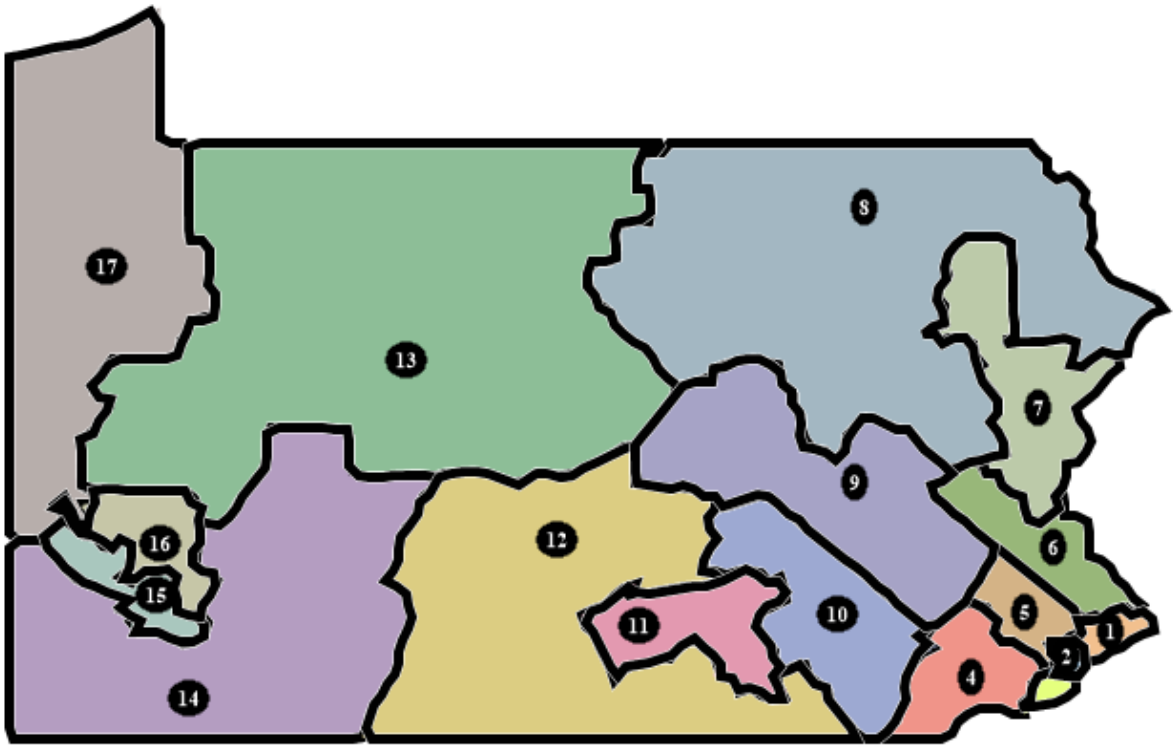

PENNSYLVANIA PROPORTIONAL PLAN

SEBASTIAN ALARCON

DRAW CONGRESS

INTRODUCTION

In 2011, Pennsylvania enacted what many consider the "Gerrymander of the Decade."[1] Despite winning more votes in the 2012 elections, Democratic candidates only won five congressional seats while Republicans won thirteen.[2] The Pennsylvania Supreme Court finally struck down this gerrymander in 2018, which lead to a fairer map.[3] By the 2020 elections, Democrats were able to secure nine of Pennsylvania's eighteen congressional seats.[4]

Although partisan gerrymandering is non-justiciable in federal courts, Pennsylvania law prevents drawing maps to gain an unfair partisan advantage.[5] Furthermore, it is incumbent on map makers to avoid the even the appearance of gerrymandering given Pennsylvania's partisan divisions and contentious decade of election litigation. Therefore, I created this map with two goals in mind: ensure proportional representation and comply with the law. Before I began work on this plan, several proposals had been submitted to the Pennsylvania Supreme Court, including by Governor Tom Wolf. I chose to make my plan as different as possible from Governor Wolf's to demonstrate another way to achieve proportional representation. Throughout this report, I compare my plan to the governor's as well as the maps enacted in 2018 and 2022 where data is available.

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[1] Andrew Prokop, *Pennsylvania's gerrymandered House map was struck down – with huge implications for 2018*, VOX (Feb. 5, 2018, 1:16 PM), https://www.vox.com/2018/1/22/16920636/pennsylvania-gerrymander-ruling-house.
[2] *Id.*
[3] *Id.*
[4] *Pennsylvania Election Results*, N.Y. Times (last visited Mar. 29, 2022), https://www.nytimes.com/interactive/2020/11/03/us/elections/results-pennsylvania.html.
[5] *Compare Rucho v. Common Cause*, 139 S. Ct. 2484, 2506-07 (2019) ("partisan gerrymandering claims present political questions beyond the reach of federal courts"); *with League of Women Voters v. Commonwealth*, 178 A. 3d 737, 817 (Pa. 2018) ("gerrymandering for unfair political advantage . . . violates Article I Section 5 of the Pennsylvania Constitution").

I faced three key obstacles when creating this map. The first was how to allocate an odd number of districts along party lines. While Pennsylvania passed Illinois to become the fifth most populous state, its population grew at a rate of 2.4 percent over the last decade, far slower than states like Florida (14.6 percent) and Texas (15.9 percent), both of which gained congressional seats.[6] As a result, Pennsylvania lost a congressional seat for the second cycle in a row.[7] With seventeen districts in play, I had to choose between creating a plan where Democrats win nine districts and Republicans win eight, or a plan where both parties win eight districts and compete for a ninth. I chose a mix of both options and created a plan where Democrats are expected to win nine districts in an even election, the last by the smallest of margins. This solution was somewhat predetermined by where voters live – outside of the Philadelphia and Pittsburg areas, it is hard to create districts that favor Democrats. However, it is also a fair result since Pennsylvania elected Joe Biden President and sent nine Democrats to Congress in 2020 by narrow margins.[8]

The second challenge I faced was how to split counties and cities. The Pennsylvania Constitution provides that no county, city, or town shall be divided "unless absolutely

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[6] *New Vintage 2021 Population Estimates Available for the Nation, States and Puerto Rico*, U.S. Census Bureau (Dec. 21, 2021), https://www.census.gov/newsroom/press-releases/2021/2021-population-estimates.html; *Census 2020 Redistricting Data*, Pennsylvania State Data Center (last visited Mar. 29, 2022), https://pasdc.hbg.psu.edu/; *Florida Was Third-Largest State in 2020 With Population of 21.5 Million*, U.S. Census Bureau (Aug. 25, 2021) https://www.census.gov/library/stories/state-by-state/florida-population-change-between-census-decade.html; *Texas Added Almost 4 Million People in Last Decade*, U.S. Census Bureau (Aug. 25, 2021) https://www.census.gov/library/stories/state-by-state/texas-population-change-between-census-decade.html.

[7] Matt Maisel, *Pa. loses congressional seat, electoral vote following census release; state districts expected to shift*, FOX 43 (Aug. 20, 2021, 3:06 PM), https://www.fox43.com/article/news/politics/fox43-capitol-beat/pennsylvania-loses-congressional-seat-electoral-vote-fox43-capitol-beat/521-a0be4db9-6318-4254-910c-2a1cc413d9b9.

[8] N.Y. Times, *supra* note 4.

necessary."[9] While Philadelphia must be split to ensure districts with equal population, I also split Pittsburg. As a result, the districts I drew in Alleghany County are more likely to perform for Democrats than similar districts in other plans.[10]

On the other hand, one of the toughest choices was deciding when not to split cities and counties. For example, District Nine has eleven extra residents. Although the Pennsylvania Supreme Court struck down a plan in 2002 with a deviation of nineteen voters, I did not reduce the deviation because doing so requires splitting a county in a district in which there are no counties split.[11] Since the language of the Pennsylvania Constitution establishes a presumption against splitting counties, the district can be justified if challenged for violating the principle of one-person, one-vote. All told I split sixteen counties, the same as Governor Wolf and two more than the enacted plan.[12] This includes thirty-eight cities and towns.[13] This is more than Governor Wolf's twenty-two and the enacted plan's twenty-three, but as my analysis of partisan performance shows, many of these splits are necessary to achieve proportional representation and equal representation. [14]

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[9] Pa. Const. art. II, § 16.
[10] *Compare Pennsylvania Proportional Map*, PlanScore (last visited Mar. 28, 2022), https://planscore.campaignlegal.org/plan.html?20220324T063235.334637528Z; *with* Carter Petitioner's Map, PlansSore (last visited Mar. 28, 2022), https://planscore.campaignlegal.org/plan.html?20220322T180833.571834011Z; *and* The Governor's Map, PlanScore (last visited Mar. 28, 2022), https://planscore.campaignlegal.org/plan.html?20220322T180833.571834011Z.
[11] See *Vieth v. Pennsylvania*, 188 F. Supp 2d 532 (M.D. Pa. 2002).
[12] *Compare Ratings: PA Final*, Dave's Redistricting App (last visited Mar. 28, 2022), https://davesredistricting.org/maps#ratings::26f141f7-6757-495e-80d0-8756d901957b; *with Ratings: The Governor's Map*, Dave's Redistricting App (last visited Mar. 28, 2022) https://davesredistricting.org/maps#ratings::fe2ff034-a707-4d2f-a781-60eb79ea8b7d; *and Ratings: Carter Petitioner's Map*, Dave's Redistricting App (last visited Mar. 28, 2022), https://davesredistricting.org/maps#ratings::f90e83ef-f6e1-422e-8f9c-ac3a38c6011b.
[13] *Id.*
[14] *Id.*

The last challenge I faced was ensuring racial and ethnic minorities have an equitable chance to elect their candidates of choice. Over the last decade, the state's African American population grew by 9.8 percent and now accounts for 12.7 percent of Pennsylvania's population.[15] Similarly, the state's Hispanic or Latino population grew by 45.8 percent and is now 8.1 percent of Pennsylvania's population.[16] Although both populations grew statewide, only the Philadelphia African American population is compact enough to meet the requirements for a majority-minority district under section two of the Voting Rights Act.[17] In the end, I was able to create a one majority African American district (District Two) and created another district (District Three) where taken together, the African American, Hispanic, and Asian populations are greater than the White population. The creation of District Three was necessary due to my decision to split Bucks County, but as I discuss in my analysis of opportunities for racial minorities, today's Supreme Court would likely find this district's composition is not required under the Voting Rights Act.

Ultimately, I created a proportional representation plan that is legal. The following report begins with a discussion of how this plan complies with the law. It then evaluates the plan as a whole across traditional redistricting criteria. Finally, it includes a plan description discussing what I prioritized across each district.

LEGAL COMPLIANCE

This plan complies with applicable federal and state law. The following analysis focuses the one-person one-vote requirement, the prohibition on racial gerrymandering and the

[15] *Pennsylvania Population Hit 13 Million in 2020*, U.S. Census Bureau (Aug. 25, 2021), https://www.census.gov/library/stories/state-by-state/pennsylvania-population-change-between-census-decade.html.
[16] *Id.*
[17] *See Id.*

requirements of the Voting Rights Act, and current law regarding partisan gerrymandering. As Pennsylvania state law often mirrors federal law, I discuss both in concert with one another.

I. The Plan Complies with the One-Person One-Vote Requirement

In 1964, the Supreme Court established that "diluting the weight of votes because of place of residence impairs basic constitutional rights under the Fourteenth Amendment."[18] However, the Court recognized there is a limit to what map makers can practicably do to achieve equal population.[19] As a result, the Court later held there "are no *de minimis* population variations, which could practicably be avoided, but which nonetheless meet the standard of Art. 1 §2, *without justification* (emphasis added)."[20] Deviations from equal population that are not the result of a good-faith effort to achieve population equality can only be justified by showing they are required to achieve a particular state objective.[21] Pennsylvania courts construe such justifications narrowly – in 2002, a panel for the Middle District of Pennsylvania struck down a congressional map for a deviation of just nineteen people. [22]

My plan complies with the one-person one-vote requirement as nearly as is practicable given state objectives. The ideal district population is 764,865 people.[23] Fifteen of the seventeen districts in this plan come within plus or minus six people of this number. Of those fifteen districts, the ones that deviate from the ideal population do so because I could not find an exchange of census blocks that would yield the ideal population across adjacent districts.

