COMPATIBILITY VS. DENSITY:

A CASE FOR HOUSING DENSITY IN AUSTIN, TEXAS

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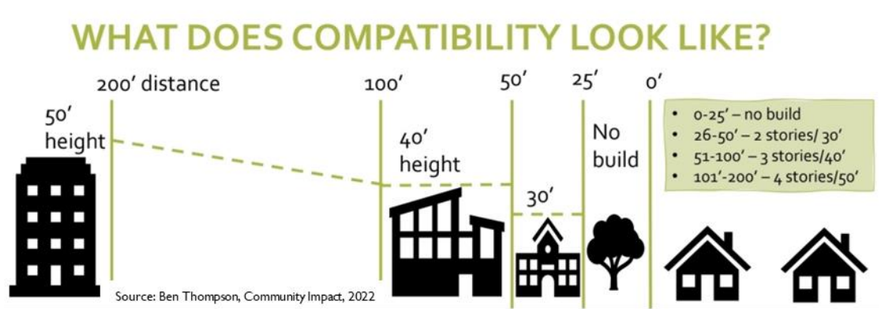
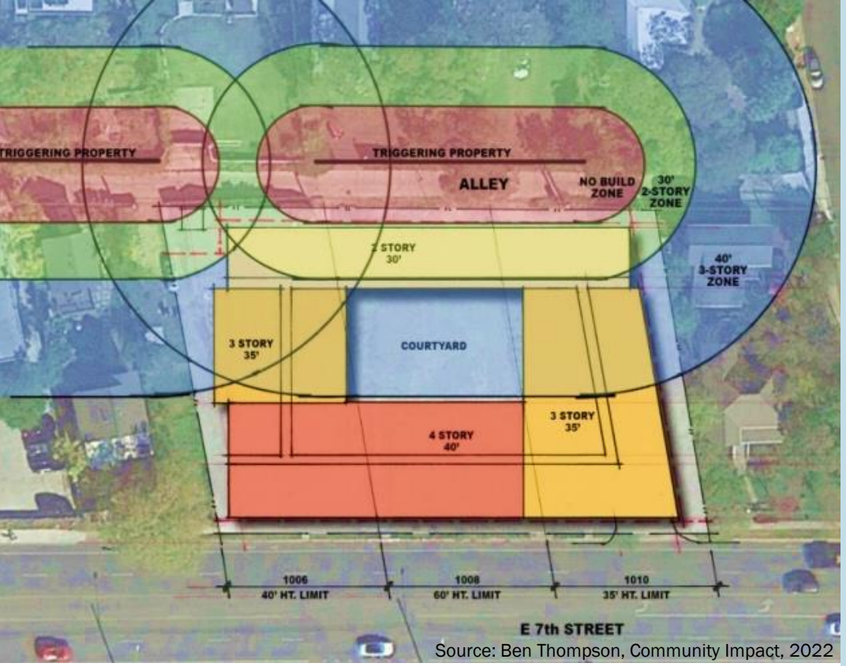
WELCOME TO AUSTIN

In the last 10 years Austin, Texas has seen unprecedented growth in population. US News and World Report has named Austin in the top 10 ‘Fastest-Growing Places in the U.S.’ (2022). The population has growth 33%, much higher than the national average of 7.4% growth. In the last 5 years alone, tech jobs have grown by 28.7%, compared to 16.0% for all industries in Austin. In the core urban areas, median income has increased while average number of people per household has decreased. Real estate speculation has skyrocketed in the commercial and residential sectors. The average home price has increased 11.5% in the last two year alone. (Austin Chamber of Commerce, 2022) As the city grows, the housing stock becomes more unaffordable. Local housing affordability advocates are urging city council to consider reducing regulations that restrict denser development in the city. One such regulation is the compatibility law.



COMPATILITY

Compatibility laws are used in Austin, TX to limit development around single-family residential properties. As Austin is growing, demand for housing is increasing. Compatibility laws limit how tall a building can be within a certain range of single family detached homes. For example, no structure can be built 0-25 feet from a single-family home. Development is restricted to 2 stories when within 25-50 feet, 3 stories when within 50-100 feet, and can subsequently increase 1 foot for every 10 feet setback. Austin is a fast-growing city, and the housing stock is in high demand. Creating more housing is limited by these rules. The depiction above shows how these rules can limit the potential for more units.



Source: Ben Thompson, Community Impact, 2022

COMPATILITY IN ACTION

In the image above, you can see a single-family lot line and an apartment building across the street. Each buffer from the lot line depicts a height restriction based on distance. The number of stories, and therefore the number of units are limited closer to single family homes.

As elected officials, community groups, residents, and other stakeholders contemplate and negotiate the future of compatibility laws, we seek to contribute our analysis to show areas of Austin that receive a high livability score but have restriction on building height, and therefore density. We aim to demonstrate the value of lessening or eliminating compatibility laws that restrict development height, especially for residential use. This leads to our research question:

WHAT AREAS ARE SUITABLE FOR RESIDENTIAL DEVELOPMENT BUT RESTRICTED BY COMPATIBILITY LAWS IN AUSTIN, TX?

APPROACH

We are interested in highlighting areas in Austin that are highly suitable for residential development but restrict density using compatibility laws. To do so, we've leveraged multiple-criteria decision analysis (MCDA). An MCDA is a method to determine spatial suitability by assigning a score based on predetermined indicators, or criteria. We define 'areas suitable for residential development' as areas that contain particular features or amenities within a certain proximity. Areas closer to a feature or amenity receive a higher score. Features and amenities are referred to as "criteria" in this report.

