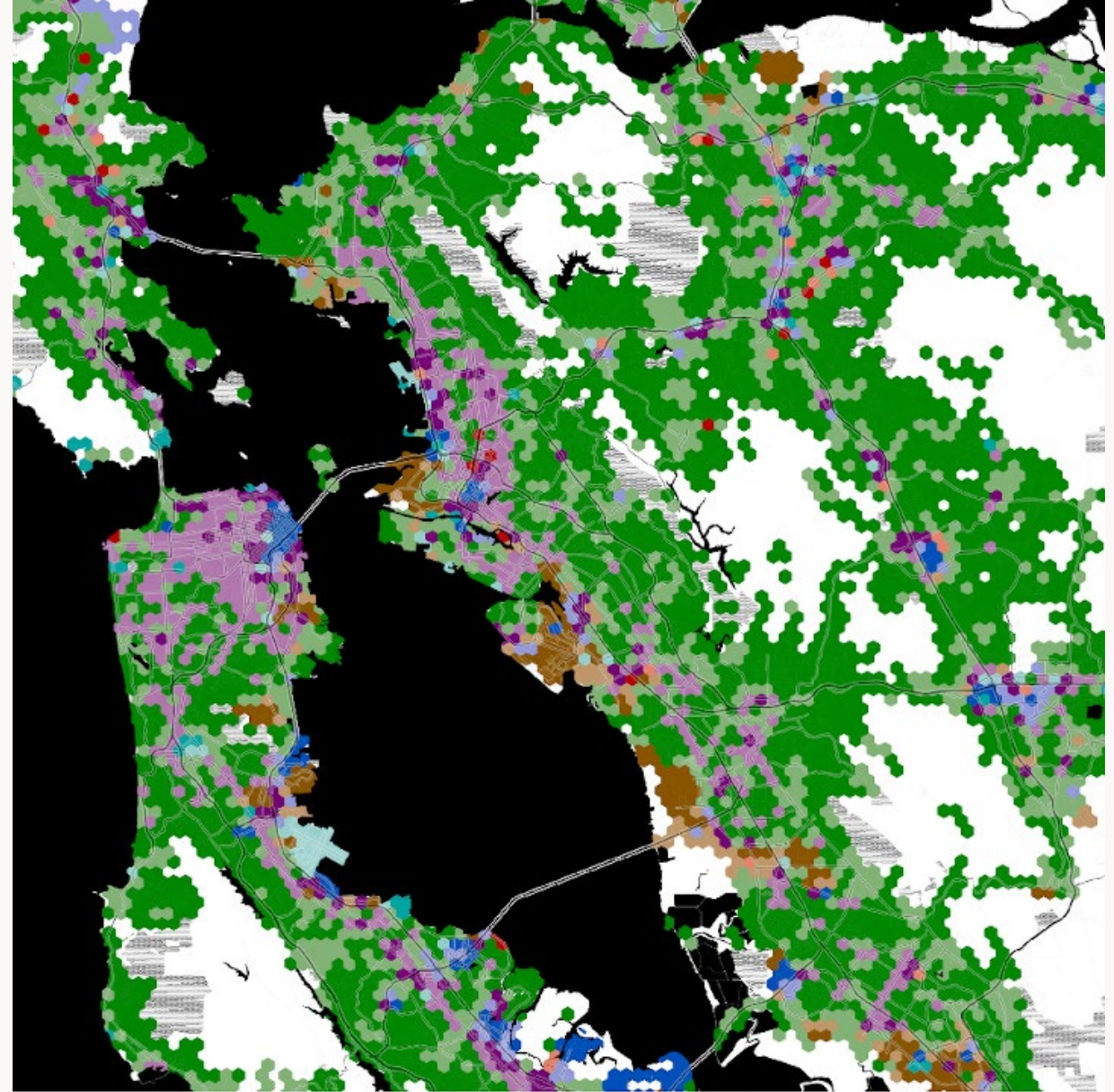
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in San Francisco



## Land Use Type

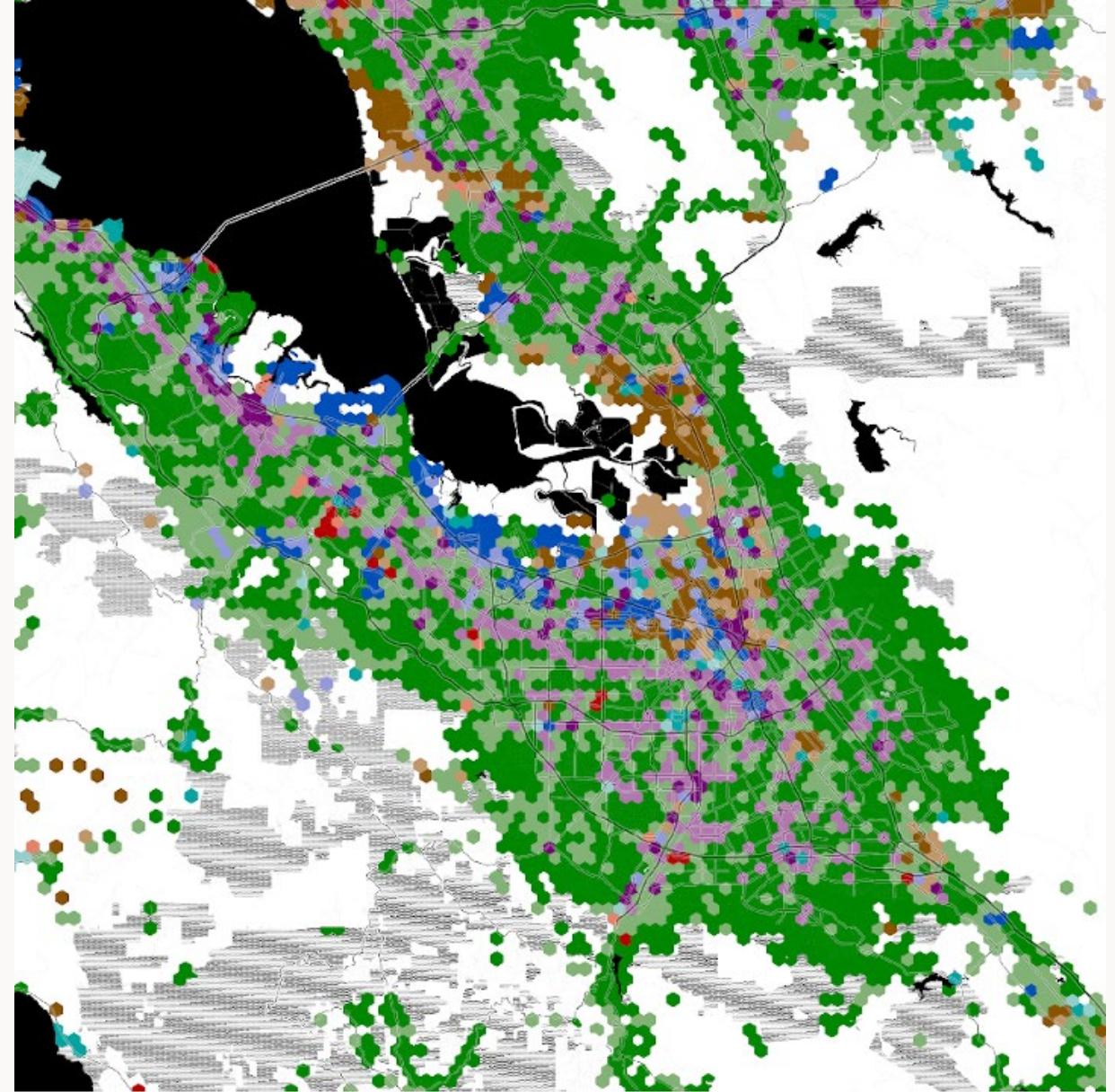
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in San Jose



## Land Use Type

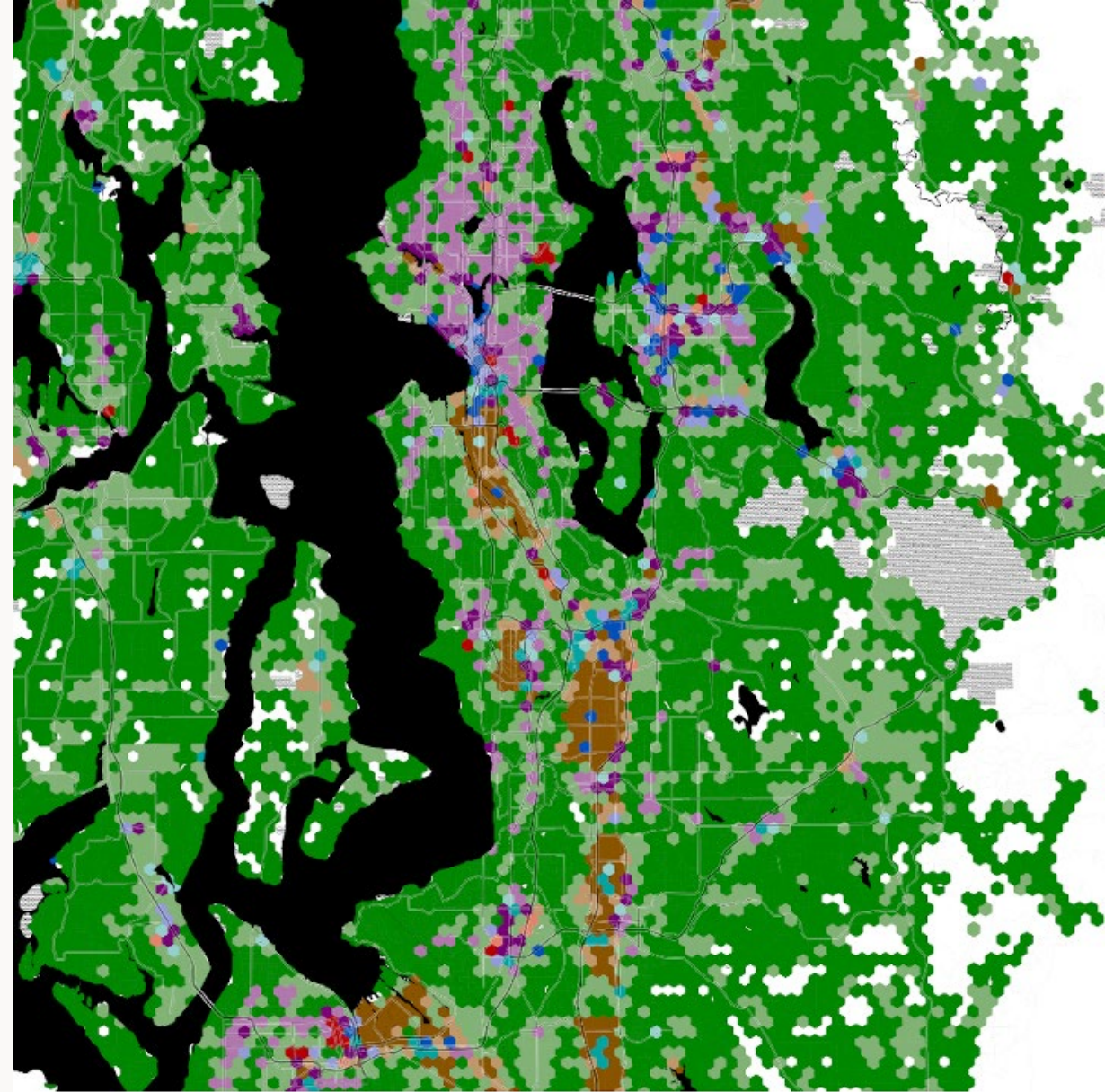
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Seattle



## Land Use Type

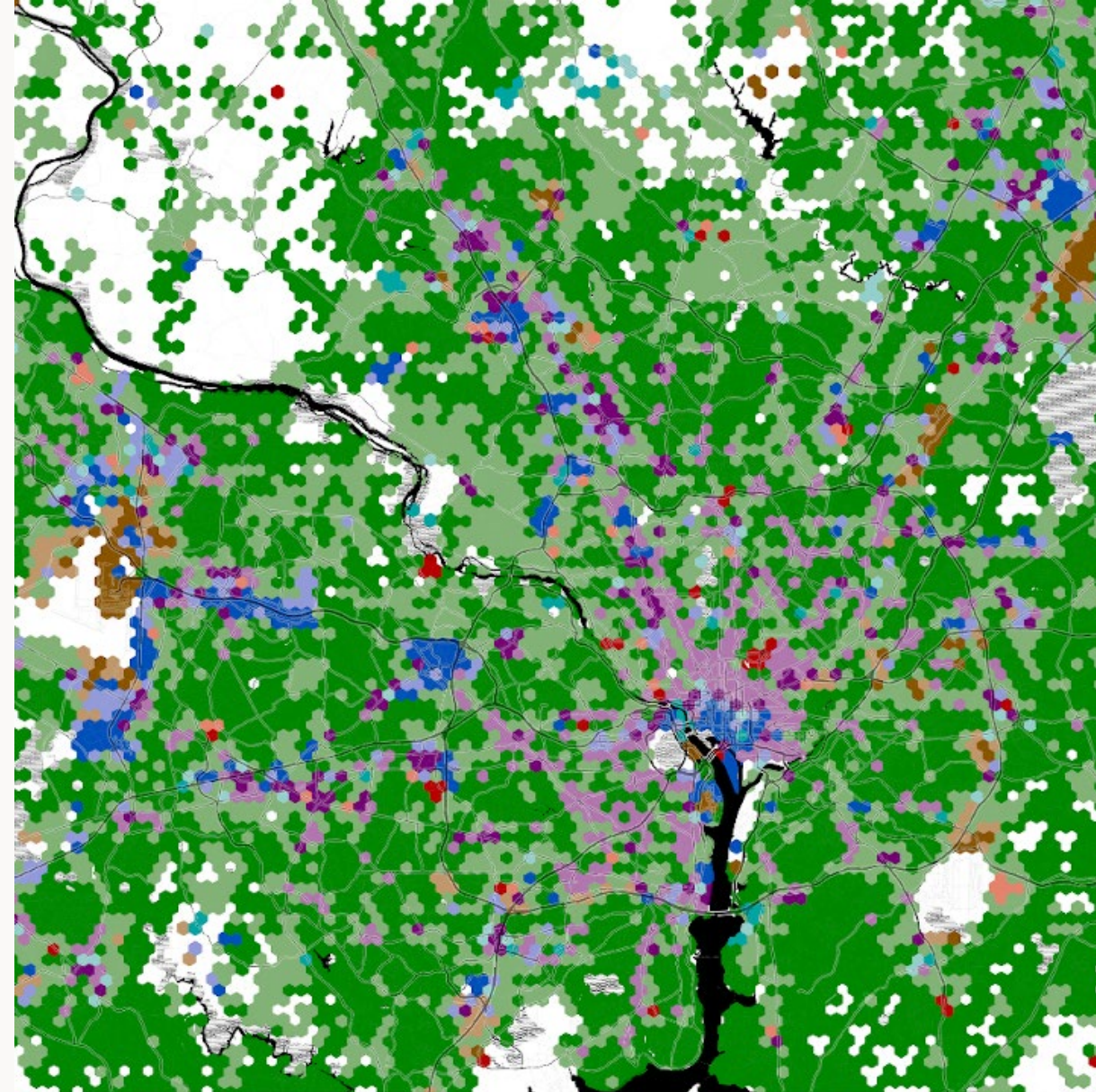
- High-Density CBD
- Pure Residential
- Residential

- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Land Use Types in Washington



## Land Use Type

- High-Density CBD
- Pure Residential
- Residential

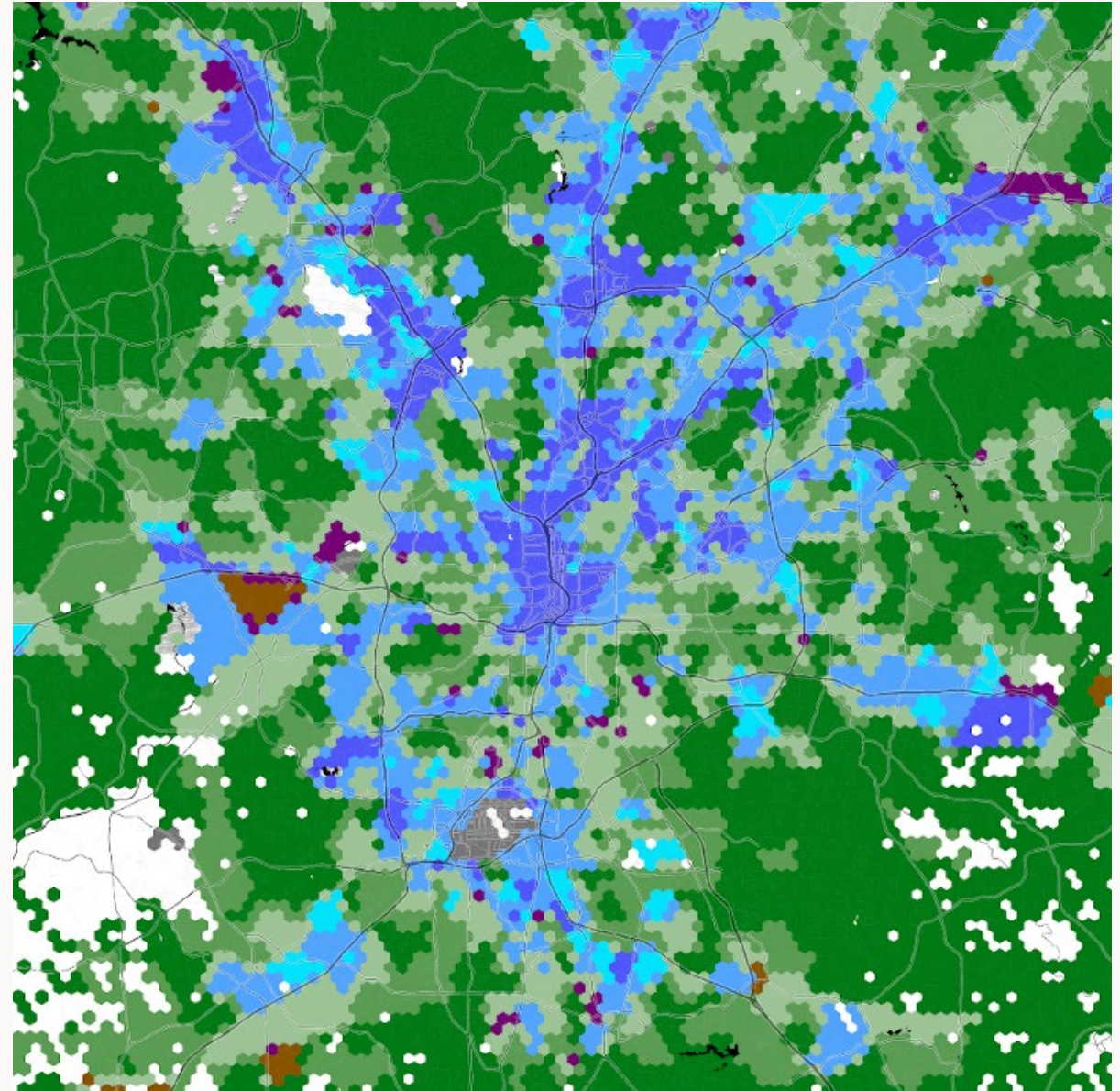
- Mixed Use
- Walkable Residential
- Retail
- Mixed Retail
- Eds/Meds

- Mixed Eds/Meds
- Office
- Mixed Office
- Industrial
- Mixed Industrial



# Housing Type Maps

# Housing Types in Atlanta



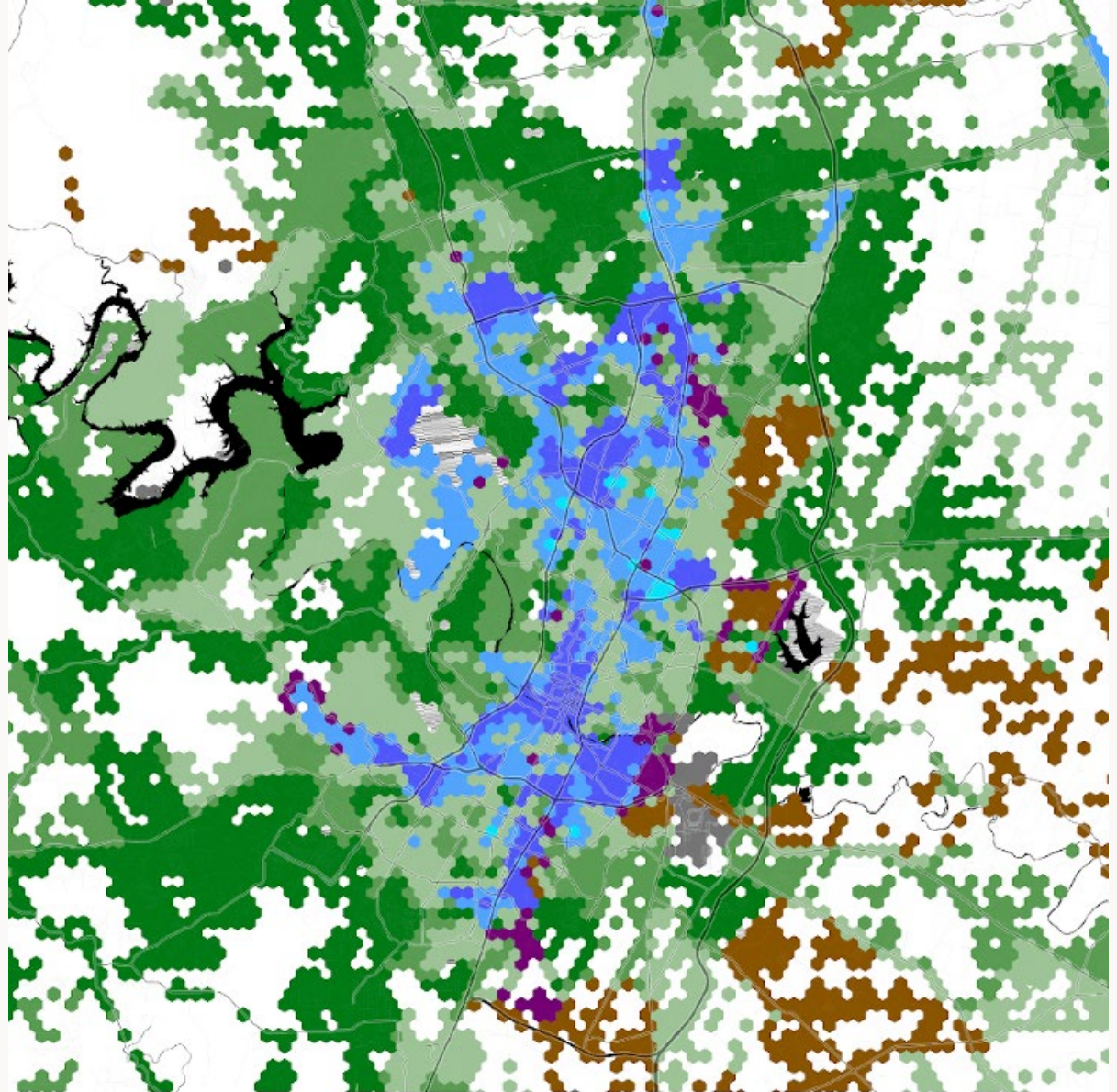
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Austin



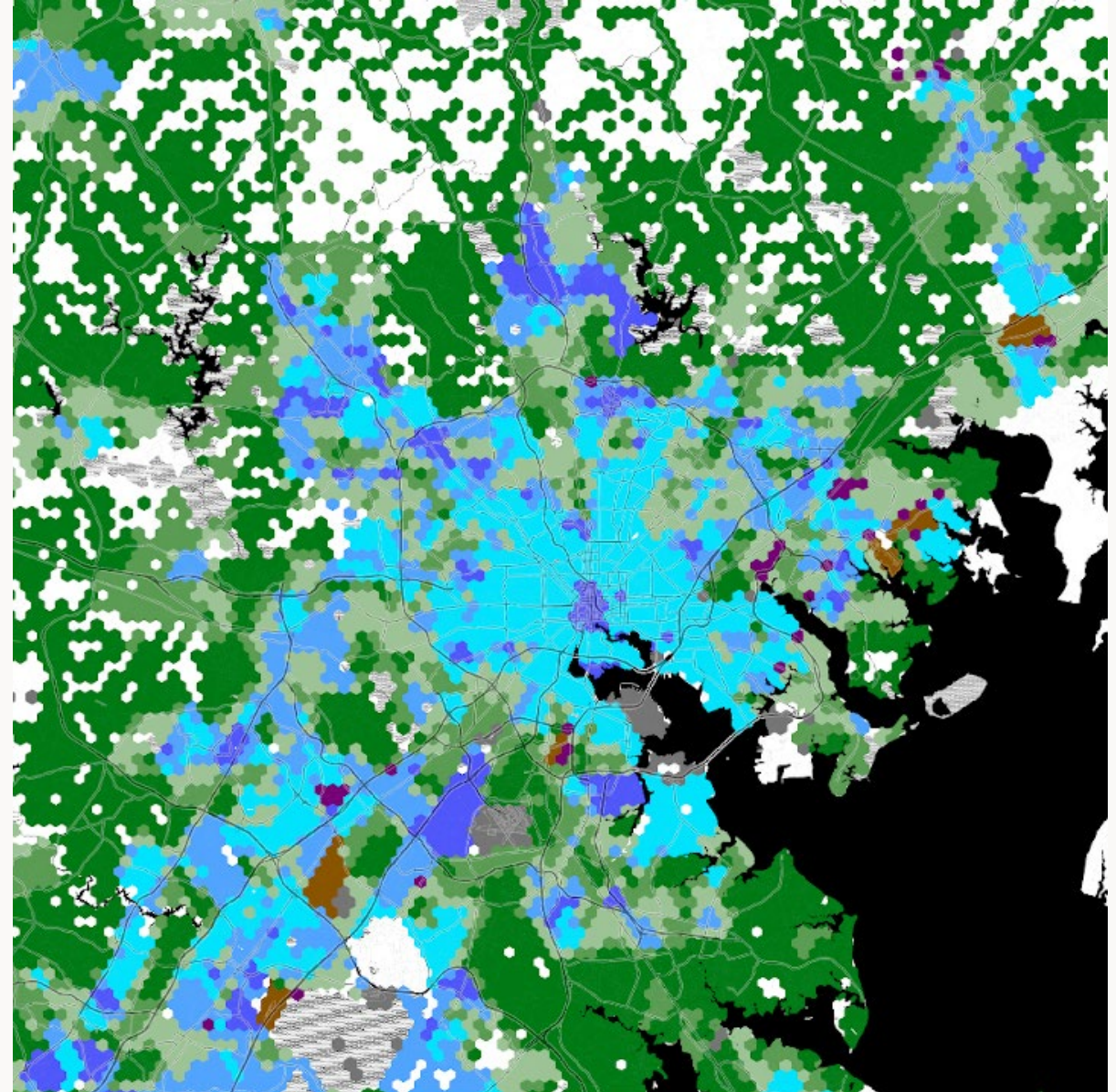
## Housing Type

- > 90% Single-Family Homes
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- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Baltimore



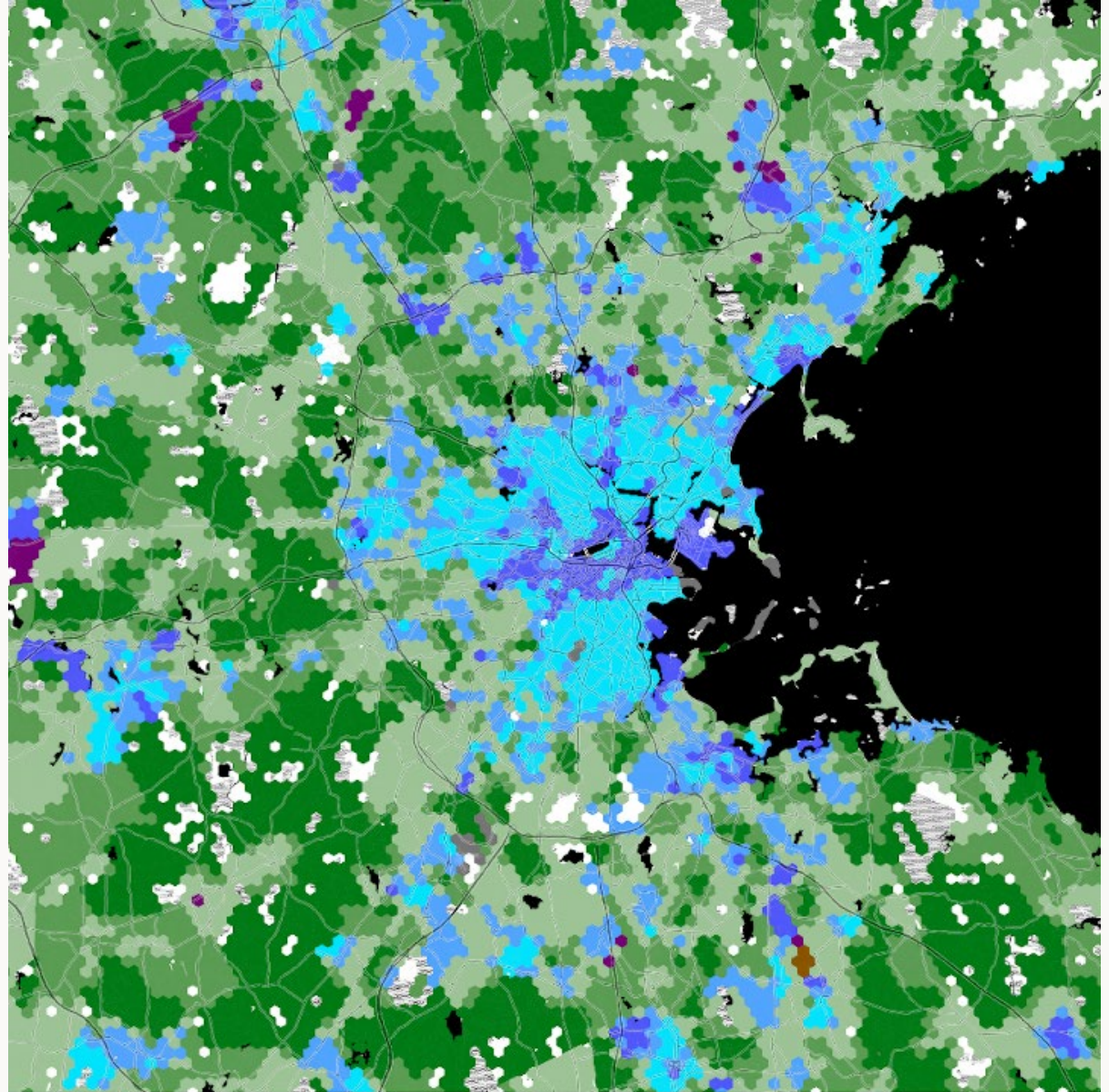
## Housing Type

- > 90% Single-Family Homes
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- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Boston

