
# Opportunity Zone Designation in Appalachian Ohio

Jared Bees, Emma Cozza, Emily Pritt, Chase Stephen,

Richie Svencer, Matthew Thomas, Liz White, Austin Ziance

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# Abstract

This project was carried out by the junior and senior Mathematics and Computer Science majors at Marietta College in Marietta, Ohio in collaboration with Sunday Creek Horizons: a consultation company based in Athens, Ohio focused on assisting the 32 counties of Appalachian Ohio in both social and economic development. The goal of this project focuses on stimulating economic development across Appalachian Ohio through the recommendation of Opportunity Zones for designation by the federal Treasury Department. Using a mixed quantitative and qualitative approach, this project went beyond the new criteria outlined in the One Big Beautiful Bill Act (OBBBA) and used additional data from the American Community Survey (ACS), JobsOhio, and other publicly available government databases to create statistical models that evaluate workforce availability, educational level, and overall economic readiness for investment at a census tract level.

In addition to socioeconomic indicators, this report analyzes critical infrastructure, including available transportation, broadband accessibility, utilities, and available workforce in the regions around census tracts to further inform Opportunity Zone recommendations. Data science and statistical analysis were used to assess each tract's capacity to support sustainable economic development. Qualitative analysis was also conducted to identify existing assets and potential investments that enhance tract readiness and competitiveness.

The results provide a ranked framework for Opportunity Zone designation and targeted economic development, offering actionable insights for policymakers, regional economic developers, and potential investors. This work demonstrates how integrated data analytics and qualitative analysis can support regional planning strategies and create long term economic growth in the historically underserved region of Appalachia.

# Background

Originally created by the federal government under the 2017 Tax Cuts and Jobs Act (TCJA), Opportunity Zones (OZs) were created as an experimental place-based investment incentive to stimulate long-term economic growth in smaller, underserved communities across America. OZs promote investment through multiple federal tax benefits tied to capital gains tax. Investors set up Qualified Opportunity Funds (QOFs), and the invested capital from a QOF is then invested into any regional development projects of the investor's choosing. There are no restrictions on who can set up a QOF or where its funds can be utilized, and local governments within a region can even set up their own QOF to drive local investment.

Opportunity Zones are designated census-tracts chosen by the federal Treasury Department based on the direct nominations of all 50 state governors. After the passing of the TCJA in 2017, the first round of OZs (referred to as OZ 1.0) were designated in 2018, and the project was met with a wide range of results across the country. However, the TCJA also outlined that OZs would be redesignated on January 1st, 2027 (referred to as OZ 2.0) and would continue to be redesignated every decade. At the time of this report, states are currently working to select new OZs to recommend for OZ 2.0 and learn from mistakes made during OZ 1.0.

Under the original TCJA, OZs provided investors who chose to invest in a QOF with 3 main benefits[1,2]:

1. Capital gains taxes on prior gains could be deferred at an investor's discretion until December 31, 2026, if the gains were reinvested into a QOF.
2. An investor would receive a 10% step-up basis (a provision that adjusts the cost of an inherited asset on the date of the previous owner's death) for all QOF investments after the first 5 years of holding, which would increase to a 15% step-up basis if investments were held for an additional 2 years.
3. If an investment was held for 10 years or more, all appreciation (the increase in value of the investment) on the OZ investment was tax free.

Many states also chose to include their own unique additional benefits for OZ investors. In Ohio, investors would be eligible to apply for a claimable tax credit (a dollar-for-dollar reduction on the amount of taxes they owe) on their income taxes either the year they invested or the following year[1]. Since Ohio cannot give tax credits for federal taxes, this incentive only applied to investors living in Ohio to encourage local investment by Ohioans.

The passing of the OBBBA in 2025 modified the benefits of investing in an OZ in a few ways. First, deferral of capital gains tax has become a rolling 5-year deferral following the initial investment, meaning investors can now defer capital gains taxes based on their

initial OZ investment, rather than based on a fixed date. Second, the 15% step-up basis after 7 years of holding was eliminated completely, leaving only the 10% step-up basis after 5 years. Finally, investments made into QOFs in OZs designated as "rural" have become subject to a 30% basis step-up after 5 years, rather than the standard 10%[2,3]. As of the writing of this report, the Ohio-specific incentives remain unchanged for OZ 2.0.

For a census tract to be considered for OZ status, however, it must first meet a few criteria outlined in the TCJA that have also since been modified by the OBBBA. The original eligibility requirements were that a census tract must have either[1,2]:

a.) a poverty rate at or above 20% and an MFI (Median Family Income) below 120% of its area MFI
or
b.) an MFI at or below 80% of its area's MFI.

Tracts could also be designated as OZs if they were contiguous with a tract that met the requirements, even if the contiguous tract itself did not meet the requirements. The changes made to eligibility requirements by the OBBBA are the following: a census tract must now be below 70% of the area MFI rather than 80%, and census tracts are no longer eligible simply by being contiguous to an eligible tract: all tracts must now meet the criteria on their own to be considered[2].

## Economic Overview

The Appalachian region of America is a historically exploited, underserved, and forgotten region. For generations, companies have used the natural resources of the region and left the local towns behind once it became unprofitable to continue operations in the area. This has caused a lasting cycle of poverty, low education, and low economic development in the region. According to the Appalachian Regional Commission (ARC), 23 of the 32 counties in Appalachian Ohio alone contain at-risk areas, and 19 of the 32 counties are at-risk entirely[4]. The ARC defines "distressed" as meaning the county was within the top 10% of the worst economic performers of all counties in America; and defines "at-risk" as a county being economically vulnerable, but not within the top 10% with the distressed tracts[4]. Figure 1 below shows all the distressed and at-risk counties segmented by similarly ranked census tracts within Appalachian Ohio:

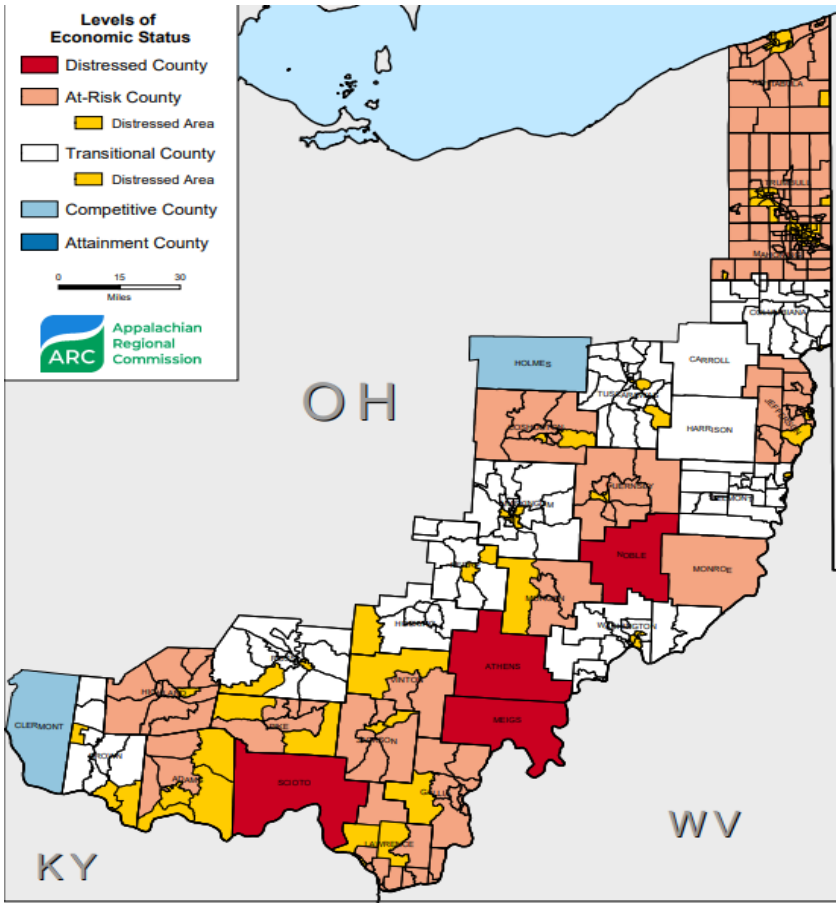



Figure 1: ARC Designation of County-Level Economic Statuses in Appalachian Ohio in the Fiscal Year 2024.[4]