ASSUPTIONS & LIMITATIONS

It is important to note, MCDAs utilize a scoring system to determine suitability. The method to determine scores is developed by the analysis team and is explained in the methodology section of the report. The analysis design process begins with asking, "how do we define suitability?" The criteria used to define suitability is explained in the following section. Additionally, the team referred to anecdotal feedback from housing density activists and residents in Austin to develop the scoring method.

For criteria inputs that are assigned a score based on proximity to a feature or amenity, our group had to decide how to determine proximity with two potential methods: by Euclidean distance from the feature or driving distance, accounting for road network pathways. For features that require driving for access, we employed service areas made using network analysis. Features that provide benefit to a resident based on direct proximity utilized Euclidean distance buffers.

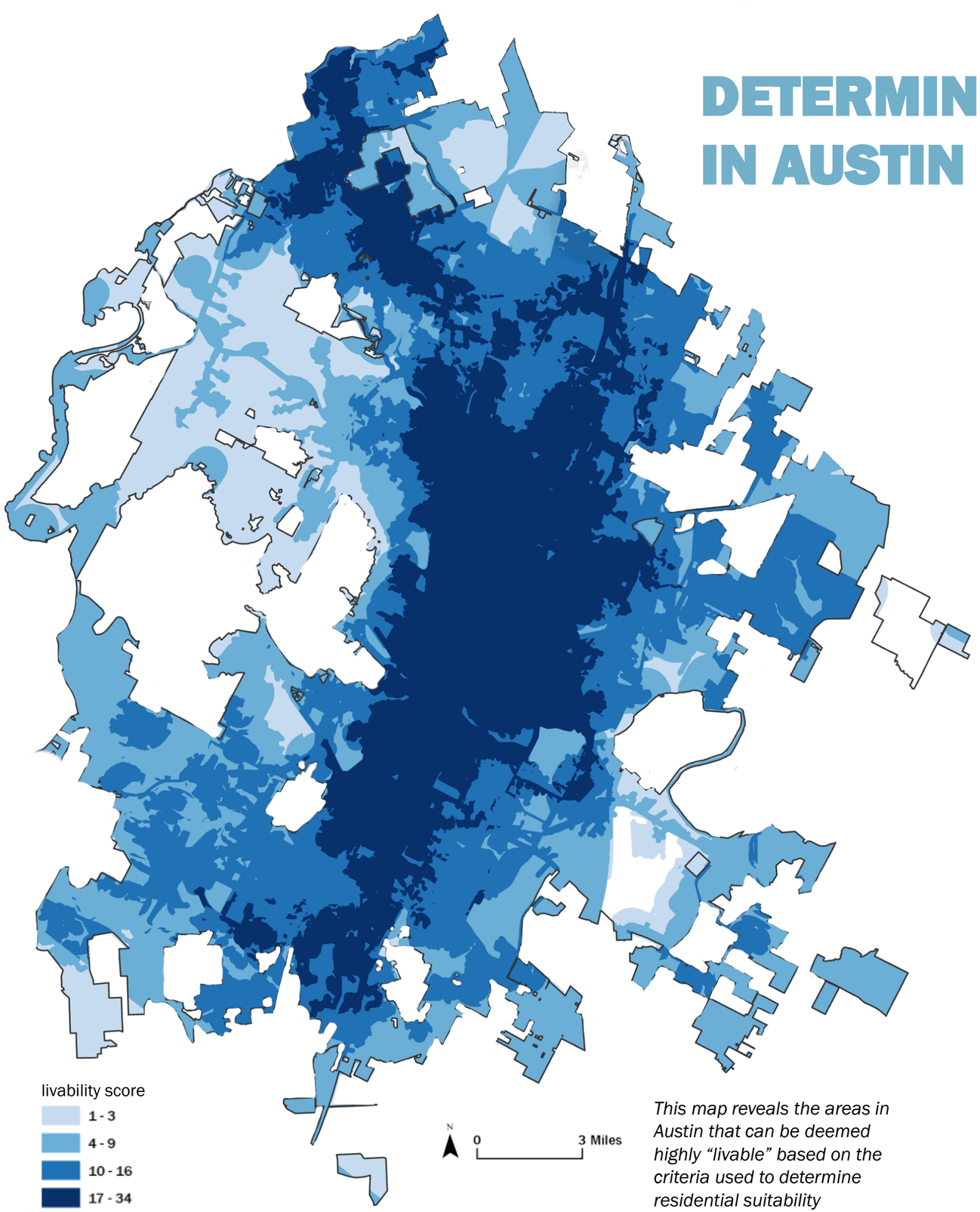
Additionally, we have employed density-based clusters in order to determine 'hubs' for business and retail land uses. Our analysis relies on the availability of data and is bound by a time scope.