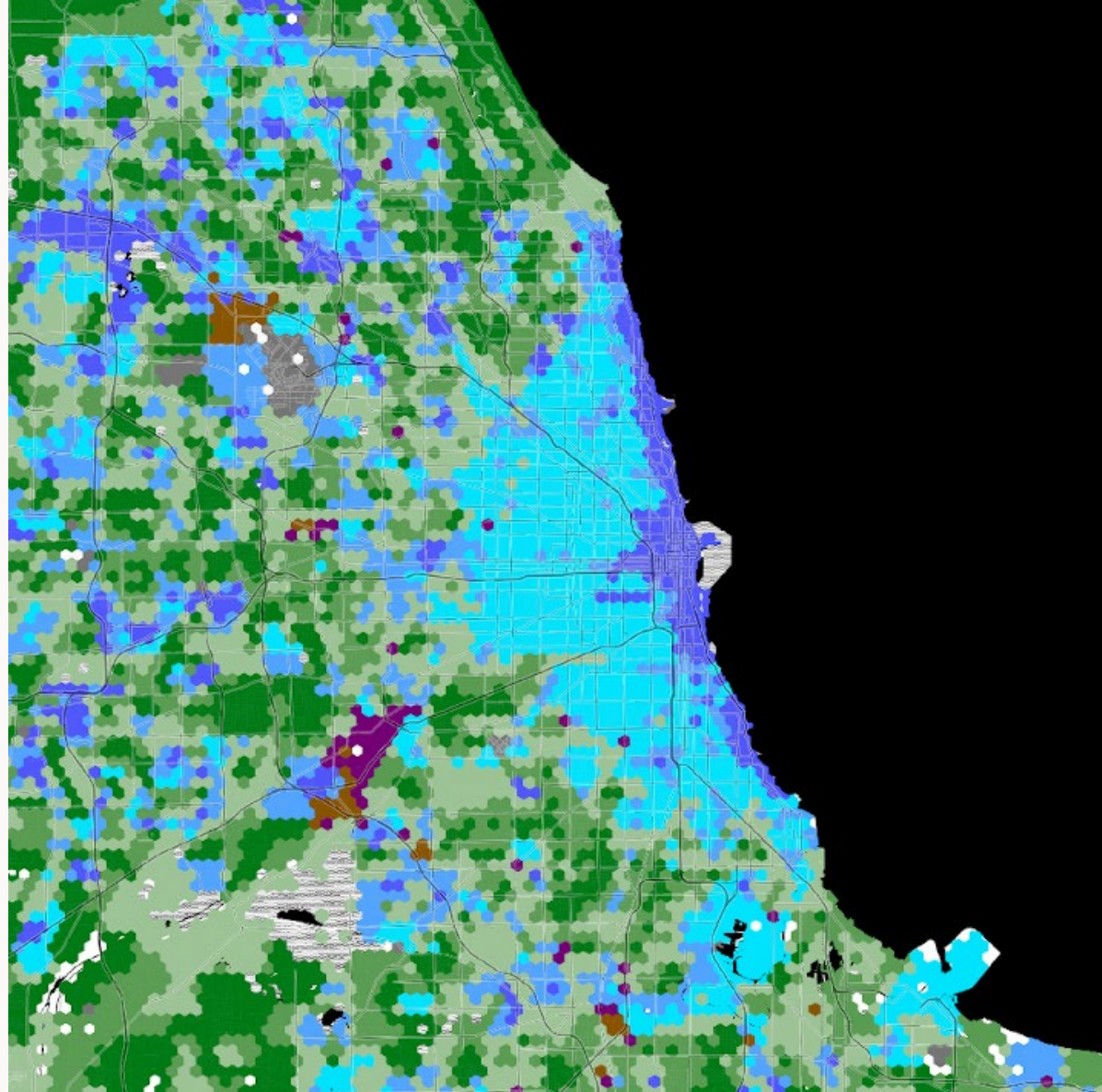


## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data

# Housing Types in Chicago



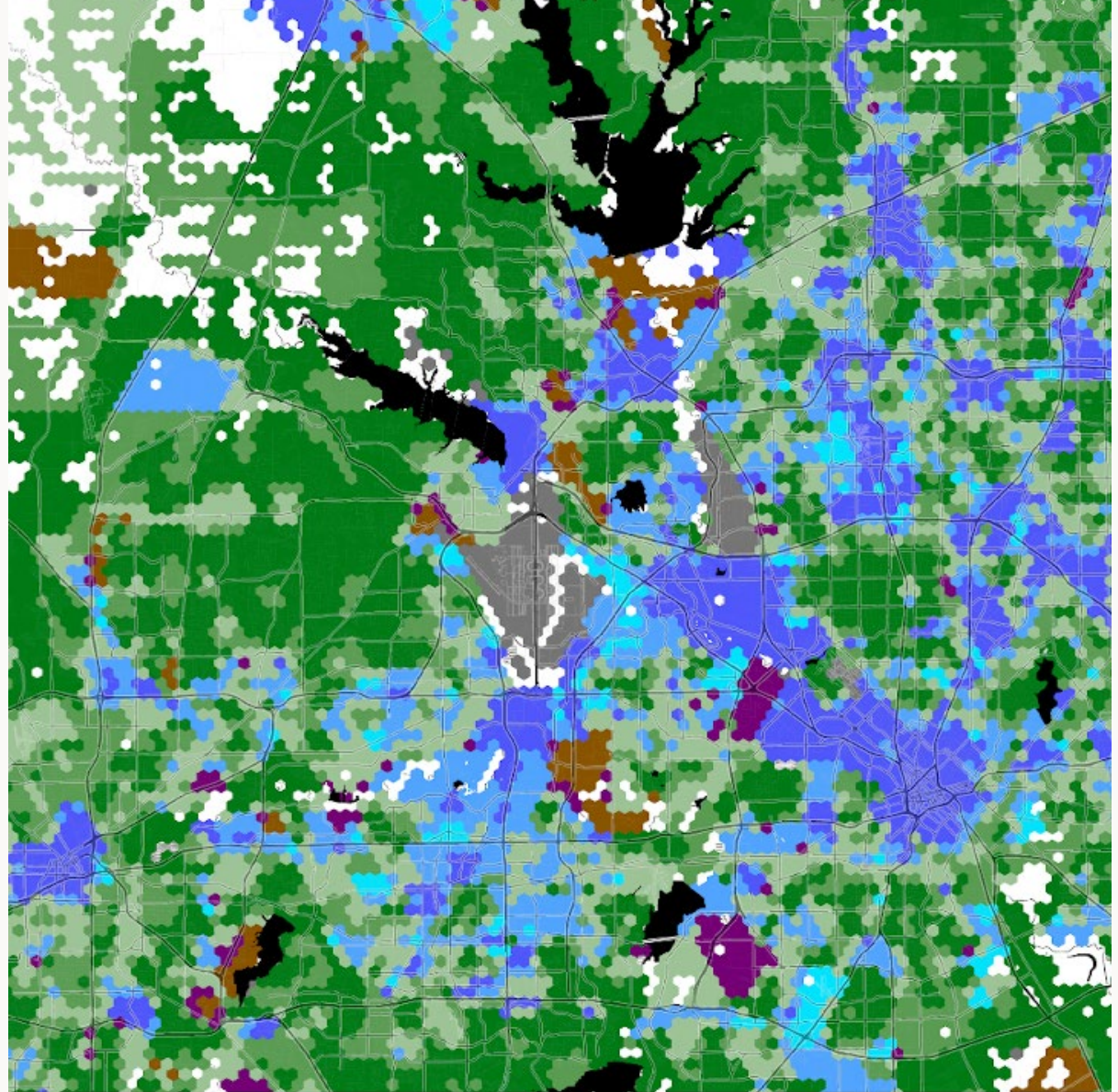
## Housing Type

- > 90% Single-Family Homes
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- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Dallas



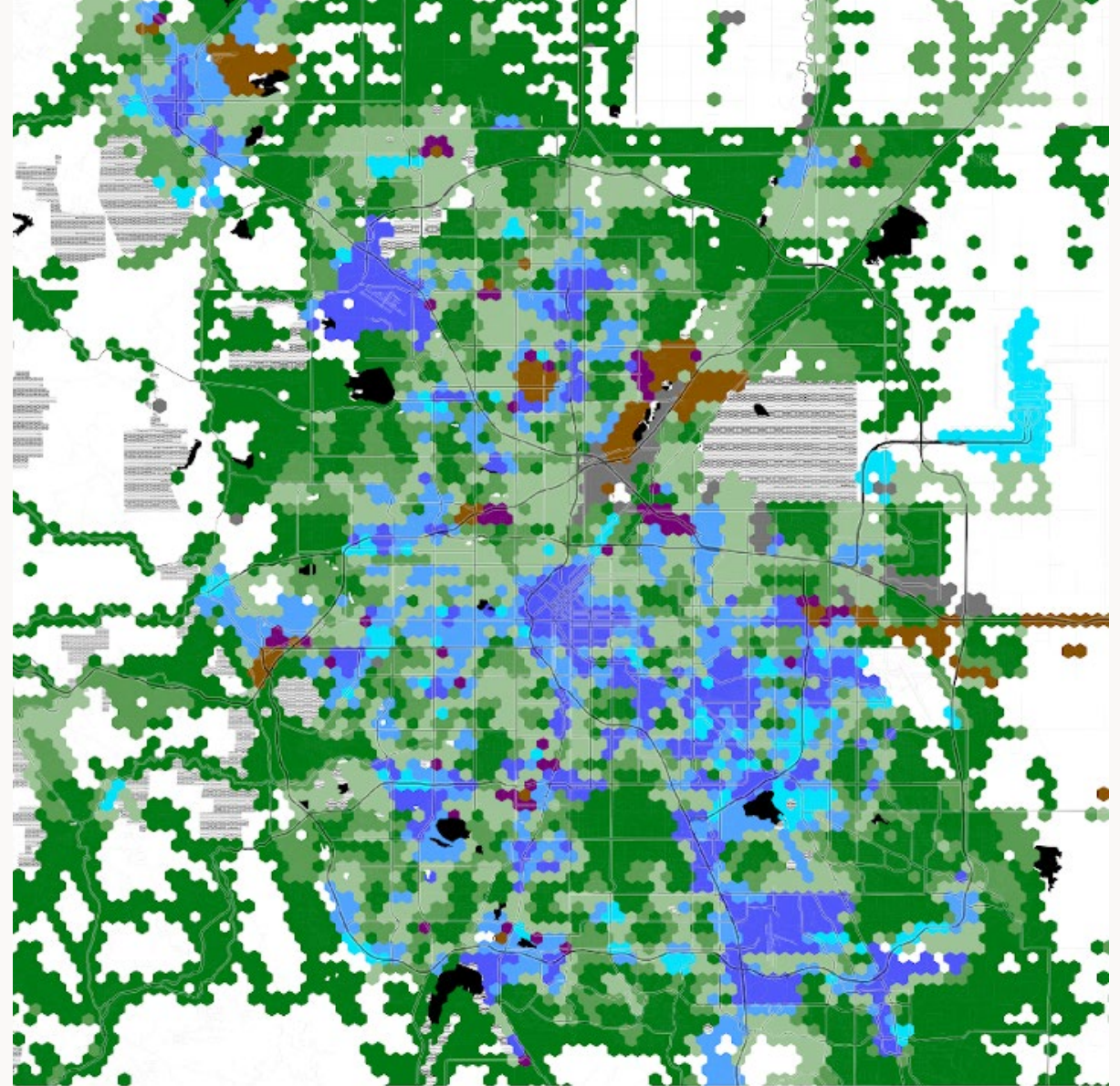
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Denver



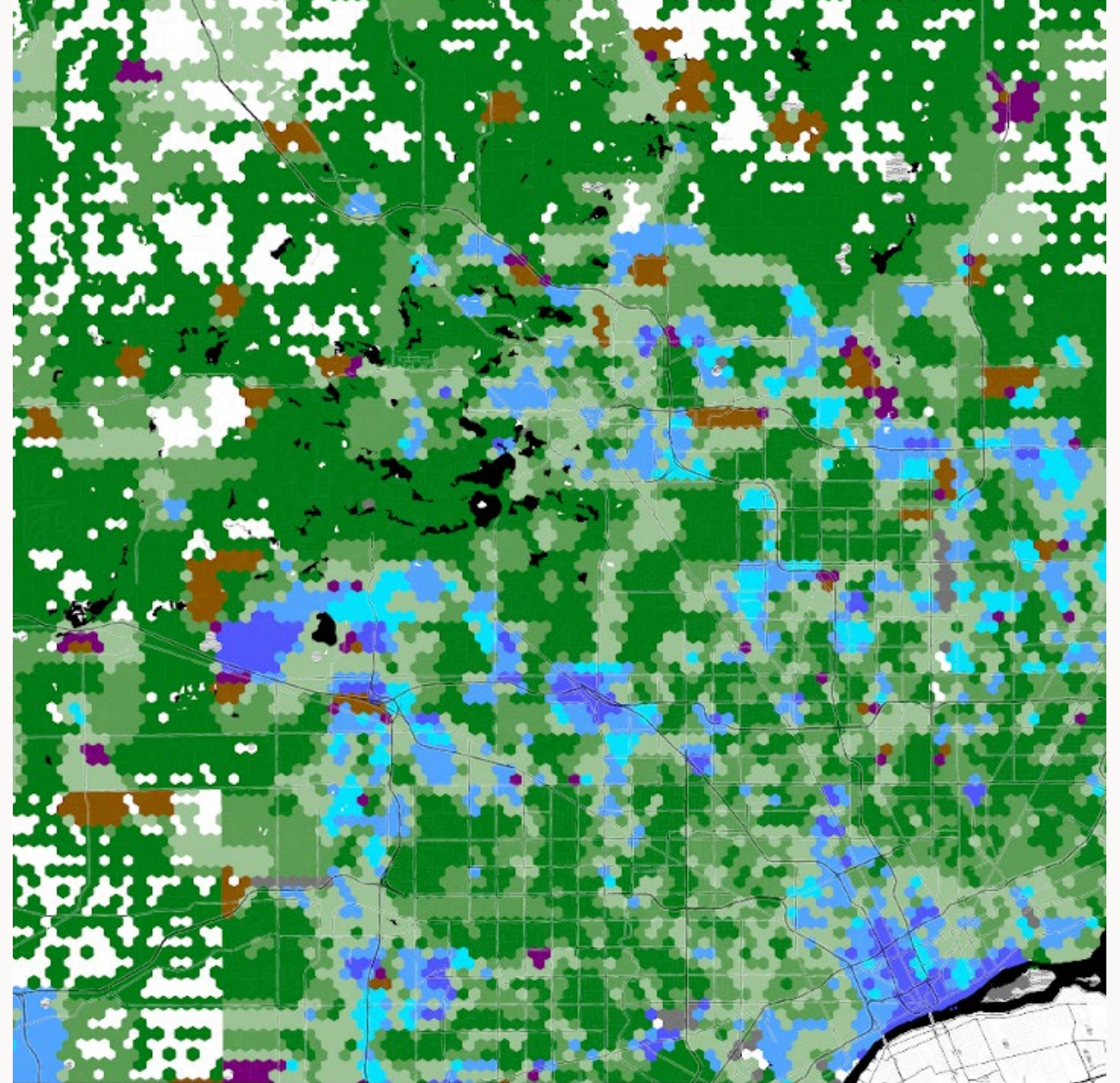
## Housing Type

- > 90% Single-Family Homes
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- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Detroit

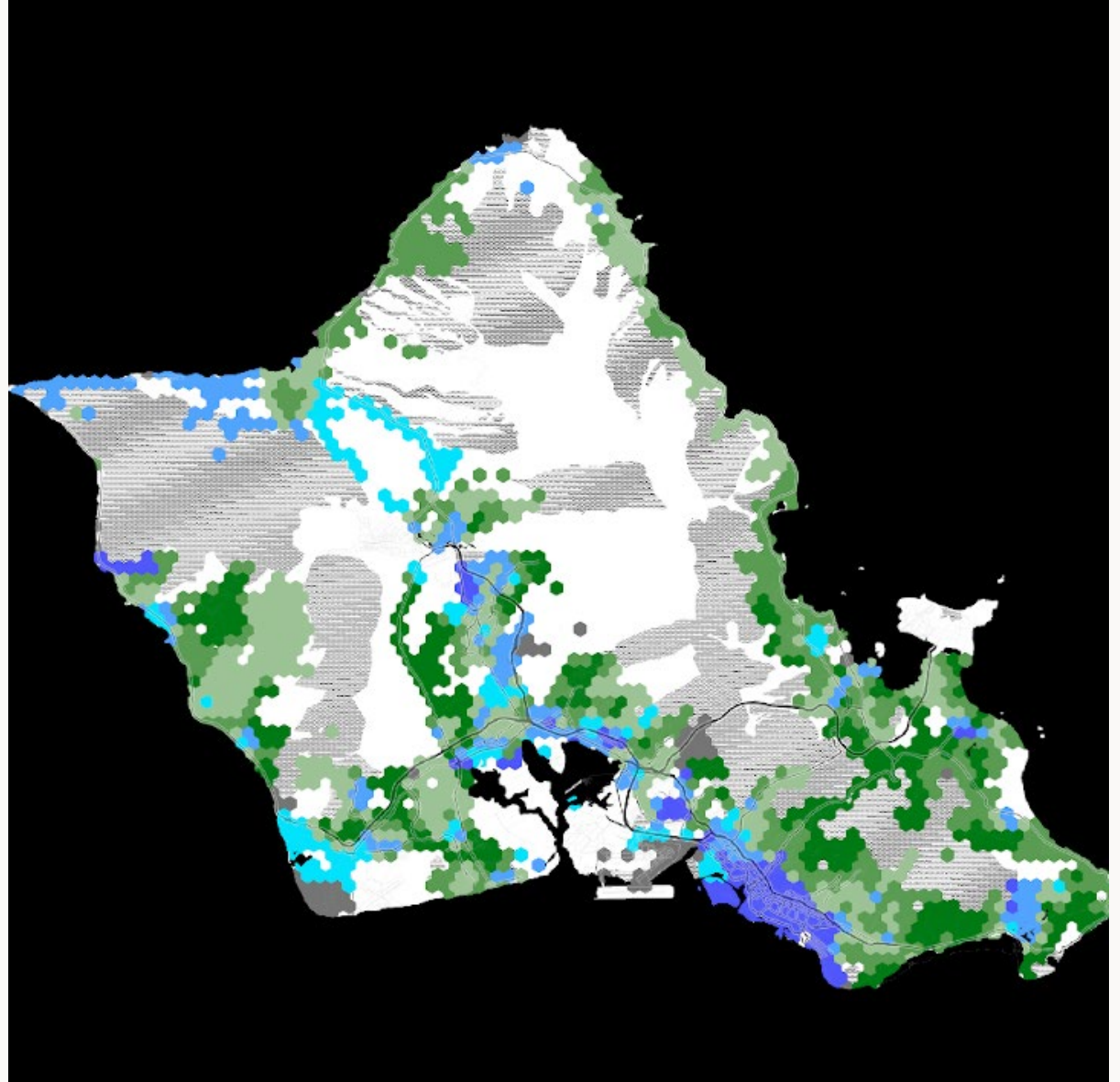


## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data

# Housing Types in Honolulu



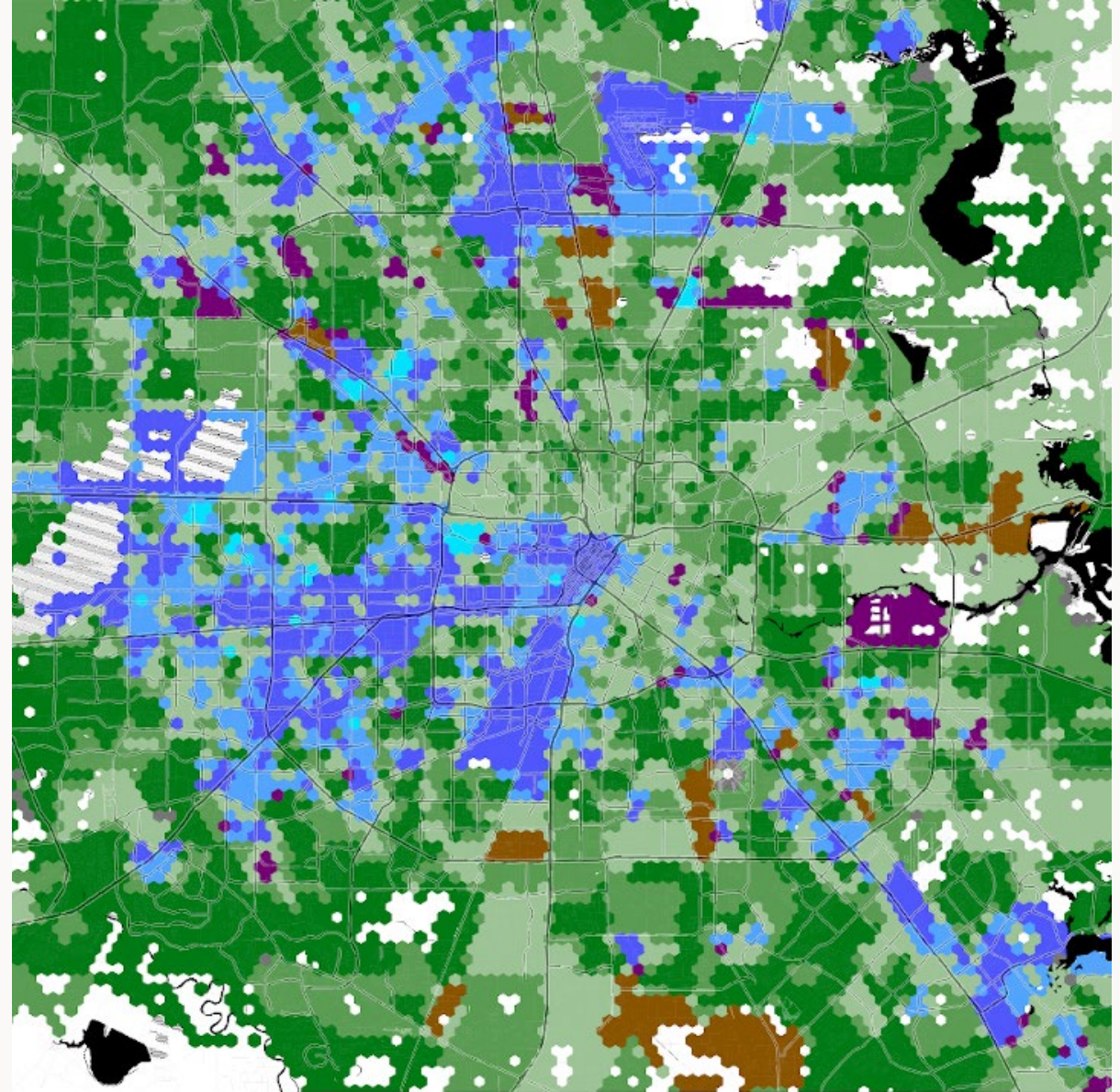
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

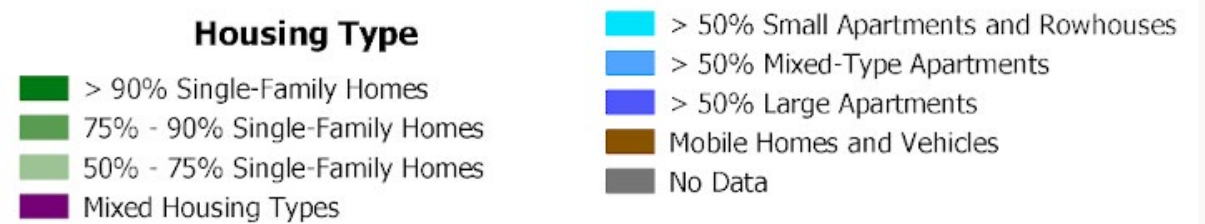
- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Houston

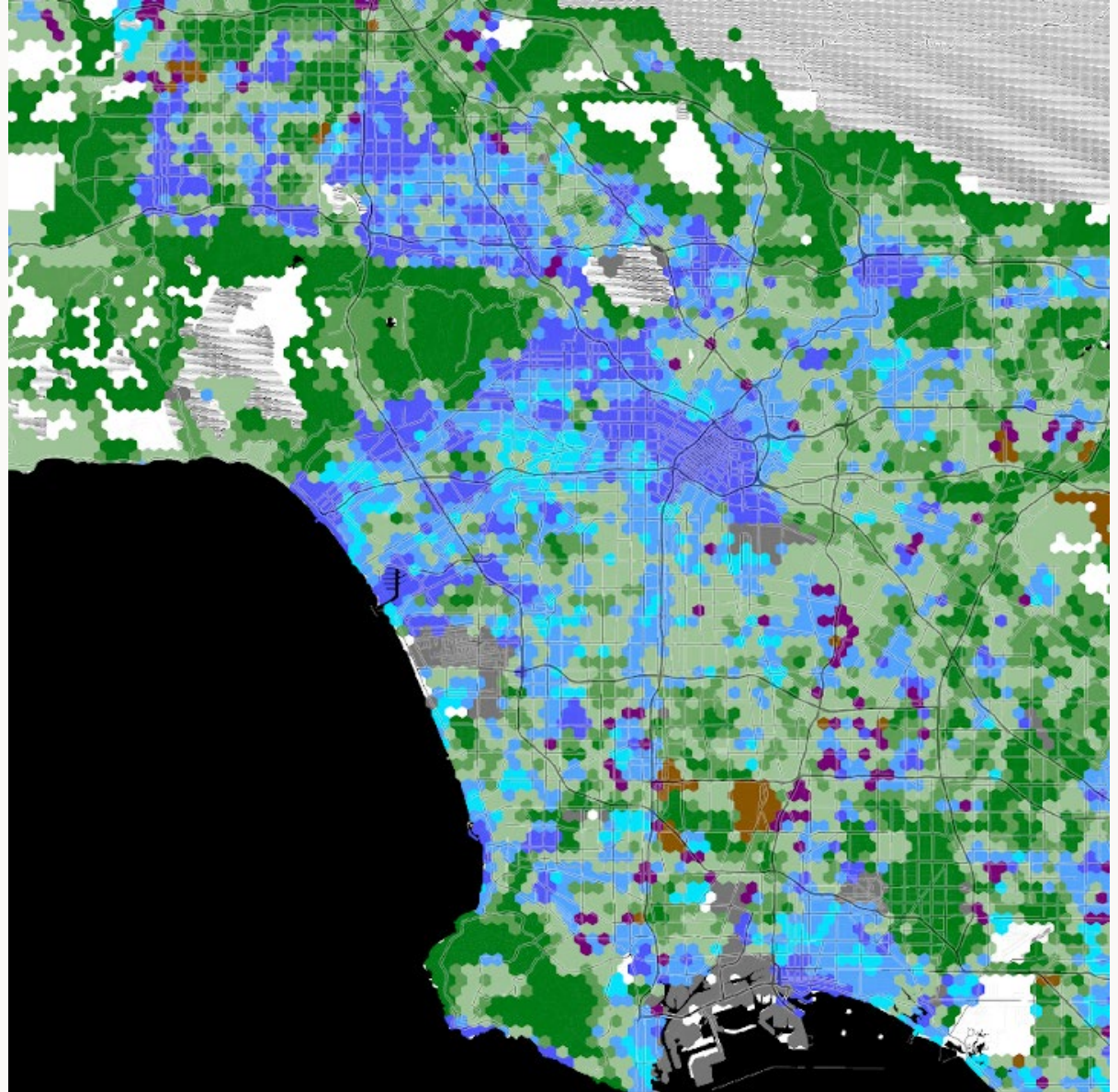


## Housing Type





# Housing Types in Los Angeles



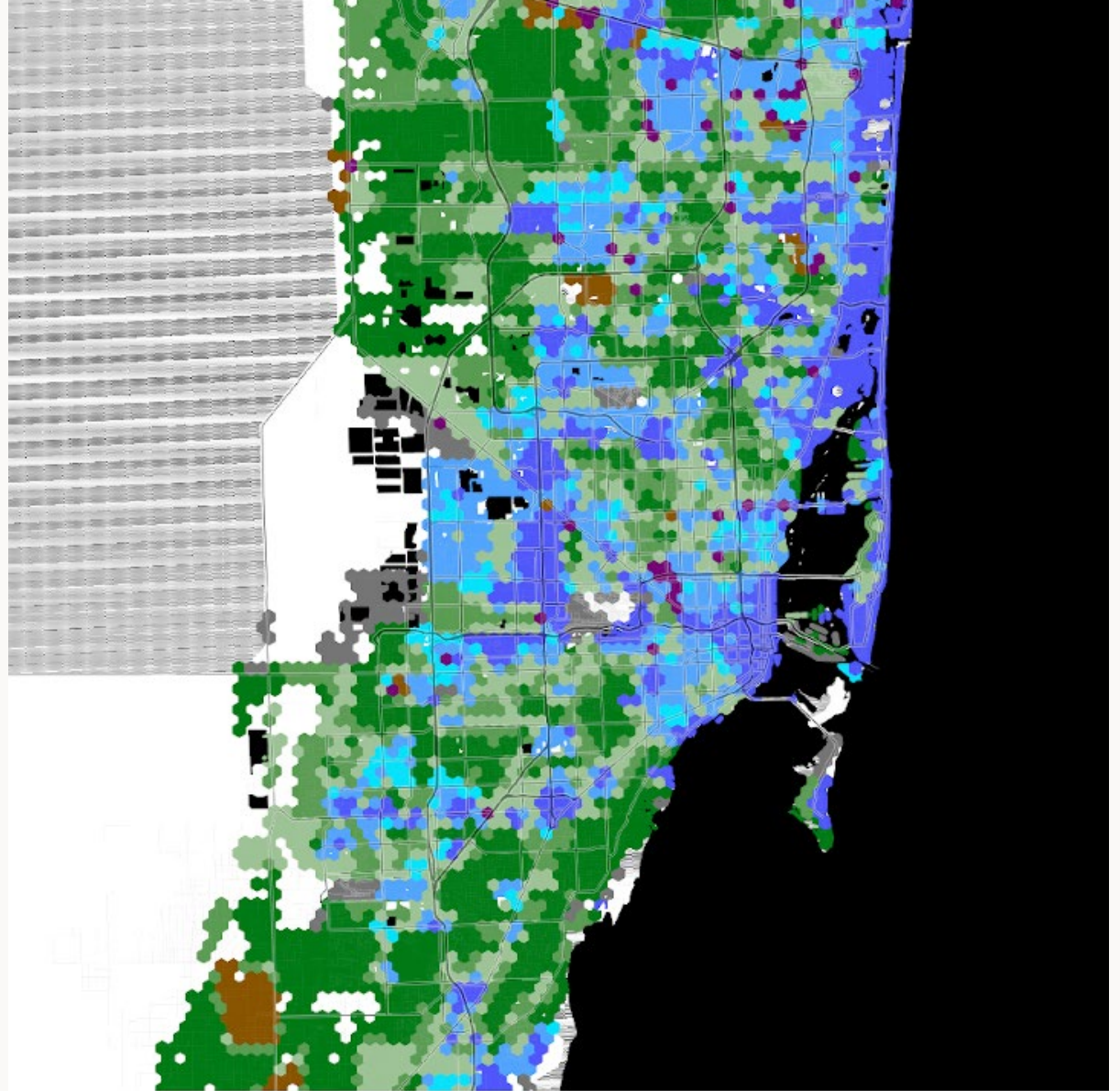
## Housing Type

- > 90% Single-Family Homes
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- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Miami

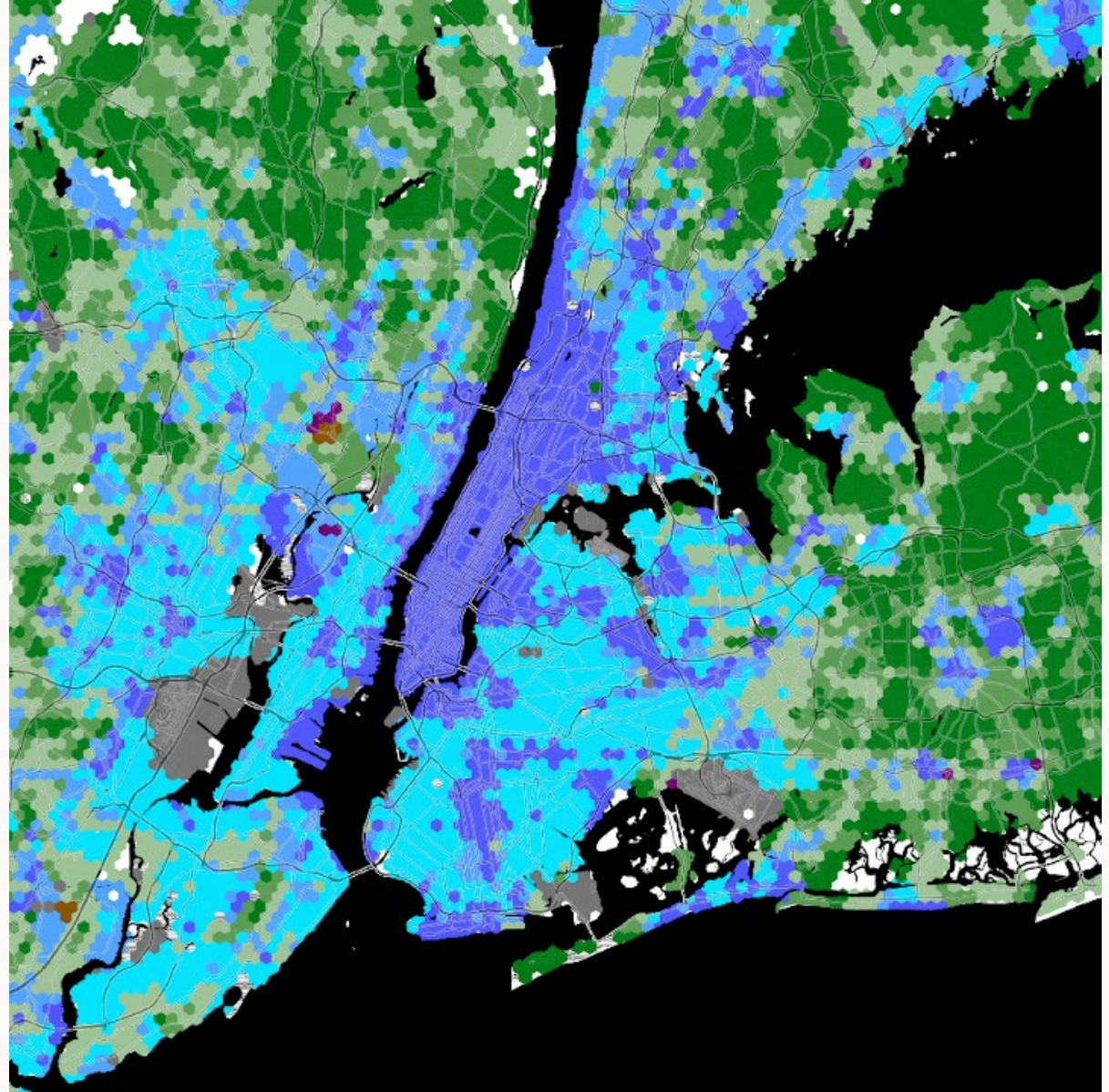


## Housing Type

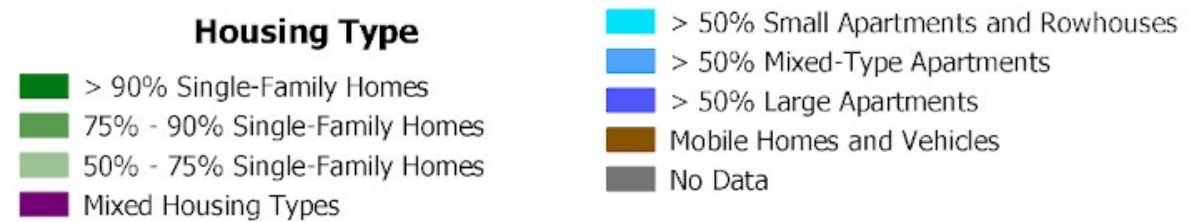
- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data