Using the new 2024 American Community Survey (ACS) 5-year data, tracts that meet basic eligibility requirements based on the OBBBA were identified for the next 10-year designation cycle. It was found that there are 208 tracts across the region that meet these requirements (referred to as "eligible"), further highlighting the desperate need for new investments into both new economic developments and ongoing projects. Table 1 below shows the makeup of the industry of Appalachia Ohio ranked by number of workers in the workforce. This table highlights that the unique economic makeup of the region is largely manufacturing, natural resources, and construction with the rest being mainly supporting industries or essential services such as retail, food, lodging, health social services, and government that would be found anywhere in America.

| NAICS Industrial Sector | Average Annual Employment (a) |
|---|---|
| Health Care and Social Assistance | 788,922 |
| Manufacturing | 683,148 |
| Retail Trade | 546,638 |
| Local Government | 501,144 |
| Accommodation and Food Services | 461,566 |
| Administrative and Waste Services | 321,777 |
| Professional and Technical Services | 283,754 |
| Transportation and Warehousing | 250,090 |
| Wholesale Trade | 238,074 |
| Finance and Insurance | 235,929 |
| Construction | 233,271 |
| Other Services, Except Public Administration | 153,371 |
| Management of Companies and Enterprises | 139,120 |
| State Government | 126,885 |
| Education Services | 88,600 |

Table 1: Breakdown of top 15 industries in Appalachian Ohio in 2022, sorted by average annual employment.[5]

This table from the Bureau of Labor Statistics shows not only the most prevalent industries in Appalachian Ohio, but also that these industries all hire a significant amount of Appalachian Ohio's population of 1,985,283 residents[6], which serves to further highlight the high job turnover rate in the region. These high employment numbers combined with the reduction in population the region is predicted to experience as shown in Figure 2, act as the setup for further economic downturn in Appalachian Ohio if significant changes are not made. However, as previously mentioned, the economic hardships of Appalachian Ohio are nothing new, and residents will continue to stay and suffer the consequences of large industries' actions until sustainable solutions are discovered. One of these changes proposed by this paper is the intentioned and researched designation of OZs in the region, which is to be utilized as another tool for regional economic development officials when pitching the region to both investors and new industries looking to move in.

**Total Population**

| Census | | | | | |
|---|---|---|---|---|---|
| 1800 | 27,467 | 1910 | 1,245,494 | 2020 | 1,985,283 |
| 1810 | 121,079 | 1920 | 1,392,587 | | |
| 1820 | 279,295 | 1930 | 1,503,078 | Estimate | |
| 1830 | 423,379 | 1940 | 1,572,210 | 2024 | 1,972,196 |
| 1840 | 608,472 | 1950 | 1,629,217 | | |
| 1850 | 747,405 | 1960 | 1,828,632 | | |
| 1860 | 815,996 | 1970 | 1,871,900 | | |
| 1870 | 875,713 | 1980 | 2,011,695 | Projection | |
| 1880 | 1,002,395 | 1990 | 1,965,333 | 2030 | 1,894,121 |
| 1890 | 1,058,762 | 2000 | 2,040,712 | 2040 | 1,786,488 |
| 1900 | 1,140,017 | 2010 | 2,042,040 | 2050 | 1,683,507 |

Figure 2: Population statistics of the 32 counties of Appalachian Ohio.[6]

# Methodology - Overview

Initial research on this project consisted primarily of developing a familiarity with the counties of Appalachian Ohio, their current socio-economic conditions, and the benefits and limitations of Opportunity Zone (OZ) designations, summaries of which can be seen in the above Background and Economic Overview sections of this report. It was determined exactly which criteria were required to be met for designation as an OZ, as well as several other factors which could influence the utilization of an OZ designation.

After identifying eligible tracts based upon the minimum criteria outlined in the OBBBA, additional criteria were created to rank tracts by considering both qualitative and quantitative attributes beyond what made them eligible for OZ status. First, the most important attributes a census tract could have to indicate investment potential or job creation opportunities were outlined: these attributes were determined to be workforce, education, vacant housing, and total number of unemployed citizens. A more in-depth breakdown on this aspect of the project can be found in the Quantitative Modeling section.

Next, available development sites and existing infrastructure within these eligible census tracts were taken into consideration in a qualitative manner. The reason behind looking at available sites within a tract is an economic philosophy known as Cluster Theory, and the reason for looking at existing infrastructure to available sites is based on conversations held with economic development officials from counties across Appalachian Ohio, both of which are further outlined in the Qualitative Ranking section.

The quantitative data from the ACS and JobsOhio databases and the qualitative knowledge on the economic statuses and development sites within many Appalachian counties were combined to create a more in-depth method of ranking census tracts. Tracts were scored based on quantitative data using statistical models outlined in the Quantitative