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[18] *Reynolds v. Sims*, 377 U.S. 533, 566 (1964).
[19] *Wesberry v. Sanders*, 376 U.S. 1, 7-8 (1964) ("the command of Art I. s 2, that Representatives be chosen 'by the People of the several States means that as nearly as is practicable one man's vote in a congressional election is to be worth as much as another's").
[20] *Karcher v. Daggett*, 462 U.S. 725, 734 (1983).
[21] *Id.* at 741.
[22] *See Vieth,* 188 F. Supp 2d.
[23] *See infra* Appendix 1.

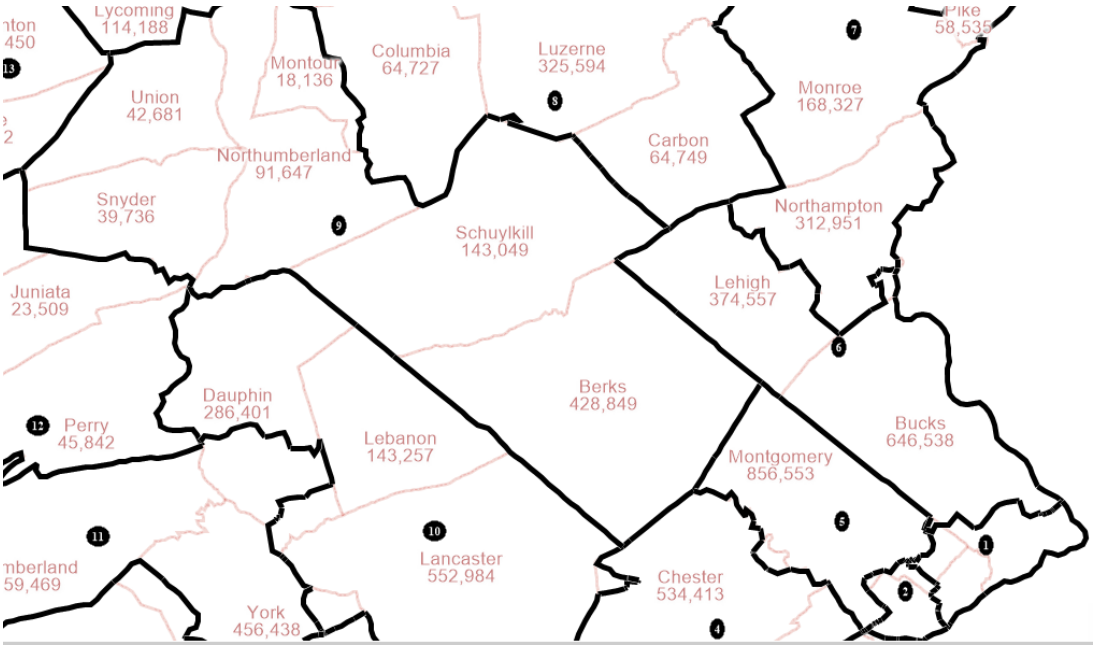

Figure 1: Map of Districts Adjacent to District Nine.

Two districts, Districts Eight and Nine, deviate by more than six people: District Eight has nine extra residents and District Nine has eleven extra people. This means that the maximum deviation among districts this plan is seventeen people, between District Nine (nine extra people) and District Seventeen (six fewer people). This is close to the nineteen-person deviation struck down in 2002 but is necessary to achieve the state's goal of minimizing county splits. District Nine includes six counties and splits none. The districts surrounding it below ideal population are District Four (two below), District Five (one below), District Six (one below), and District Ten (five below). Nine voters could theoretically move out of District Nine, but this would require splitting Berks County four times (see Figure 1). Therefore, keeping District Nine as is more aligned with the Pennsylvania Constitution's goal of reducing county splits and would likely survive scrutiny in a population equality challenge. [24]

[24] *See* Pa. Const. art. II, § 16.

Similarly, the nine-person deviation in District Eight is likely to survive a challenge. District Eight is surrounded by District Thirteen (ideal population), District Nine (discussed above), and District Six and District Seven, both of which are one person below the ideal population. Therefore, only two voters can be moved out of District Eight. In creating the map, I could not find an exchange of census blocks that would reduce the population of District Eight without splitting cities in Luzerne or Carbon County. In the event District Eight was not found to be the product of good-faith efforts to achieve population equality, its deviation could still be justified as complying with the Pennsylvania's goal of reducing city splits, as enshrined in its constitution.[25]

II. This Plan is Not a Racial Gerrymander

There are two primary ways plaintiffs challenge redistricting plans on the grounds that they are unconstitutional racial gerrymanders. The first is when a plan is so irregular it can only be explained as an effort to segregate races for the purposes of voting.[26] The second is when a plaintiff can show race was the predominant factor motivating the design of a redistricting plan.[27] This can be shown by demonstrating that a legislature subordinated traditional redistricting principles, like compactness, contiguity, and respect for political subdivisions, to racial considerations.[28]

This plan would survive both types of challenges. I considered race solely for the purpose of complying with the *Voting Rights Act* (described below) and drew my plan according to the traditional redistricting principle of respect for political subdivisions. The most oddly shaped

[25] *Cf. Vieth,* 188 F. Supp 2d (striking down a district where there is no justification for county splits).
[26] *Shaw v. Reno,* 509 U.S. 603, 649 (1993).
[27] *Miller v. Johnson*, 515 U.S. 900, 916 (1995).
[28] *Id.*

district in this plan is District Sixteen, which was drawn to connect Democratic voters in Beaver and Alleghany counties. Since District Sixteen is seventy-seven percent White, and District Seventeen is eighty-six percent white, the unusual shape of District Sixteen cannot be explained as an effort to segregate races for voting.[29]

Likewise, if the Supreme Court struck down the Voting Rights Act and I was not obligated to consider race in certain contexts (discussed below), the shape of the districts with the highest minority populations would not provoke a *Shaw* challenge. District Two is a majority African American district with a Reock score of .56, and District Three is a plurality African American district with a Reock of .4.[30] Considering these districts have Reock scores higher than the plan average (.34) and do not resemble the shape of district the Supreme Court objected to in *Shaw*, it is likely they could survive challenges alleging racial gerrymandering.[31]

III. This Plan Complies with the Section Two of the Voting Rights Act

A plaintiff challenging a redistricting plan under section two must meet all three prongs of the test established in *Thornburg v. Gingles*. First, the plaintiff must demonstrate that a minority group is sufficiently large and compact to constitute a majority of a congressional district. The plaintiff then must demonstrate the minority group is politically cohesive. Lastly, the plaintiff must demonstrate the White majority votes as a bloc that allows it to defeat the minority's preferred candidates. If all prongs are met, states are required to produce a district that allows minority voters to elect their preferred candidates.[32]

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[29] *See infra* Appendix 1.
[30] *Id.*
[31] *PA Final*, Dave's Redistricting App (last visited Mar. 28, 2022), https://davesredistricting.org/maps#ratings::26f141f7-6757-495e-80d0-8756d901957b; *Shaw*, 509 U.S.
[32] *Thornburg v. Gingles*, 478 U.S. 30 (1986).

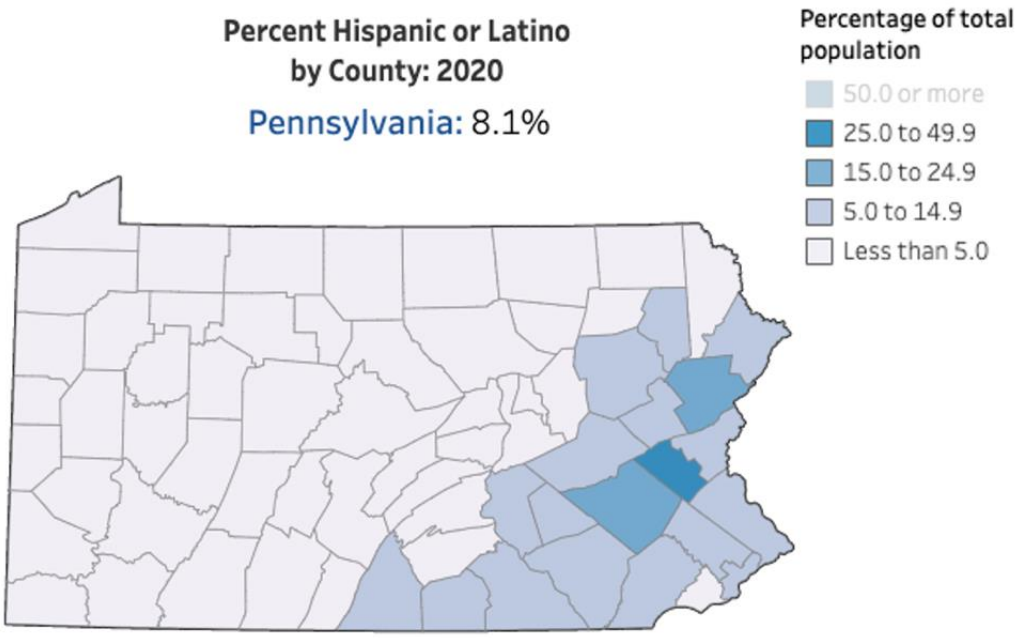

Figure 2: Percentage Hispanic or Latino by County. Graph from the Census Bureau.[33]

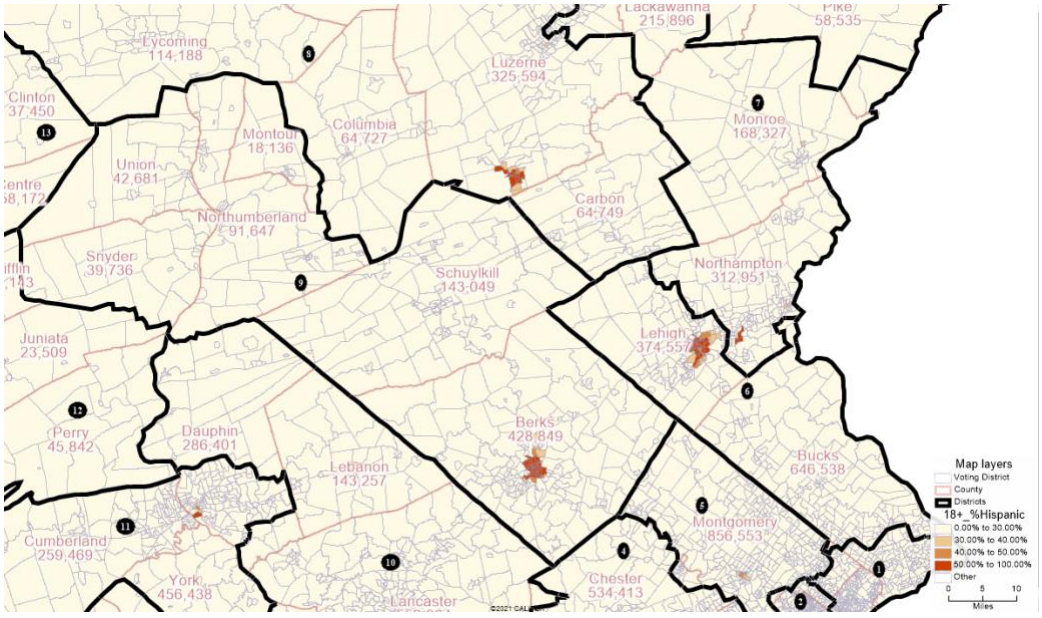

Figure 3: Concentration of Hispanic and Latino Voters Over the Age of Eighteen in Berks and Lehigh County