# Housing Types in New York

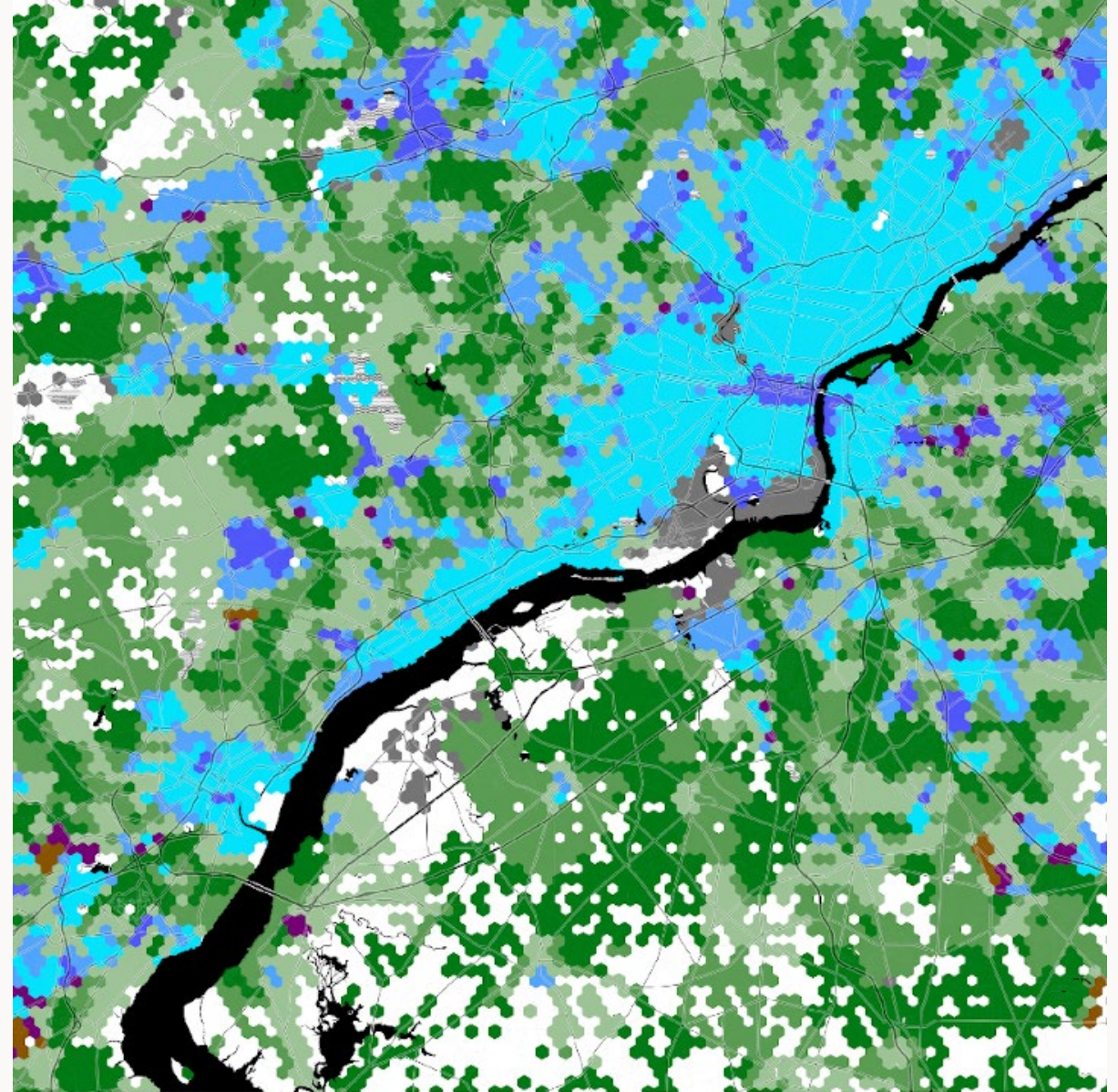


## Housing Type





# Housing Types in Philadelphia



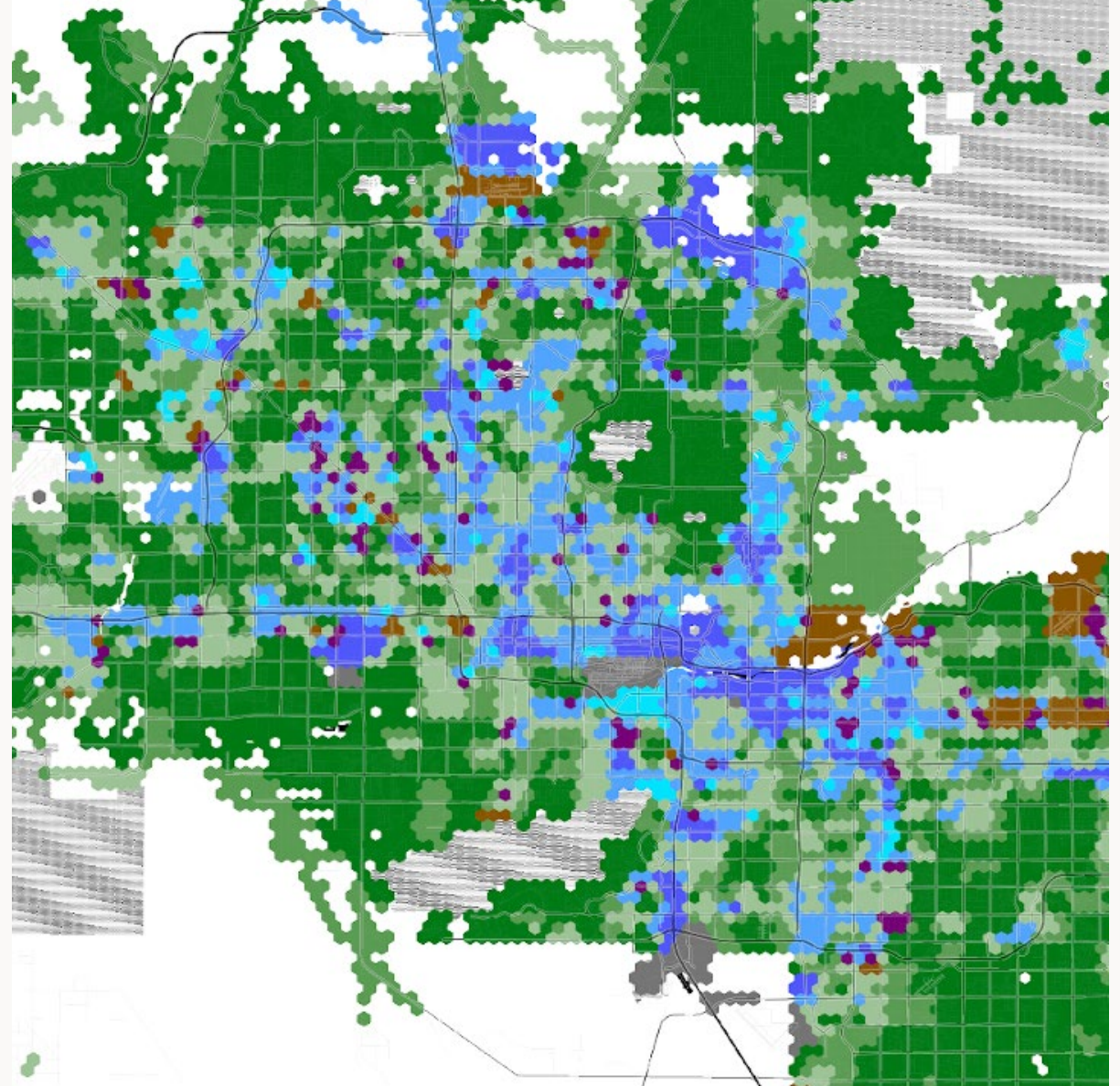
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Phoenix



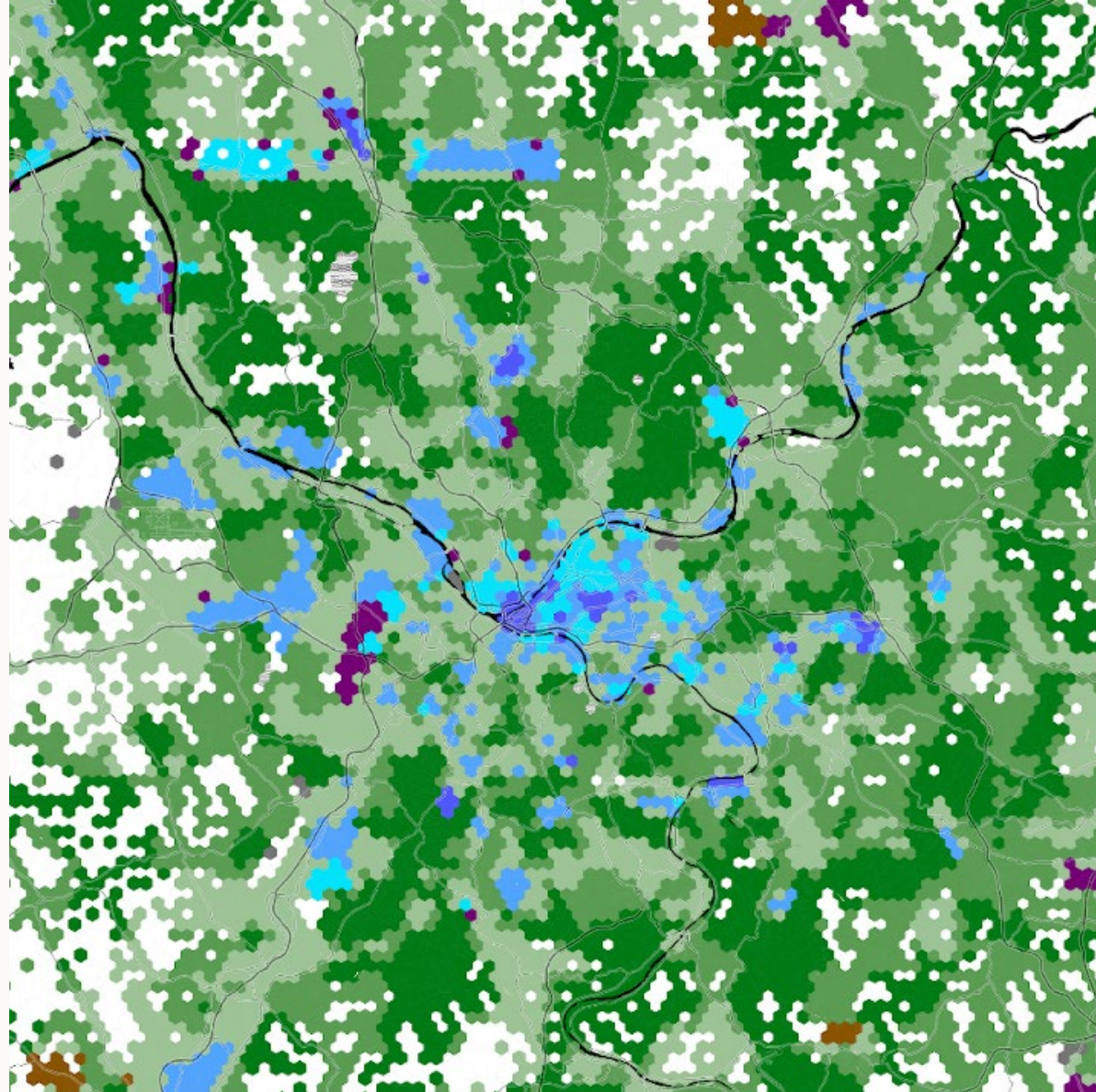
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Pittsburgh



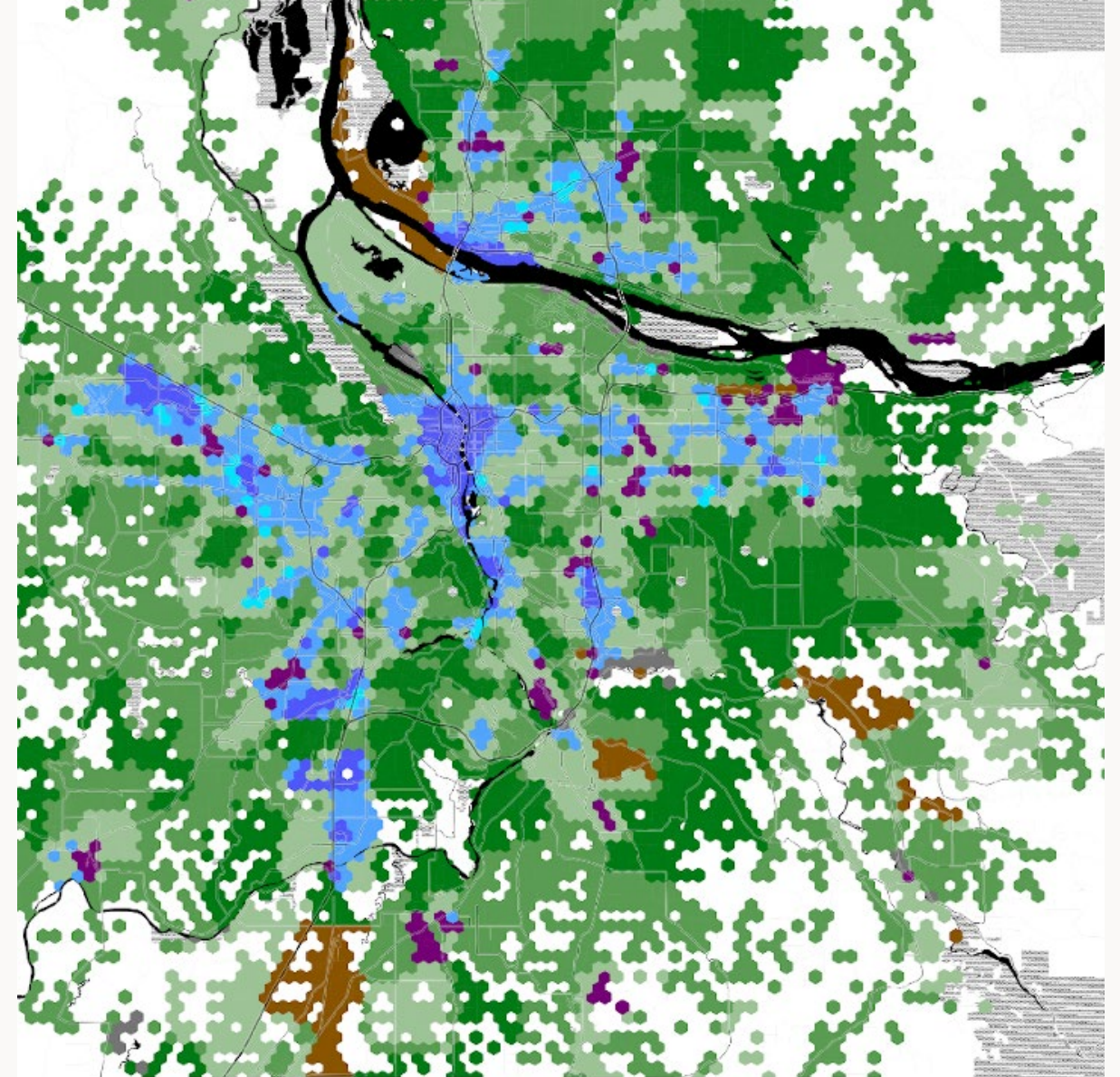
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

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- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
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# Housing Types in Portland



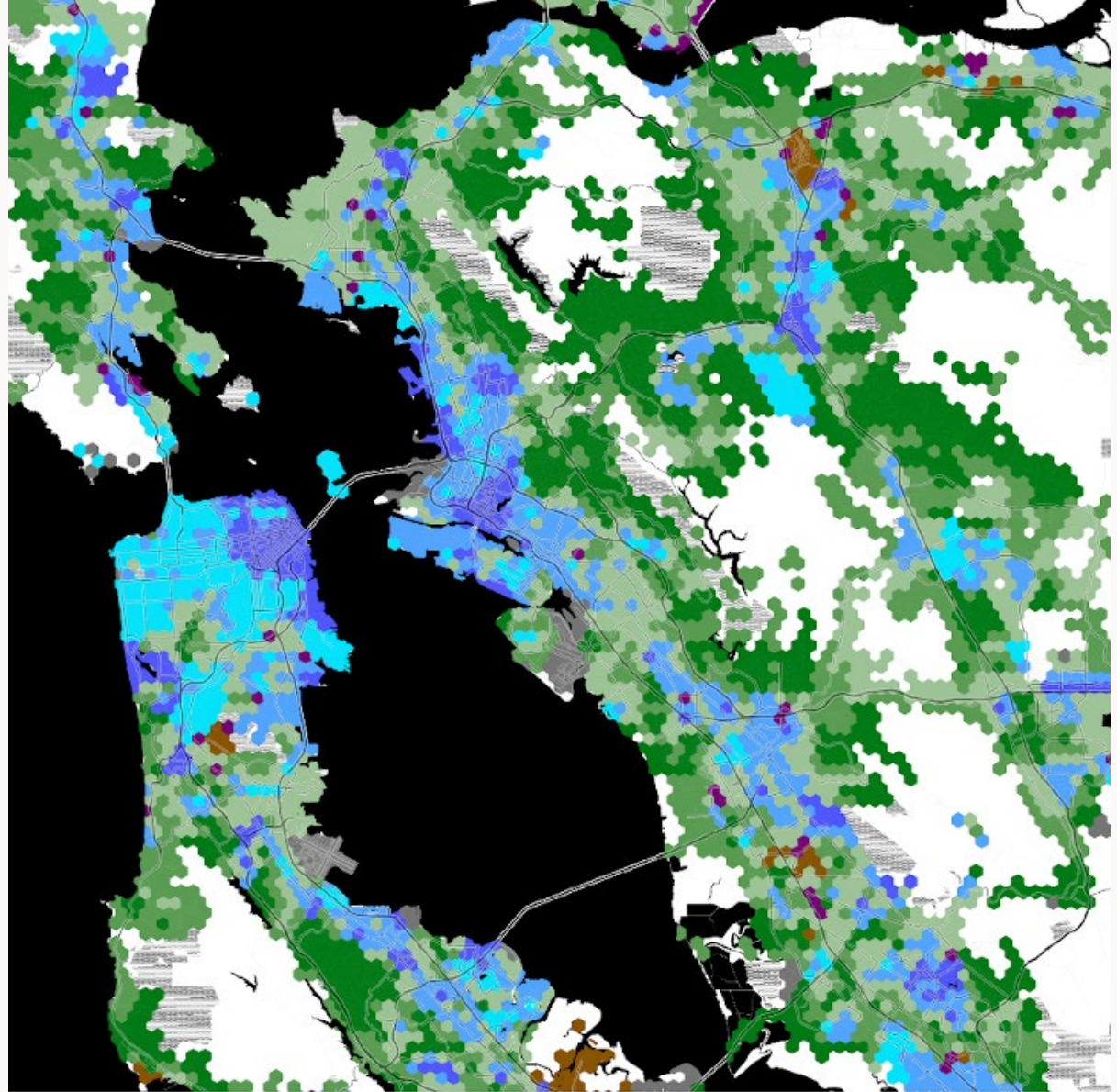
## Housing Type

- > 90% Single-Family Homes
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- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in San Francisco

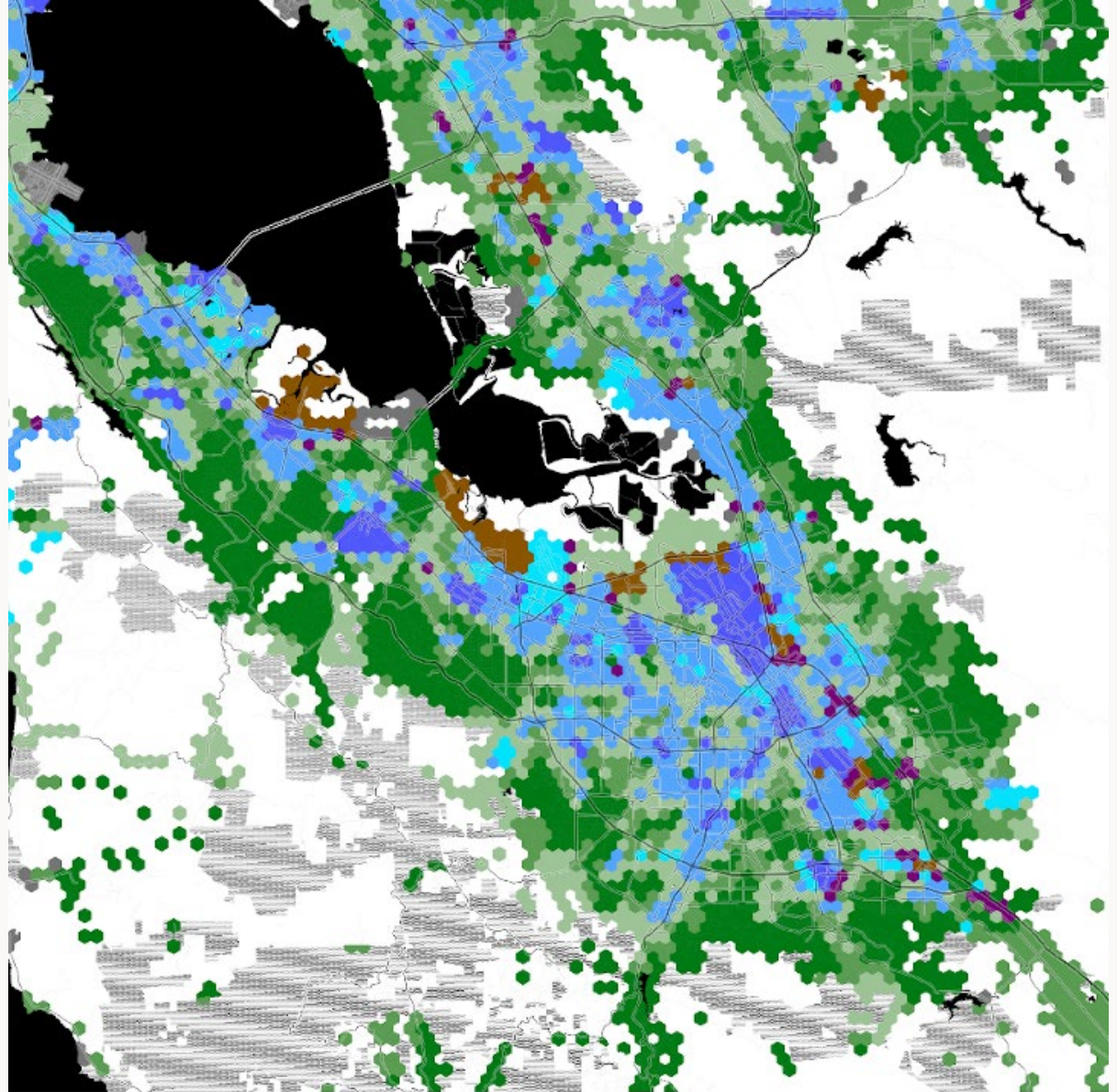


## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data

# Housing Types in San Jose



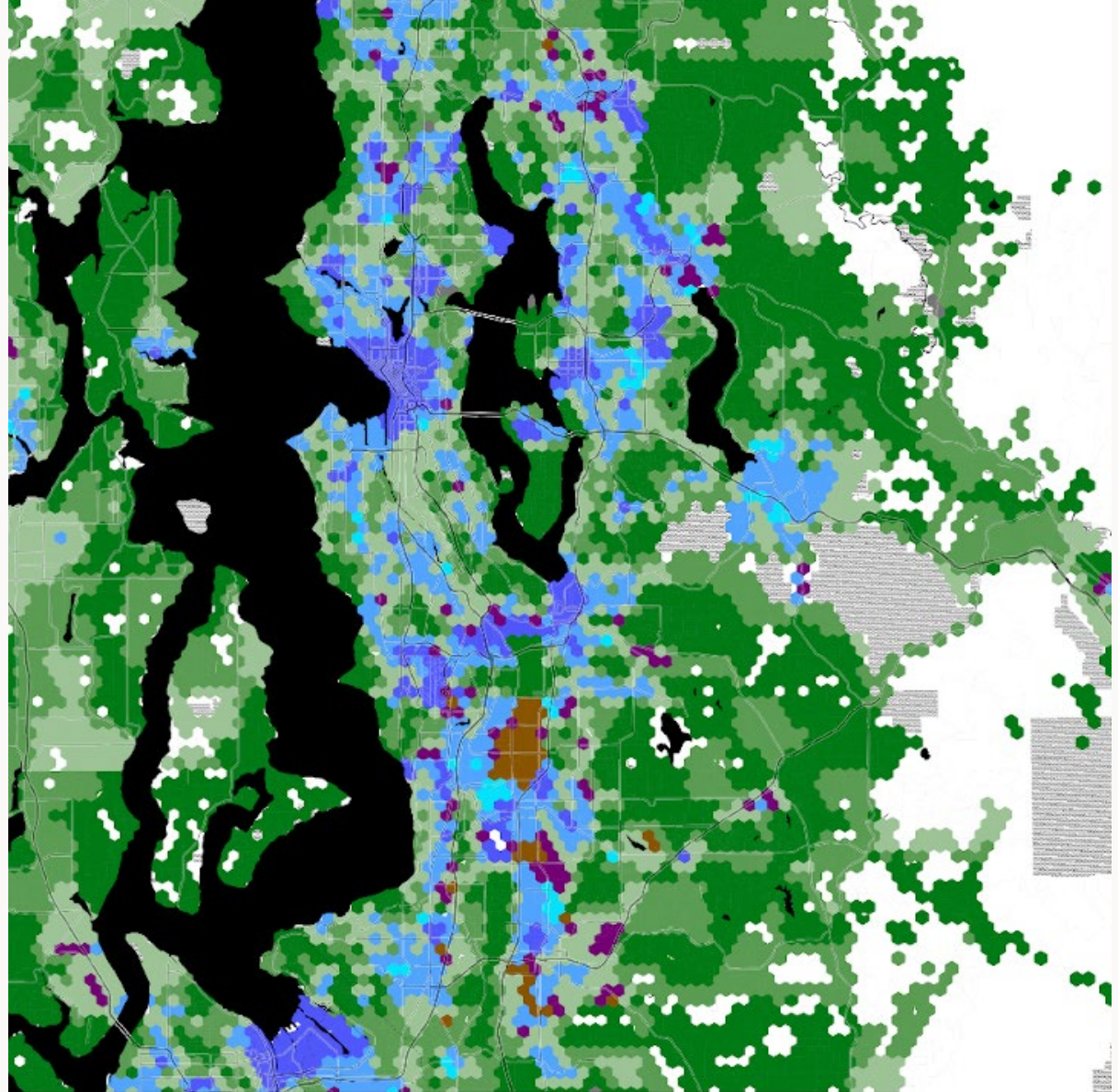
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Seattle



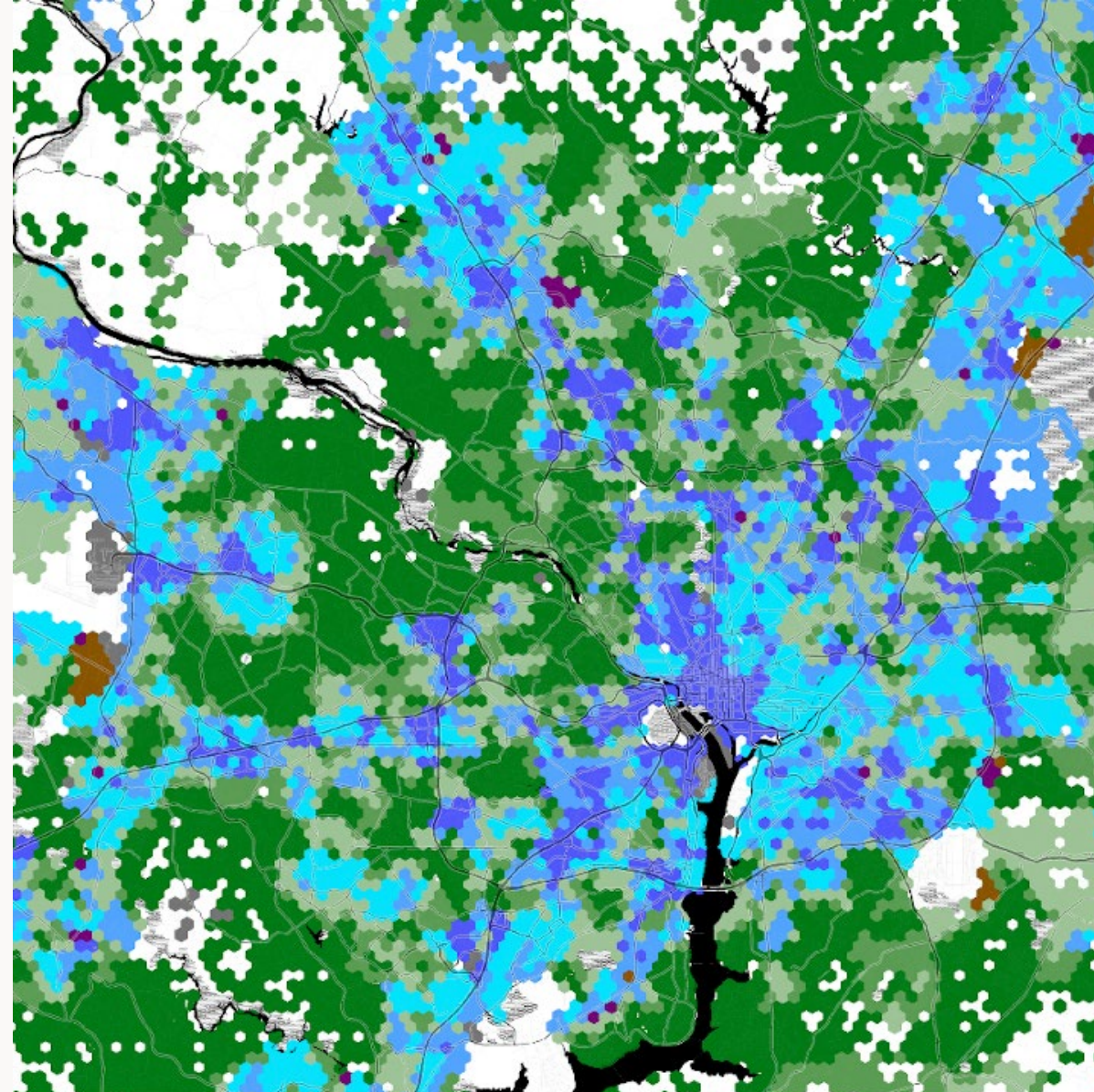
## Housing Type

- > 90% Single-Family Homes
- 75% - 90% Single-Family Homes
- 50% - 75% Single-Family Homes
- Mixed Housing Types

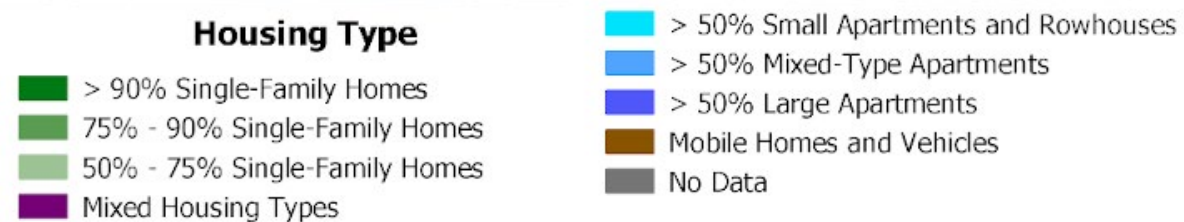
- > 50% Small Apartments and Rowhouses
- > 50% Mixed-Type Apartments
- > 50% Large Apartments
- Mobile Homes and Vehicles
- No Data