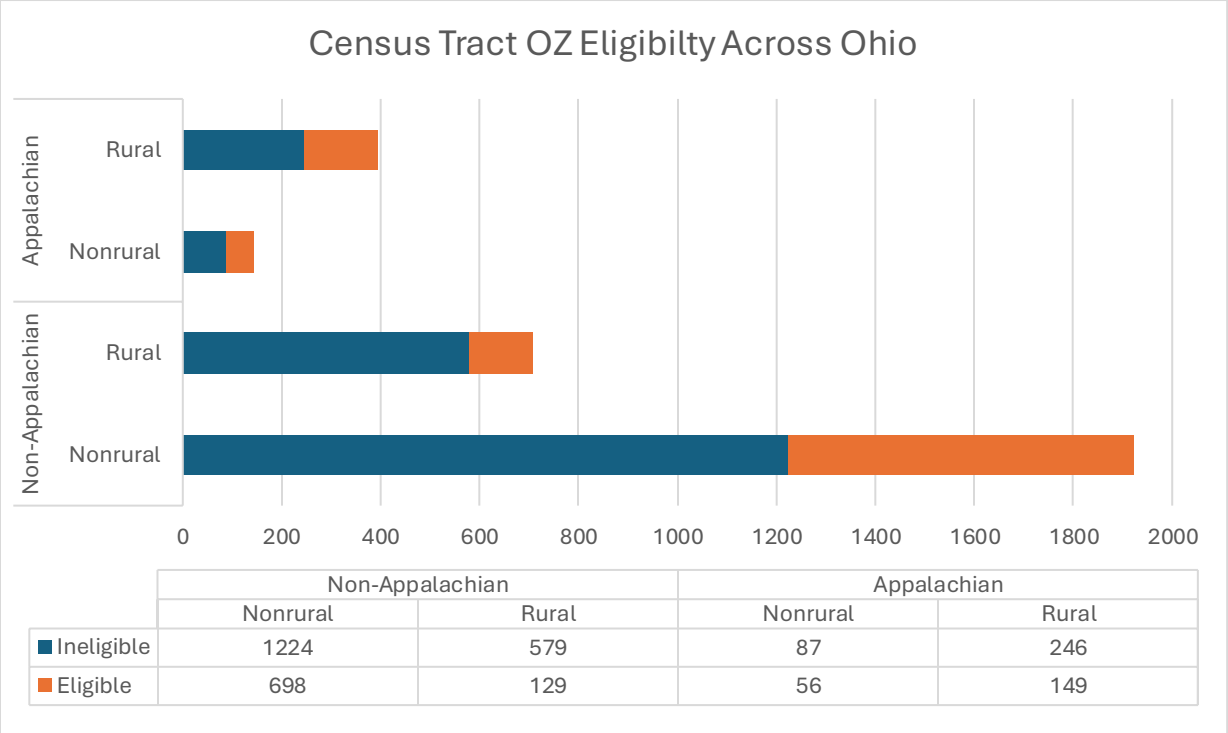
Modeling section and their scores were adjusted based on various weighted qualitative aspects of their respective socioeconomic status. Altogether, this resulted in a tiered list of census tracts, the highest tier of which are what have been chosen to be recommended as the best new OZs in Appalachian Ohio, as is described in the Results section.

## Eligibility

To restate, eligibility for an OZ designation requires a census tract to fulfill one of the following criteria: either a tract Median Family Income (MFI) less than 70% of the area MFI, or a poverty rate above 20% as well as a tract MFI less than 125% of the area MFI[1,2,3]. At the start of this project in January 2026, the federal Treasury Department had not yet released the official list of eligible census tracts, so the first step was to predict OZ eligibility given the aforementioned criteria. Data for every census tract within Appalachian Ohio was collected from the 2020-2024 American Community Survey (ACS) 5-year estimate[7,11] and placed into a unified Microsoft Excel file, where eligible tracts were identified by calculating their percent MFI and classified accordingly. The total number of tracts identified as eligible was 208, which only slightly exceeded the 205 officially eligible tracts listed in April 2026 by the Treasury. The tracts incorrectly identified as eligible were Harrison county's tract 975700, Scioto county's tract 004000, and Mahoning county's tract 801700. The number of eligible tracts statewide totals to 1032, which means up to 258 tracts may be nominated for OZ designation statewide. A proportional nomination would allocate 52 tracts for the Appalachian Ohio region but given the desperate need for economic development in the region and the focus on rural census tracts in OZ 2.0, this report proposes that a greater number be nominated within the region.

Appalachian Ohio differs from the rest of the state not only in its greater proportion of rural census tracts, but also in its higher rate of eligibility for rural tracts and lower rate of eligibility for nonrural tracts. When it comes to census tracts, the classification of 'urban' corresponds to a "territory identified [as encompassing] at least 2,000 housing units or [as having] a population of at least 5,000. This includes adjacent territory containing non-residential urban land uses."[13] Therefore, any census tract in or adjacent to an area defined as 'urban' would be considered an urban census tract. There are further designations within the 'urban' classification depending on size of an area and population density referred to as 'metropolitan' and 'micropolitan' areas; however, these classifications did not play a role in this project, so they will not be considered further. There is no formal definition for a 'rural' census tract other than any tract that is not defined as urban, so rural tracts can tend to vary greatly in culture, population makeup, and various other factors. The lower population and population density of Appalachian Ohio stems from the smaller

number of urban centers, and thus the much higher frequency of rural designation. Counties with large cities had more census tracts, and thus more eligible nonrural tracts.




| | Non-Appalachian | | Appalachian | |
|---|---|---|---|---|
| | Nonrural | Rural | Nonrural | Rural |
| Ineligible | 1224 | 579 | 87 | 246 |
| Eligible | 698 | 129 | 56 | 149 |

Figure 3: Census Tract OZ Eligibility Across the State of Ohio

Similar behavior can be seen in Appalachian Ohio to a lesser extent. Mahoning county has both the most total tracts and the most eligible tracts of the 32 counties, primarily due to the city of Youngstown, which is one of the most urban areas of Appalachian Ohio[6]. While other cities exist across the region like Guernsey county's Cambridge, Muskingum county's Zanesville, and Washington county's Marietta, their relatively lower populations result in fewer tracts in each area, and the existence of residential and commercial corridors are often what place these regions into the eligible range for OZ status. It follows that the majority of eligible census tracts within Appalachian Ohio are also rural.

## Quantitative Modeling

As mentioned in the methodology breakdown, the aim was to create a way to meld the quantitative and qualitative attributes that can differentiate the tracts and help to more effectively justify OZ designation selections of the best tracts. This was accomplished by

combining socioeconomic indicators of economic growth with the available infrastructure and sites within those tracts.

First, it was necessary to find the list of all the tracts that met the basic eligibility criteria, and as outlined in the Eligibility section, a total of 208 tracts were found, later adjusted to 205. Next, it was important to identify socio-economic qualities that indicate good investment potential. The four additional criteria decided on were:

**Available Workforce**[8] – A sizeable available workforce indicates to investors new operations can be staffed without having to spend additional capital for major recruitment costs. Furthermore, if a tract is underemployed rather than completely detached from the labor market, it suggests untapped productivity capacity.

**Vacant Housing Rate**[9] – Moderate vacancy rates indicate room for population growth within an area. New workers can move to an area with much more ease, and without causing immediate housing shortages and driving up home prices. Additionally, for real estate or community developers, this can indicate opportunities for redevelopment or rehabilitation at relatively lower acquisition costs. High vacancies also often mean increased distress within an area.

**Education Levels**[10] – Education is a strong proxy for human capital. Tracts with higher levels of educational attainment (this project focused on bachelor's degrees and up) tend to support a more adaptable and productive workforce. This attracts high level industries to areas such as energy, technology, AI, chemical manufacturing, etc. This can be observed firsthand in the Youngstown-Warren area, where the proximity of the college Youngstown State University has led to many high-tech manufacturers beginning production within the county. (One example being Ultium Batteries: an EV battery manufacturer)

**Number of Unemployed Residents**[12] – The number of unemployed residents pairs with the available workforce nicely. A slightly elevated number of unemployed residents with a good available workforce can indicate labor availability without full saturation, meaning businesses can hire without wages going up immediately. However, too high of a number of unemployed residents indicates to investors that an area may have structural issues like a skills mismatch or a weak local economy.

These four criteria were combined to create scores. The initial scoring of the tracts followed the procedure below:

$$\frac{\text{Tract Number} - \text{Overall Minimum}}{\text{Overall Maximum} - \text{Overall Minimum}} = Score$$

Figure 4: Initial scoring calculation example.