Pennsylvania's two largest minorities are African Americans, which account for 12.7 percent of the state's population, and Hispanics or Latinos, which comprise 8.1 percent of the

[33] U.S. Census Bureau, *supra* note 15.

population.[34] However, the Hispanics and Latino population cannot meet the first prong of the *Gingles* test. Figure 2 shows that most Hispanic and Latino voters are concentrated in Berks, Lehigh, and Monroe County. However, Figure 3 demonstrates that the population is not compact and that Hispanic voters are instead clustered around major city centers within their respective counties. For example, in District Six and District Nine, Hispanic voters are clustered near Allentown and Reading respectively. Even assuming it is possible to combine all the Hispanic voters from District Six through District Nine, it would not be possible to create a majority-Hispanic district – Hispanic voters would only make up 42.41 percent of this hypothetical district.[35]

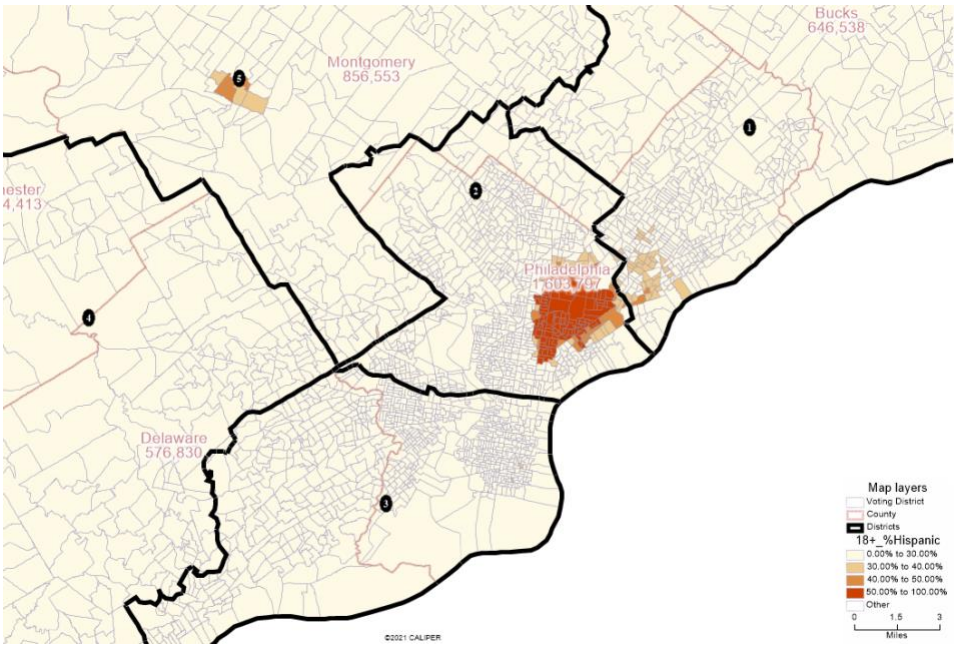

Figure 4: Concentration of Hispanic Voters in Philadelphia County.

The same is true in the Philadelphia County, which also has a substantial Hispanic population (14.9 percent).[36] While the Hispanic population is relatively compact in Philadelphia County (see

[34] *Id.*
[35] *See infra* Appendix 1.
[36] U.S. Census Bureau, *supra* note 15.

Figure 4, it is not substantial enough to merit its own district. District Two encompasses the most compact Hispanic population in Philadelphia County, which is 15.55 percent of the district's population. Even if it was possible to combine all Hispanic voters in the first three districts, they would comprise at most 32.75 percent of a district.[37]

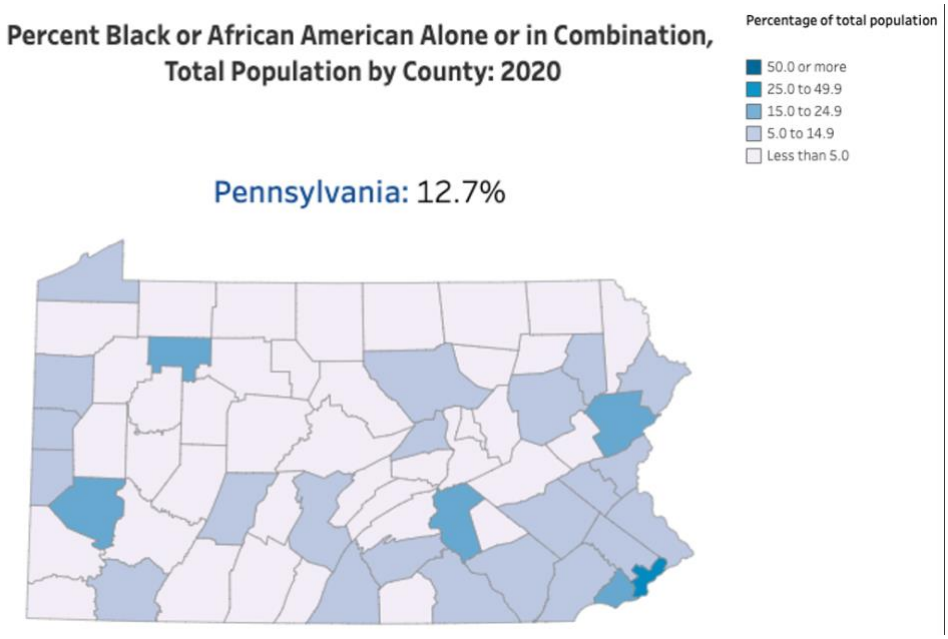

Figure 5: Concentration of African American Voters by County. Map from Census Bureau.[38]

[37] *See infra* Appendix 1.
[38] U.S. Census Bureau, *supra* note 15.

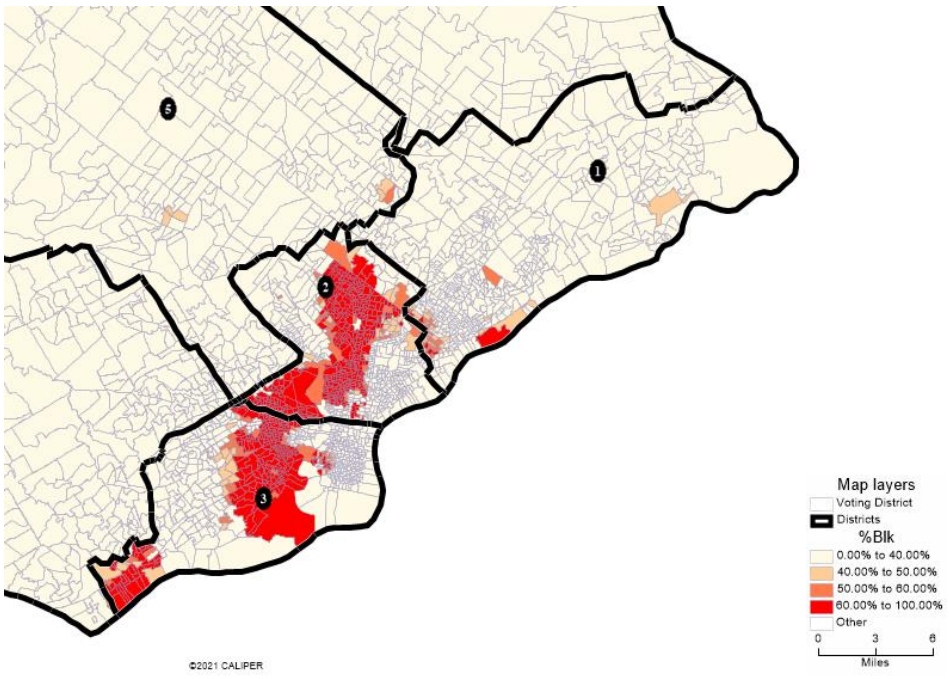

Figure 6: Concentration of African American Voters in Philadelphia.

By contrast the African American population can pass the *Gingles* test. African Americans comprise 12.7 percent of the state's population, enough to fill over two districts by themselves if they were sufficiently compact. However, Figure 5 shows that African American voters are heavily concentrated in six counties within Pennsylvania. Of these counties, only Philadelphia, where forty-two percent of residents are African American, has a sufficiently large and compact population to meet the first *Gingles* prong. [39]

I did not have access to granular data on political cohesion among minority groups nor data on racial bloc voting while creating these districts. However, commentary suggests that political cohesion and bloc voting occurred in Philadelphia during the 2020 election such that the remaining *Gingles* prongs are satisfied.[40] The majority African American district I drew, District

[39] *Id.*
[40] *See e.g.*, Theodore R. Johnson, *Tuesday proved that racial groups don't vote as a bloc – with one exception*, Washington Post (Nov. 6, 2020),

Two, mirrors the shape of the district included in both Governor Wolf's plan and the enacted map (see Figure 6).[41] The only difference between those districts and mine is that I adopted a different southern border to include most of Philadelphia's Hispanic population (see Figure 4). Since African American voters comprise 52.48 percent of the district, it complies with section two of the Voting Rights Act.[42]

In creating my plan, I discovered that while African Americans across the state could fill two districts on their own, it is not possible to create a second majority-minority district within Philadelphia. African American voters comprise 52.48 percent of District Two but only account for 36.13 percent of District Three. The African American population of District One is also not sufficiently compact to be combined with either District Two or Three to help create a second majority-minority district.

However, it is worth noting that White voters only account for 46.77 percent of District Three's population.[43] In other words, minorities together outnumber White voters in District Three. The Supreme Court has yet to rule on whether a majority-minority district is required when different minorities vote together as a bloc against White voters.[44] Considering the Court recently used the Shadow Docket to reject a second majority-African American district in Alabama, I am skeptical this Court would require a majority-minority district composed of a multi-majority bloc.[45] That said, District Three still complies with the law because the

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https://www.washingtonpost.com/outlook/voting-blocs-racial-groups/2020/11/06/1162ddc8-1fa2-11eb-b532-05c751cd5dc2_story.html.

[41] *See infra* Appendices 1-3.

[42] *See infra* Appendix 1.

[43] Note that District One is also a plurality minority district because minorities are over thirty-seven percent of voters. *See infra* Appendix 1.

[44] *Cf. Bartlett v. Strickland*, 556 U.S. 1 (2009) (holding the Voting Rights Act does not require drawing of crossover districts with a large plurality of minority voters).

[45] *Merrill v. Milligan*, No. 21-1086, 2022 WL 827847 (2022).

predominant factor used to create it was partisan performance – race was only the primary factor in creating District Two.

IV. This Plan is Not an Unfair Partisan Gerrymander

In 2019, the Supreme Court ruled that partisan gerrymandering is a non-justiciable issue. [46] Therefore, this plan cannot be challenged in federal court for excessive partisanship. However, the Pennsylvania Supreme Court has ruled that partisan gerrymandering violates the state constitution.[47] To determine whether a plan is a partisan gerrymander, Pennsylvania examines the extent to which neutral districting principles, such as equal population and contiguity, have been subordinated to achieve an unfair partisan advantage.[48] While the shape of districts is not dispositive, "isthmuses and tentacles" that ignore the integrity of political subdivisions can be used to establish the subordination of neutral districting principles.[49]

[46] *Rucho,* 139 S. Ct. at 2506-07 ("partisan gerrymandering claims present political questions beyond the reach of federal courts.").
[47] *League of Women Voters* 178 A. 3d at 816-17 ("gerrymandering for unfair political advantage . . . violates Article I Section 5 of the Pennsylvania Constitution).
[48] *Id.*
[49] *Id.* at 819.