# Housing Types in Washington



## Housing Type

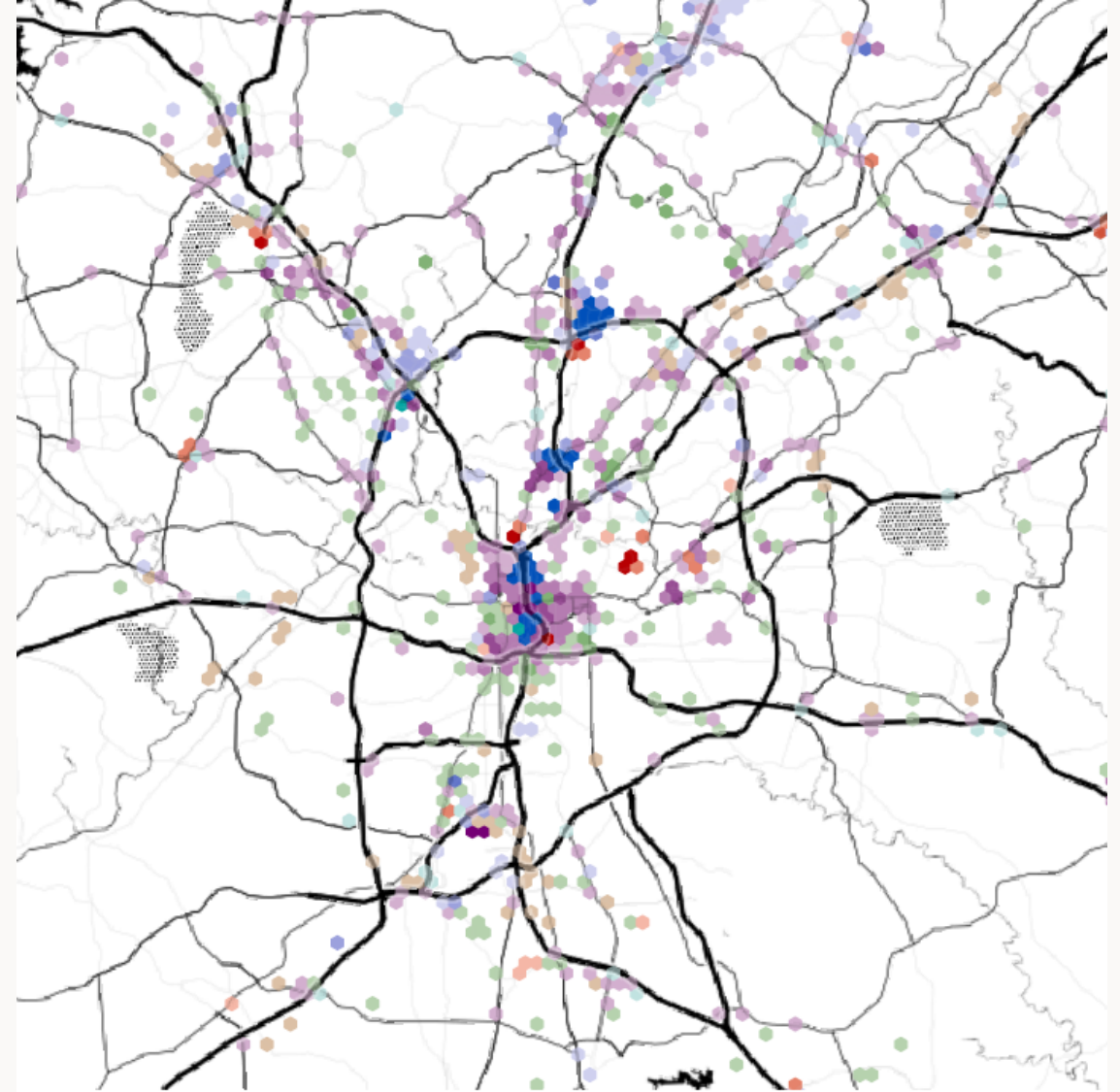




# Neighborhood Cluster Maps

# Neighborhood Types in Atlanta

Intensity =  
Walkshed-Adjusted Density



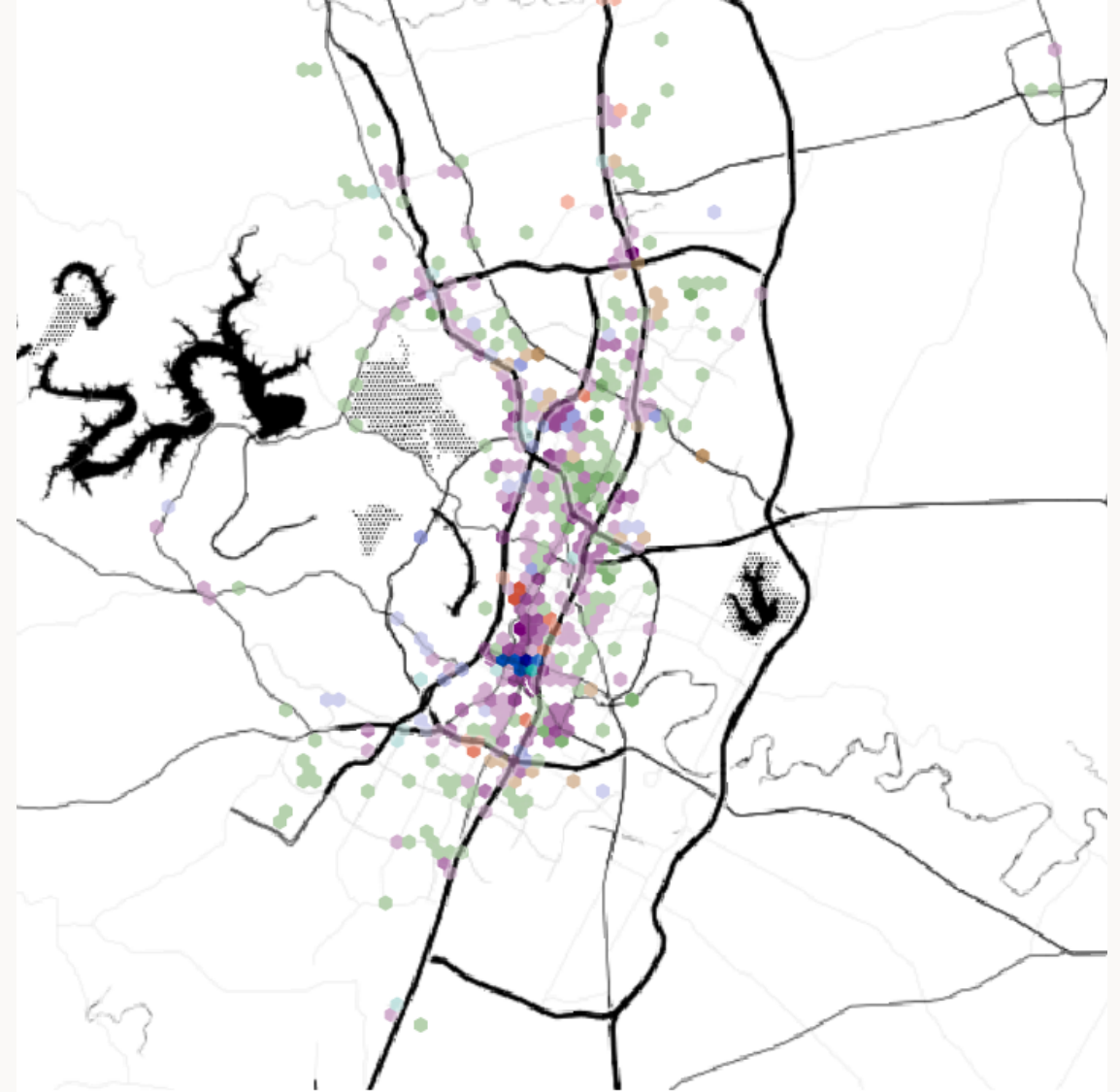
**Land Use and Intensity**

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
Very-High Intensity Walkable Resid/Mix Use	High-Intensity Eds/Meds	High-Intensity Industrial
High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

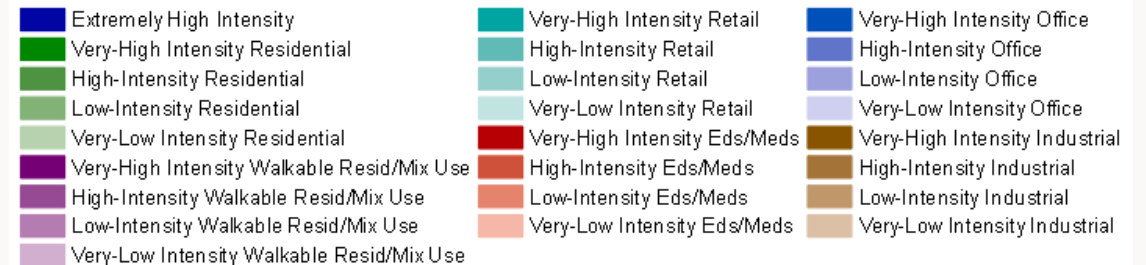


# Neighborhood Types in Austin

Intensity =  
Walkshed-Adjusted Density

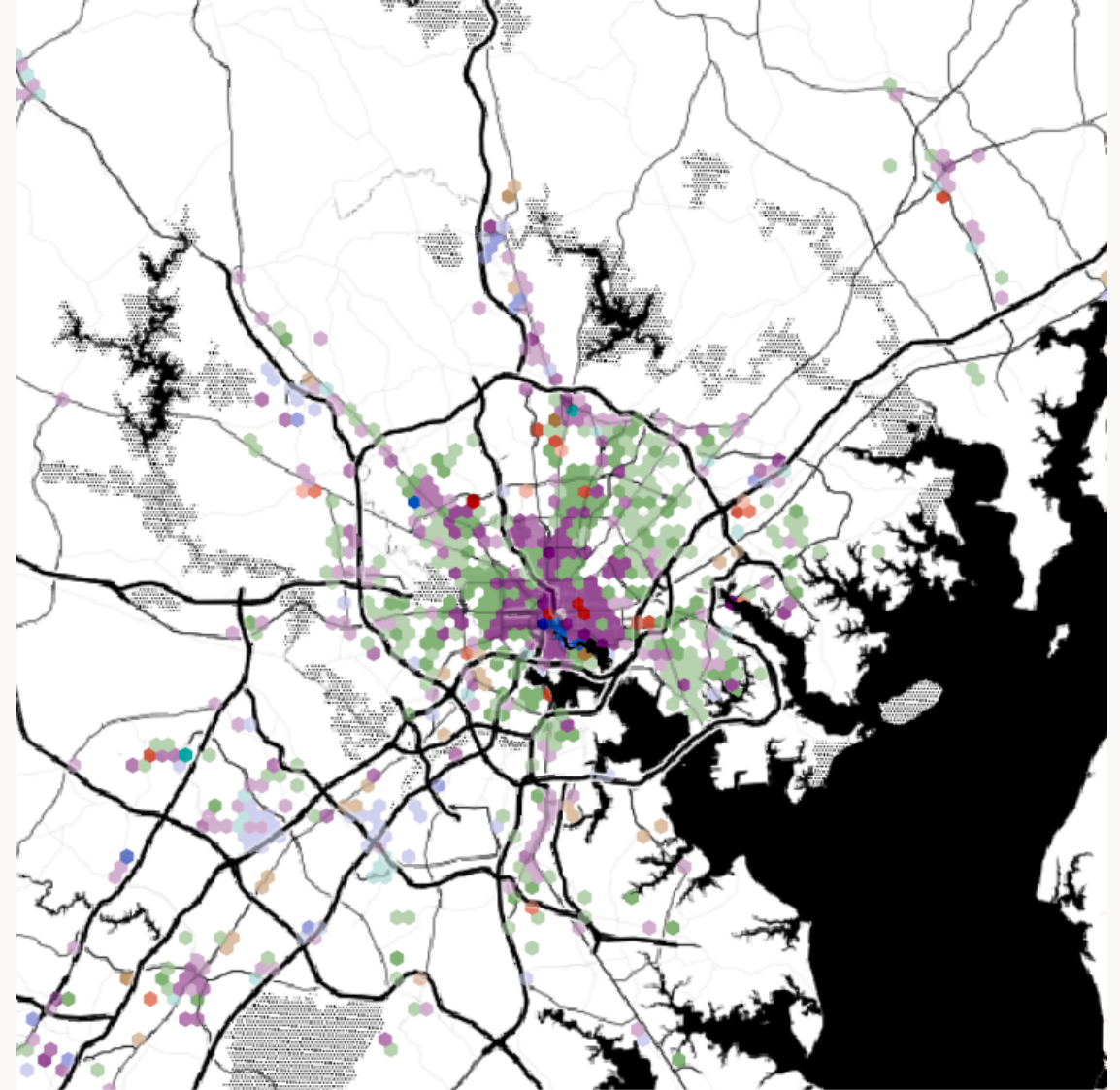


## Land Use and Intensity

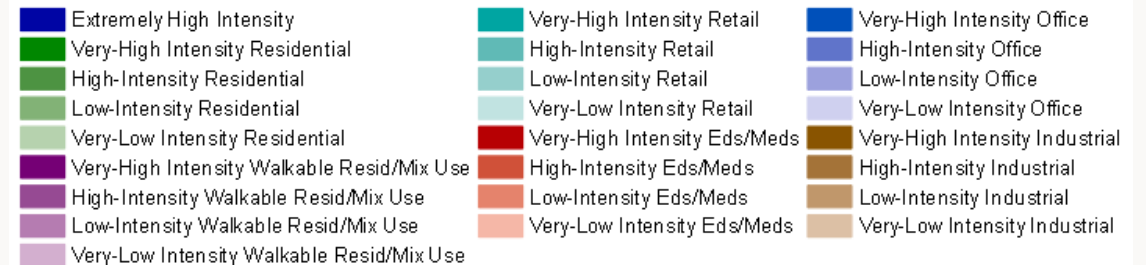


# Neighborhood Types in Baltimore

Intensity =  
Walkshed-Adjusted Density



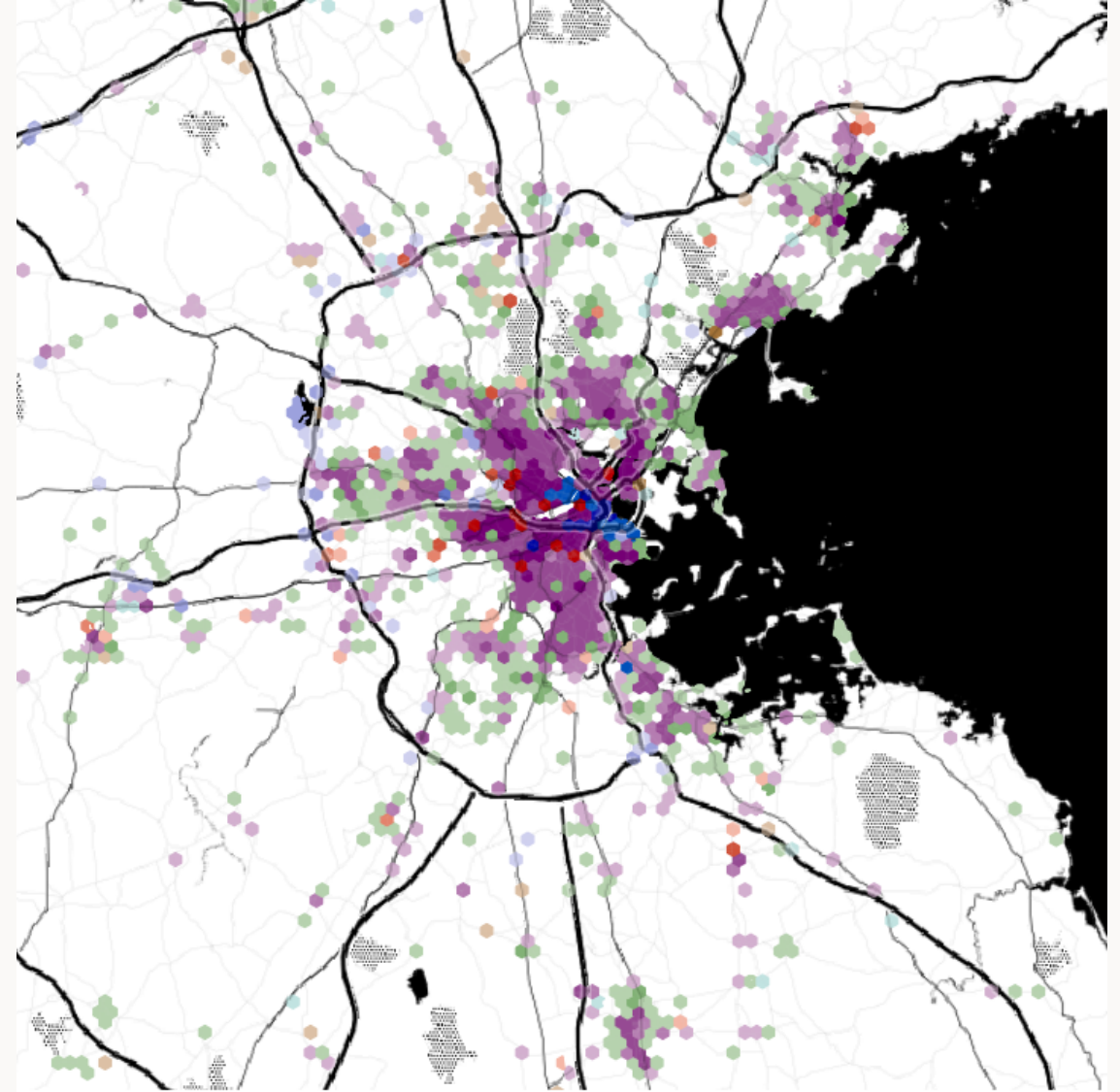
**Land Use and Intensity**



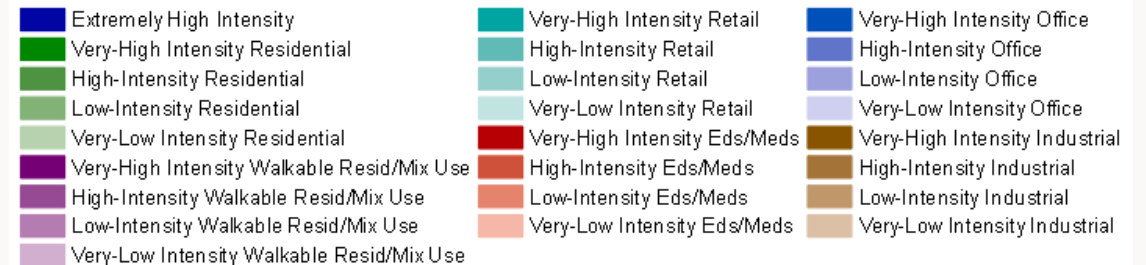


# Neighborhood Types in Boston

Intensity =  
Walkshed-Adjusted Density

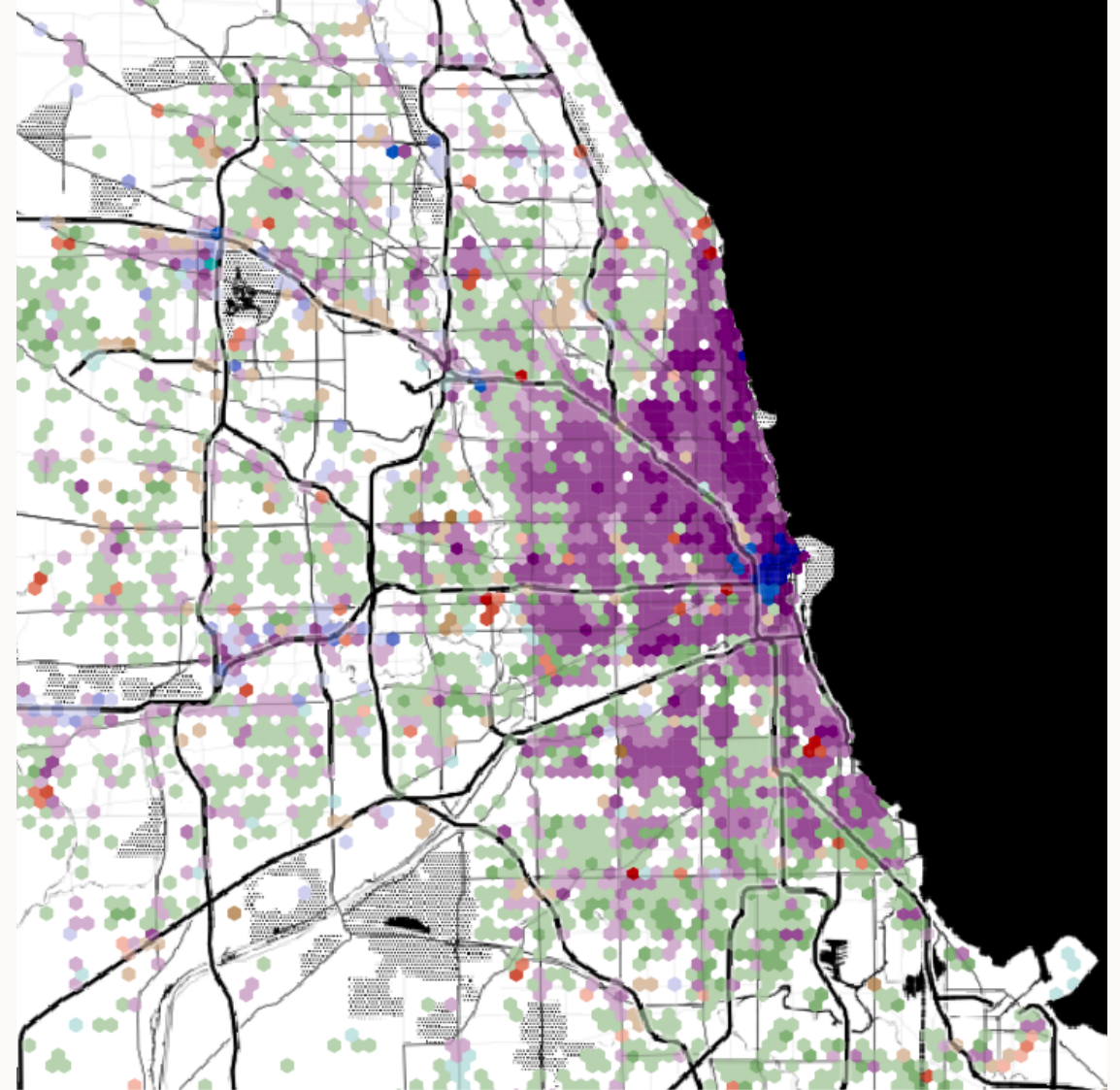


## Land Use and Intensity

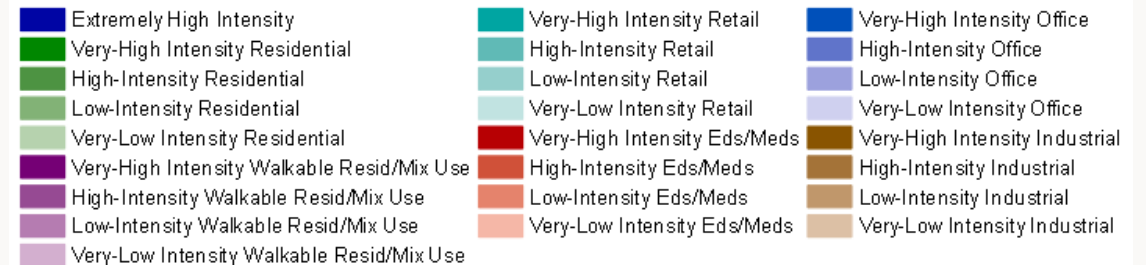


# Neighborhood Types in Chicago

Intensity =  
Walkshed-Adjusted Density



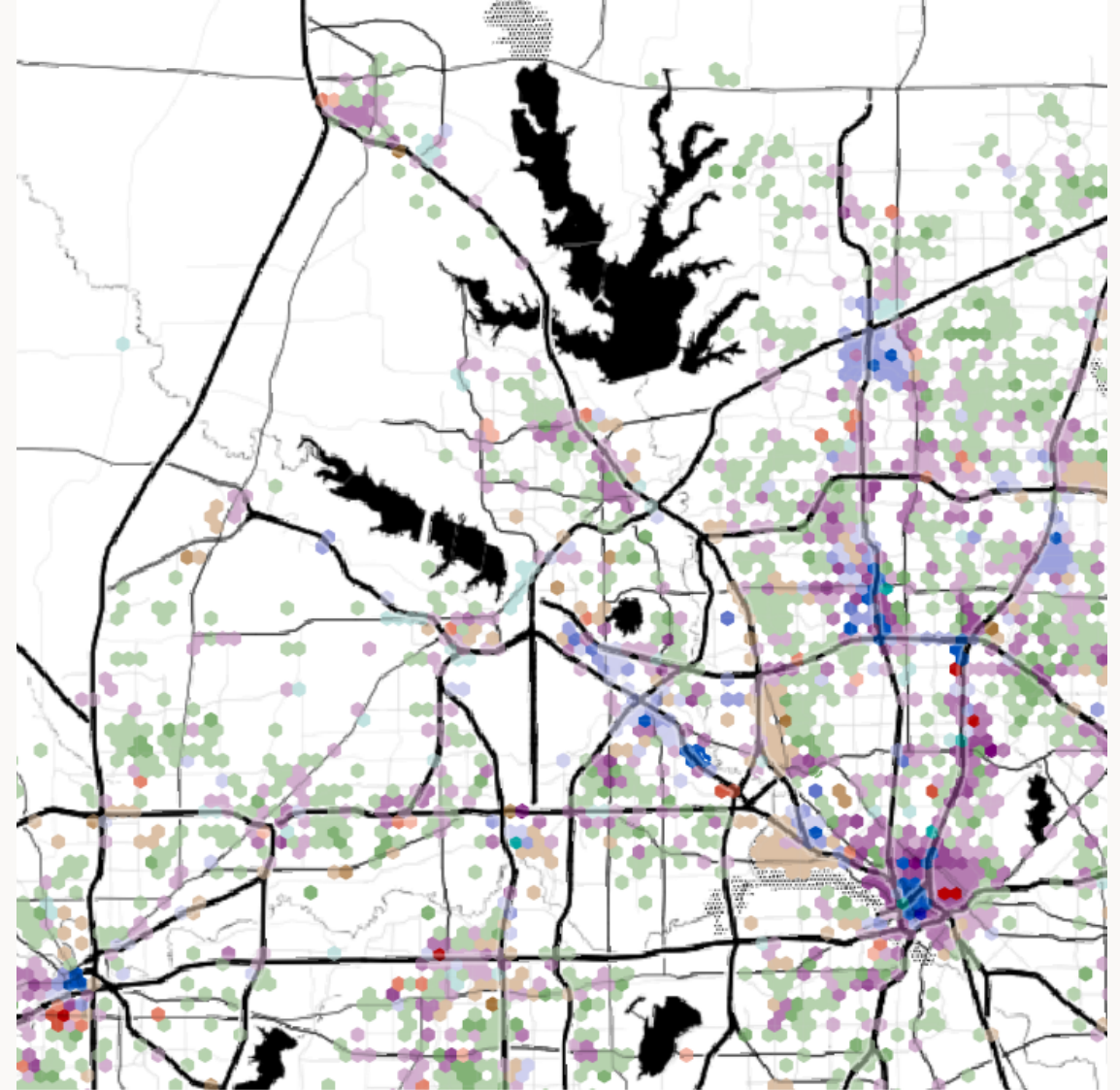
**Land Use and Intensity**



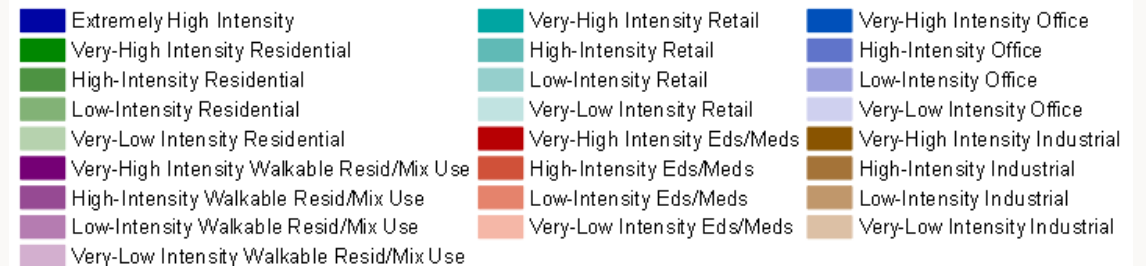


# Neighborhood Types in Dallas

Intensity =  
Walkshed-Adjusted Density

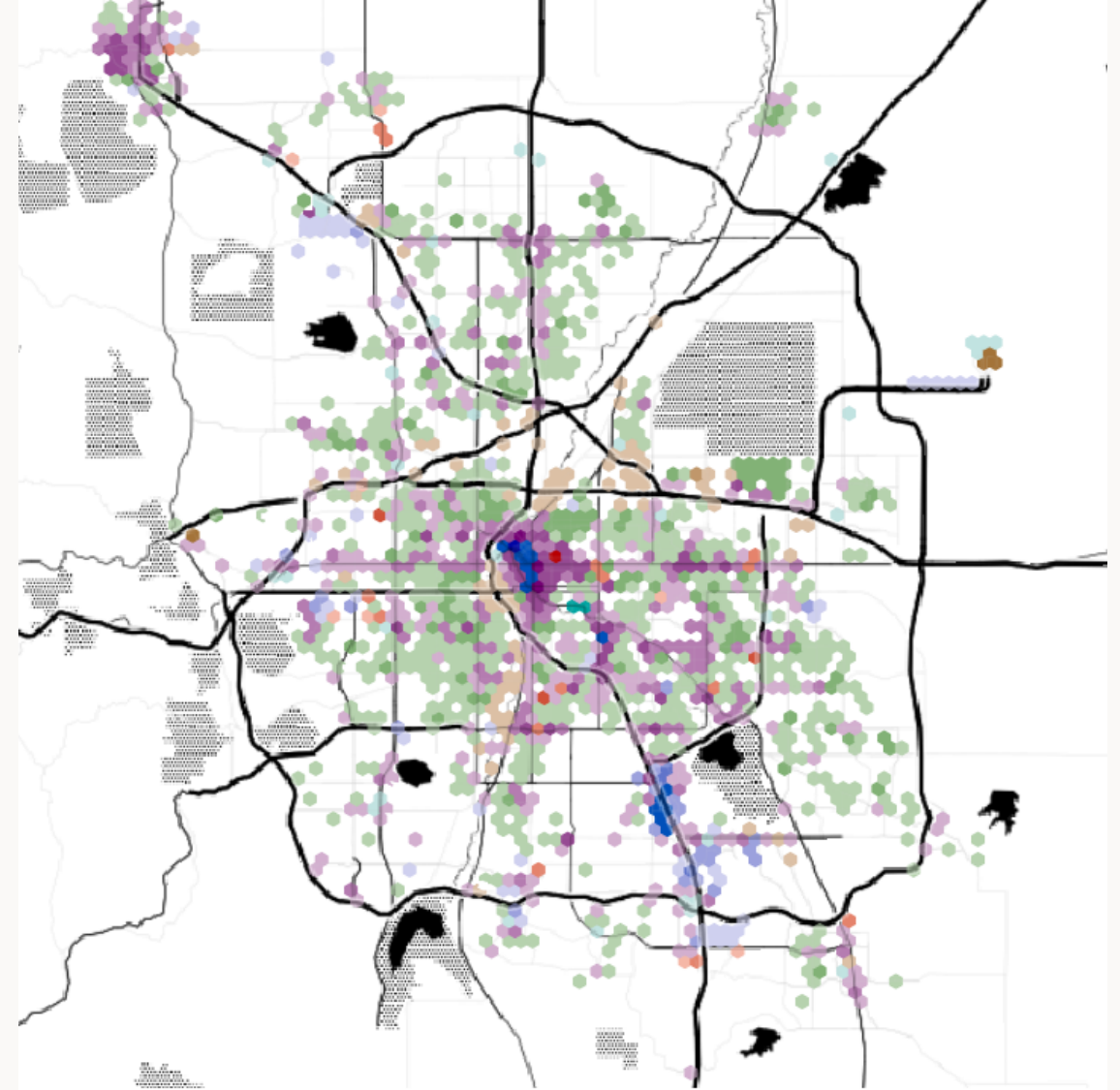


**Land Use and Intensity**

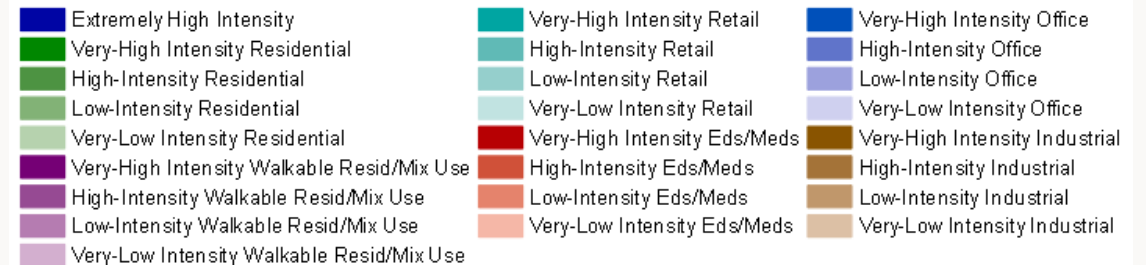


# Neighborhood Types in Denver

Intensity =  
Walkshed-Adjusted Density



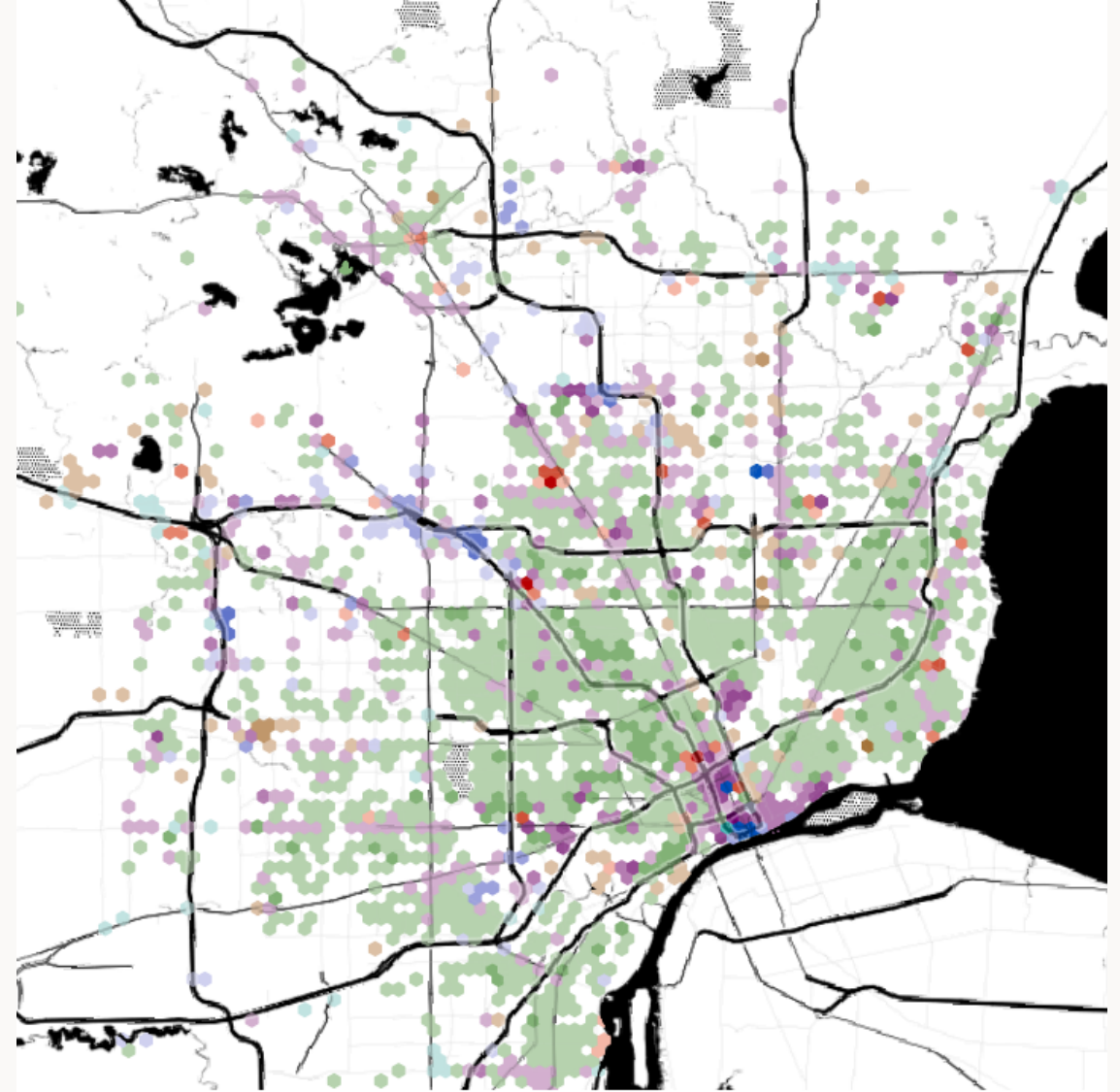
## Land Use and Intensity





# Neighborhood Types in Detroit

Intensity =  
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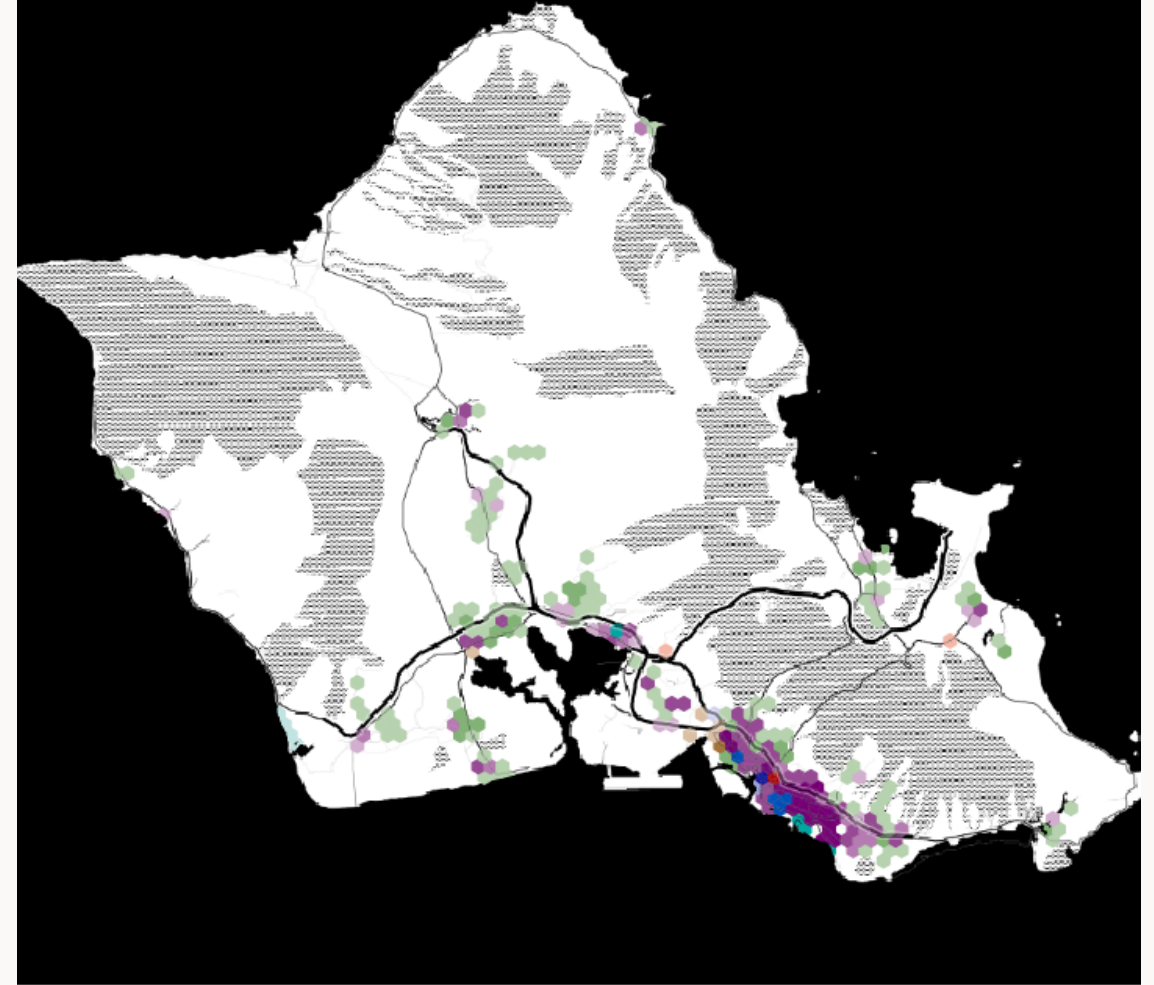


## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
Very-High Intensity Walkable Resid/Mix Use	High-Intensity Eds/Meds	High-Intensity Industrial
High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

# Neighborhood Types in Honolulu

Intensity =  
Walkshed-Adjusted Density



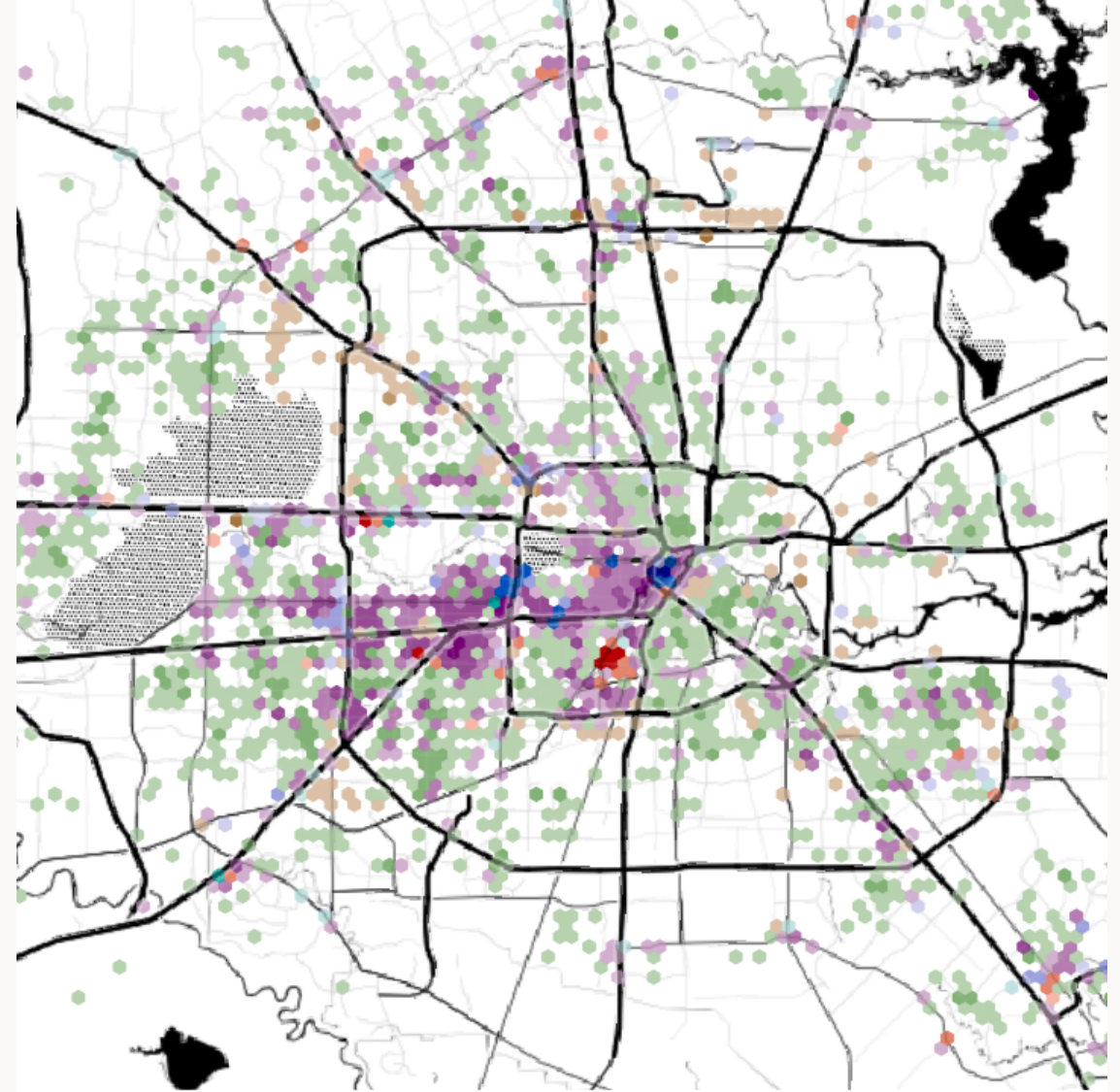
## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
Very-High Intensity Walkable Resid/Mix Use	High-Intensity Eds/Meds	High-Intensity Industrial
High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		



# Neighborhood Types in Houston

Intensity =  
Walkshed-Adjusted Density

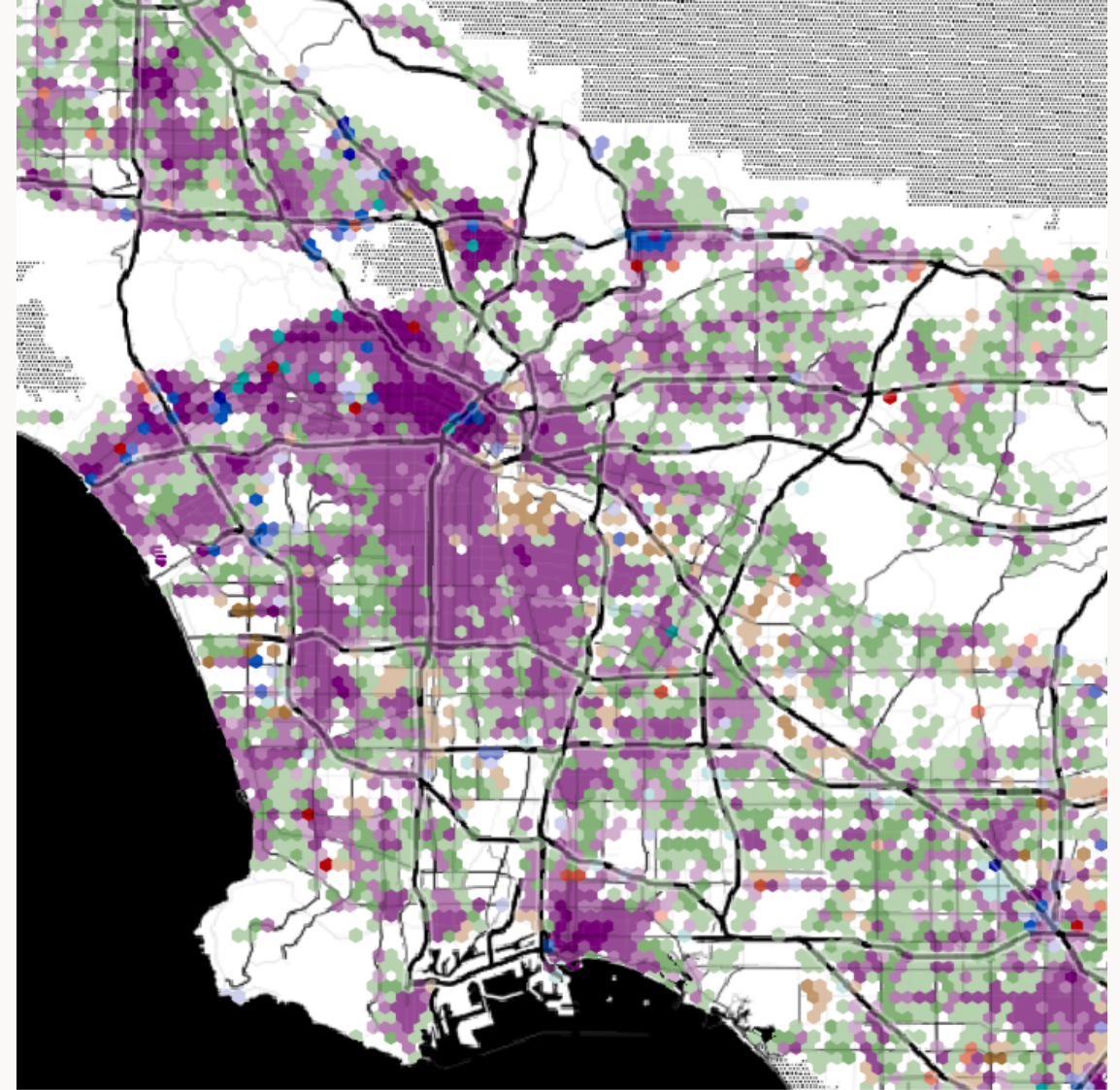


**Land Use and Intensity**

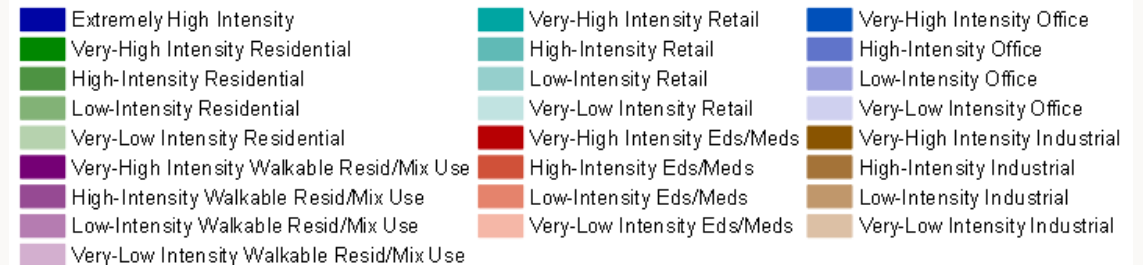
Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
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High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

# Neighborhood Types in Los Angeles

Intensity =  
Walkshed-Adjusted Density



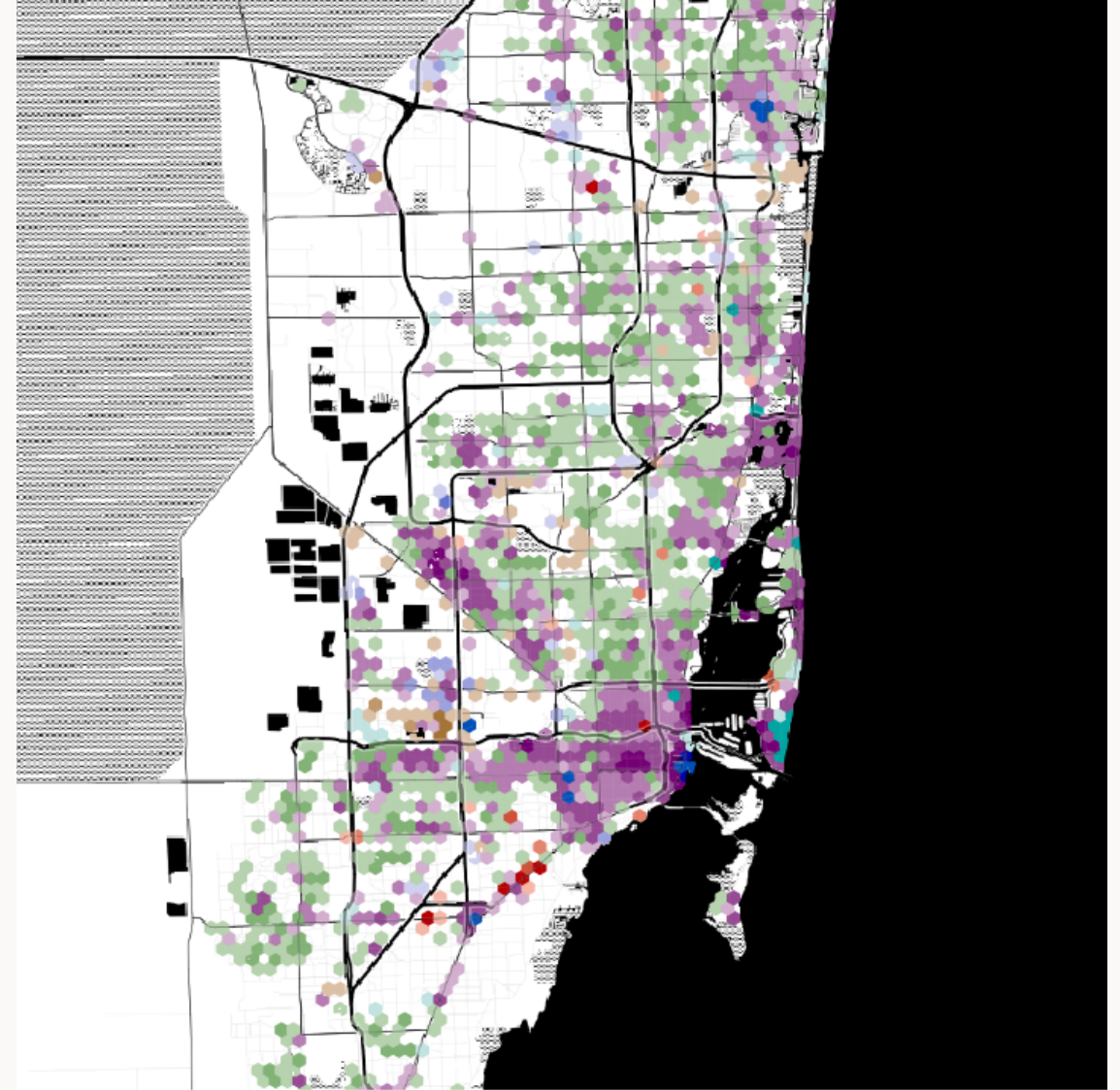
## Land Use and Intensity





# Neighborhood Types in Miami

Intensity =  
Walkshed-Adjusted Density

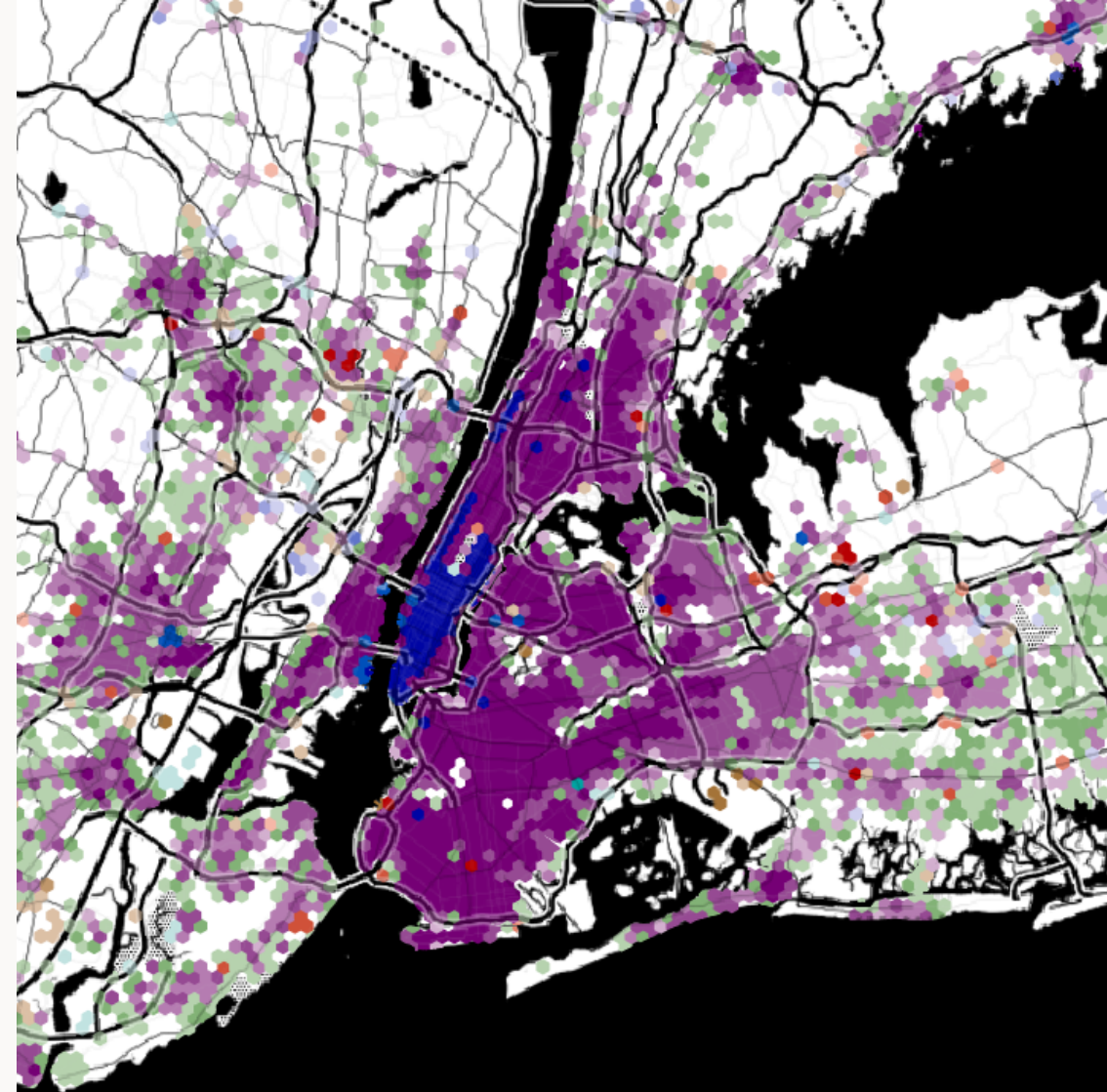


## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
Very-High Intensity Walkable Resid/Mix Use	High-Intensity Eds/Meds	High-Intensity Industrial
High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

# Neighborhood Types in New York

Intensity =  
Walkshed-Adjusted Density



## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
Very-Low Intensity Residential	Very-High Intensity Eds/Meds	Very-High Intensity Industrial
Very-High Intensity Walkable Resid/Mix Use	High-Intensity Eds/Meds	High-Intensity Industrial
High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

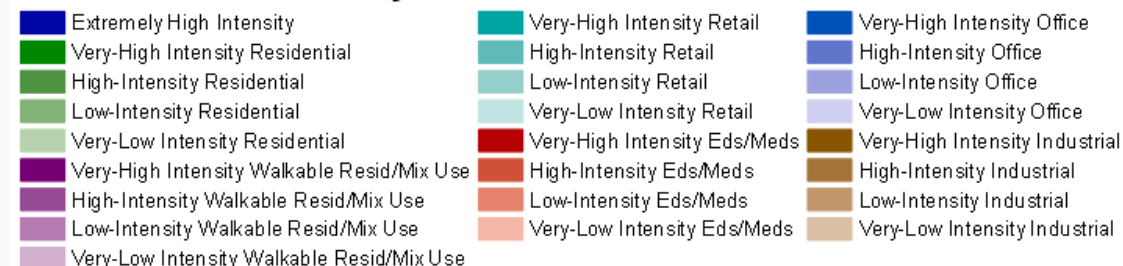


# Neighborhood Types in Philadelphia

Intensity =  
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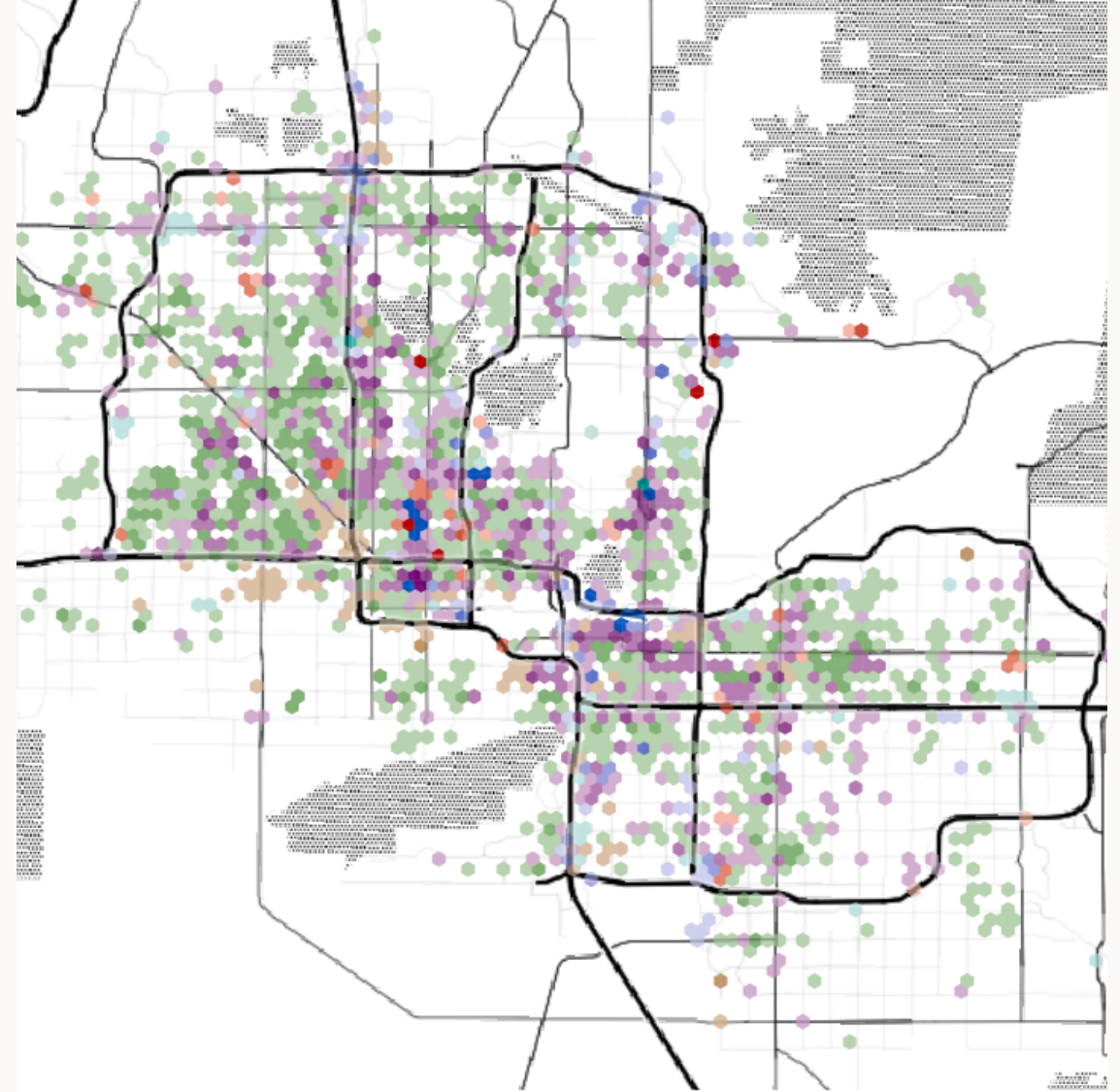


## Land Use and Intensity



# Neighborhood Types in Phoenix

Intensity =  
Walkshed-Adjusted Density



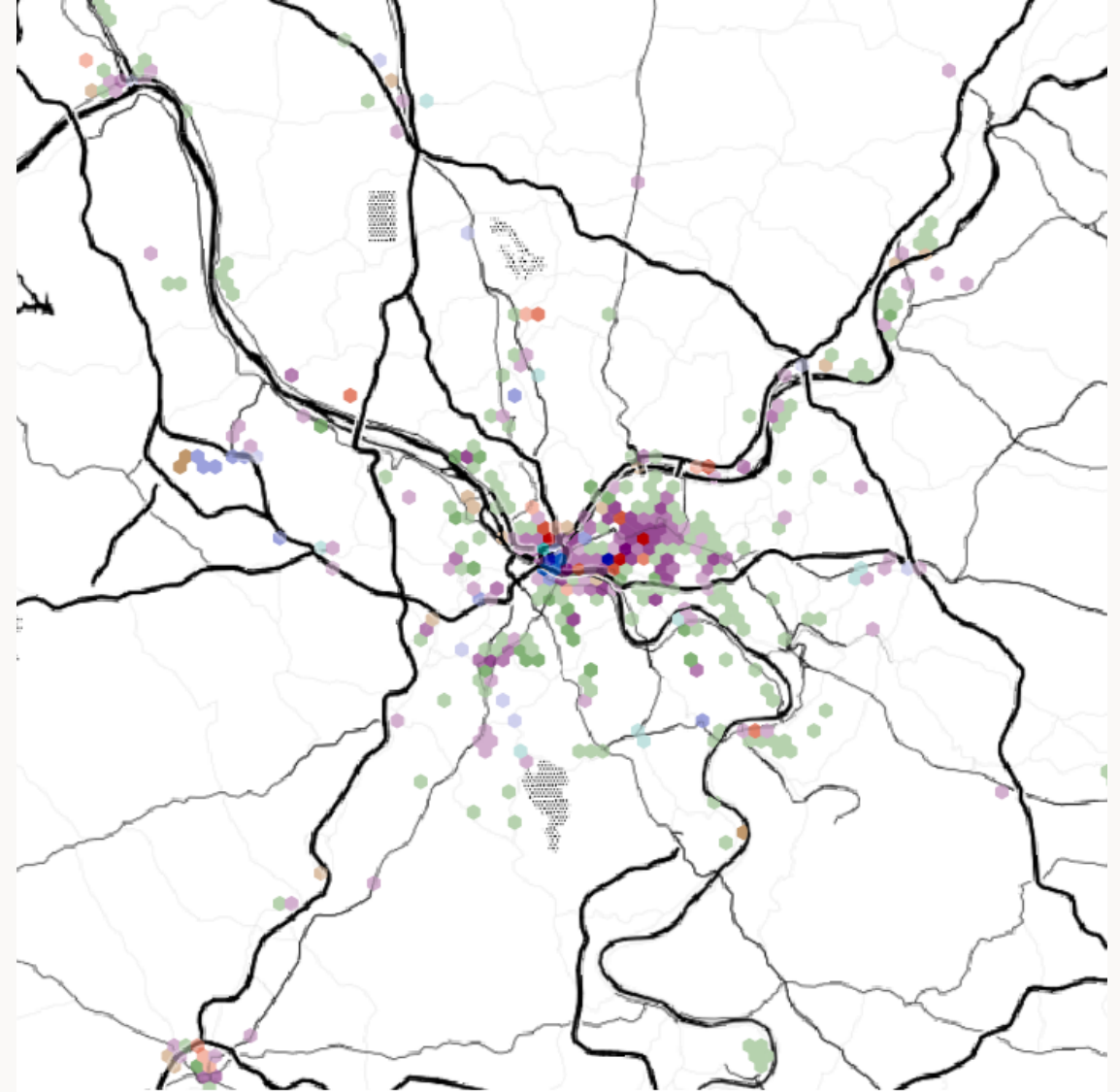
## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
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Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
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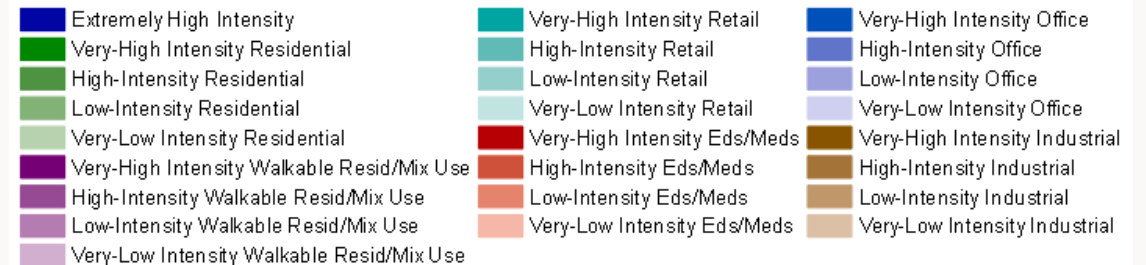