For cases where percentages were used, the final quotient of the difference of the tract percentage and the minimum percentage with the maximum and minimum was multiplied by 10 to create the final score. For each of the four criteria selected, once the data was sourced from the ACS 5-year survey[8,9,10,12], the maximum and minimum values for all four of the criteria were found in each county then the calculation was done to find the score for each category.

Next, it was determined how to weight the scores of the different attributes within the socio-economic model. To do this, 4 models were created that all favored different criteria based on each model's focus. The equal weight model, in which all criteria were weighted equally at 16.67% of the total score; The Need-Based model, which favors higher distress indicators like a high vacant housing rate, a high number of unemployed residents, a low education, and low income; The Investment Readiness model, which serves as the opposite of the Need-Based model and favors criteria that indicate a tract has the physical and workforce-based resources be invested in, such as an available workforce and better education; and the Balanced model, which focuses on weighting the criteria as they might be ranked in the mind of an investor, since they are the people who are ultimately trying to be attracted by OZs.

Table 2: Weighting of criteria in the 4 quantitative census tract modeling methods.

| **EQUAL WEIGHT MODEL** | | **BALANCED MODEL** | |
|---|---|---|---|
| **Criteria** | **Percent** | **Criteria** | **Percent** |
| Tract Income % Weight | 16.67% | Tract Income % Weight | 18% |
| % Below Poverty Level Weight | 16.67% | % Below Poverty Level Weight | 22% |
| Education Weight | 16.67% | Education Weight | 10% |
| Vacancy Weight | 16.67% | Vacancy Weight | 5% |
| Labor Weight | 16.67% | Labor Weight | 25% |
| Unemployment Weight | 16.67% | Unemployment Weight | 20% |

| **NEED-BASED MODEL** | | **INVESTMENT-READINESS MODEL** | |
|---|---|---|---|
| **Criteria** | **Percent** | **Criteria** | **Percent** |
| Tract Income % Weight | 20% | Tract Income % Weight | 15% |
| % Below Poverty Level Weight | 25% | % Below Poverty Level Weight | 15% |
| Education Weight | 10% | Education Weight | 15% |
| Vacancy Weight | 10% | Vacancy Weight | 10% |
| Labor Weight | 15% | Labor Weight | 30% |
| Unemployment Weight | 20% | Unemployment Weight | 15% |

# Computational Aspects of Modeling

While Excel was utilized for most calculations and analysis, data processing utilizing Python was also explored. For evaluating the likely eligibility and model scores of census tracts, a program was devised to take in data as a CSV file, sort it into a dictionary-like structure, automatically perform calculations such as normalizing data points, and finally output the scores and ranking to a text (.txt) file. This program relies on storing information about various regions in Python objects designed to act as hybrids between arrays and dictionaries, allowing for a region's data to be pulled from the object or for navigation to sub-regions (e.g. from state to county or from county to census tract). These objects are then iterated through by the second stage of the program, calculating the eligibility for each tract and their respective score under each model, and writing said scores to a text file alongside their rankings compared to other eligible tracts.

The main benefit of this Python-based processing is that this program can be easily adapted to other similar data sets while requiring minimal changes. The program computed eligibility and rankings not only for every tract in Appalachian Ohio, but for the entire state as well. So long as the CSV file input has all the required information in the appropriate columns, data pertinent to other states and time ranges can be processed with almost no changes. The program was also designed to be robust enough to handle non-numeric values without producing errors, thus ensuring functionality even when data may be unavailable for a given region.

The biggest limitation is that the program is also pickier than a human with tract eligibility and model scoring. For instance, if a given census tract is missing MFI data, the program cannot evaluate its eligibility under the <70% Area MFI criterion and must instead rely on the Poverty criterion only. If both are missing, the tract is automatically considered likely ineligible and passed over for later calculations.

Proposed changes to the program include outputting the data into a new CSV or Excel file for ease of further analysis, as a text file is unwieldy for computational purposes, although more readable by a human. With the release of the official list of eligible census tracts, another potential change would be removing the eligibility calculation portion of the code and restructuring it to run with the given eligibility listing. Since the Treasury Department's list also includes information on the rural designation of census tracts, such a restructuring would also allow for potential comparisons between the rural and non-rural regions of Appalachian Ohio.

## Qualitative Ranking

The other half of creating a complete model was to find a way to combine the socio-economic score with some qualitative attributes that data cannot encapsulate such as the types of investible sites in a tract and quality of investible sites compared to others. Before this could be done, however, it was important to obtain an understanding of the current state of the average investible site and redevelopment project within various parts of the region. To achieve this, the team had the opportunity to meet with several county commissioners and economic development officers for various counties across Appalachian Ohio over the course of the project. The specific experts met with and the counties they represent can be found in Table 3 below:

Table 3: Economic Development Officials met with by the team and their roles.

| ECONOMIC OFFICIAL | OFFICIAL TITLE | COUNTY REPRESENTED |
|---|---|---|
| **JESSE ROUSH**[14] | President & CEO, Southeastern Ohio Port Authority | Washington County |
| **MARK LEININGER**[15] | Executive Director, Holmes County Economic Development | Holmes County |
| **BILL ARNETT**[16] | Executive Director, Cambridge-Guernsey County Community Improvement Corporation | Guernsey County |
| **MARLA AKRIDGE**[17] | Executive Director, Tuscarawas County Economic Development Corporation | Tuscarawas County |
| **GWYNN STEWART**[18] | Assistant Professor, Community Development, Ohio State University – Noble | Noble County |
| **SHANNON WELLS**[19] | Director of Economic Development | Morgan County |
| **TERRI FETHEROLF**[20] | Director of Development | Vinton County |

Through meeting with these officials, a deeper understanding was also developed of what an economic developer looks for when pitching projects to an investor, and the things the investor looks for when deciding where to invest capital. A common concern among these officials was an overabundance across the region of developable land that lacked the infrastructure to carry out developments and gather the interest of investors in the development. This is simply because of the lack of basic necessities for a site to even be considered “shovel-ready” (such as water, sewer, or electrical access), the lack of sites with a significant amount of flat land (the recommended amount was at least 10 acres of flat

land), and the additional capital expenditure that would be required for the development of these sites. These conversations further highlighted the base-level struggles Appalachian Ohio experience in regard to competing on both a national and a statewide market when it comes to attracting investors. Many sites within Ohio have benefits that an investor can compare when selecting where to invest their capital, but Appalachia not only lacks these benefits, but also lacks the basic day-to-day needs of its residents and businesses looking to move in. So, when trying to create the final ranking, to consider the available sites within an area and set the sites apart based on whether they have infrastructure available to the site (Water, Sewage, 3-Phase Electricity, Broadband, and Railway Access), data from the website JobsOhio was gathered[21]. From the site-level data, the most important qualitative factors to include into the final model were chosen. One of the key factors of investment potential is readily available access to the basic infrastructures (Water, Power, Sewage, and Broadband), however, rail access was also included because rail access can indicate existing industry within an area.