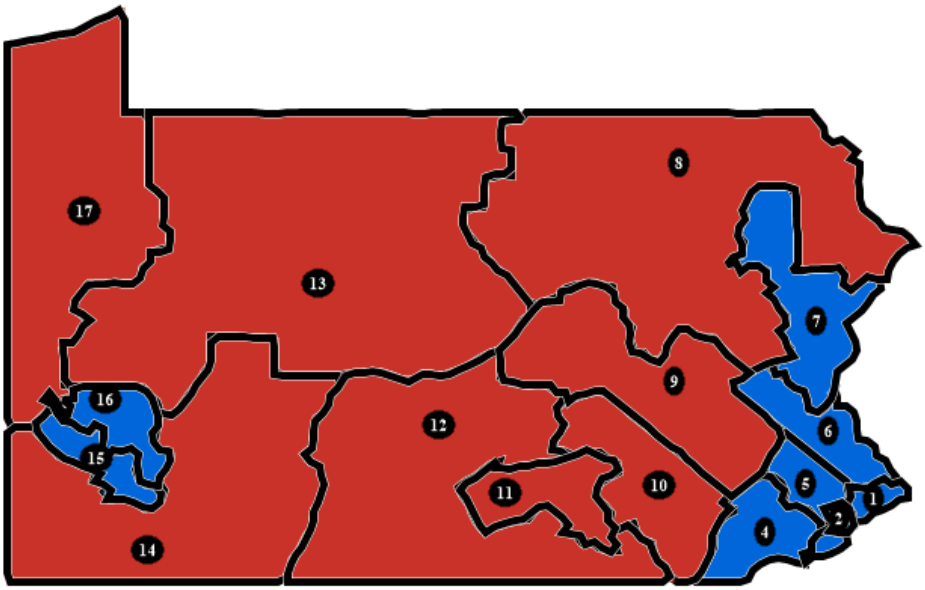

Figure 7: Expected Partisan Performance of this Redistricting Plan.

This plan as a whole would survive the scrutiny of the Pennsylvania Supreme Court because it does not award an unfair partisan advantage. Figure 7, where Democrats win all blue districts and Republicans win all red districts, shows Democrats win only one more district than Republicans in an even election. In District Seven, the percentage of the total vote in District Seven is even for both parties, which shows Democrats win a ninth congressional seat by the thinnest of margins.[50] Considering President Biden only won the state by .2 percent, favoring Democrats to narrowly win a ninth seat is fair because it mirrors the results of a statewide election.[51]

Similarly, attempts to challenge individual districts would fail. There are ample Democratic voters in Philadelphia, Montgomery, Delaware, Chester, Bucks and Lehigh Counties such that splits between those counties do not materially affect the partisan performance of this plan's first

[50] *Pennsylvania Proportional Map*, PlanScore (last visited Mar. 28, 2022), https://planscore.campaignlegal.org/plan.html?20220324T063235.334637528Z;
[51] N.Y. Times, *supra* note 4.

six districts. For those districts, the chance of a Democratic candidate winning never dips below sixty percent.[52] Potential plaintiffs might focus on the isthmus in District Six in Northampton County. However, a challenge to District Six is not promising. Northampton County naturally divides cities on its western border. To achieve equal population, I decided it would be better to split a city with a lower population along Northampton County's southern border than to depart from county divisions in cities along its western border.[53]

Instead, potential plaintiffs are more likely to challenge District Seven as well as District Sixteen, where decisions to split political subdivisions have greater partisan ramifications. Beginning with a challenge to District Seven, this will fail because as discussed above, the Democrats' advantage is slim at best. Second, both the enacted map and this map split Luzerne County.[54] This plan splits Luzerne County less than the enacted plan but takes care not to split any of its cities. As a result, it is unlikely that merely splitting Luzerne County could substantiate a state challenge. My decision to split Pike County would also not justify a challenge. The enacted map includes a second county split as well in Monroe County.[55] Splitting Monroe County in this plan would not make sense because it borders Northampton County, which is also in District Seven. Since the Pennsylvania Supreme Court approved a plan with a district that also splits two northeast counties, District Seven would survive scrutiny.

Likewise, District Sixteen would survive a state challenge. First, Democrats are expected to receive fifty-two percent of the vote share when there is no advantage in the generic ballot.[56]

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[52] PlanScore, *supra* Note 50.
[53] I do not address a potential state challenge to District 10 because it mirrors the district enacted by the Pennsylvania Supreme Court. See *infra* Appendix 1 *and* Appendix 3.
[54] See *infra* Appendix 1 *and* Appendix 3.
[55] See *infra* Appendix 3.
[56] PlanScore, *supra* Note 50.

This is a fair advantage considering the generic ballot favored Republicans by more than five points twice in the last decade – for example by 5.7 points in 2014 – so Republicans are not prevented from competing for the district.[57] Second, this plan, the governor's proportional plan, and the enacted plan all divide Alleghany, Beaver, and Westmoreland Counties to achieve equal population.[58] Therefore, there is nothing inherently suspect about including part of Beaver County in District Sixteen. Since I ensured the Beaver County isthmus does not divide cities, Pennsylvania courts would not find it persuasive evidence of partisan gerrymandering. Finally, the decision to split Pittsburg would not substantiate a state challenge. The Pennsylvania Supreme Court strikes down plans where the districts created are not within the ordinary range of plans "generated with solicitude toward applying traditional redistricting considerations."[59] As demonstrated in the evaluation section of this report, this plan adheres to traditional redistricting principles. Furthermore, this is not the only plan that splits Pittsburg. The governor's map splits the city and still achieves an "ok" rating on Dave's Redistricting App in the splitting category.[60] This rating can only be achieved using traditional considerations, which suggests splitting Pittsburg does not necessarily put plans outside the range acceptable to Pennsylvania Courts.

EVALUATION BASED ON REDISTRICTING CRITERIA

This section covers a range of traditional criteria, but most of the analysis is devoted to proportional representation, minority representation, and splitting political subdivisions. This analysis shows this plan is more proportional than the enacted plan, affords similar opportunity

[57] *2014 Generic Congressional Vote*, Real Clear Politics (last visited Mar. 28, 2022), https://www.realclearpolitics.com/epolls/other/generic_congressional_vote-2170.html.
[58] *See infra* Appendices 2-3.
[59] *League of Women Voters* 178 A. 3d at 819.
[60] Dave's Redistricting App, *supra* note 12.

to minority voters, but splits more cities. This plan also compared favorably to the governor's proportional plan.

I. This Plan Is More Proportional Than the Enacted Plan

Over the last decade, most Pennsylvania counties shifted right.[61] Since 2016, the partisanship of those counties has remained static with one major exception: Philadelphia, the most populous county, which swung four points to the right in 2020.[62] Therefore, it is best to assess partisan performance using PlanScore, which puts more weight on recent elections, than Dave's Redistricting App, which uses a composite of election results from 2016.

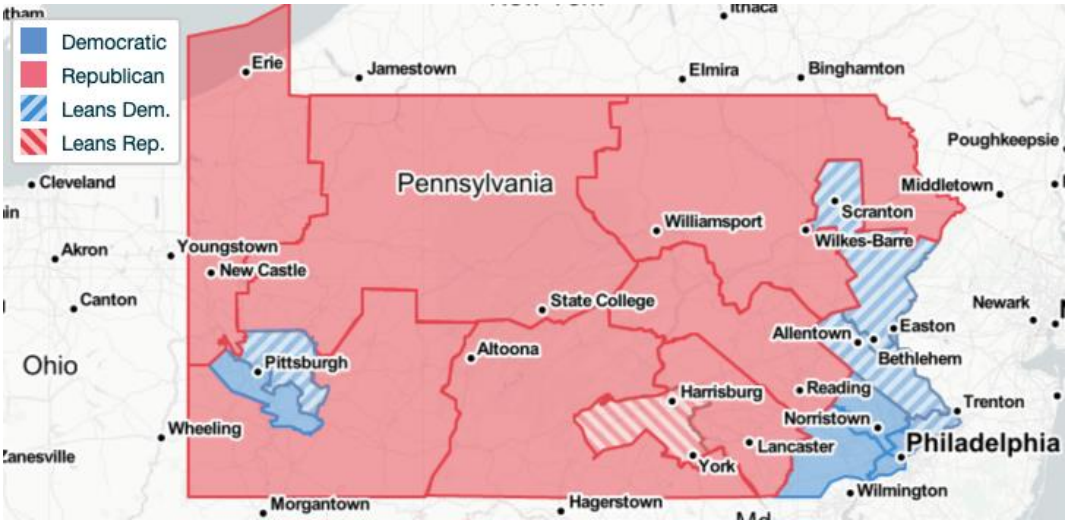

Figure 8: PlanScore Analysis of this Plan.[63]

Based on outcomes alone, this plan is more proportional than the enacted map. This plan ensures Democrats have an opportunity to win nine districts in an even election (see Figure 8). By comparison, Democrats are only expected to win eight districts under the enacted map (see

[61] *How Biden Flipped Pennsylvania and Won the Election*, N.Y. Times (last visited Mar. 28, 2022), https://www.nytimes.com/interactive/2020/11/07/us/elections/pennsylvania-counties-battleground-state.html.
[62] *Id.*
[63] *Pennsylvania Proportional Map*, PlanScore (last visited Mar. 28, 2022), https://planscore.campaignlegal.org/plan.html?20220324T063235.334637528Z.

Figure 9).[64] This is simply disproportional given that Pennsylvania Democrats won a majority of congressional districts in the last two election cycles as well as one presidential election.[65]

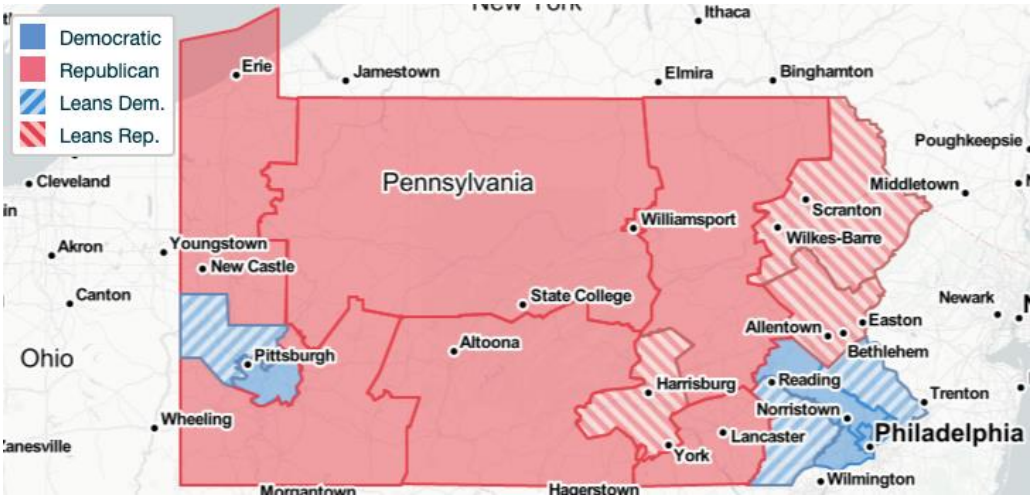

Figure 9: PlanScore Analysis of Enacted Map.[66]

Furthermore, my plan is more likely than the enacted plan to lead to proportional outcomes because it provides more robust margins for Democrats. For example, in Alleghany County, Democrats are expected to receive fifty-eight percent of the vote in one district and fifty-one percent in the other under the enacted plan.[67] My districts on the other hand award Democrats fifty-six and fifty-two percent of the vote share respectively.[68] The difference is small but coutns in situations like the 2016 Election, where the generic ballot only favored Republicans by 1.1 percent.[69] The difference in margins is also evident when comparing the first six districts of both plans. Whereas the probability of a Democratic win these districts never falls below sixty percent under my plan, the lowest probability of a win in the enacted map is fifty-seven percent.