# Neighborhood Types in Pittsburgh

Intensity =  
Walkshed-Adjusted Density

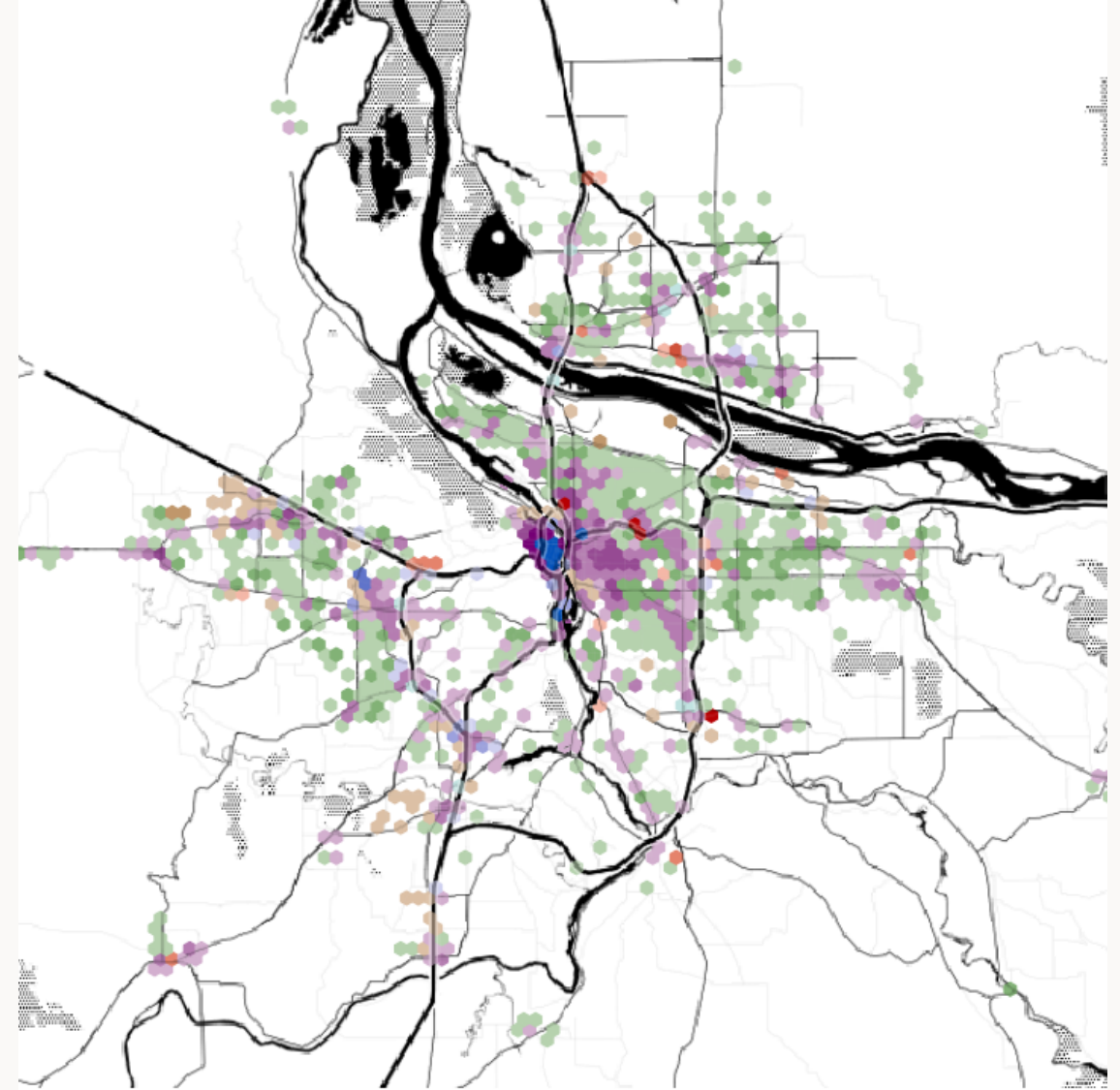


## Land Use and Intensity

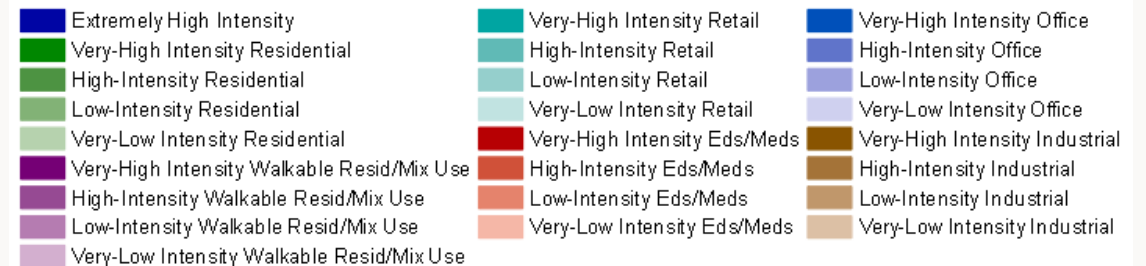


# Neighborhood Types in Portland

Intensity =  
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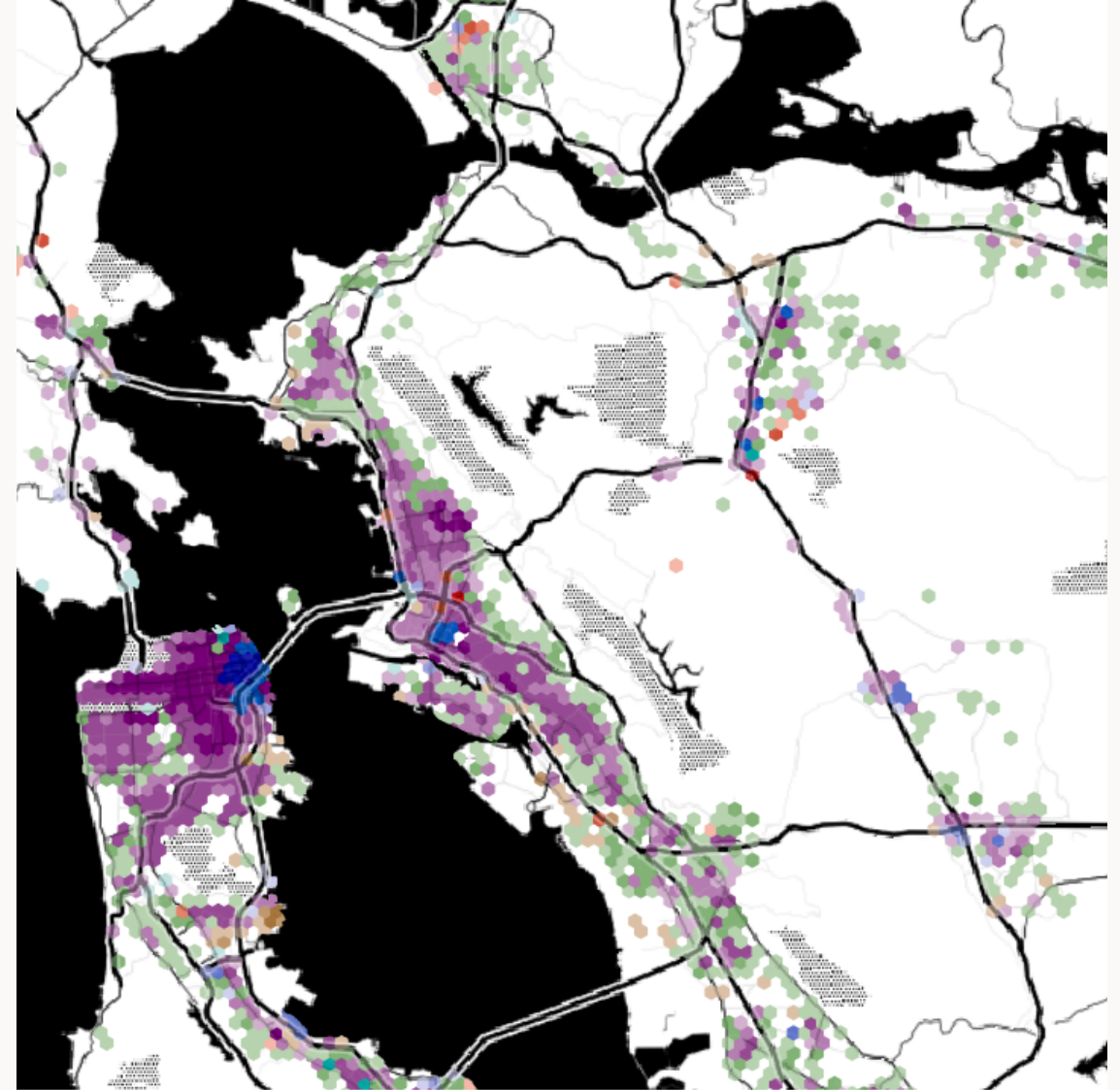
**Land Use and Intensity**





# Neighborhood Types in San Francisco

Intensity =  
Walkshed-Adjusted Density

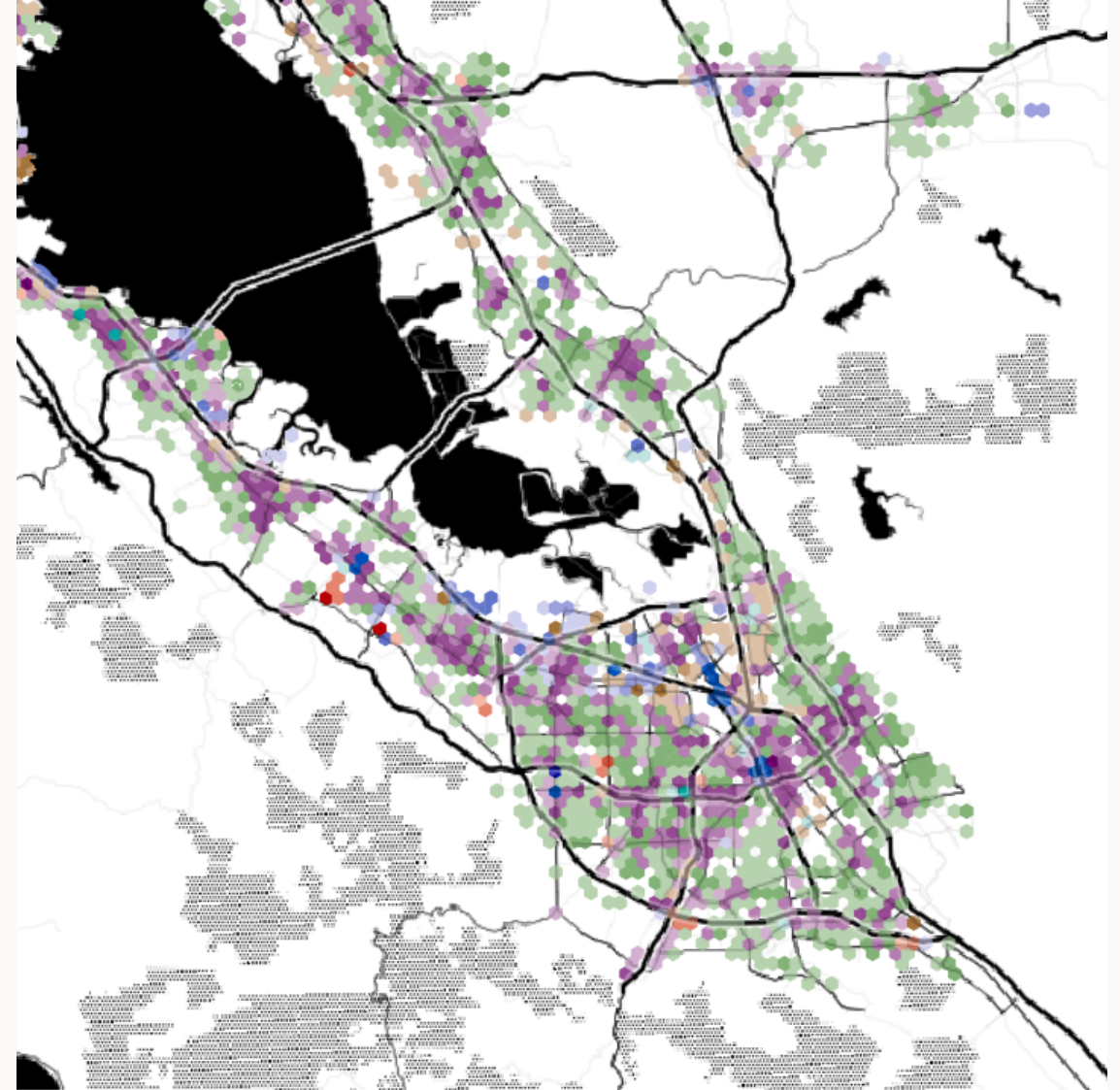


## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
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High-Intensity Walkable Resid/Mix Use	Low-Intensity Eds/Meds	Low-Intensity Industrial
Low-Intensity Walkable Resid/Mix Use	Very-Low Intensity Eds/Meds	Very-Low Intensity Industrial
Very-Low Intensity Walkable Resid/Mix Use		

# Neighborhood Types in San Jose

Intensity =  
Walkshed-Adjusted Density



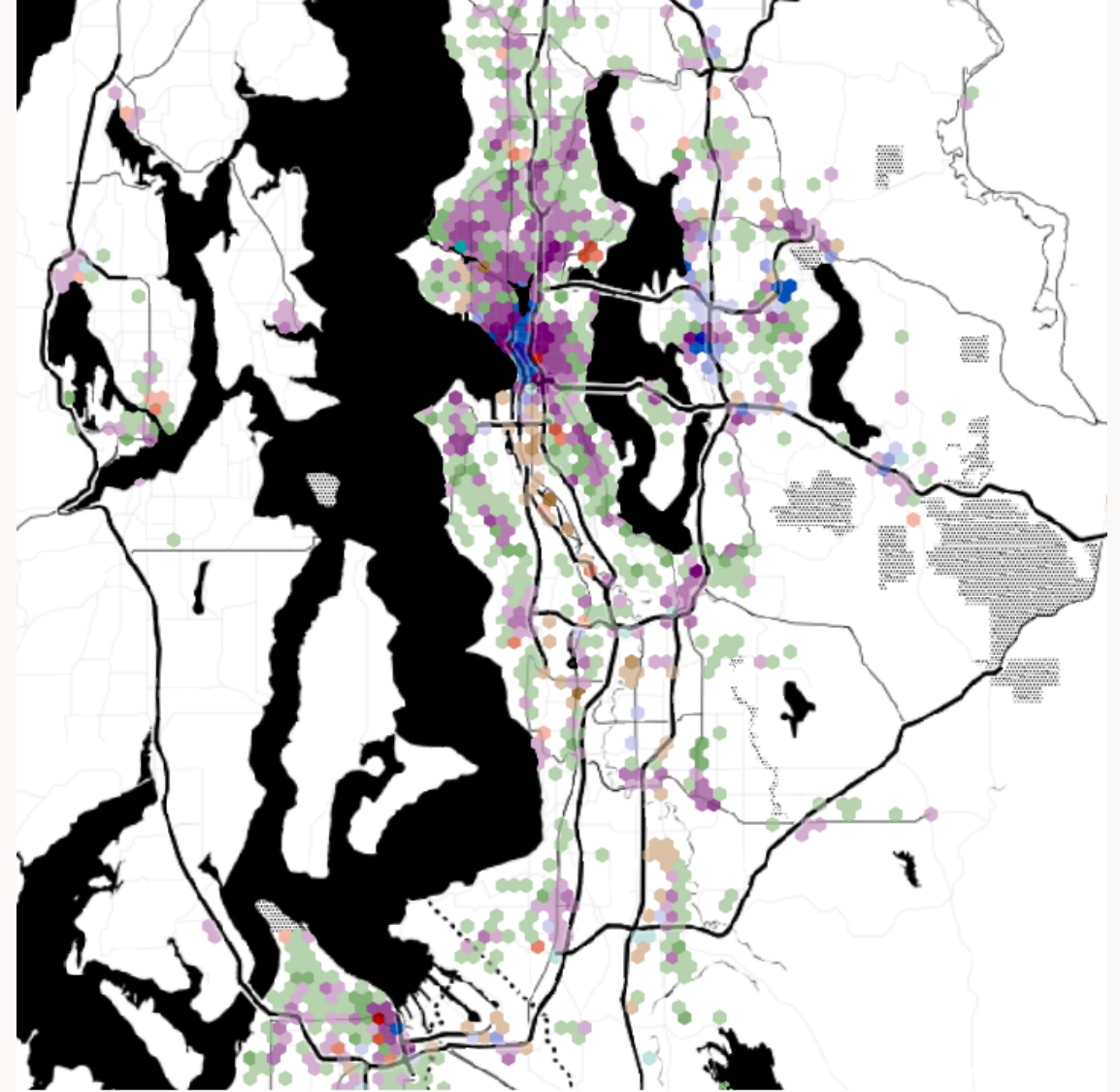
## Land Use and Intensity

Extremely High Intensity	Very-High Intensity Retail	Very-High Intensity Office
Very-High Intensity Residential	High-Intensity Retail	High-Intensity Office
High-Intensity Residential	Low-Intensity Retail	Low-Intensity Office
Low-Intensity Residential	Very-Low Intensity Retail	Very-Low Intensity Office
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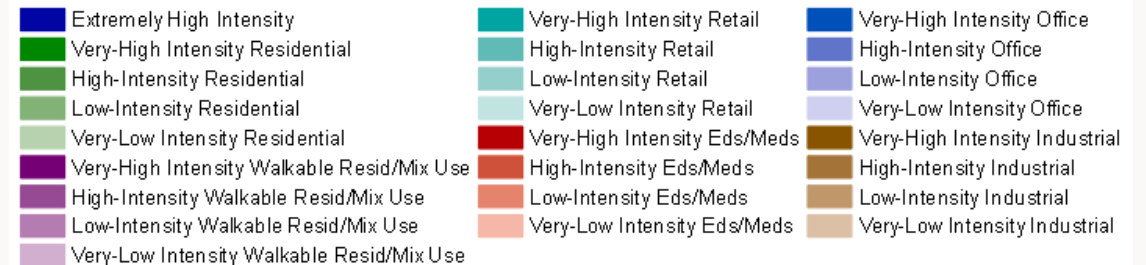


# Neighborhood Types in Seattle

Intensity =  
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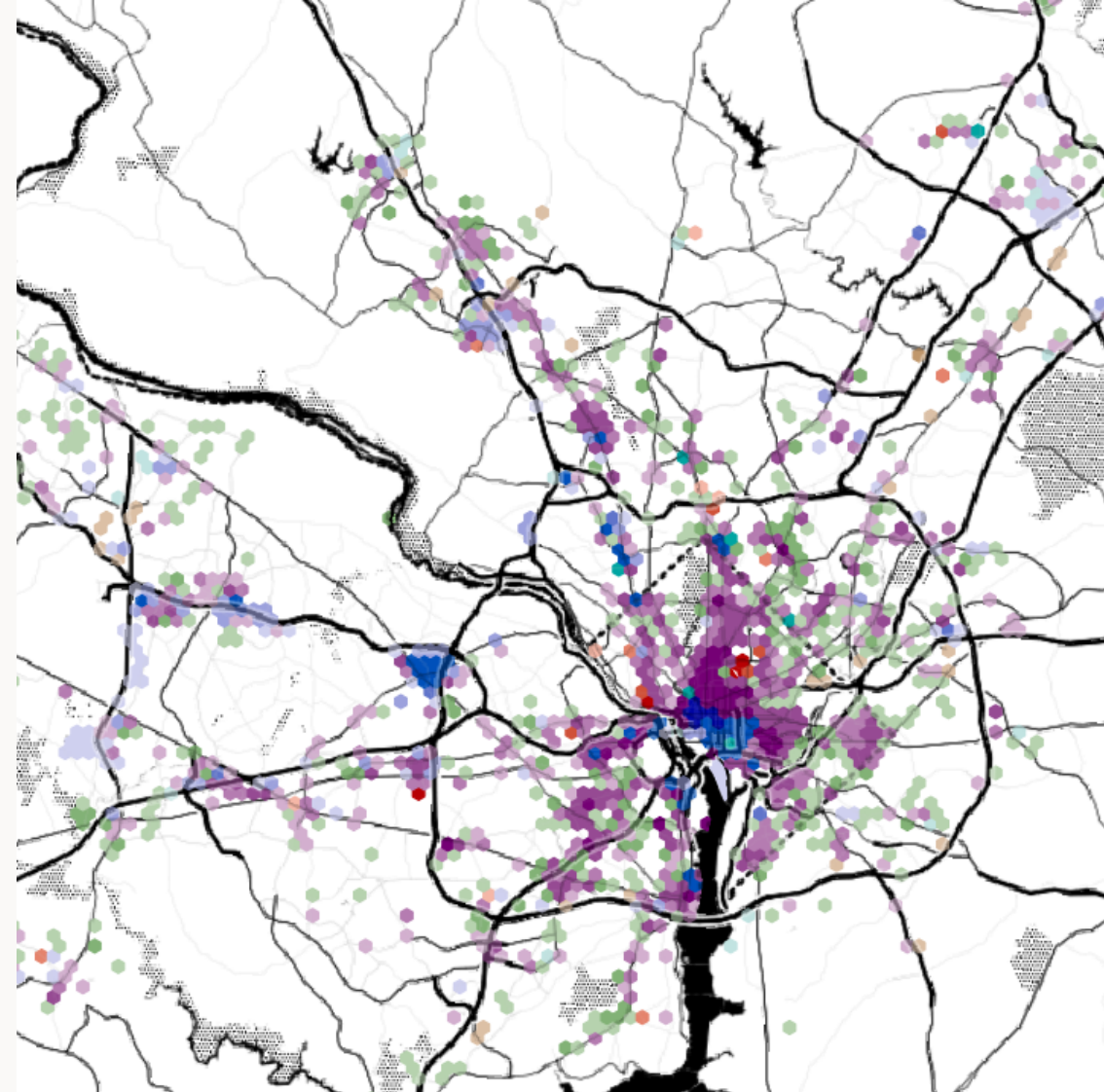


**Land Use and Intensity**



# Neighborhood Types in Washington

Intensity =  
Walkshed-Adjusted Density



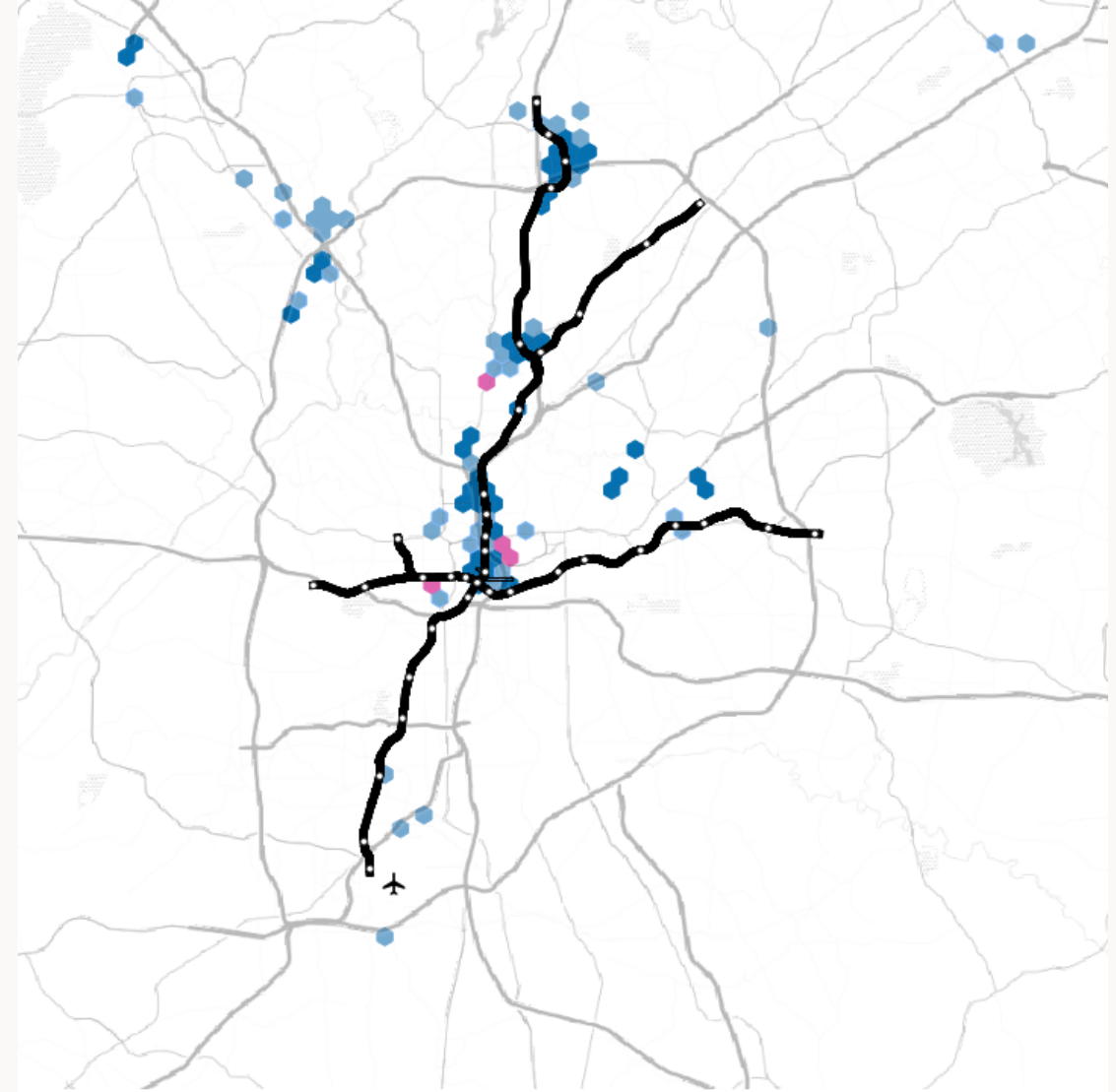
## Land Use and Intensity





# Metro Area Clustering and Rail Transit Maps

# Dense Neighborhoods and Public Transit in Atlanta

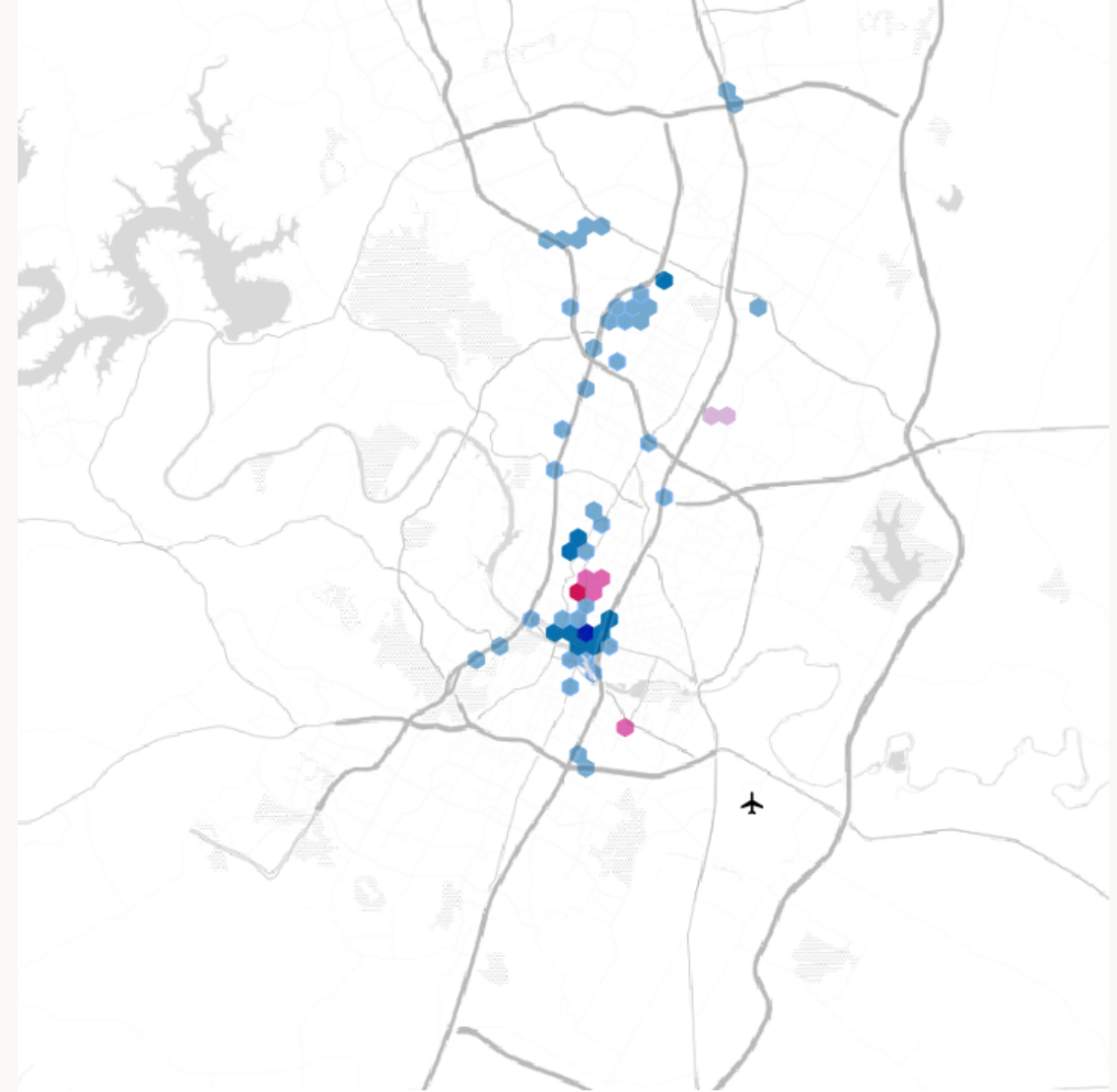


## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)



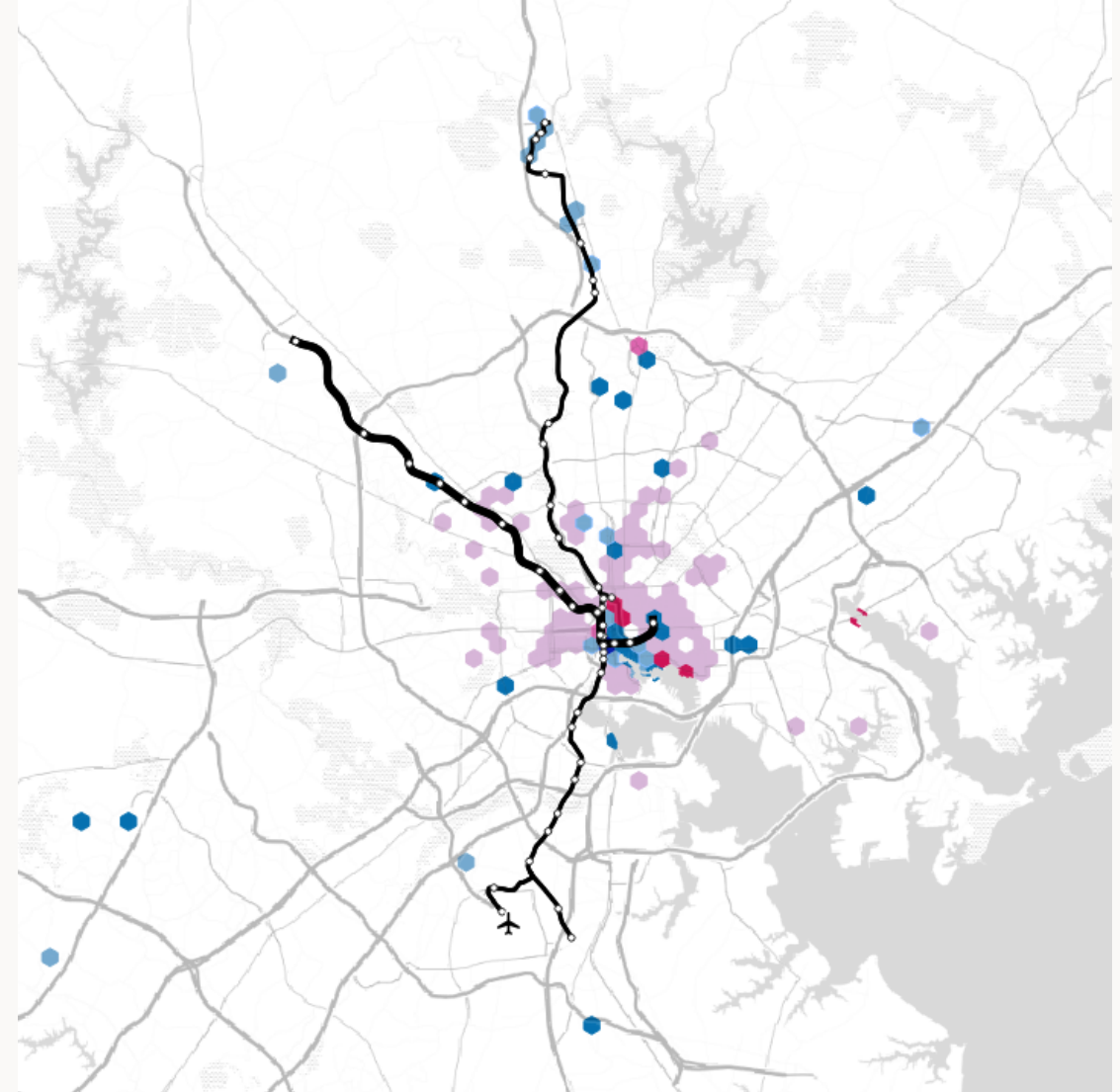
# Dense Neighborhoods and Public Transit in Austin