METHODOLOGY

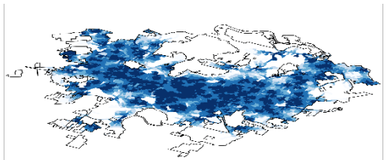
	criteria for livability	data source	data processing	scoring (5 = highest suitability)
analysis layers	proximity to TODs [1]	Austin Geospatial Services TOD Map	leveraged static map from Austin Geospatial Services to create TOD boundary and a 0.5 mi buffer around TODs	areas in a TOD received a 5, areas within a 0.5 mi boundary received a 1
	proximity to transit corridors	Austin Dept. of Planning Corridor Map	using streets network, created service areas every 0.25 driving mi from access points to major highways, freeways and transit corridors	service areas received a score of 5 if closest to transit corridor, 1 for furthest
	high rates of population growth	2010 & 2020 US Decennial Census	measured rate of change in population density from 2010 to 2020 per census tract using US Decennial Census	tracts received a score of 5 if in the top quintile of population growth, 1 for lowest
	proximity to schools	Austin Dept. of Planning Land Use Inventory	using streets network, created service areas every 0.5 driving mi from grade schools, colleges, trade schools	service areas received a score of 5 if closest to schools, 1 for furthest
	proximity to business districts		using streets network, created service areas every 1 driving mi from core business districts	service areas received a score of 5 if closest to business districts, 1 for furthest
	proximity to retail & entertainment districts		using streets network, created service areas every 1 driving mi from shopping, retail, and entertainment districts	service areas received a score of 5 if closest to retail & entertainment, 1 for furthest
	proximity to parks		using Euclidean distance, created a buffer ring every 0.125 mi, roughly 3 min walk on average, to parks	service areas received a score of 5 if closest to parks, 1 for furthest
decision layers	compatibility restrictions		Euclidean distance boundaries created to represent height restrictions from 'no development' to 2-5 story buildings allowed	no score assigned; used for analysis of restricted height compared with high suitability
	residential zones	Austin Dept. of Planning Zoning Map	all lots zoned for residential use were isolated from the larger zoning	no score assigned; used to review suitability score for lots zoned for residential
		Step 1 – determine suitability criteria. Features and amenities listed under analysis layers are inputs to reveal livable areas. Decision layers reveal where residential development is possible but restricted.	*Step 2 – pull and clean data from respective sources.*	*Step 3 – prepare data for MCDA by rasterizing cleaned data with boundaries or classes in order to create an index for scoring "suitability," i.e. "livability"*	*Step 4 & 5 – assigning scores for each set of variables and calculating the score across all criteria*

[1] Transit-Oriented Development Zones – areas designated by the City of Austin as current and future sites for high-density development and multi-modal transit hubs
**see appendix for details on data and methodology*

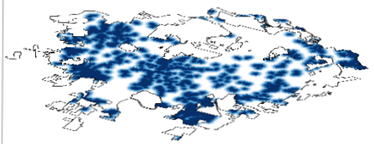
DETERMINING SUITABLE PLACES TO LIVE IN AUSTIN



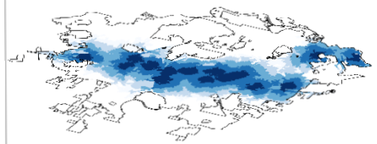
This map reveals the areas in Austin that can be deemed highly "livable" based on the criteria used to determine residential suitability



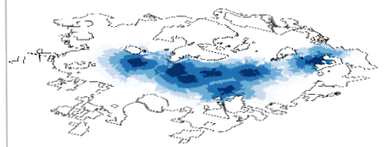
Proximity to **schools** determines educational accessibility for families with children and ease of access for those seeking higher education.



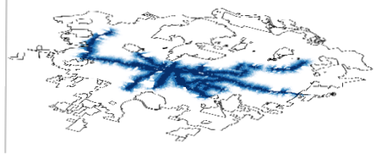
Proximity to **parks** aids in determining overall accessibility to outdoor spaces. Parks provide space for recreation, community-building, and have environmental benefits.



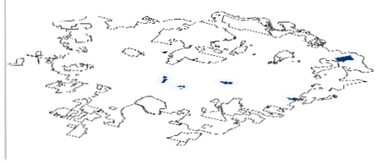
Proximity to **shopping and retail hubs** can determine opportunities for easy access to vital goods like groceries. They can also indicate general economic investment in a neighborhood.



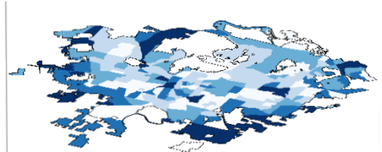
Proximity to **business hubs** is an indicator of job opportunities in an area. Additionally, using office spaces as a proxy, they can determine accessibility to higher-paying, non-service industry jobs.