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[64] Carter Petitioner's Map, PlanScore (last visited Mar. 28, 2022), https://planscore.campaignlegal.org/plan.html?20220322T180833.571834011Z.
[65] See e.g., N.Y. Times, *supra* note 4.
[66] PlanScore, *supra* note 64.
[67] *Id.*
[68] PlanScore, *supra* note 63.
[69] *2016 Generic Congressional Vote*, Real Clear Politics (last visited Mar. 28, 2022), https://www.realclearpolitics.com/epolls/other/2016_generic_congressional_vote-5279.html.

When compared to the governor's map, this map holds up well. Both favor Democrats to win nine districts, and they achieve equally robust results in Alleghany County where the predicted vote share in the least Democratic district is fifty-two percent.[70] The results are also similar across the first six districts in both plans where the vote share Democrats are expected to win in their least favorable district is fifty-one percent.[71] The key difference is the margin of victory in the seventh district that favors Democrats. My plan favors Democrats by mere thousands of votes while the governor's map ensures Democrats win at least fifty-one percent of the vote, which explains why my plan as a whole has a higher partisan bias (1.7 percent Republican).[72] Considering Democrats barely won a majority of votes across the state in the 2020 elections, it could be argued this plan is more reflective of the current Pennsylvania electorate.[73] However, if one looks only at the likelihood of Democrats winning nine districts, the governor's plan is more proportional because it ensures a more robust margin of victory. This result was expected. As mentioned in the introduction, I choose to make my plan as different as possible from the governor's which included trying to draw a seventh Democratic district in Scranton. All the same, this plan proves there is more than one way to achieve a proportional map.[74]

[70] PlanScore, *supra* note 10.
[71] *Id.*
[72] *Id.*
[73] N.Y. Times, *supra* note 4.
[74] PlanScore provides the best data to evaluate the competitiveness of individual districts but does not provide a single score like Dave's Redistricting App to compare the competitiveness of entire plans as a whole. For the same reason I use PlanScore data to evaluate performance, I am hesitant to use Dave's data to compare competitiveness between plans. However, outside of District Seven, this map is likely less competitive than the enacted map because often the more proportional a map, the less competitive it is.

II. This Plan and the Enacted Map Afford Similar Opportunity for Minorities

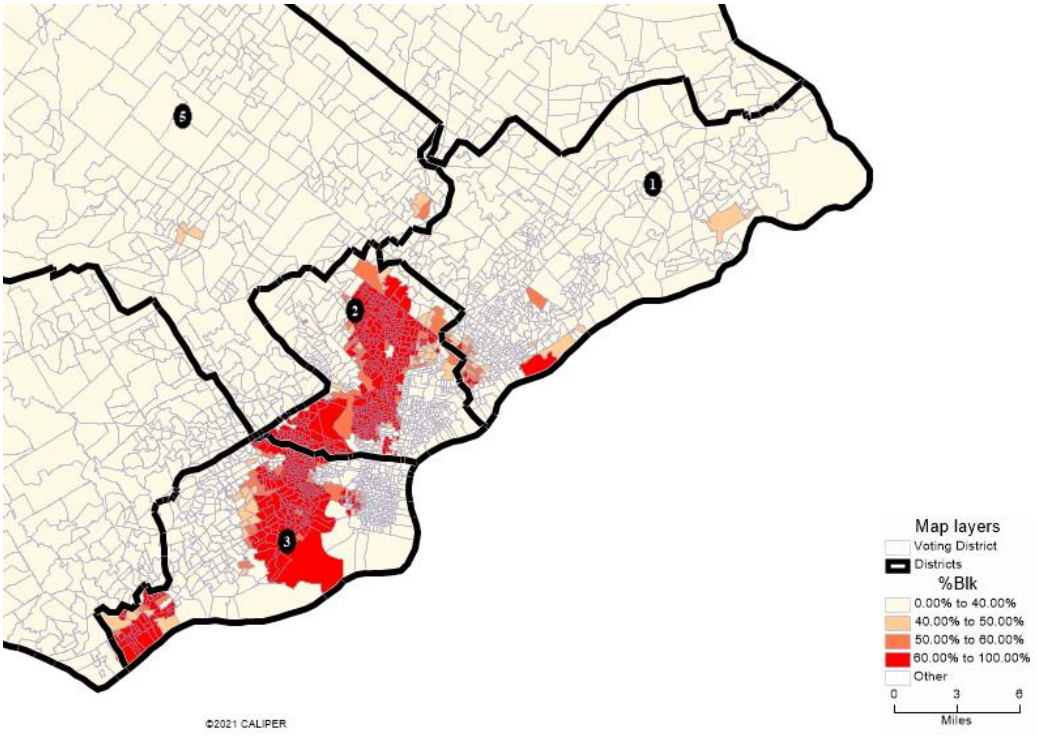

Figure 10: Concentration of African American Voters in Philadelphia County.

Looking broadly at Pennsylvania minorities, there should be four minority opportunity districts: one for Hispanic and Latino voters, two for African American voters, and one for Asian voters.[75] However as discussed in the legal compliance section, except for African American voters, minorities are dispersed so widely across the state that it is impossible to draw opportunity districts for them without inviting a *Shaw* challenge.

The best mapmakers can do is create a majority African American district and two plurality minority districts in Philadelphia County (see Figure 10). As a result, there is not much variance in the Dave's Redistricting App minority representation scores for this plan (forty-six), the enacted plan (forty-eight), and the governor's plan (thirty-eight).[76] The variation in the score

[75] Dave's Redistricting App, *supra* note 12.
[76] *Id.*

appears to be due to the margin of minority voters in the third plurality district. Like the enacted plan, this plan creates a third plurality district (District One) where minorities make up more than thirty-seven percent of the population.[77] By comparison, the governor's plan receives a lower score because it only creates two districts that are either majority or plurality minority. [78]

III. This Plan Splits Counties and Cities More Often than Other Plans

While the Pennsylvania Constitution disfavors splitting political subdivisions, there must be sixteen county splits to achieve equal population. The enacted plan splits counties seventeen times and splits twenty-three cities in the process. [79] However, it does not ensure proportional representation, so it does not need to split counties and cities as often as my plan.

The better comparison is between this plan and the governor's plan, which also achieves proportional representation. Like the governor's plan, this plan splits sixteen counties.[80] That said, this plan splits those counties twenty-five times as compared to the governor's nineteen.[81] The discrepancy in county splits suggests the governor found a more efficient way to achieve equal population than I did. Looking at the number of county splits alone, the governor's plan is the superior proportional representation map. Nonetheless, some additional splits are beneficial. For example, this plan splits Montgomery County three times to create a third plurality minority district (District 1).[82] While the governor achieved proportionality and only split Montgomery County twice, his plan lacks a third plurality minority district.[83]

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[77] *Id.*
[78] *Id.*
[79] *Id.*
[80] *Id.*
[81] *Id.*
[82] *See infra* Appendix 1.
[83] Dave's Redistricting App, *supra* note 12.

Similarly, this plan splits cities more often than the governor's. This plan splits thirty-eight cities and towns compared to the governor's twenty-two.[84] Some splits are unavoidable. Philadelphia for instance must be split because it has more people than can fit in one district.[85] Others are a product of my decision to differentiate this plan from the governor's. For example, both plans split Pittsburg, but this plan draws Lehigh and Northampton Counties in two separate districts and their shared border splits the city of Bethlehem.[86] However, I concede that on balance, the governor found a more efficient way to achieve proportional representation and equal population that splits fewer cities.

IV. This Plan is Less Compact than Other Plans

The Reock measure of this plan is .34.[87] This is less than the Reock for the governor's plan (.40) and the enacted plan (.41).[88] This plan's Reock is reduced by three outlier districts: District Six (.25), District Fifteen (.25) and District Seventeen (.29).[89] In comparison with the governor's plan and the enacted plan, I drew a longer district in Alleghany County because my original design closely followed the Ohio River, which reduced the district's Reock. Likewise, I stacked counties in a way that made District Six and District Seventeen long, reducing their Reock. That said, there are districts in this plan that are very compact. For example, District Two has a Reock of .56.[90] However, if this plan was judged solely by compactness, it would not be the optimum plan.

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[84] *Id.*
[85] *Id.*
[86] See *infra* Appendix 1.
[87] Dave's Redistricting App, *supra* note 12.
[88] See *infra* Appendix 1.
[89] *See infra* Appendix 1.
[90] *See infra* Appendix 1.

PLAN DESCRIPTION

This section describes the approach I took to creating my map and then challenges I faced with each district. My process began by looking up the population and partisanship of Pennsylvania counties and glancing at the governor's proposed map. I realized I needed three districts near Philadelphia and that given the racial and ethnic composition of the city, there would likely be at least one majority-minority district. I then outlined three districts in Philadelphia that all touched the New Jersey border and plotted the racial demographics of the city. After finalizing the majority-minority district (District Two), I moved the borders of District One and District Three away from central Philadelphia until they reached equal population. At this point, I incorporated partisan data and realized that some combination of Delaware, Chester, Montgomery, Bucks, and Lehigh County would yield three additional Democratic seats.

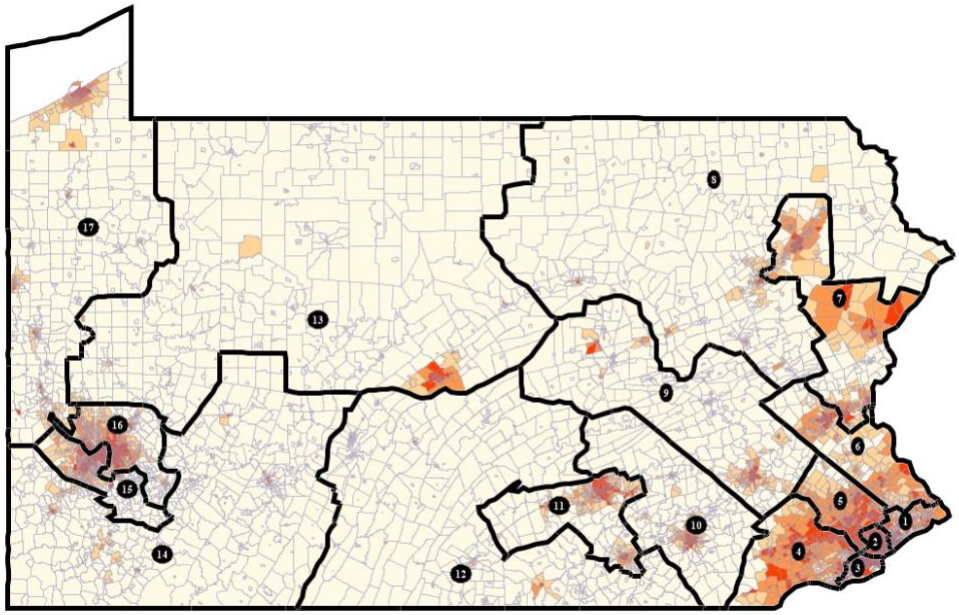

Figure 11: Concentration of Democratic Voters. Redder Areas More Concentrated.

After creating these districts, I realized the number of Democratic voters decreased the further North and West one moved from Philadelphia (see Figure 11). I also noticed Democratic

voters concentrate in urban areas. As a result, my strategy shifted and I created District Seven, District Nine, District Ten, and District Eleven by connecting counties with concentrated Democratic voters. Next, I split counties as needed to achieve equal population. This led to districts with relatively robust margins for and against Democrats. Once these districts were finished, I connected counties in rows from west to east until I reached Pittsburg. This led to the creation of District Eight, District Twelve, and District Thirteen.