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in Baltimore

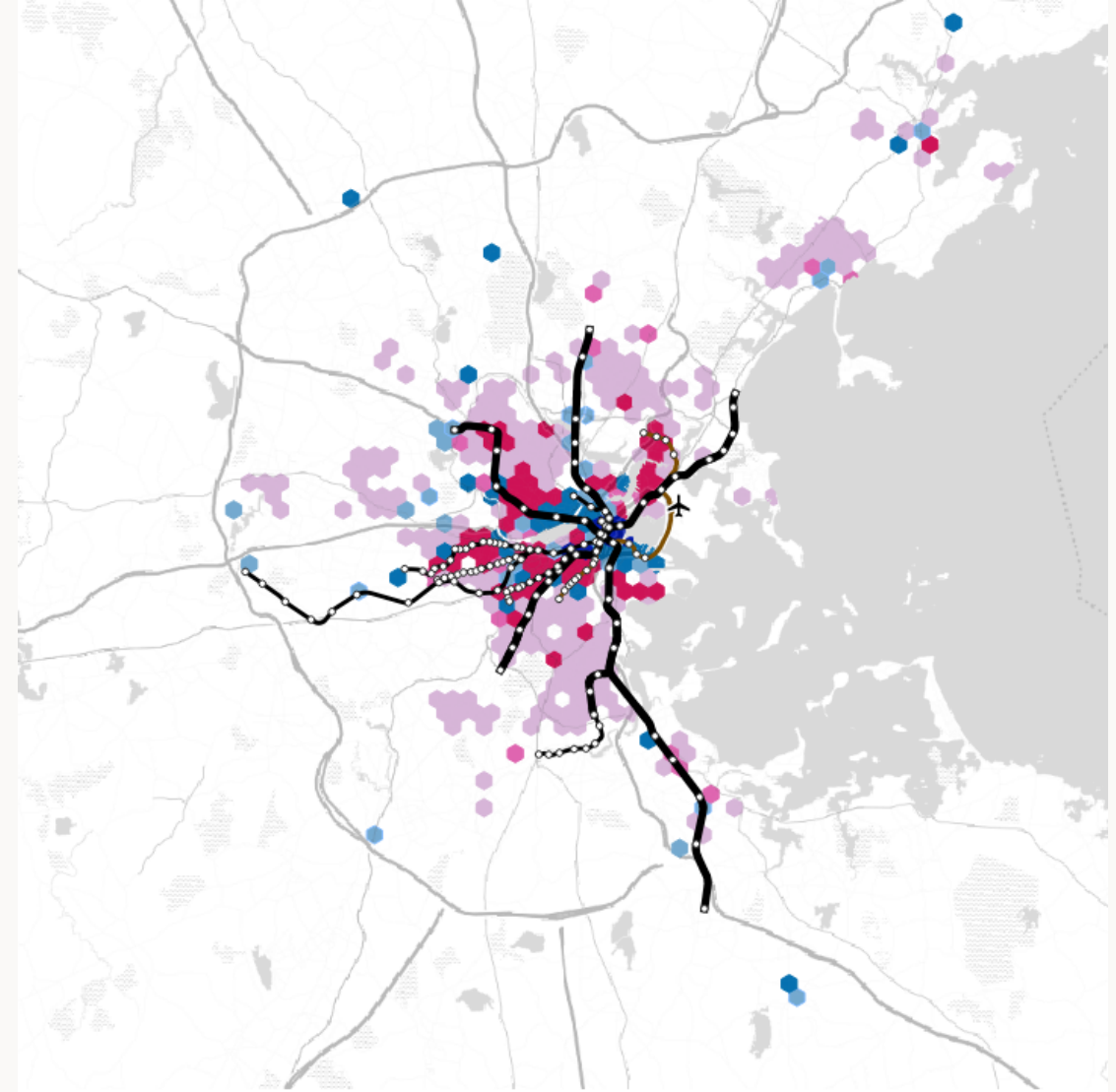


## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
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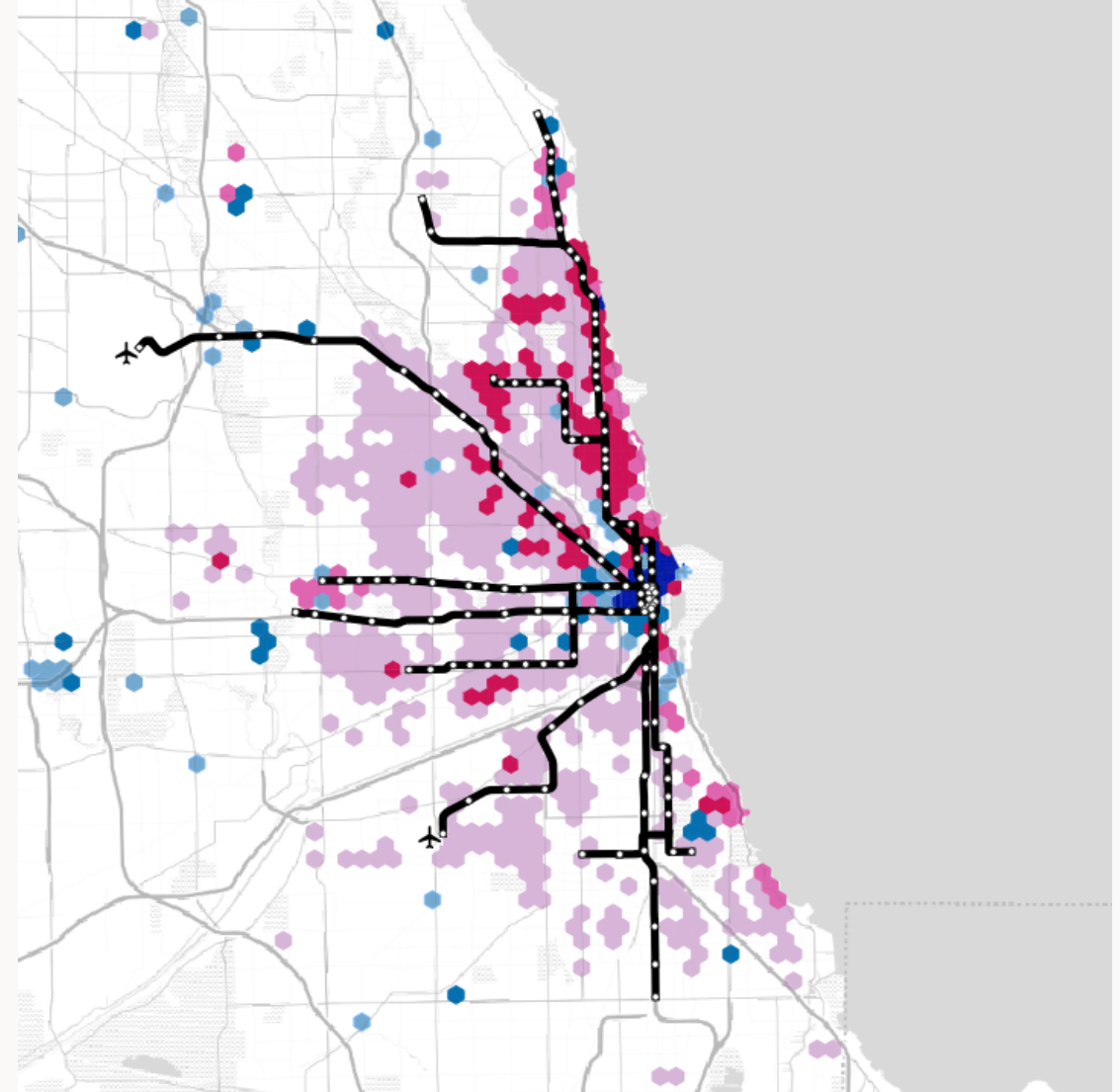
# Dense Neighborhoods and Public Transit in Boston



## **Neighborhood Types for Metro Area Typology**

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in Chicago

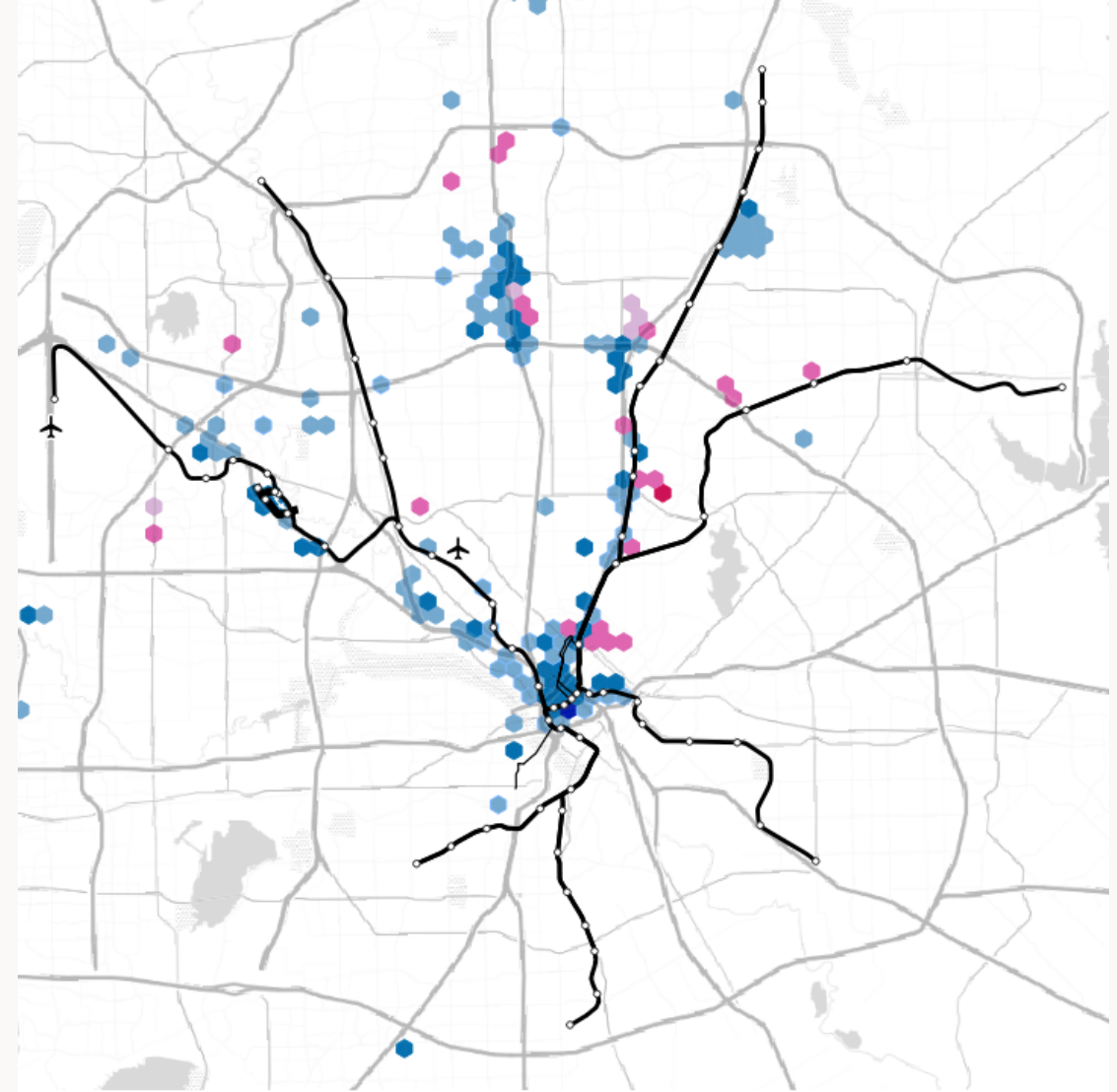


## **Neighborhood Types for Metro Area Typology**

- Very-High Density Central Business District
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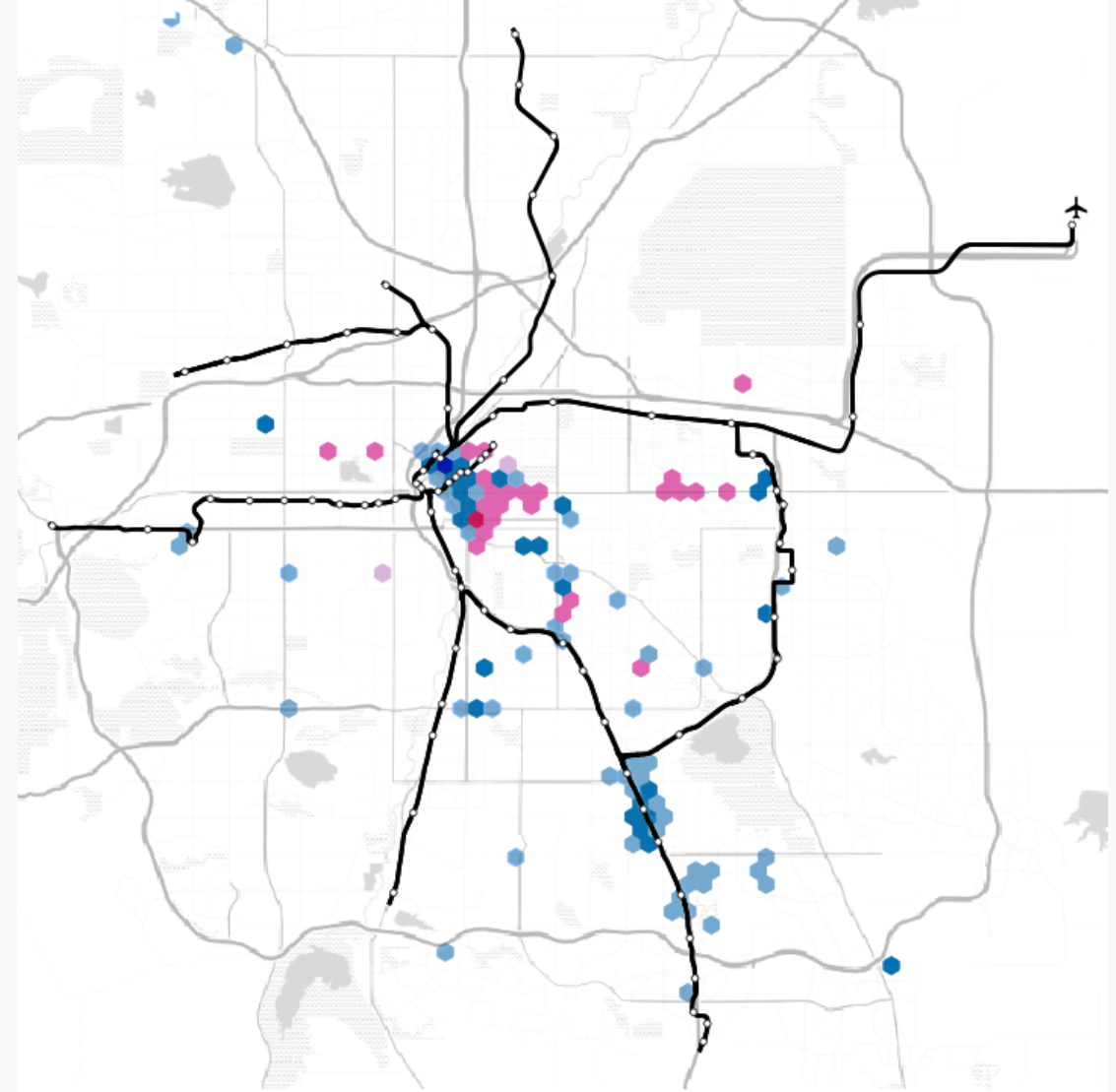
# Dense Neighborhoods and Public Transit in Dallas



## **Neighborhood Types for Metro Area Typology**

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in Denver

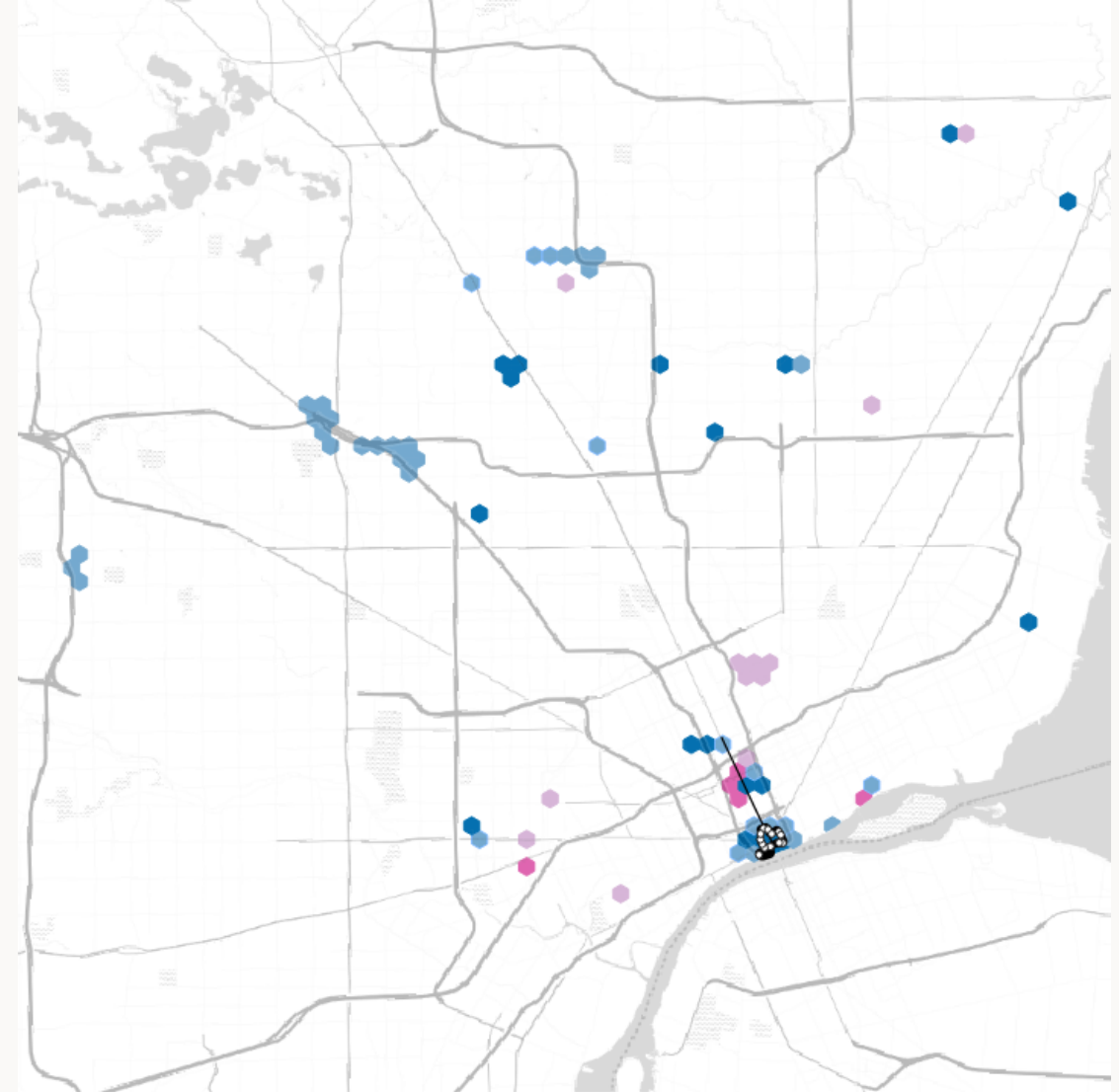


## **Neighborhood Types for Metro Area Typology**

- Very-High Density Central Business District
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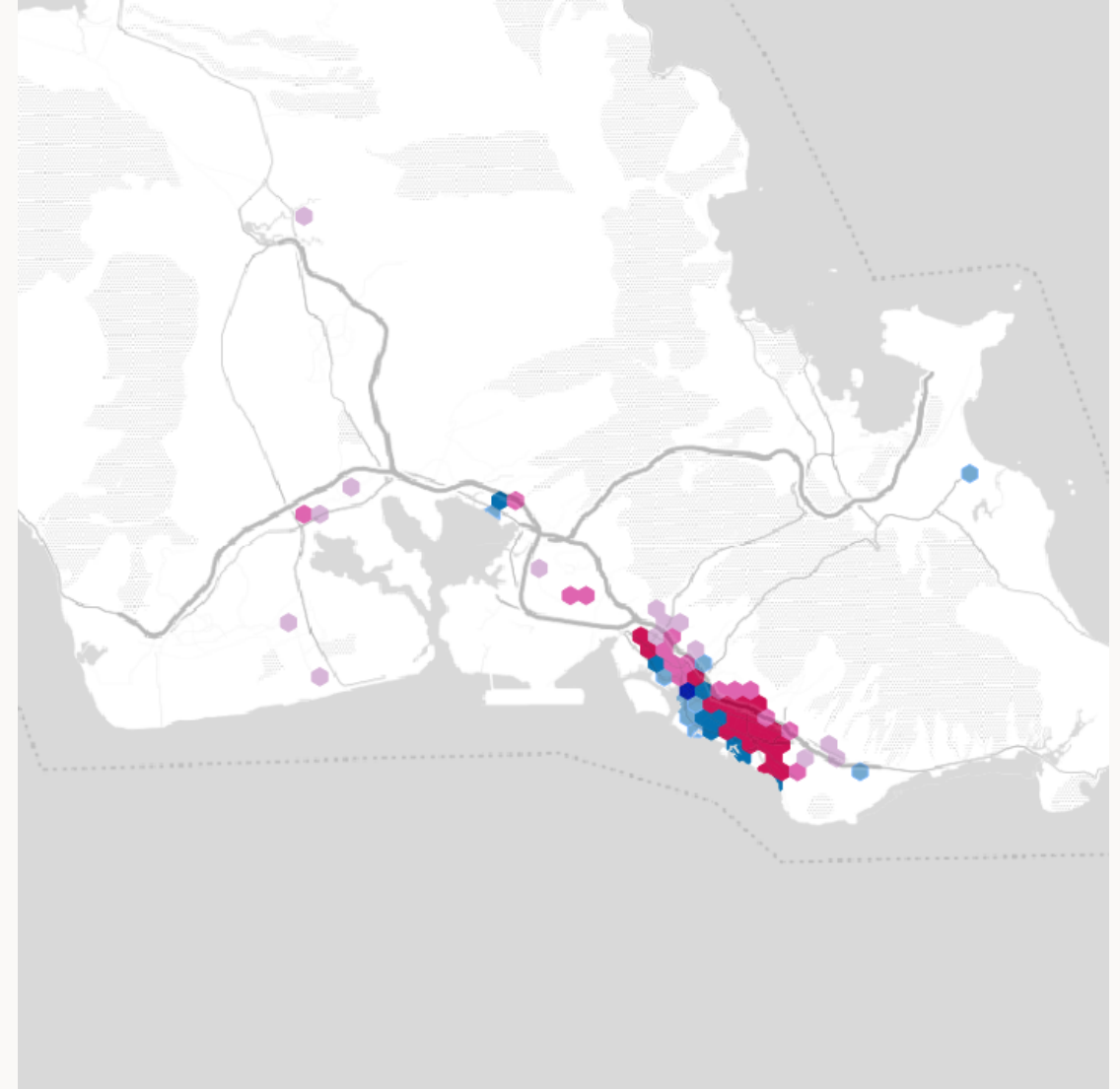
# Dense Neighborhoods and Public Transit in Detroit



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
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- Medium-Density Commercial
- High-Density Residential
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# Dense Neighborhoods and Public Transit in Honolulu

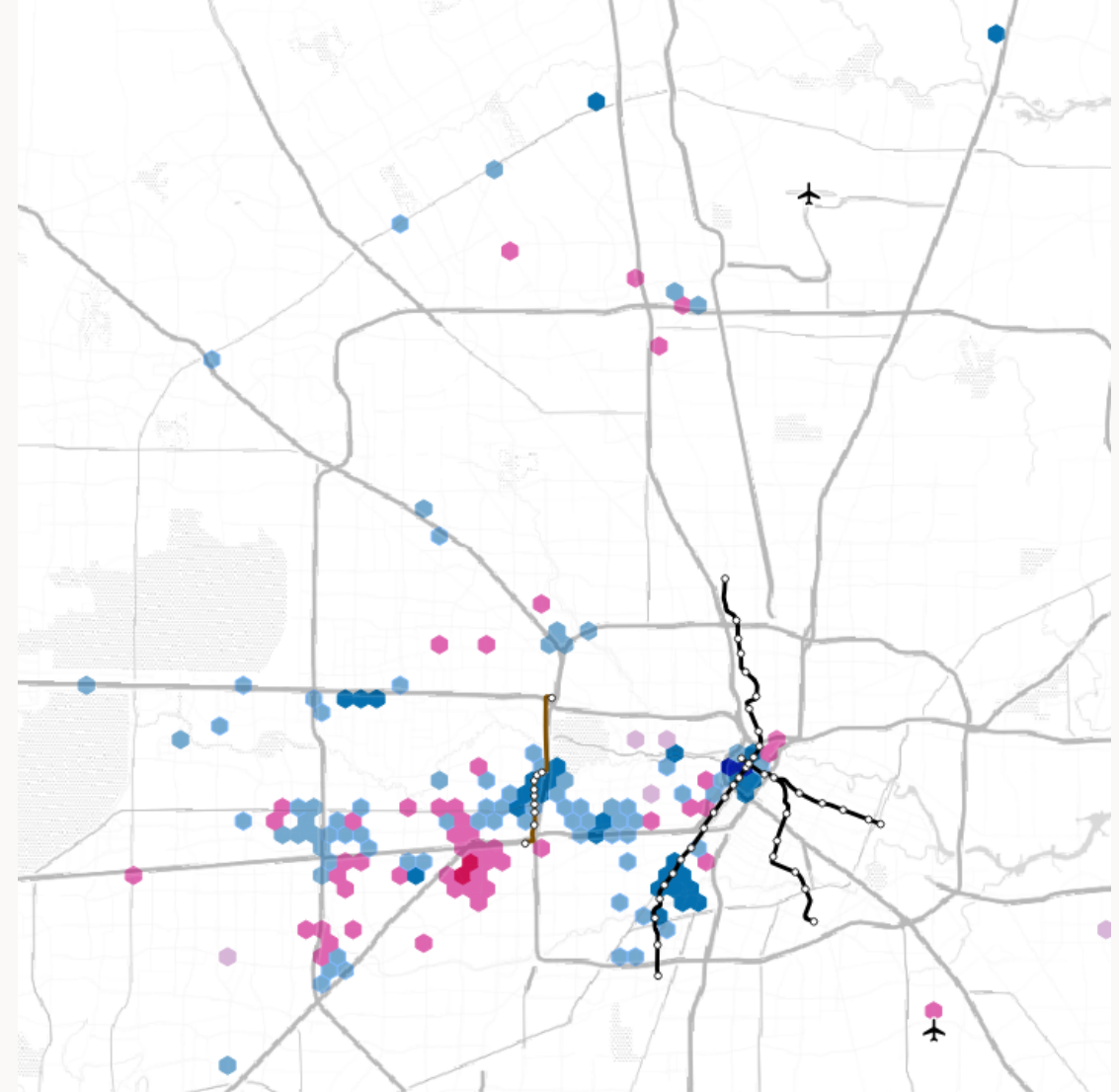


## **Neighborhood Types for Metro Area Typology**

- Very-High Density Central Business District
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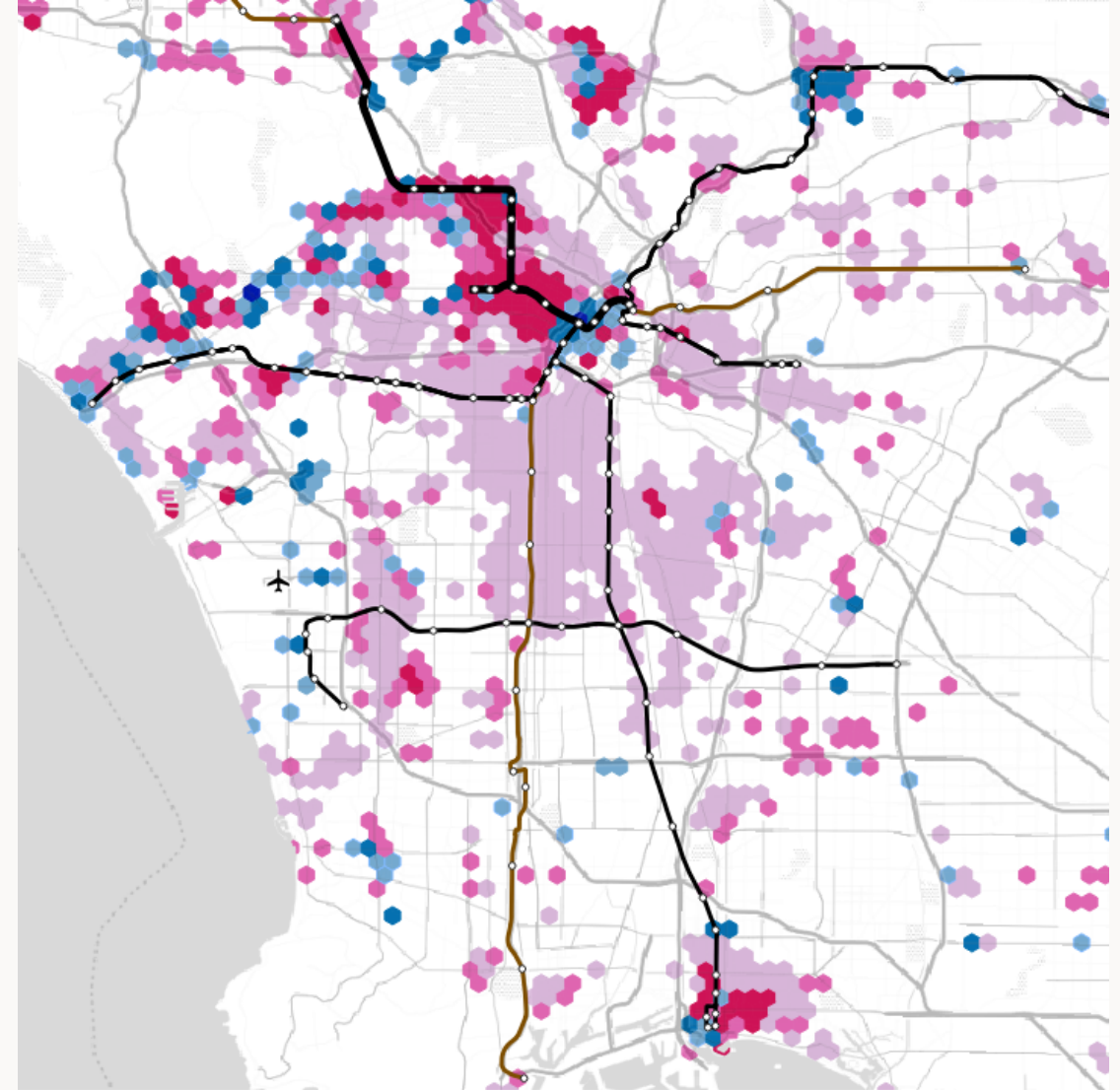
# Dense Neighborhoods and Public Transit in Houston



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
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# Dense Neighborhoods and Public Transit in Los Angeles

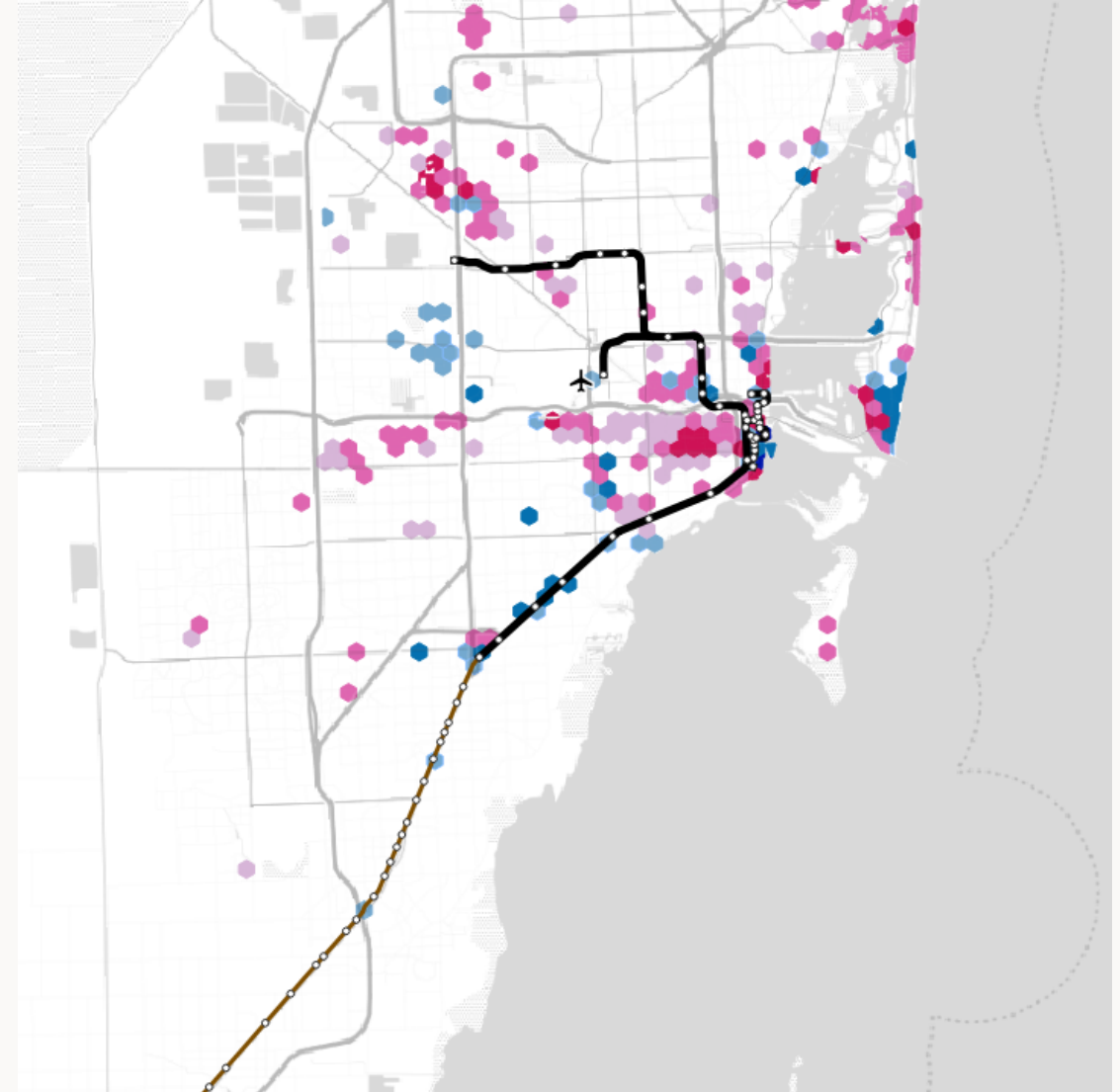


## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
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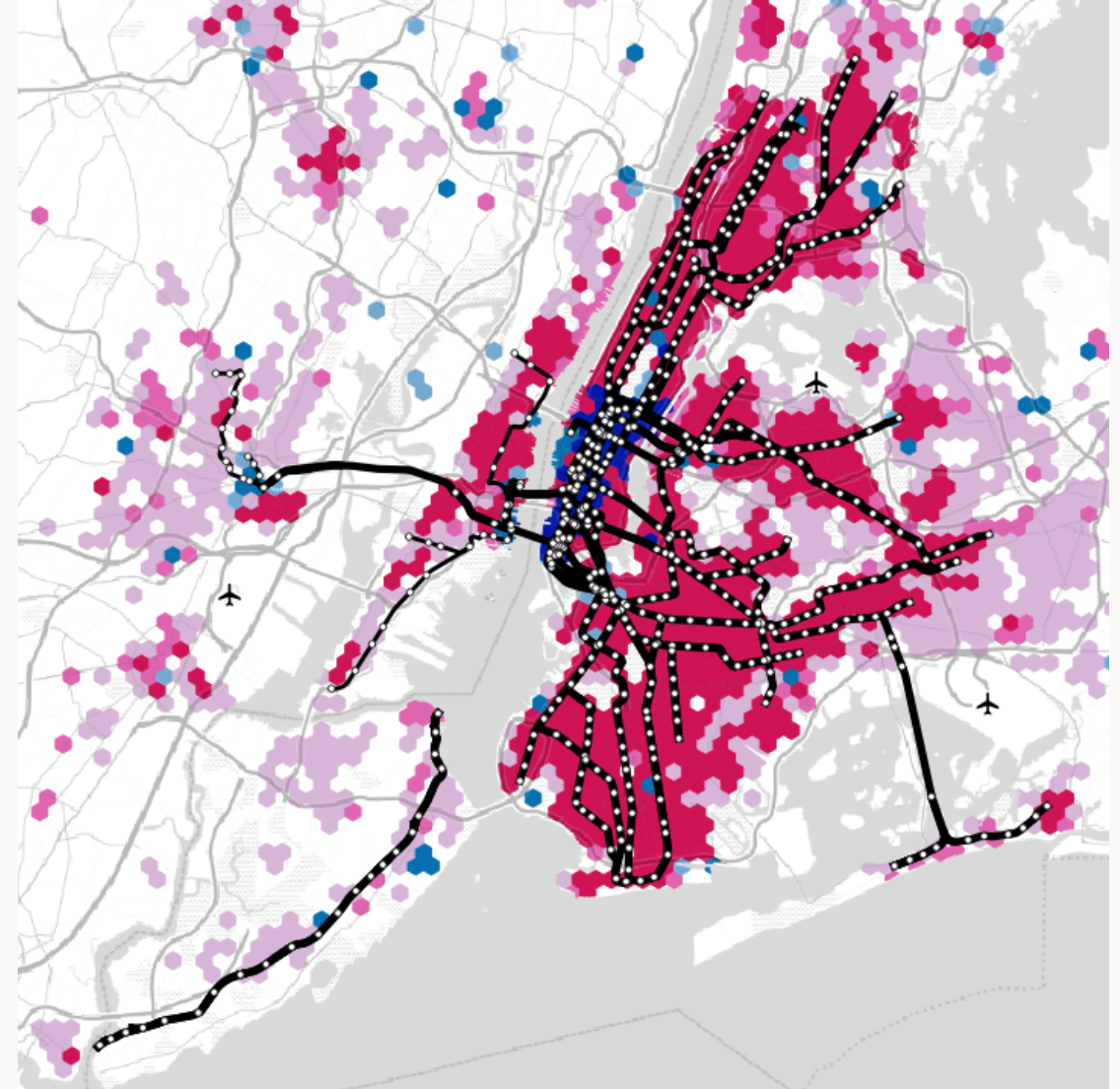
# Dense Neighborhoods and Public Transit in Miami