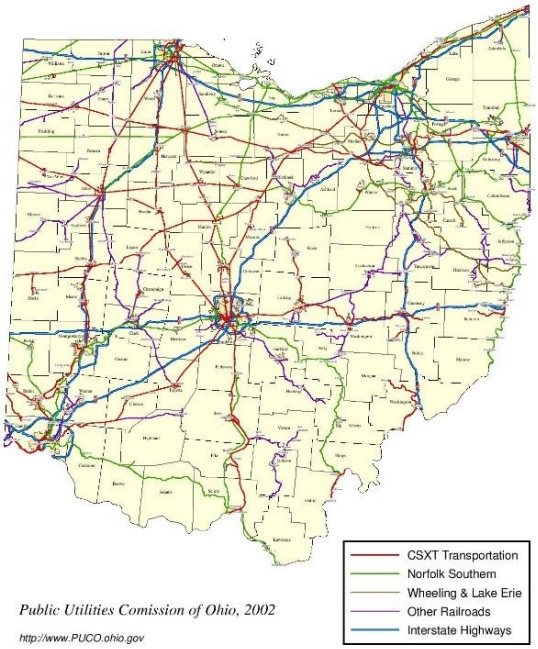



Figure 5: Railway access across the state of Ohio.[22]

It is apparent to see that railroads in Appalachian Ohio are centered around the major industrial hubs of the region: cities and along the Ohio river. Specifically, along the Ohio river, rail access tends to be used where many chemical manufacturing plants are located. To the north of the Appalachian region, the Warren-Youngstown area features a hub of railroads around their manufacturing industry. Finally, Ashtabula County features a strong chemical and industrial presence as well as an abundance of railroads tied to those in the Youngstown area.

Giving more weight to tracks with rail access aligned with the underlying methodology because of a driving concept for this project known as Cluster Theory. From Michael E. Porter, a professor at Harvard's Business School[23], cluster theory is the paradoxical interconnectedness of industry and business to isolated geographic locations, despite the ever-growing global network of supply chains. This phenomenon shows that if there are pre-existing industries or investments near current investment opportunities, investors are much more likely to invest in that area. This is believed to be why the manufacturing dominance in northern Appalachian Ohio in counties like Ashtabula and Trumbull occurs: the manufacturing industry already exists, and this has led to other manufacturing industries moving into this area due to the expertise of the local populous. An overview of the density of manufacturing industries within Appalachia can be seen in Figures 6 and 7 below:

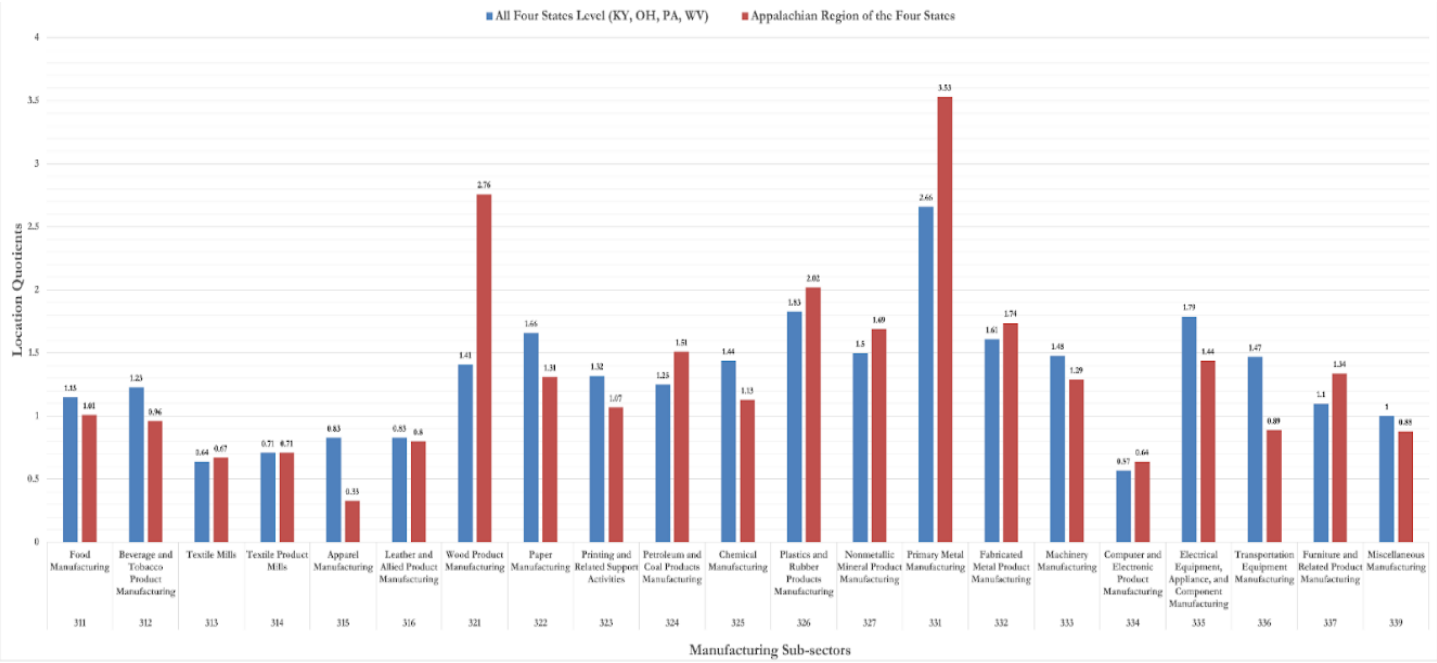



Figure 6: LQ of manufacturing industries within four Appalachian states.[24]

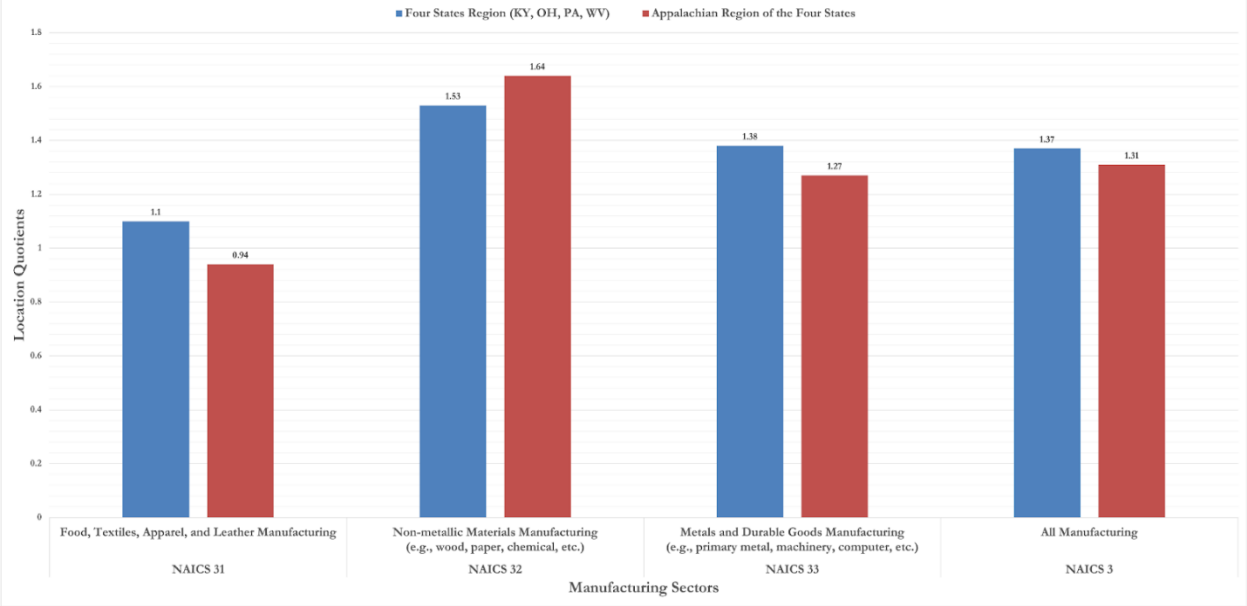



Figure 7: LQ of manufacturing sub-sectors within four Appalachian states.[24]

Combining the considerations of the economic developers, the current industrial and economic status of the region, and the principles of cluster theory led to the creation of a final model that combined the quantitative socio-economic model developed in the previous section with the additional qualitative information.