When I got to Pittsburg, I decided to split the city to ensure robust margins for Democrats. I tried to connect Beaver, Alleghany, and Westmoreland County together and divide in a line that rough traces the path of the Ohio River. However, I had to deviate from this to ensure that District Fifteen and District Sixteen favored Democrats. The remaining counties were combined in districts above and below Alleghany County to create District Fourteen and District Seventeen.

With a rough draft of my plan complete, I entered my data into PlanScore and made further tweaks to ensure the districts performed as intended. This involved examining partisan data and selecting a different combination of cities to include in a district. For example, I spent a lot of time redrawing District Seven to ensure it supported a Democratic candidate and to avoid splitting cities in Luzerne County. Once I was satisfied with the vote margins across the plan, I did one last check to ensure the population of each district was as close to equal as I could make it.

The rest of this section describes the individual districts in this plan and compares them to the governor's 2022 proposal and the 2018 and 2022 enacted maps. I was able to find demographic and compactness data for the 2022 enacted map, but unfortunately, I only have compactness data for the 2018 enacted map and only demographic data for the governor's proposal.

1. East Philadelphia

As mentioned above, this district was created after District Two. My original intention was just to split Bucks County, but I realized I decided to split Montgomery County as well so that when I created District Six, I did not have to split more cities in Northampton County to achieve equal population. As a result of my decision to draw District Two below Broad Street, District One has a different western edge than the districts in other plans and extends further east.

This has a small effect on partisan outcomes. Rather than a ninety-nine percent likelihood of winning the district (labeled District Two in the governor's proposal and the enacted maps), Democrats have an eighty-seven percent chance.[91] It also is more compact than districts enacted in 2018 and 2022. This district's Reock is .41, while the enacted districts were .33 and .37 respectively.[92]

This difference produces a more noticeable impact on the district's racial composition. Moving the district further east incorporates more white voters. This is still the second plurality-minority district in Philadelphia, but it has a lower percentage of minority voters (37.02 percent) than the governor's proposed district (58.84 percent) and the 2022 enacted district (58.68 percent).[93] Essentially, this plan puts the lowest percentage plurality minority district east of Philadelphia instead of west as is done in the 2022 enacted map.

2. Central Philadelphia

This district was created to comply with the Voting Rights Act. My initial thought was just to include as much of the African American population as possible, but I was concerned this would be illegal packing, and would trigger scrutiny. Instead, I opted to just include enough African

[91] PlanScore *supra* note 10.
[92] *See infra* Appendices 1-3.
[93] *Id.*

American voters to produce a comfortable majority. The northern border mirrors that of other proposals which split Montgomery County to include the African American population just outside Philadelphia (compare to District Three in the governor's proposal and the enacted maps). However, the southern border of District Two does not stop at Broad Street and the Western Boarder does not extend further than Carroll Park. This is a major departure from the plans enacted in 2018 and 2022 as well as the governor's 2022 proposal.[94]

As a result of these differences, District Two's African American oting age population is 52.48 percent. This is better than the governor's proposed district, which has a BVAP of 51.45 percent, as well as the enacted map's BVAP of 50.98 percent.[95] In addition, the Hispanic voting age population is 15.55 percent, which exceeds the governor's 5.04 percent and the enacted map's 5.34 percent.[96]

These differences have no effect on partisan outcome – in all plans, Democrats are more than ninety-nine percent likely to win.[97] In terms of compactness, this district is better than the maps enacted in 2018 and 2022.[98] The Reock for this district is .56, compared with .4 and .43 respectively. [99] Overall, this is a better majority-minority district than the district in recently enacted maps and the governor's proposal.

3. West Philadelphia

As mentioned above, this district was created after I finalized District Two. My original theory was that this might be a second majority African American district. However, once I

[94] *Id.*
[95] *Id.*
[96] *Id.*
[97] PlanScore *supra* note 10.
[98] *See infra* Appendices 1-3.
[99] *Id.*

looked at the remaining population, it became clear that I could not create a second majority African American district. Instead, I decided to create a plurality-minority district and drew the district west along the southern border of Philadelphia and Delaware County (compare to District Five in the governor's proposal and the enacted maps).

This decision had no impact on partisan outcome – in all plans, Democrats are more than ninety-nine percent likely to win.[100] However, it did create a third plurality minority district, which does not exist in the governor's plan.[101] Minorities make up 53.23 percent of this district, which is lower than the 58.68 in the 2022 enacted plan's second-most minority populated district.[102] The Reock for this district is .4, which is commensurate with the Reock for the 2018 and 2022 enacted districts, which are .44 and .41 respectively.[103]

4. Chester and Delaware County

My initial plan for this district was just to take the remainder of Delaware County and draw the district up to the border with Montgomery County in the east and the border with Lancaster County in the west. Unfortunately, given how I drew the previous three districts it was not possible to include all of Chester County without going over equal population. By comparison, the enacted districts from 2018 and 2020 as well as the governor's proposal include none of Delaware County and instead split Berks County (compare to District Six in the governor's proposal and the enacted maps).[104]

This difference marginally increased the likelihood of a Democratic victory as well as the district's compactness. In this proposed district, Democrats are ninety-one percent likely to win

[100] PlanScore *supra* note 10.
[101] *See infra* Appendices 1-3.
[102] *Id.*
[103] *Id.*
[104] *Id.*

while in the governor's map and the 2020 enacted map, Democrats are only eighty-seven percent likely to win.[105] In addition, the Reock score for this district is .46 as compared to .45 in the maps enacted in 2018 and 2022. [106]

This biggest impact of this change is on the district's diversity. The minority voting population is only 19.88 percent while both the governor's proposal and the enacted map are above twenty-seven percent.[107] As a result, this district has roughly three percent fewer Hispanic voters and two percent fewer Asian voters.[108] The African American voting population is also almost one percent higher in this proposed district than it is in other maps.[109]

5. Montgomery County

Having split Montgomery County to create District One and District Two, my goal was to create this district without further splitting the county. This differs from the approach of the enacted maps in 2018 and 2022 as well as the governor's proposal, which all split neighboring Berks County to achieve equal population (compare to District Four in the governor's proposal and the enacted maps).

This change improves Democrat's chance of winning as well as the district's compactness. Under this plan, Democrats are ninety-eight percent likely to win this district as compared to ninety four percent in the governor's plan and the 2022 enacted map.[110] In terms of compactness, this district has a Reock of .47 as compared to .41 and .27 in the enacted 2018 and 2022 maps respectively.[111]

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[105] PlanScore *supra* note 10.
[106] *See infra* Appendices 1-3.
[107] *Id.*
[108] *Id.*
[109] *Id.*
[110] PlanScore *supra* note 10.
[111] *See infra* Appendices 1-3.

This change also has minimal impact on the district's diversity. Minority voters account for over twenty-four percent of this district and the governor's proposed district, better than the 21.43 percent under the enacted 2022 district.[112] Compared with the enacted map, this proposed district has roughly two percent more Asian voters, and roughly the same number of African American and Hispanic voters.[113]

6. Lehigh and Bucks County

Having already split Bucks County to create District One, I decided to extend the District Six north to either Lehigh or Northampton County. I included Lehigh County because it came closest to equal population, but I had to take part of Northampton County to be truly equal. As a result, I split the area northwest of Reigelsville to find the remaining 1,179 people needed.[114] This design differs from the enacted 2018 and 2022 maps and the governor's proposal, which do not include Lehigh or Northampton County but instead split Montgomery County to reach the ideal population of voters (compare with District One of the governor's plan and the enacted maps).[115]

This difference leads to a higher probability of a Democratic win. Under this plan, Democrats are sixty percent likely to win this district, better than the governor's fifty-nine percent and the 2022 enacted map's fifty-seven percent.[116] This boost is likely due to the inclusion of liberal areas like Allentown and the exclusion of more conservative voters in southern Bucks County.

Furthermore, this district has a higher minority population under this plan (23.18 percent) than in the governor's plan or the enacted 2022 plan, where minorities account for 17.15 percent

[112] *Id.*
[113] *Id.*
[114] *Id.*
[115] *Id.*
[116] PlanScore *supra* note 10.

of the voting population.[117] The bulk of this increase comes from Hispanic voters, which are more than fifteen percent of this district but are closer to five percent in both the governor's map and the 2022 enacted plan.[118]

As a result of the above increases the compactness declined precipitously. By choosing to draw the district vertically, the Reock fell to .25.[119] By comparison, the maps enacted in 2022 and 2018 have Reock scores of .4 and .43 respectively because they are wider for splitting Montgomery County.[120] In short, this district sacrifices compactness to boost the probability of a Democratic win and the district's diversity.

7. Lackawana, Monroe, and Northampton County

As a result of my decision to split Lehigh and Northampton County, this district differs the most from the districts included in the governor's plan as well as the maps enacted in 2022 and 2018 (compare to District Eight in the governor's proposal and the enacted maps). My original thought was to try to connect Lackawana, and Northampton County with the hopes that Democratic voters in cities would be enough to offset Republican votes in Monroe County. Unfortunately, they were not and so I was forced to split Luzerne County to get the district to perform for Democrats. This proved to be a greater challenge than anticipated because the cities along Luzerne County were too populous to take without splitting and many were less Democratic than originally expected. As a result, I decided to split Pike County as well to get ensure the district performed for Democrats.

[117] *See infra* Appendices 1-3.
[118] *Id.*
[119] *Id.*
[120] *Id.*

The most important of the design choices of this district is on partisan performance. Under this plan, Democrats are fifty two percent likely to win this district.[121] By comparison Democrats are only nineteen percent likely to win this district in the governor's plan and thirty-two percent likely under the enacted 2022 map.[122] At first impression, this suggests a major improvement in Democratic chances. However, since this is the last district Democrats are likely to win in east Pennsylvania, it must be compared against a similar district in other plans. Democrats are only expected to win only eight districts in the enacted 2022 map, but they are expected to win a ninth district under the governor's plan (the governor's District Seven).[123] Under the governor's plan, Democrats are fifty-four percent likely to win this district.[124] As discussed in the evaluation section, it could be argued that this plan is more in line with the current preferences of the Pennsylvania electorate by giving Democrats a lower chance to win a ninth district. However, looking at performance only, the governor's plan is more likely to deliver a proportional result.

This district is also more diverse than the district in the governor's plan and the 2022 enacted map. Minorities account for only 22.89 percent of the district's voters, as compared with 19.53 percent in the governor's plan (compared once again with his District Eight) and 21.82 percent in the enacted map.[125] Hispanic, African American, and Asian voters are roughly one percent higher in this district than in the enacted 2022 map because this district does not include less diverse areas further east. [126]

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[121] PlanScore *supra* note 10.
[122] *Id.*
[123] *Id.*
[124] *Id.*
[125] *See infra* Appendices 1-3.
[126] *Id.*

This district is also less compact than the maps enacted in 2018 and 2022. The Reock score for this district is .32 as compared with .47 for the 2022 map and .49 for the 2018 map.[127] Reock is lower because this map includes a narrow isthmus into Luzerne County and does not combine counties northeast of Monroe County.

8. Northeast Pennsylvania

This district was created after I finished District Seven and District Nine. Therefore, my goal was to group all remaining counties east of District Seven and stretch the district as far west as I could. As mentioned in the legal compliance section, I also finalized this district after I finalized District Thirteen which already had equal population. Rather than rework District Seven and threaten to undo the work I did to achieve an advantage for Democrats, I decided to keep the surplus voters in this district. This district differs sharply from the enacted district and the district proposed by the governor, which are both vertical and do not take counties east of Monroe. Therefore, it is better to explain why the district performs the way it does rather than compare it to districts in other plans.