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
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- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in New York

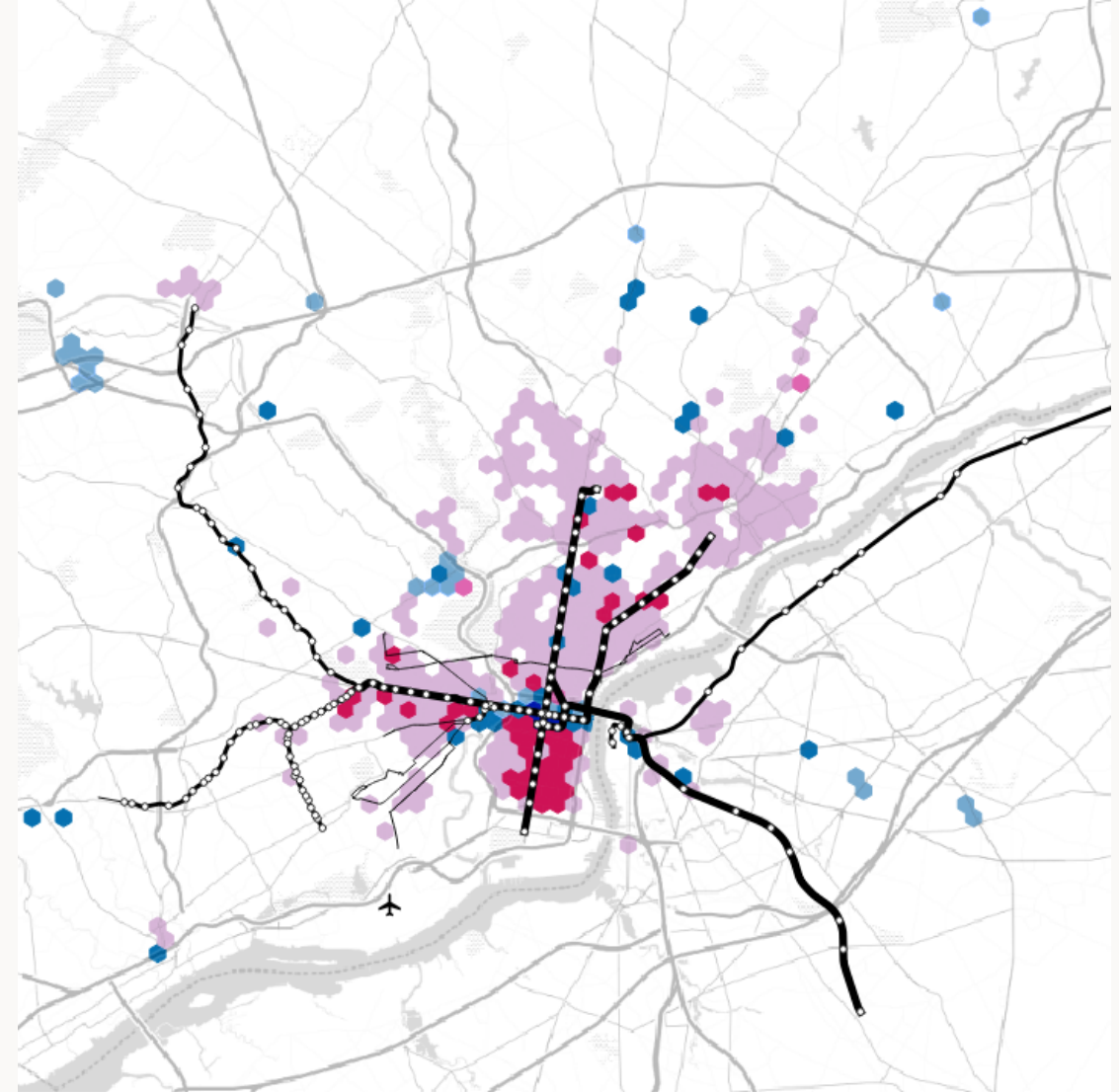


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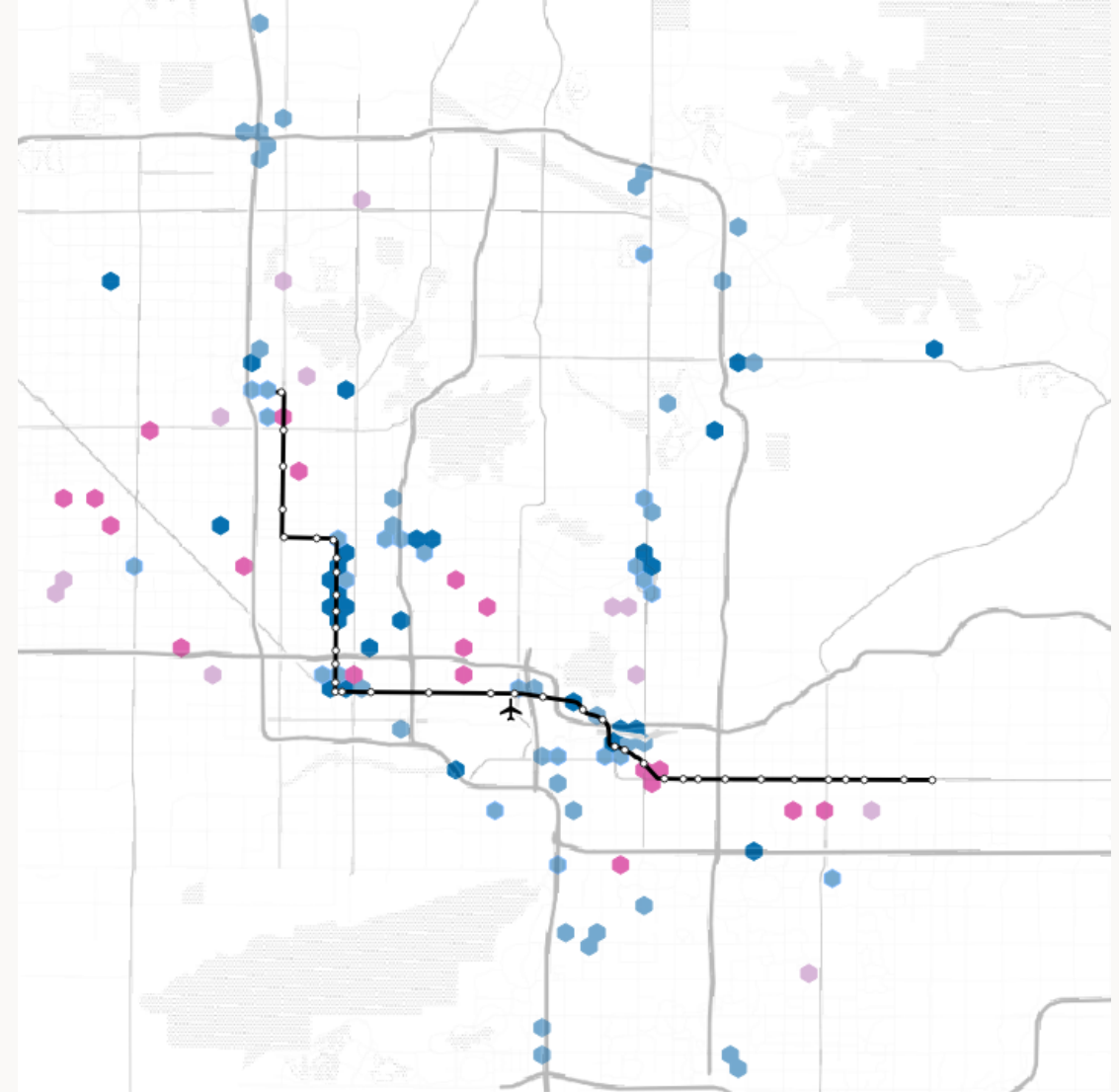
# Dense Neighborhoods and Public Transit in Philadelphia



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in Phoenix

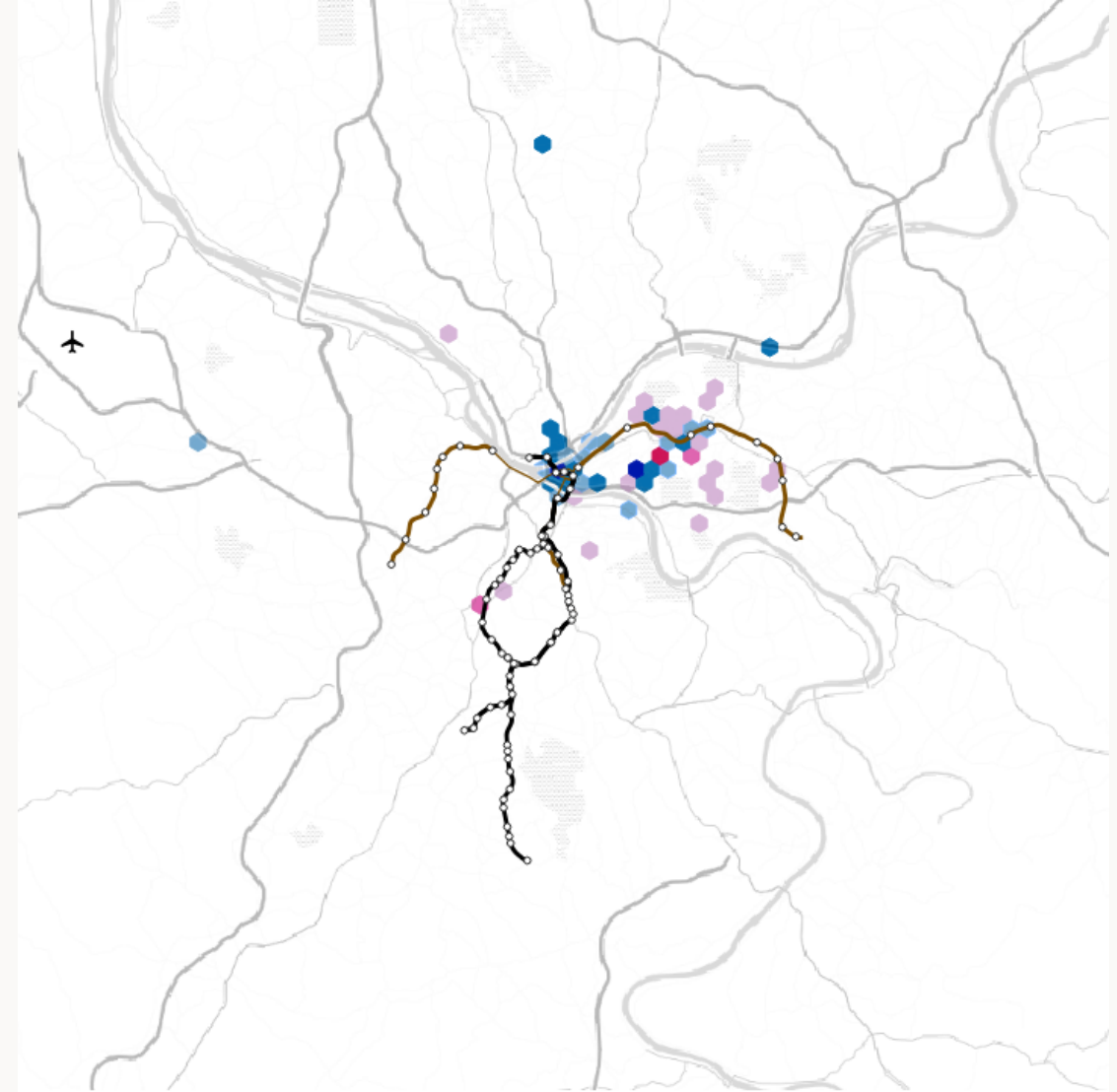


## **Neighborhood Types for Metro Area Typology**

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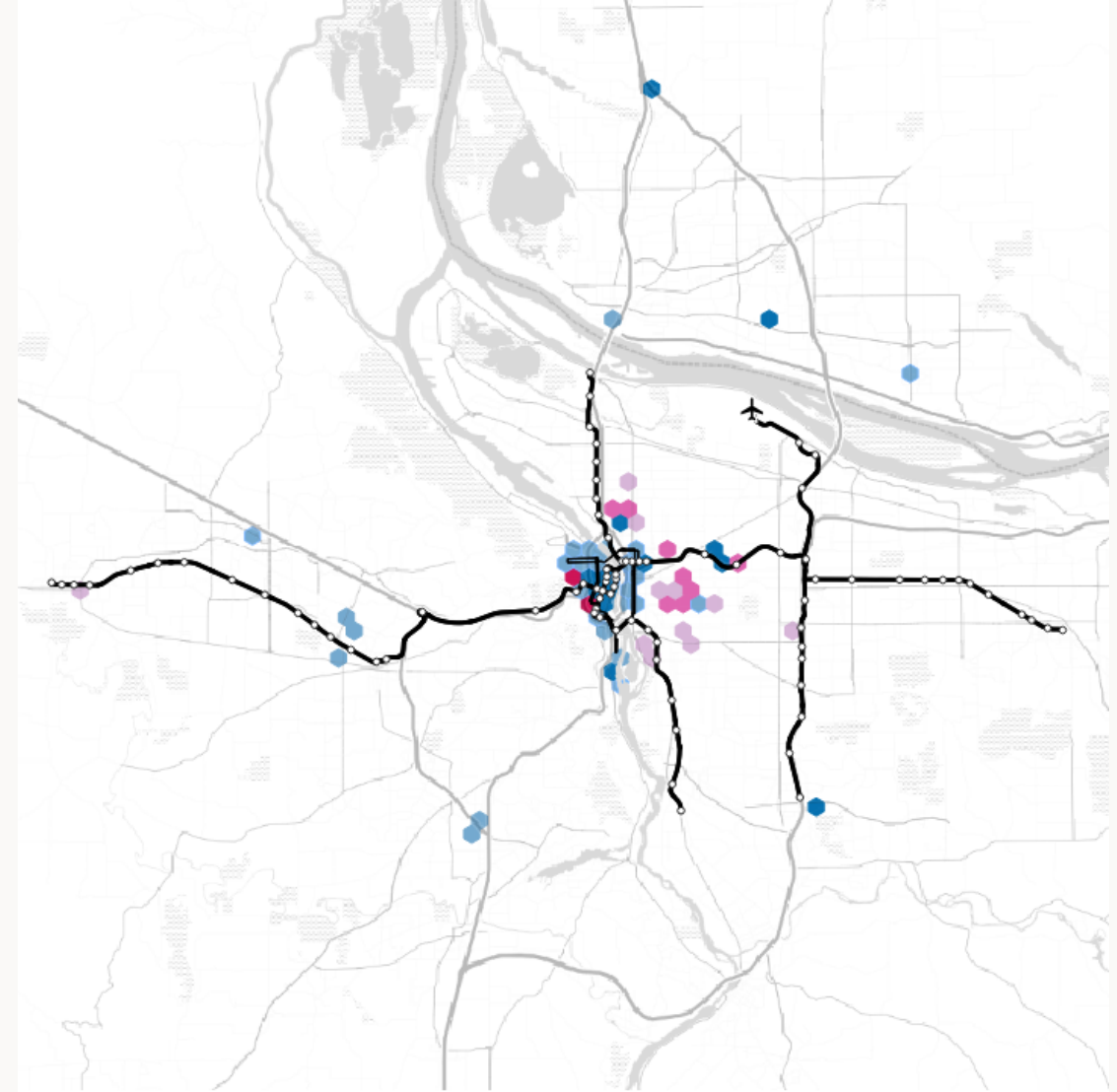
# Dense Neighborhoods and Public Transit in Pittsburgh



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
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- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in Portland

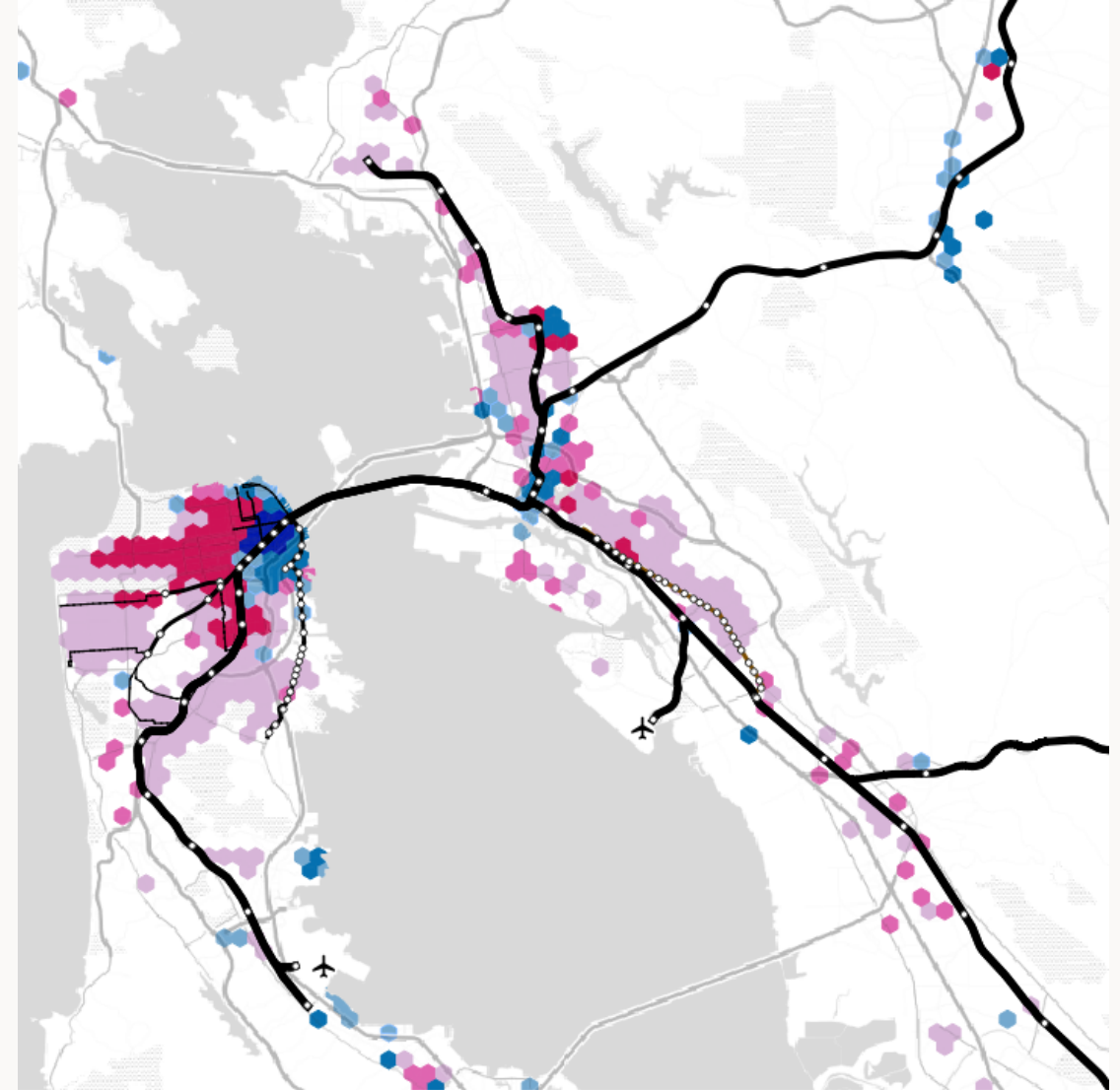


## **Neighborhood Types for Metro Area Typology**

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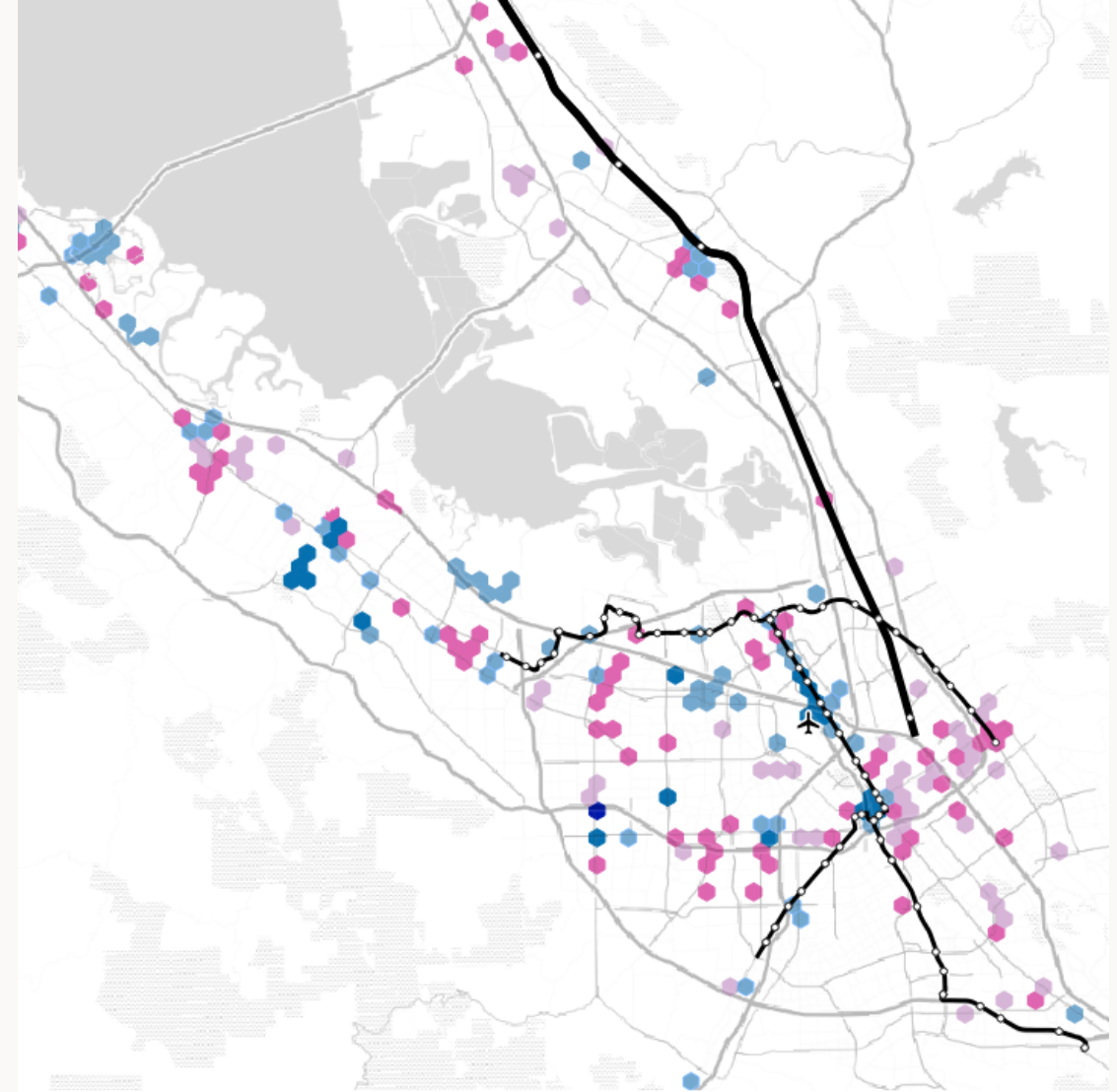
# Dense Neighborhoods and Public Transit in San Francisco



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
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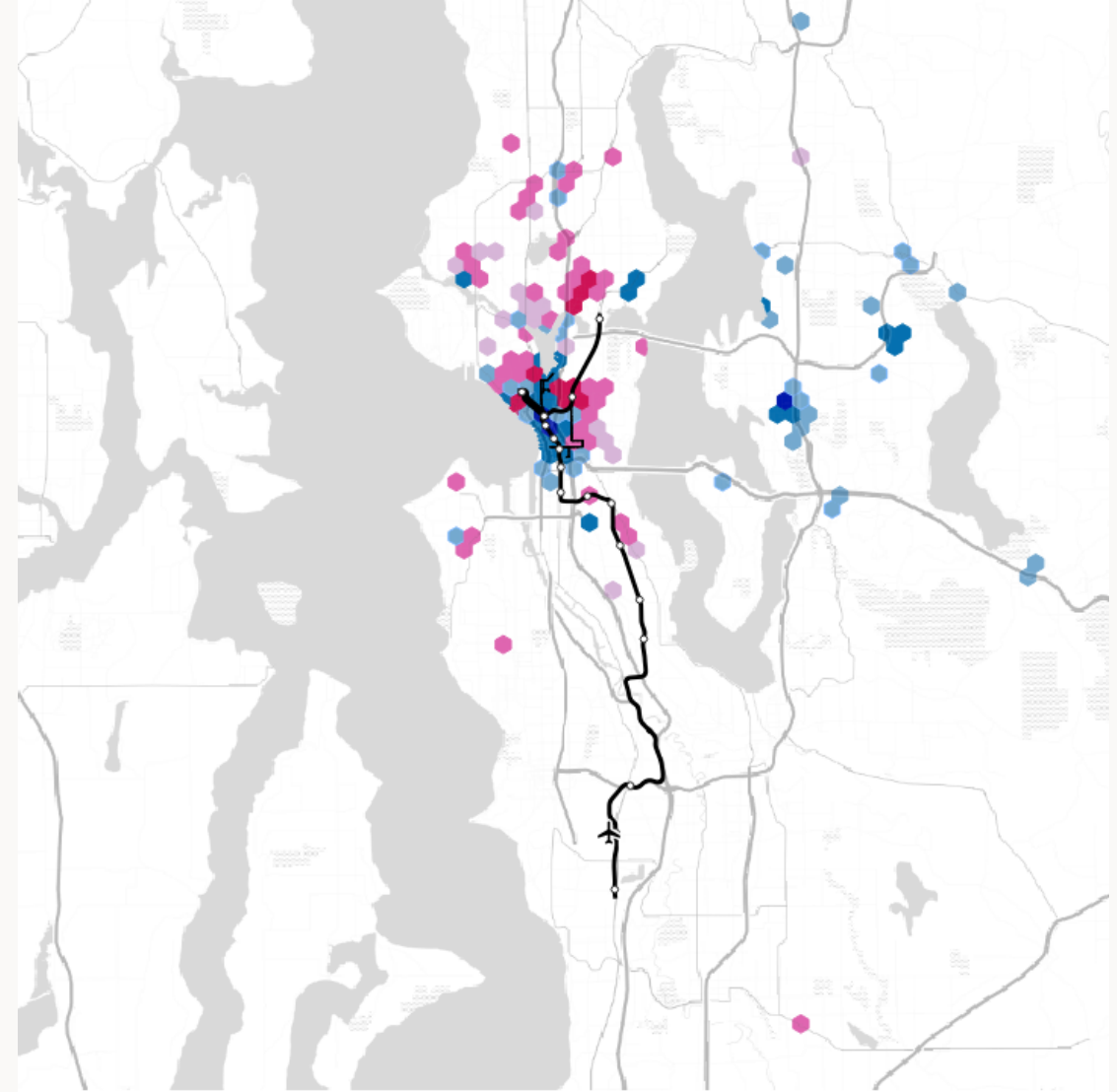
# Dense Neighborhoods and Public Transit in San Jose



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)

# Dense Neighborhoods and Public Transit in Seattle

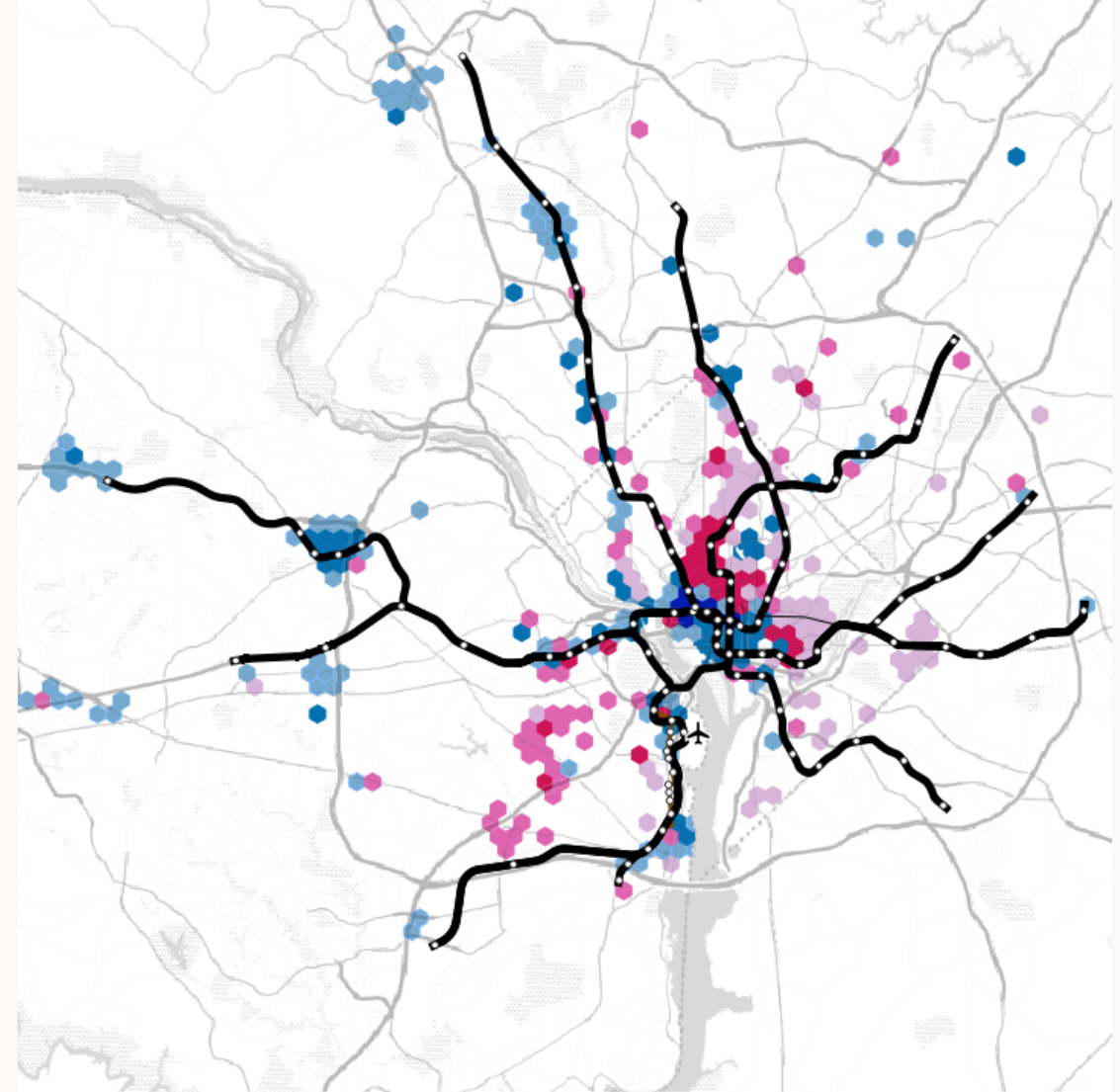


## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
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- High-Density Residential
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- Medium-Density Residential (Small Apartments and Rowhouses)



# Dense Neighborhoods and Public Transit in Washington



## Neighborhood Types for Metro Area Typology

- Very-High Density Central Business District
- High-Density Commercial
- Medium-Density Commercial
- High-Density Residential
- Medium Density-Residential (Large Apartments)
- Medium-Density Residential (Small Apartments and Rowhouses)