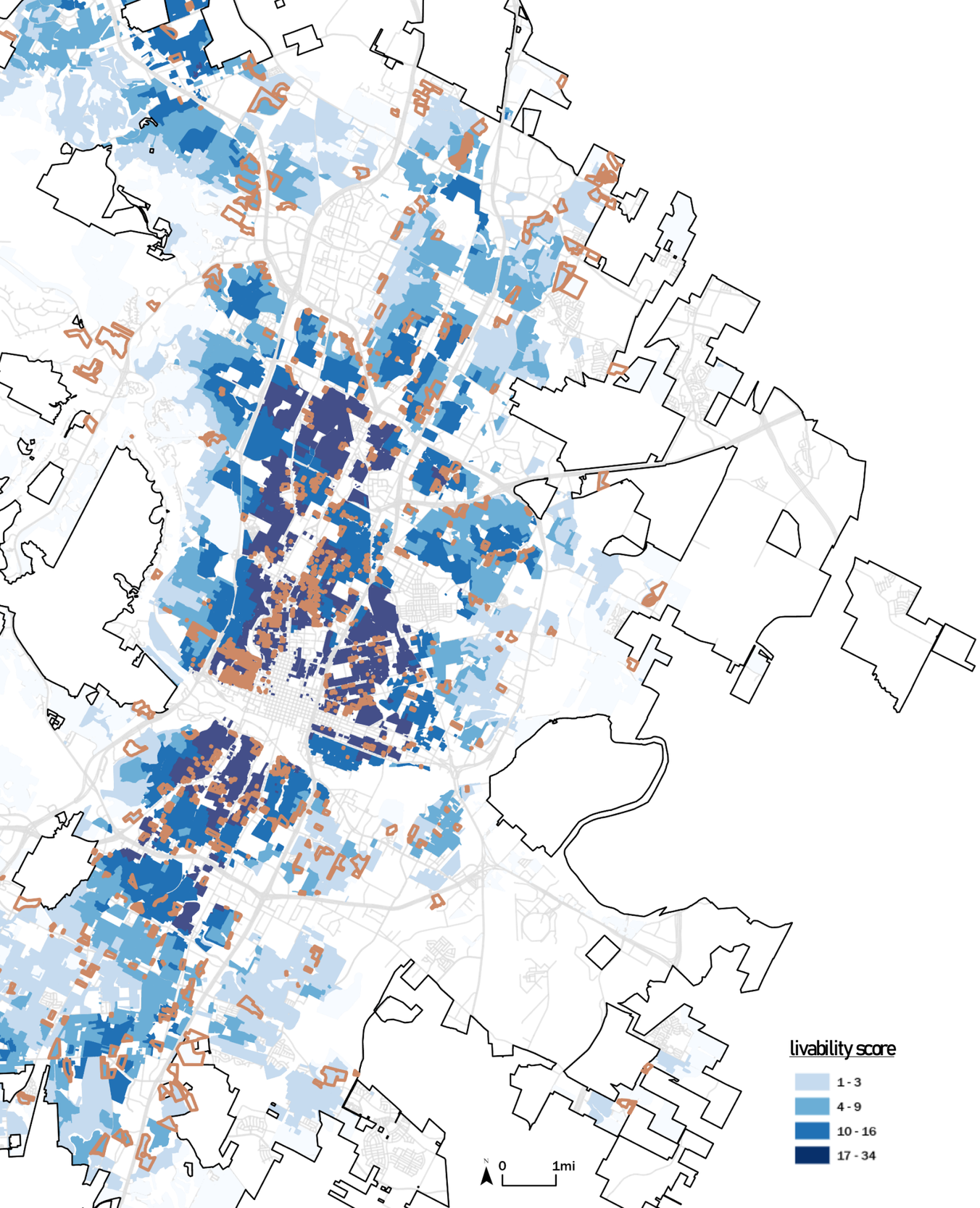
Proximity to **transit corridors** act as an indicator of ease of access to public transport and main thoroughfares.



Proximity to **transit-oriented development** can indicate governmental investment that aims to create transit-accessible, high-density neighborhoods.



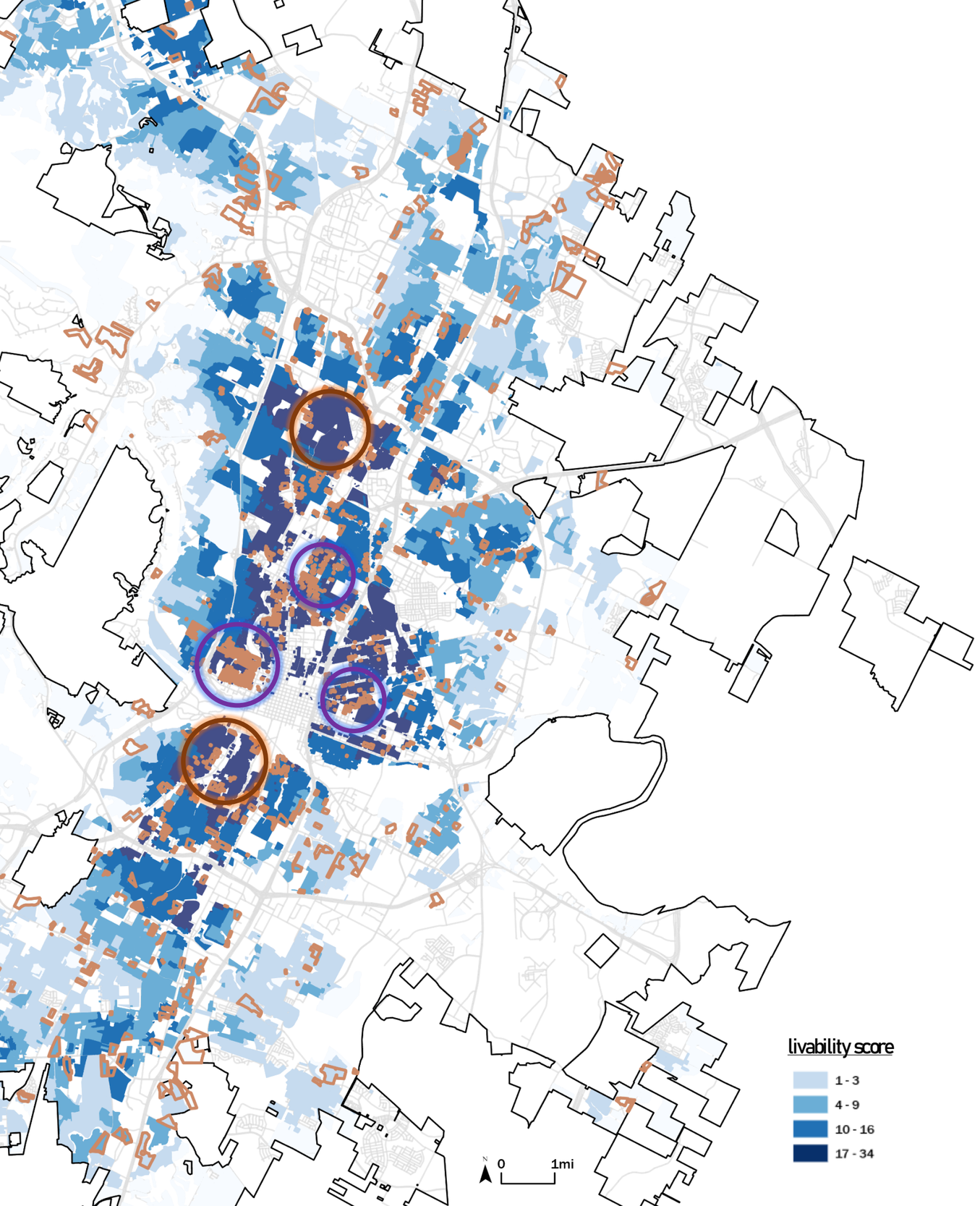
Population growth in an area can indicate what neighborhoods currently have high demand for housing. It can also spur economic growth through increased investment and an expanded tax base.