The premise of the final combined model is that for each site available within a tract 0.5 points are added to the total score from the socio-economic model, then within each site, for each piece of available infrastructure, 0.25 points is added. Below are tables with a few examples of how census tracts were scored with just the qualitative models (Table 4) versus how these scores changed when adjusted with new qualitative information (Table 5):

Table 4: Examples of OZ scores from quantitative modeling.

| Tract | County | Equal Weight Score | Need-Based Score | Balanced Score | Investment-Readiness Score | Combined Average Score |
|---|---|---|---|---|---|---|
| *770600* | *ADAMS COUNTY* | 4.7 | 4.6 | 4.6 | 4.6 | **4.6** |
| *770100* | *ADAMS COUNTY* | 4.5 | 4.2 | 4.6 | 4.8 | **4.5** |
| *770400* | *ADAMS COUNTY* | 4.0 | 3.8 | 3.9 | 4.1 | **4.0** |
| *770200* | *ADAMS COUNTY* | 3.4 | 3.0 | 3.2 | 3.6 | **3.3** |
| *770500* | *ADAMS COUNTY* | 3.5 | 3.1 | 2.9 | 3.2 | **3.2** |

Table 5: Examples of OZ scores from Table 4 adjusted with qualitative scaling.

| Number of Sites | Sewer | Gas | Electric | Water | Sites Score | Infrastructure Score | Total Score (avg) |
|---|---|---|---|---|---|---|---|
| 3 | 0 | 0 | 1 | 1 | 1.5 | 0.5 | **7.1** |
| 3 | 1 | 0 | 0 | 1 | 1.5 | 0.5 | **6.5** |
| 2 | 0 | 0 | 0 | 0 | 1 | 0 | **6.0** |
| 1 | 0 | 0 | 0 | 0 | 0.5 | 0 | **5.3** |
| 0 | 0 | | | | 0 | 0 | **5.2** |


Figure 8: Average changes in scores from qualitative model to final model.

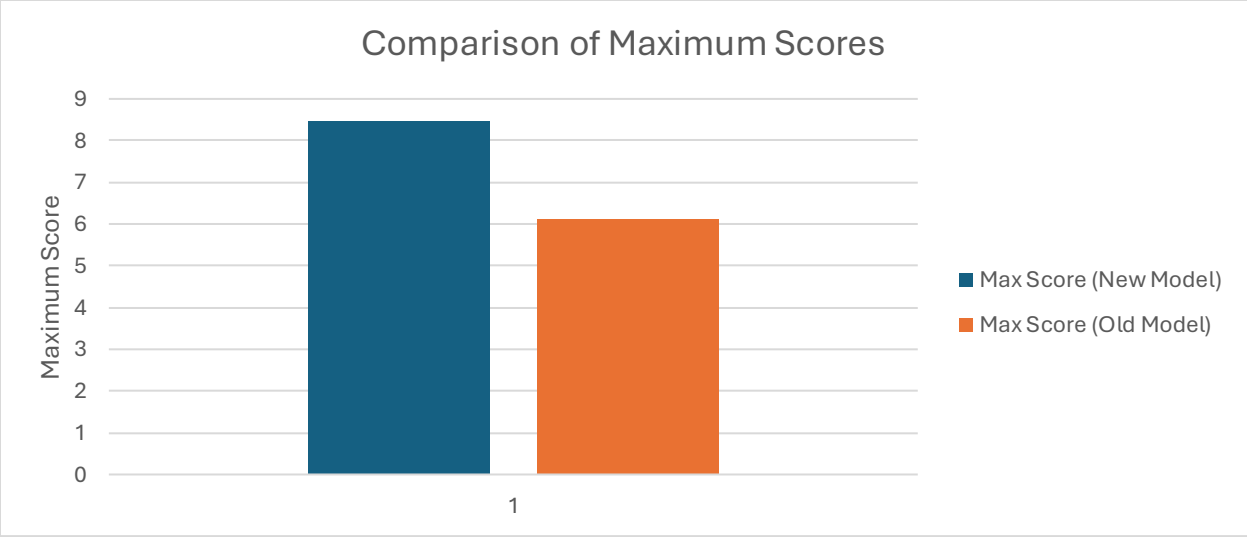



Figure 9: Comparison of maximum scores between quantitative and final models.

The two figures above show that across the region there is a moderate increase in the scores of tracts by taking infrastructure and rail access into consideration.

In the end, the function of the quantitative scoring seemed to be to filter out tracts that were eligible but were of bad quality for OZ investments, leading to a baseline threshold that the average tract needed to clear to have a chance at scoring highly in the qualitative aspect of the model. The addition of the qualitative information seemed to have served to bring out the best tracts from the ones that were all initially promising, leading to certain tracts separating away as the clear favorites for OZ catalyzed economic growth.

## Examples of Investable Sites

There are no restrictions in the TCJA or the OBBBA on what types of projects capital in a QOF can be invested into; however, the short-term nature of OZs has tended to incentivize certain developments over others in the past. Since OZs are legally required to be redesignated every 10 years and all the tax incentives for investors reach their full potential after 10 years, anyone who invests into an OZ does so expecting to obtain a quick return on investment (ROI). Census tracts cannot expect investments in projects during their OZ status to last since the census tract may not still be an OZ in 10 years' time, so projects that are presented to investors with the potential for OZ tax incentives tend to be redevelopment projects rather than the construction of large and new sites that may take decades. This presents a challenge for many Appalachian Ohio communities because many of these small towns and villages do not have a large existing infrastructure base (if any at all), and in many places the hilly geography can be incredibly restrictive to a community's

horizontal expansion. Many counties will need to get creative in the projects they propose during their time as OZs in order to best utilize the designation and avoid the inaction that plagued OZ 1.0. It is for this reason that this section lists some examples of what were considered good investable sites within potential OZs on different scales and in different regions of Appalachian Ohio. The goal is to give a better understanding of the types of projects that were prioritized for this report, as well as serve as inspiration for leaders of future Appalachian OZs to assist in redeveloping their counties.

**Leasure Farms Housing Developments: Zanesville, Ohio**[25,29]


Figure 10: The Leasure Farms property when it was purchased for development.[26]

Figure 11: An example of a house on the Leasure Farms property today, currently up for sale.[27,28]

Development and redevelopment of housing have been found to be the most successful ventures for a community when attempting to gain OZ funds. Due to their quick turnaround and near guarantee that the project will be seen through and the properties will be purchases, housing is a popular sell to an investor, especially when it comes to redevelopment. The city of Zanesville in Muskingum County has been working since 2023 to construct new single-family and multi-family apartment units on a formerly abandoned farming property just outside of city limits. According to many Appalachian Ohio economic officials in interviews[14,16,19], Zanesville has recently become the prime example of how a small Ohio community should grow and operate, and an OZ status can only serve to benefit them when selling projects like Leasure Farms housing to investors. Although this project and all of those seen in this section were not funded with OZ capital, they all serve as examples of projects that OZ money would serve perfectly.