Democrats have less than a one percent chance to win this district because it does not include more liberal cities like Scranton.[128] Indeed, the cities excluded from this isthmus in Luzerne County voted for Democrats by less than fifty percent in the 2020 election (see Figure 11). Similarly, minorities only account for 13.31 percent of voters in this district because more diverse cities are instead in District Seven.[129] Finally, the district's Reock score is .44, which is low due to my decision to merge areas east and west of District Seven into one district.[130]

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[127] *Id.*
[128] PlanScore *supra* note 10.
[129] *See infra* Appendices 1-3.
[130] *Id.*

9. Central Eastern Pennsylvania

After creating District Seven, I employed the same strategy of trying to combine counties with dense liberal populations in hopes of creating a competitive district. My original hope was that the population of Reading and Lewisberg would make the district competitive. Using this strategy did not create a competitive District Nine, but it did create a district with only eleven people over the ideal district population without splitting any counties. As discussed in the legal compliance section, I chose to keep this deviation because achieving exactly equal population would have required splitting Berks County four times and the Pennsylvania Constitution disfavors county splits. The most similar district in the enacted maps and the governor's proposal cover the same southern region but go much further north because those districts do not include more populous Berks County (compare to District Nine in both the governor's proposal and the enacted maps).

The biggest effect of including Berks County is to boost the diversity of the district. Minorities account for 19.91 percent of voters in this district but are only barely over ten percent in the district in both the enacted 2022 map and the governor's proposal.[131] The biggest jump is among Hispanic voters, who make up 19.91 percent of this district as compared to roughly four and a half percent in the other maps.[132]

The changes I made to this district also have a minor effect on partisan outcome and compactness. Democrats are two percent likely to win this district as compared to less than one percent in both the governor's proposal and the enacted 2022 map.[133] In addition, the district has

[131] *Id.*
[132] *Id.*
[133] PlanScore *supra* note 10.

a Reock score of .37, which is much less compact than the 2018 enacted map's .55 but is on par with the 2022 enacted map's .41.[134]

10. Greater Dauphin, Lancaster, and Lebanon County

Like District Nine, my approach for District Eleven was to connect liberal areas in hopes of creating a competitive district. This created a problem because I needed to keep Lancaster in District Ten to achieve equal population. My hope was that there would enough Democratic votes in the city to make the district competitive, but it was not to be. The big difference between this district and the district in other proposals is which county is split to achieve equal population. Like the governor's plan, this plan splits Dauphin County and minimizes splits in York County. However, this district stops outside the Harrisburg suburbs while the governor's district includes Harrisburg. By contrast, the enacted map does not split Dauphin County (compare my plans' district with District Eleven in the governor's proposal and the enacted maps).

Despite the similarities in shape, this district's partisan performance and racial composition matches the one in the 2022 enacted map instead of the one in the governor's proposal. While the governor's proposal gives Democrats a twenty-two percent chance to win this district, both my plan and the enacted 2022 map give Democrats a one percent chance to win.[135] In addition, minority voters account for almost twenty-five percent of the governor's district, while both my plan and the enacted map include fewer than seventeen percent minority voters.[136] The effects on partisan performance and minority representation are entirely due to the decision not to include liberal diverse cities like Harrisburg.

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[134] *See infra* Appendices 1-3.
[135] PlanScore *supra* note 10.
[136] *See infra* Appendices 1-3.

Partisanship and race are where the similarities end. This district is less compact than the one enacted in 2018 and 2022. This district's Reock score is .39 as compared to .45 in both the 2018 and 2022 enacted district.[137] The score is lower because I split Dauphin County instead of York County, creating a taller district.

11. Greater Harrisburg and York Area

This district mirrors the shape of the district in the 2022 map (compare to District Ten under the governor's plan and the enacted maps). Like in District Nine, my strategy was to try to connect liberal areas to create competitive districts. Unlike in District Nine, this time it worked! Here, Democrats have a one in three chance to win the district.[138] This is far superior to the twenty-nine percent chance Democrats have to win in the enacted map and the two percent chance Democrats have to win under the governor's proposal.[139] This district is also the most competitive relative to all similar districts in the enacted plan and the governor's proposal.[140] The takeaway is that to create the most competitive district in this region, map makers should combine Harrisburg and York but trim area within Dauphin and York County.

Aside from partisanship, the differences between this district and the enacted district are negligible. Minority voters make up more than twenty-five percent of this district and the enacted district, much better than the governor's district, where minorities are only 16.54 percent of voters.[141] This district is also less compact than the ones enacted in 2018 and 2022 because the

[137] *Id.*
[138] PlanScore *supra* note 10.
[139] *Id.*
[140] *Id.*
[141] *See infra* Appendices 1-3.

isthmus I drew to York is narrower. As a result, this district's Reock is .36 as compared to .49 in 2018 and 2022.[142]

12. South Central Pennsylvania

This district was created after I finished District Nine, District Ten, and District Eleven. Satisfied with those districts, I decided to draw a district with remaining Dauphin and York County and extend it as far west as I could.

This mirrors the approach taken in the 2022 enacted plan and the governor's proposal, and as a result, this district is very similar across all plans (compare to District Twelve in the governor's proposal and District Thirteen in the enacted maps). Democrats are less than one percent likely to win this district, and minorities account for roughly eight percent of the district's voters.[143] The district's .39 Reock score compares favorably to the 2022 enacted district's .4, which is itself a drop from the 2018 enacted district's .56.[144]

13. North Central Pennsylvania

This district was created after I had made a rough draft of District Eight and after I finished District Twelve. I decided to connect counties in a rectangle from the edge of those districts until I hit Alleghany County. I then reduced the counties and then split Butler County to achieve exactly equal population.

This mirrors the approach taken in the 2022 enacted plan and the governor's proposal, and as a result, this district is similar across all plans (compare to District Fourteen in the governor's proposal and District Fifteen in the enacted map). Democrats are less than one percent likely to

[142] *Id.*
[143] PlanScore *supra* note 10; *see infra* Appendices 1-3.
[144] *See infra* Appendices 1-3.

win this district, and minorities account for nine percent of the voters.[145] The only major difference is that this plan's proposed district is less compact. The Reock score is .44 as compared to the 2022 enacted district's .57 and the 2018 enacted district's .67. [146] This difference is because my isthmus connecting to Alleghany County is narrower than in other plans.

14. Southwest Pennsylvania

I created this district after finalizing the Alleghany County districts. My goal was to draw a district absorbing all voters under District Thirteen and under the intersection of Alleghany and Beaver counties.

This mirrors the approach taken in the 2022 enacted plan and the governor's proposal, and as a result, this district is similar across all plans (compare to District Thirteen of the governor's proposal and District Fourteen of the enacted map). Democrats are less than one percent likely to win this district, and minorities account for roughly eight percent of voters.[147] The only difference is compactness. My district has a Reock score of .41, while the enacted districts in 2018 and 2022 have scores of .54 and .47 respectively.[148] This reflects the differences in the districts' isthmus above Alleghany County.

15. South Alleghany County

This district was finalized after I created District Sixteen. The original plan for this district was to include Pittsburg but otherwise stay south of the Ohio River and maintain that line into Westmoreland County. However, as described in the discussion of District Sixteen, this idea was abandoned to ensure District Sixteen performs for Democrats. As a result, it includes all of

[145] PlanScore *supra* note 10; *see infra* Appendices 1-3.
[146] *See infra* Appendices 1-3.
[147] PlanScore *supra* note 10; *see infra* Appendices 1-3.
[148] *See infra* Appendices 1-3.

Pittsburg south of the Alleghany River and excludes Homewood North and South, East Hills, and everything east of Lemington Avenue.

As I describe more fully in my discussion of District Sixteen, this plan differs from the governor's plan and the enacted 2022 district, both of which split Alleghany County into west and east.[149] Furthermore, the governor's plan splits Pittsburg where the Ohio and Allegany River meet while the enacted district does not split Pittsburg at all. Since the districts are so different in design, the rest of this analysis compares this district with the Allegany district Democrats are most likely to win across all plans (compare to District Fourteen in the governor's proposal and District Twelve in the enacted map).

Viewed in isolation, this district is strictly worse than the district proposed by the governor and the district enacted in 2022. Democrats are ninety-two percent likely to win this district, one percentage fewer than under the governor's district and two percent fewer than the enacted district.[150] Minorities make up roughly twenty percent of the voters in this district but are roughly twenty-four percent of the governor's district and the enacted district.[151] The biggest failing is the decrease in compactness. The Reock score for this district is .25, as compared with .63 for the 2022 enacted district and .46 for the 2018 enacted district.[152] This is a product of my original plan to try to follow the line of the Ohio River as closely as possible.

This district's deficiencies beg the question why keep it at all? As I explain in my discussion of District Sixteen, the deficiencies of this district are necessary to give Democrats a better chance that two districts will perform for them in Alleghany County.

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[149] *See infra* Appendices 1-3.
[150] PlanScore *supra* note 10.
[151] *See infra* Appendices 1-3.
[152] *Id.*

16. North Alleghany County

This is the first district I worked on in Alleghany County. When I started, I knew I had to have two districts perform for Democrats to achieve proportional representation. I originally tried to create this district by only splitting Alleghany and Westmoreland County along a line that roughly follows the Ohio River but put Pittsburg in District Fifteen. However, I could not get this district to perform. My first solution was to take area to the east of Pittsburg. I took as much as I could but hit a point where I ran out of voting districts that voted for Democrats. I then decided to take Aliquippa and Ambridge in Beaver County. This created a majority Democratic district but did not create enough of a margin that I could be comfortable it would perform. Therefore, I split Pittsburg by taking everything north of the Allegheny River as well as Homewood North and South, East Hills, and everything east of Lemington Avenue.

This design is quite different from the governor's proposed district and the enacted 2022 district. The governor's plan split Alleghany County by west and east and paired the western portion with Beaver County.[153] His plan splits Pittsburg as well but does so where the Alleghany River splits from the Ohio River.[154] The enacted plan also divides Alleghany County by west and east but does not split Pittsburg.[155] Since the districts are so different in design, the rest of this analysis compares this district with the Allegany district Democrats are least likely to win across all plans (compare to District Sixteen in the governor's proposal and District Seventeen in the enacted maps).

[153] *Id.*
[154] *Id.*
[155] *Id.*

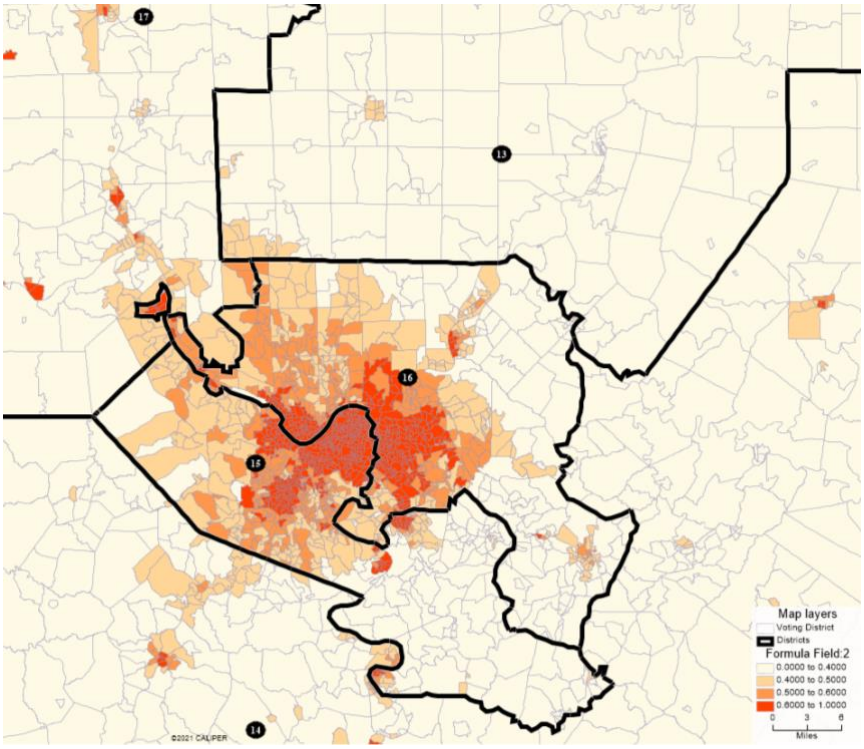

Figure 12: Heat Map of Democratic Voters in Alleghany County. The Legend Formula is Percentage Democratic Votes in 2020.