There are 2, 217 residential lots in Austin. Of those, 1,698 allow for multi-family housing. Spatially joining suitability scores to residentially zoned lots reveals over 50% of lots that are multi-family zoned are fully or partially within a height restriction of under 3 stories.

This map displays Austin's residential land use lots. The blue color gradient indicates high and low 'livability' scores, dark blue representing high-scoring areas and light blue representing low-scoring areas. The index calculates a score for every raster for every criteria layer then joined to residentially zoned lots to determine the average livability score per lot. Lots can receive a score from 1 to 35. The brown lots highlight where compatibility laws restrict development over two stories and in turn, dense, multi-family housing.

In essence, this map displays where dense housing should be developed because of high access to amenities, transit-accessibility, and population growth but is restricted by compatibility laws.

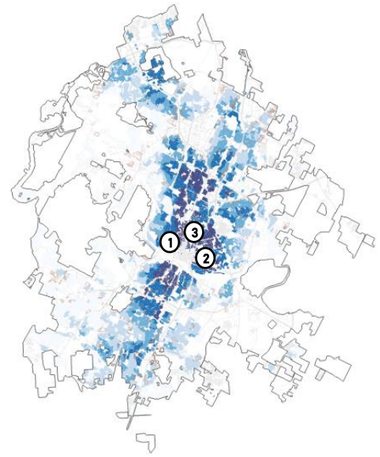


Our findings reveal two areas for consideration:

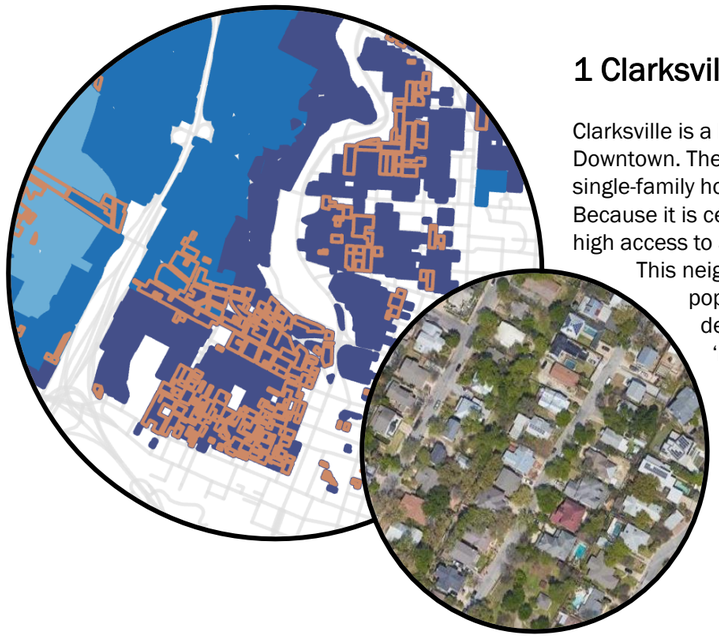
A. areas that are currently zoned for multi-family development but limited by compatibility

B. areas that are currently zoned for single-family development but should be considered for multi-family housing

areas that are currently zoned for multi-family development but limited by compatibility

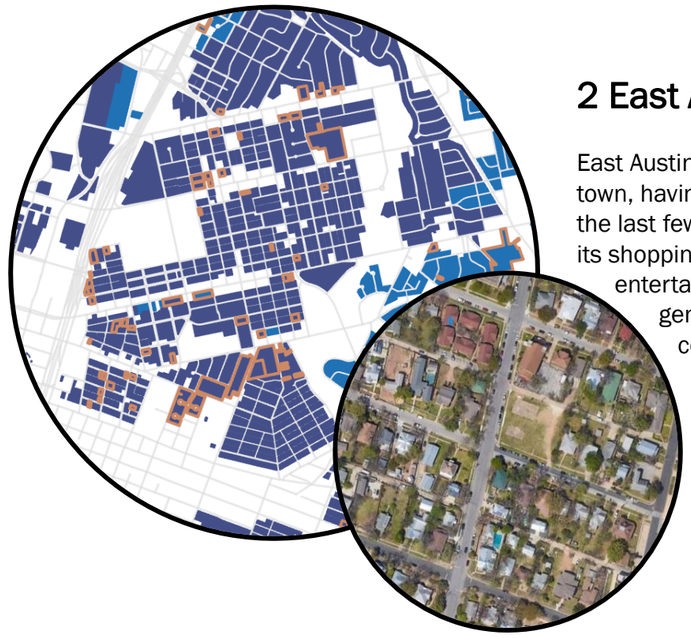


Among the areas currently zoned for multi-family development but limited by compatibility, we discuss two striking examples below.