**Midtown Market Redevelopment: Cambridge, Ohio**[30]


Figure 12: Concept Renderings of the planned Midtown Market building in Cambridge.[31]

Downtown redevelopments are another staple project championed by OZs across America, and many communities of Appalachian Ohio would benefit from a revitalization of their local downtown scenes. The city of Cambridge in Guernsey county is somewhat of an exception to this trend, already having a somewhat lively downtown atmosphere along Wheeling Avenue, but the current success they are experiencing in the planning and early execution stages of redeveloping properties along Wheeling can serve as inspiration for other Appalachian counties. An old Chevrolet dealership originally built in 1920 had to

close its doors in 2018 for financial reasons, and the building sat dormant for years until members of the community decided to reinvent the space as what will soon be called the Midtown Market. The redevelopment is planned to be "a mixed-use market that will feature local eating, drinking, and collaborative spaces. The market will include six to eight food vendors, a bar/restaurant vendor, recreation, education and co-working space." [30] As previously stated, Appalachian communities lack the abundance of empty, developable sites available to a big city, but from meeting with the economic officials, it became clear that almost every community has at least a few buildings infamous for having been abandoned long ago. Cambridge serves as an example that these sites are not hopeless but simply need the right mind to come and make the changes to these sites that can revitalize a small town in some way, and an OZ status can serve to help fund projects like this.

**Westside Sidewalk Revitalization: Marietta, Ohio**[33]

Figure 13: Harmar Village Community members beginning sidewalk restoration in 2018.[32]

Many Appalachian Ohio communities cannot execute common OZ redevelopment projects for several reasons, so it is important to find short-term necessary redevelopments unique to their communities that can use OZ capital. The city of Marietta in Washington

County recently refurbished the brick sidewalks in the section of town west of the Muskingum River in what is called Harmar Village, which serves as a great example of a project that even the smallest towns in Appalachia can benefit from. It also serves as a stark reminder that in small, overlooked communities such as those in Appalachia, real change comes from grassroots movements and everyday people making a change, both of which can be supported using these OZ investments.

## Results

Once all calculations, scores, and ranking were completed and compiled, the ordered list of census tracts was split into thirds and each third was labelled as a Tier, with Tier I being the highest scoring tracts, and Tier III being the least appropriate tracts for OZ status. The Tier I tracts' respective counties can be seen in the map below with their respective counties listed in the following table:

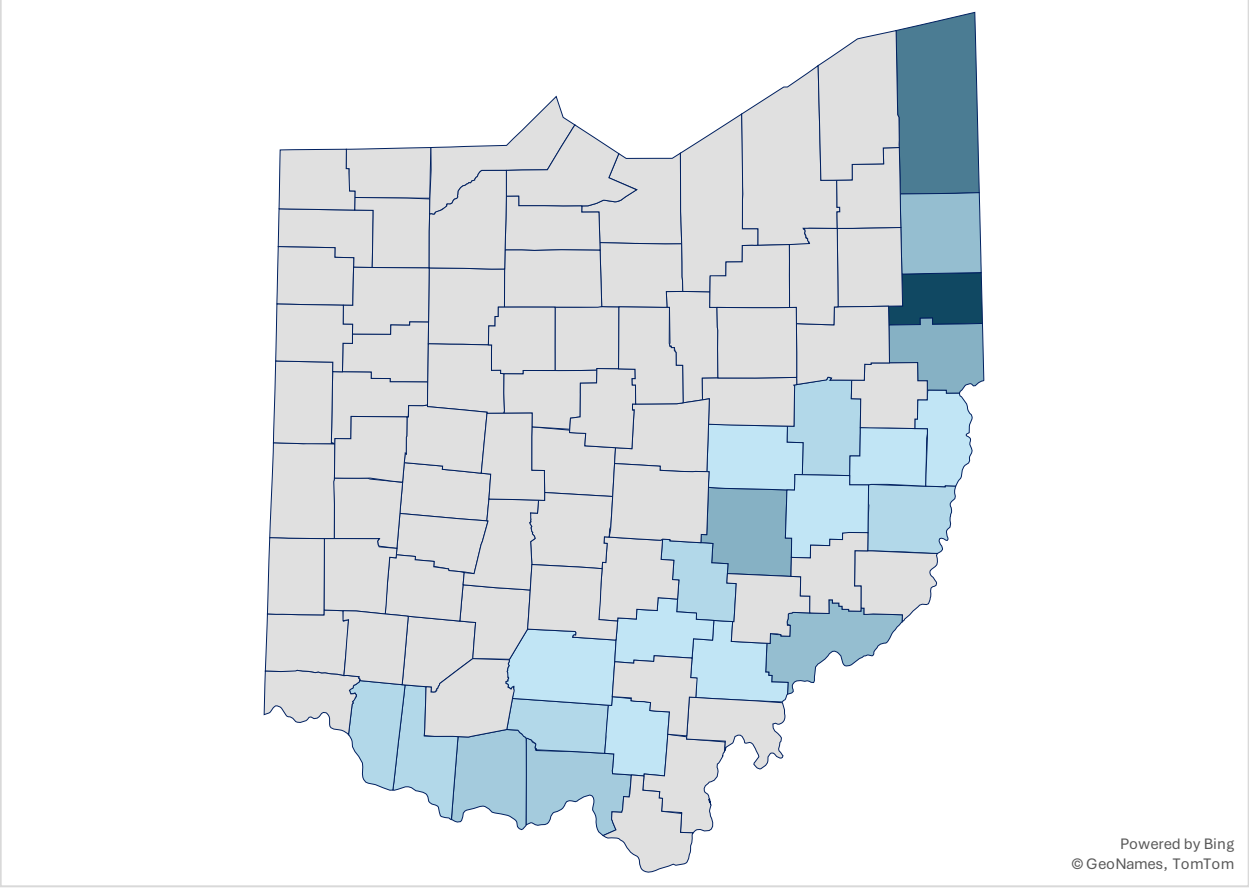



Figure 14: Heat map of Tier I Appalachian census tracts best for OZ status

Table 6: Tier I recommended census tracts from Figure 14 and their respective tract counts, and counties, sorted by amount of Tier I tracts.