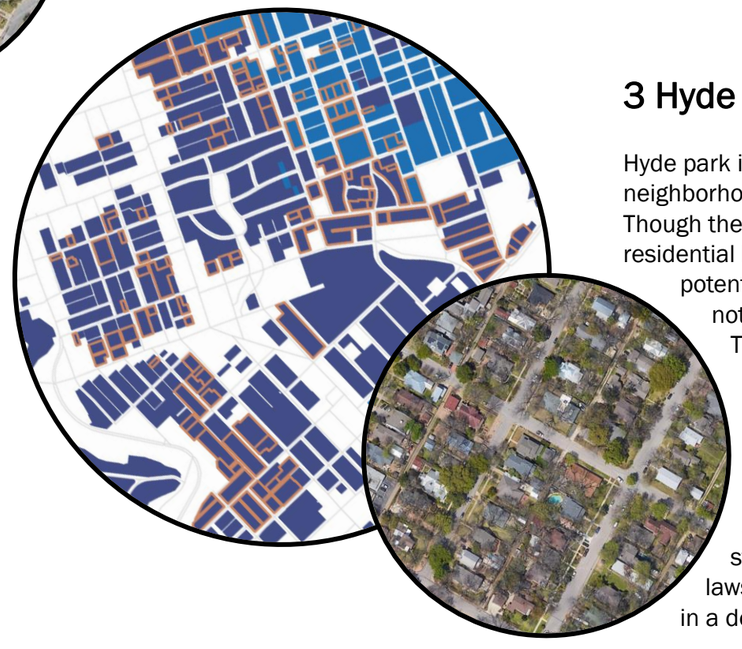
1 Clarksville

Clarksville is a historic district west of Downtown. The area consists largely of older single-family homes and historic buildings. Because it is centrally located, the area has high access to amenities and transit hubs. This neighborhood has also seen high population growth in the last decade, contributing to its high 'livability' score. Although the area is a historic district. There is still potential for increased development.



2 East Austin

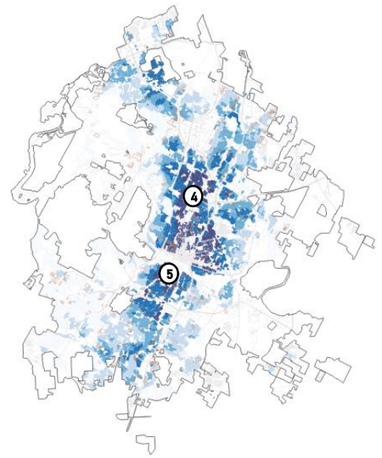
East Austin is known to be a 'trendy' part of town, having experienced gentrification in the last few years. East Austin is known for its shopping, retail and its role as an entertainment hub for the city. The gentrification process has contributed to rising rents in the area. East Austin would be a good contender for dense residential development that would increase the housing stock, making rents more affordable.



3 Hyde Park

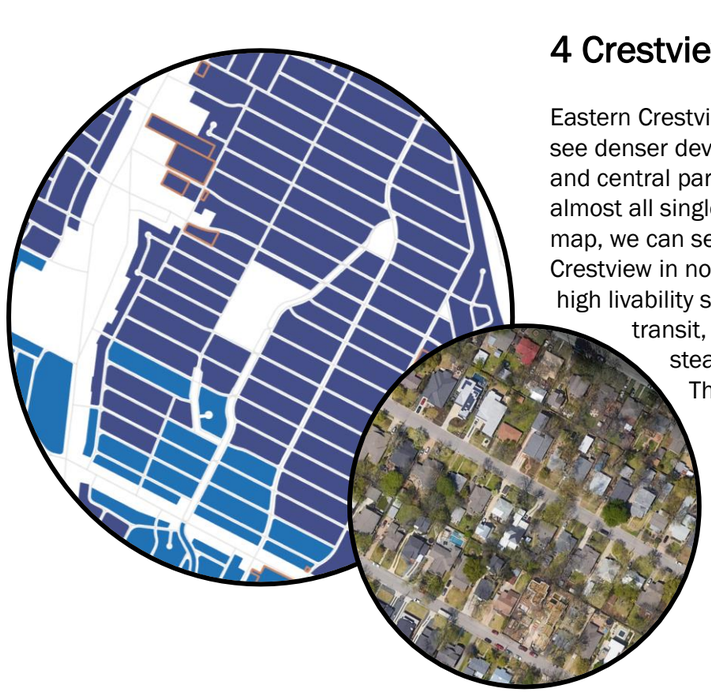
Hyde park is among the most well-known neighborhoods for its single-family lots. Though there are some multi-family residential buildings in Hyde Park. It has the potential to increase housing stock if not hindered by height limitations. The dark blue lots indicate the high livability of the neighborhood in the top quintile of scores. The map depicts the areas that allow for multi-family zoning but are not able to development more than 2 stories. Changes to compatibility laws can create more housing options in a desirable and livable neighborhood.

areas that are currently zoned for single-family but should be considered for multi-family use



Among the areas currently zoned for single-family development but should be considered for multi-family housing, we discuss two striking examples below.

In addition to our examination of areas for dense development that are limited by compatibility restrictions, we also found areas with high livability scores that are only zoned for single-family but might be a good contender for multi-family use. Two such neighborhoods include Crestview and South Bouldin Creek.



4 Crestview

Eastern Crestview has recently started to see denser development though the west and central parts of Crestview still remain almost all single-family housing. From the map, we can see the neighborhood of Crestview in north-central Austin has a high livability score. It has access to major transit, TOD zones, and has seen a steady increase in population. There is little multi-family zoning in the neighborhood. Considering the livability, regulators and planners might consider allowing multi-family zoning in this neighborhood.

5 South Bouldin Creek

South Bouldin Creek also received a high score for livability. Inspection into the existing land use, we can see that there is in fact majority single-family residential buildings. Like Crestview, Bouldin Creek is a fast-growing neighborhood. With South Bouldin Creek being slightly further from the city center, this might be a good location for affordable or denser housing. Areas with high livability scores but low rates of multi-family housing service a potential opportunities to consider policies that incentive denser housing development.

CONCLUSIONS

Our findings show that areas receiving a high livability score, and thus are suitable for residential development, are restricted by compatibility. Our analysis revealed two points of interest. Firstly, over 50% of lots that are zoned for multi-family can not be developed over three stories. This makes clear that, even within multi-family zoning, compatibility laws still greatly restrain the possibility for dense housing. Secondly, areas that are zoned for single-family and were given high livability scores are also prevalent. In order to allow for denser housing development in areas that are highly 'livable,' these areas should be considered for up-zoning. Ultimately, our findings contribute to a developing understanding of compatibility laws as restrictive to affordable housing in Austin.

Residential development will continue to be stifled by compatibility laws if single-family homes are prioritized over density and affordability. As Austin continues to experience fast growth, housing affordability and disparities in access will only become more dire issues. Local housing advocacy organizations like Austin Habitat for Humanity have urged city council to diminish compatibility for the sake of denser development. Progress has been made; in early December, city council made adjustments to the laws that allow for increased density on certain transit corridors (Swiatecki, 2022). However, the planning commission believes these adjustments do not go far enough in removing barriers to dense development. As we can see, compatibility laws are beginning to enter the broader consciousness around how we can amend policy to allow for more housing accessibility. This report aims to add spatial context to that conversation, and aid in the education of decision-makers on the impacts of compatibility laws.

REFERENCES

City of Austin Housing and Planning Department. *Zoning (Small Map Scale)* [shapefile]. Created 10 March 2015. Updated 13 December 2022. <https://data.austintexas.gov/Locations-and-Maps/Zoning-Small-Map-Scale-/5rzy-nm5e>

City of Austin Communication and Technology Management. *Street Centerline*. [shapefile]. Created 28 November 2017. Updated 15 December 2022. <https://data.austintexas.gov/Locations-and-Maps/Street-Centerline/m5w3-uea6>

City of Austin Planning and Zoning. *Land Use Inventory Detailed.* [shapefile]. Created 16 November 2017. Updated 14 December 2022. <https://data.austintexas.gov/Locations-and-Maps/Land-Use-Inventory-Detailed/fj9m-h5qy>

City of Austin Planning and Zoning. *Core Transit Corridors.* [shapefile]. Created 31 October 2017. Updated 14 December 2022. <https://data.austintexas.gov/Locations-and-Maps/Core-Transit-Corridors/g4jr-h8r2>

City of Austin, Office of the City Clerk. *Council Districts Fill.* [shapefile]. Created 8 June 2017. Updated 15 December 2022. <https://data.austintexas.gov/Locations-and-Maps/Council-Districts-Fill/hdpc-ysmz>

City of Austin Geospatial Services. *Transit Oriented Development.* [shapefile]. Created 21 May 2015. Updated 4 December 2022. <https://data.austintexas.gov/dataset/Transit-Oriented-Development/wpcp-v6nd>

US Census Bureau. (2010) *P1:Race, 2010: DEC Redistricting Data (PL 94-171)*. Accessed 15 December 2022. <https://data.census.gov/table?t=Populations+and+People&g=0500000US48453&y=2010&tid=DECENNIALPL2010.P1>

US Census Bureau. (2020) *P1:Race, 2020: DEC Redistricting Data (PL 94-171).* Accessed 15 December 2022. <https://data.census.gov/table?t=Populations+and+People&g=0500000US48453&y=2020&tid=DECENNIALPL2020.P1>

Austin Chamber of Commerce. (2021) *Cost of Living Overview.* Accessed 16 December 2022. <https://www.austinchamber.com/economic-development/austin-profile/cost-of-living/overview>

Thompson, Ben. Community Impact. (2022) *Council weighs plans to spur denser, more affordable development along major Austin roadways*. Accessed 16 December 2022. <https://communityimpact.com/austin/central-austin/city-county/2022/05/18/council-weighs-plans-to-spur-denser-more-affordable-development-along-major-austin-roadways/>

Swiatecki, Chad. Austin Monitor. (2022) Council relaxes compatibility requirements along selected corridors. Accessed 16 December 2022. <https://www.austinmonitor.com/stories/2022/12/council-relaxes-compatibility-requirements-along-selected-corridors.>

US News World Report. (2022) *Fastest Growing Places in the U.S. in 2022-2023*. Accessed 16 December 2022. <https://realestate.usnews.com/places/rankings/fastest-growing-places>