| COUNTY | NUMBER OF TIER 1 TRACTS | FIPS CODES OF NOMINATED TRACTS |
|---|---|---|
| **MAHONING** | 13 | 814000, 800501, 802400, 813800, 800600, 813700, 810300, 801100, 802900, 812400, 801600, 801300, 814100 |
| **ASHTABULA** | 9 | 000103, 000703, 000704, 000601, 000701, 001402, 000101, 000500, 000300 |
| **MUSKINGUM** | 5 | 912100, 911400, 912400, 911800, 912500 |
| **COLUMBIANA** | 5 | 952100, 950700, 952300, 951800, 952200 |
| **TRUMBULL** | 4 | 934000, 921000, 933800, 932802 |
| **WASHINGTON** | 4 | 021700, 021100, 021000, 020500 |
| **SCIOTO** | 3 | 003500, 003100, 002800 |
| **ADAMS** | 3 | 770600, 770100, 770400 |
| **PERRY** | 2 | 966000, 966200 |
| **TUSCARAWAS** | 2 | 021700, 021000 |
| **PIKE** | 2 | 952300, 952200 |
| **BROWN** | 2 | 951301, 951800 |
| **CLERMONT** | 2 | 041701, 041800 |
| **BELMONT** | 2 | 010902, 011700 |
| **ATHENS**[1] | 1 | 972900 |
| **COSHOCTON** | 1 | 961800 |
| **HARRISON** | 1 | 975600 |
| **GUERNSEY** | 1 | 977900 |
| **JACKSON** | 1 | 957800 |
| **JEFFERSON** | 1 | 000200 |
| **ROSS** | 1 | 956000 |
| **HOCKING** | 1 | 965400 |

The first and most obvious fact to draw from the final ranking is the far and away highest scoring county that is Mahoning County; this high number of tracts is likely due to Mahoning County being the site of the only truly metropolitan urban area in Appalachian Ohio: the city of Youngstown. Youngstown has a much greater population, population density, and density of census tracts than any other county in Appalachian Ohio[6] and is more comparable to cities such as Cleveland and Columbus than towns like Zanesville and Cambridge. The greater number of census tracts gives Youngstown more chances to be nominated, and it being a city gives it many more empty sites available for redevelopment

[1] Athens County had three eligible tracts based on the original data collected but after conversations with local economic developers, it was decided that the two tracts that contained most of Ohio University should not be considered. These excluded tracts were 973901 and 973101.

with access to the utilities that many rural census tracts do not. These aspects likely caused many census tracts in Mahoning County to gain score from the qualitative ranking.

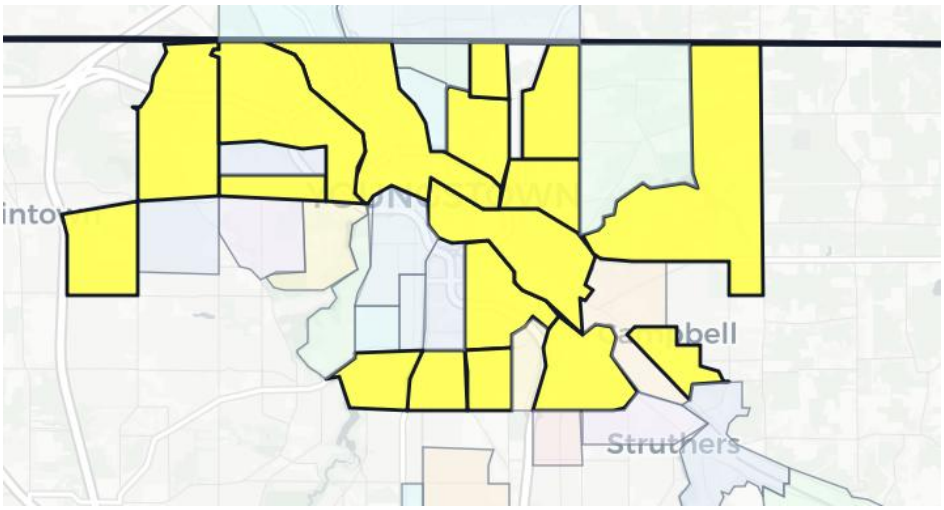



Figure 15: Census-tract breakdown of the city of Youngstown in Mahoning County.

Beyond Mahoning County, the second most notable outlier is the second-place placement of Ashtabula, which is a rural county comparable to many others in Appalachian Ohio that only received one or two designations. Upon further evaluation, it is believed that Ashtabula County scores so high due to having an abnormal abundance of various manufacturing plants when compared to other rural census tracts. This still-growing abundance of industry leads to Ashtabula having an abundance of investable sites, causing it to score higher in the qualitative ranking.

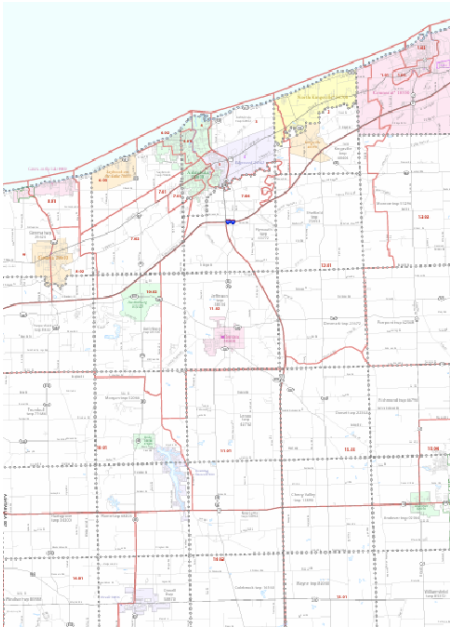


Figure 16: Census tract breakdown of Ashtabula County.[34]

In general, the trend of the ranking seems to be that as the number of cities (urban or otherwise) in a census tract increases, and the size of those cities increases, the more OZ designations a tract seems to receive. This is seen in the rankings of counties such as Mahoning (containing Youngstown), Trumbull (containing Warren), Muskingum (containing Zanesville), Coshocton (containing Coshocton), Washington (containing Marietta), and Guernsey (containing Cambridge). As a county's population decreases, the trend generally follows that the number of Tier I census tracts in that county decreases. This trend follows what the team expected to see from the start of the project: due to the short-term nature of OZ investments, OZ designations seem to have been created with the intention of helping struggling urban areas of America which contain an abundance of sites ready for redevelopment but lacking the capital investment to do so. Appalachian Ohio is not that. Counties in Appalachian Ohio are overlooked by investors not because they lack the incentives for investment, but because they lack the investments to begin with. As was openly admitted by the economic developers met with, counties in Appalachian Ohio lack sites that can be redeveloped at all, and sites that could be developed into an investment-worthy project are not ready because of a lack of basic utilities rather than a lack of funding. The work done on this project has further highlighted the need for long-term investment in the Appalachian region, rather than short-term lifelines attempting to save industries that have long left the region as was emphasized by the economic developers. However, the designation of a county as an OZ does not in any way hurt the county, so the recommendation of OZ selections still stands and can be utilized as freely by Appalachian counties as they please.

Further work on this project would first and foremost include expanding the criteria for ranking census tracts from the 6 studied. Some recommendations for further criteria include geography, cell-phone coverage, and site acreage. The challenge of further criteria becomes finding a way to quantify inherently qualitative aspects of a census tract, which may require a creative approach to the data available on the JobsOhio website. Work was also done by several team members on the likelihood a census tract would experience gentrification as a result of an OZ designation, and the investment readiness of a census tract as a whole, which upon further reflection should be included in future iterations of the project. There is also potential in expanding the model by looking at the economic growth of the last 15 years of a census tract and the projected growth of an area to support a claim that a census tract is investment ready. Overall, significant improvements could be made in the utilization of data science and computer science in the project that present the potential for future work. The project in its current form is best viewed as a solid foundation to be built upon before OZ recommendations are due, as well as serve as an informational and inspirational resource for counties in Appalachian Ohio to best utilize an OZ designation within the next ten years.

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