APPENDIX

DATA USED

Data	Data type	Source	Description	Manipulation for usage
Zoning (Small Map Scale)	shape file	City of Austin Housing and Planning Department	Zoning classification boundaries in the City of Austin and surrounding counties	Exported residentially zoned lots to aggregate suitability score by raster by lot that is zoned for residential use
Land Use Inventory Detailed	shape file	City of Austin Planning and Zoning	Detailed inventory of land use by lot	Used to create - Business Districts Layer - Retail Districts Layer - Parks Layer - Schools Layer Service area added using Network Analysis for each of those layers to determine levels of proximity using driving distance
Austin Street Centerline	shape file	City of Austin Communication and Technology Management	All roads, streets, highways in Austin traversable by car	Clipped to Austin Boundary and used to create Network Analysis later used to create Service Areas for several features
Core Transit Corridors	shape file	City of Austin Planning and Zoning	Select streets, roads, and highways that constitute the main transit corridor to travel around Austin	Service area added using Network Analysis to determine levels of proximity using driving distance
Transit Oriented Development	Static map	City of Austin Geospatial Service	Static map of TODs in Austin	Used Edit ribbon's 'Create Features' tool to trace boundaries of TODs for use in MCDA; buffer was added to determine levels of proximity using Euclidian distance
P1:Race, 2010: DEC Redistricting Data	Comma-separated values	US Census Bureau	Table includes total population per census tract	Compared to 2020 data to determine population growth by census tract
P1:Race, 2020: DEC Redistricting Data	Comma-separated values	US Census Bureau	Table includes total population per census tract	Compared to 2020 data to determine population growth by census tract
Boundaries: City of Austin Council Districts	shape file	City of Austin Planning and Zoning	Boundary of city council districts	Dissolved polygons to create boundary of Austin

APPENDIX

STEP-BY-STEP METHODOLOGY

Preparing the Data

1. Import '**Land Use Inventory Detailed**'
    a. Select by Attribute and isolate by exporting feature for the following:
        i. Land_Use = 300, for retail trade and service including apparel and accessory stores, home furniture and equipment, eating and drinking, commercial art and craft studios, entertainment and recreation services, amusement services.
        Export Feature: '**Shopping_Retail**'
        ii. Land_Use = 400, for office spaces, business services, corporate offices,
        Export Feature: '**Businesses**'
        iii. Land_Use = 640, for primary and secondary education, colleges, universities, business trade schools
        Export Feature: '**Schools**'
        iv. Land_Use =710, for parks
        Export Feature: '**Parks**'
        v. Land_Use = 100, one single-family dwelling on one lot.
        Export Feature: '**SingleFamily_Lots**'
2. Open TOD map
    a. Though the city of Austin's geospatial services department has a map of TODs, it is only available through a downloadable ArcGIS Pro file that is locked for editing or exporting. Our team had to recreate the shape file in order to edit and add buffers.
    b. Under the edit ribbon we used the 'create' feature to draw borders around the TODs
    Feature Output: '**TODs**'

3. Transit Corridors
    a. Import '**Core Transit Corridors**'

4. Population Growth
    a. Downloaded population tables from 2010 and 2020 decennial census and respective tracts:
    b. Cleaned data to only show total population for Travis, Hays, Williamson counties
    c. Dissolved 2020 census tracts by 2010 boundaries
    d. Calculated density per tract by acre
    e. Spatially joined 2020 to 2010 population density
    Feature Output: '**PopGrowth**'

5. Import 'Zoning (Small Map Scale)'
    1. Select by Attribute and isolate by exporting feature for 'zoning_base = residential"
    Feature Output: '**Residential_Zoning**'

STEP-BY-STEP METHODOLOGY

Create Analysis Layer

1. Cluster shops and businesses (separately) to identify areas of high activity or "districts"
    a. Use '**Density-Based Clustering**' tool to cluster by 55 facilities
    b. Dissolve clusters into multiple part feature
    c. Use '**Feature to Point**' tool to create a midpoint in the clusters to identify business district centroid
    Feature Outputs: '**Business_District**' & '**Retail_District**'

2. Network Analysis
    a. Import '**Austin Street Centerline**'
    b. Clip to '**City of Austin Boundary**'
    c. Create new Feature Dataset
    d. Create new network dataset
    e. Make Service Areas based on the specified increments per analysis layer
        i. '**Retail_District**' – every 1 mi
        Feature Output: '**Retail_District_ND**'
        ii. '**Business_District**' – every 1 mi
        Feature Output: '**Business_District_ND**'
        iii. '**Schools**' – every .05 mi
        Feature Output: '**Schools_ND**'
        iv. '**Core Transit Corridors**' – every 0.25 mi
        Feature Output: '**Corridor_ND**'
    f. Leverage **Update** tool to export and "update" district service area into index classification (repeat for each analysis layer)

3. Add buffers
    a. Apply Multiple Ring Buffer based on the specified increments per analysis layer
        i. '**Parks**' – every 660 ft
        Feature Output: '**Parks_Buffer**'
        ii. '**TODs**' – one buffer at 0.5 mi
        Feature Output: '**TODs_Buffer**'

4. Rasterize Data
    a. Use **Feature to Raster** tool for analysis layers and '**Residential_Zoning**' (including '**PopGrowth**')
        i. Cell size: 20

STEP-BY-STEP METHODOLOGY

Create Decision Layer

1. Reclassify
    a. Use '**Reclassify**' tool
        i. '**Retail_District_Raster**' – assign score of 1-5 based on proximity of service area to retail districts
        ii. '**Business_District_Raster**' - assign score of 1-5 based on proximity of service area to business districts
        iii. '**Schools_Raster**' - assign score of 1-5 based on proximity of service area to education facilities
        iv. '**Corridor_Raster**' - assign score of 1-5 based on proximity of service area to transit corridors
        v. '**Parks_Raster**' ' - assign score of 1-5 based on buffer rings of parks raster
        vi. '**TODs_Raster**' ' - assign score of 0,1, or 5 based on buffer rings of TOD raster

Create Decision Map

1. Map Algebra
    a. Weighted each of our decision layers evenly in order to produce a ranked decision map, DM_Ranked.

Summarizing Decisions Scores by Residential Lots

1. Raster to Point
    a. Exported scores not equal to zero to create DM_Ranked_nozero
    b. Made DM_Ranked_nozero map into points

2. Spatial Join
    a. Spatially joined points to Residential Zone layer
        i. Output field: grid_code
        ii. Merge rule: Mean