The most important benefit of this design is that it gives Democrats the highest probability to win this district. Democrats are sixty-seven percent likely to win this district but are only sixty-three percent likely to win the governor's proposed district and just sixty-one percent likely to win the enacted district.[156] This improvement is a function of splitting Pittsburg in an area where Democratic votes are highly concentrated rather than at the intersection of the Ohio and Allegany rivers (see the vertical slice in the red patch in Figure 12).

This change also improved the district's diversity. Minority voters are 19.49 percent of the district as compared to 16.44 percent in the governor's proposed district and 15.76 percent in the enacted district.[157] By far the biggest increase is among African Americans, who make up 13.15 percent of this district but only 8.33 percent of the enacted district.[158]

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[156] PlanScore *supra* note 10.
[157] *See infra* Appendices 1-3.
[158] *Id.*

The downside of this district is that it is far less compact than the district enacted in 2018 and 2022. This district has a .35 Reock while the 2018 and 2022 enacted district has a score of .51.[159] The loss in compactness is due a fundamental difference in design. By following the Ohio River to start, I guaranteed the district would be long and narrow.

17. Northwest Pennsylvania

After finishing the Alleghany County districts, I combined all remaining counties north of District Sixteen into one district. This mirrors the approach taken in the 2022 enacted plan and the governor's proposal, and as a result, this district is similar across all plans (compare with District Fifteen in the governor's plan and District Sixteen in the enacted maps). Democrats are less than three percent likely to win this district, and minorities account for roughly eleven percent of the voters.[160] This district is marginally less compact. The Reock score is .29 as compared to the 2022 enacted district's .36 and the 2018 enacted district's .32.[161] This difference is because my district does not include Butler County and is therefore narrower.

CONCLUSION

Pennsylvania is a battleground state and will likely remain so over the next decade. It is therefore a shame the map adopted by the Pennsylvania Supreme Court will not lead to proportional representation when there is no advantage in the generic ballot. In the context of the Court's decision, this plan is yet another that shows it is possible to achieve proportional representation without violating the law. I am particularly pleased this plan differs is major ways from governor's (see e.g., District Seven) yet still yields proportional representation in an even election. It remains to be seen how the enacted map will perform in 2022, but should further

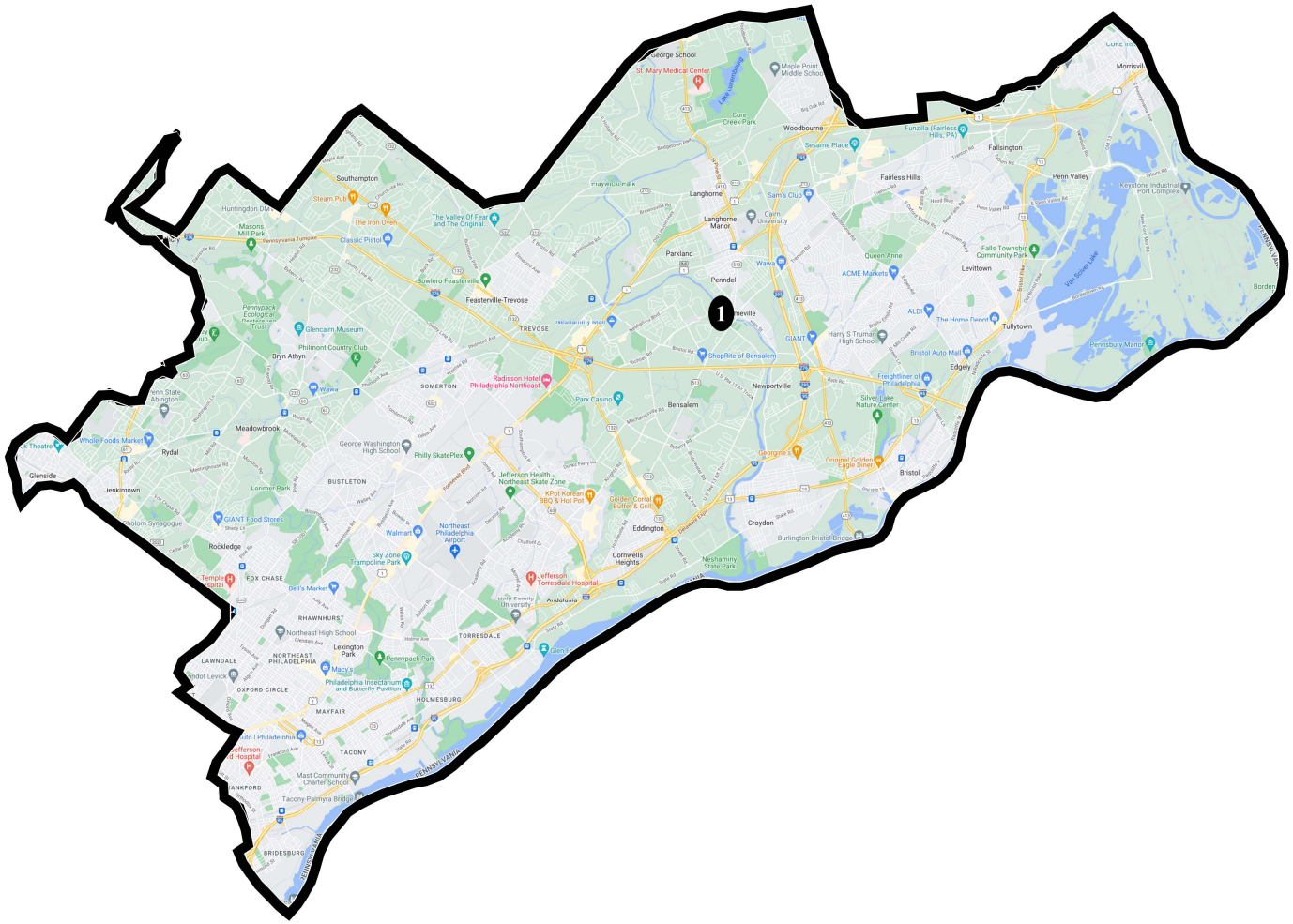
[159] *Id.*
[160] PlanScore *supra* note 10; *see infra* Appendices 1-3.
[161] *See infra* Appendices 1-3.

litigation over Pennsylvania's congressional districts arise, I hope litigants will gain knowledge from the tradeoffs I made here to achieve proportional representation.

APPENDIX 1

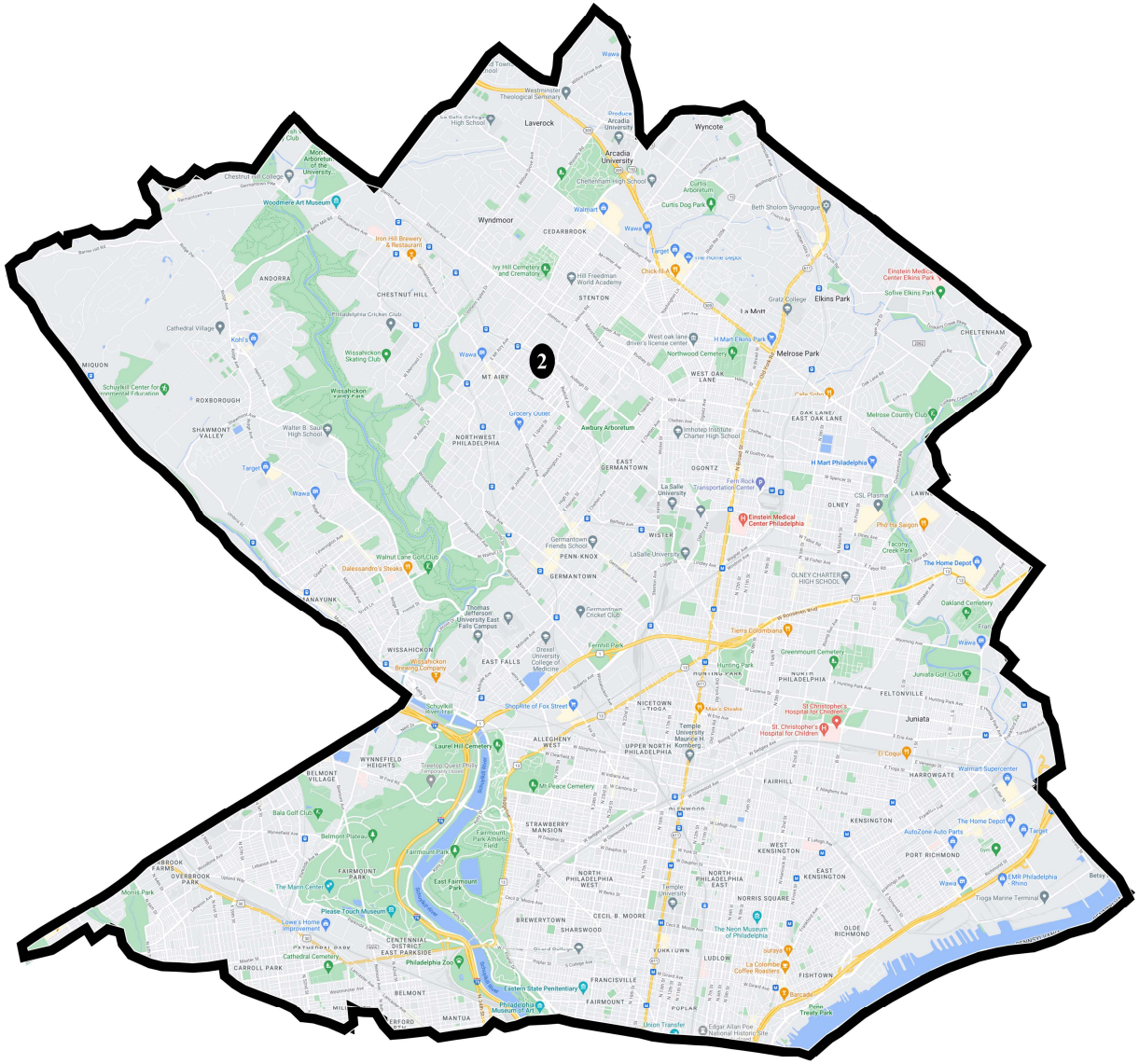
Description: Below is the map book I generated from Maptitude. It contains images of each district as well as statistics on diversity and compactness.

District: 1



Field	Value
District	1
Population	764866
Deviation	1
% Deviation	0%
Alternate Schwartzberg	1.77
Polsby Popper	0.32
Perimeter	84.45
Reock	0.41
NH_Wht	452524
% NH_Wht	59.16%
AP_Blk	127055
% AP_Blk	16.61%
AP_Ind	10137
% AP_Ind	1.33%
AP_Asn	77597
% AP_Asn	10.15%
AP_Hwn	1165
% AP_Hwn	0.15%
AP_Oth	90949
% AP_Oth	11.89%
Hispanic Origin	101102
% Hispanic Origin	13.22%
18+_Pop	596750
NH18+_Wht	375812
% NH18+_Wht	62.98%
18+_AP_Blk	88680
% 18+_AP_Blk	14.86%
18+_AP_Ind	7442
% 18+_AP_Ind	1.25%
18+_AP_Asn	57722
% 18+_AP_Asn	9.67%
18+_AP_Hwn	851
% 18+_AP_Hwn	0.14%
18+_AP_Oth	63046
% 18+_AP_Oth	10.56%
H18+_Pop	67680
% H18+_Pop	11.34%
D 20_Pres	207294.58
% D 20_Pres	56.96%

District: 2

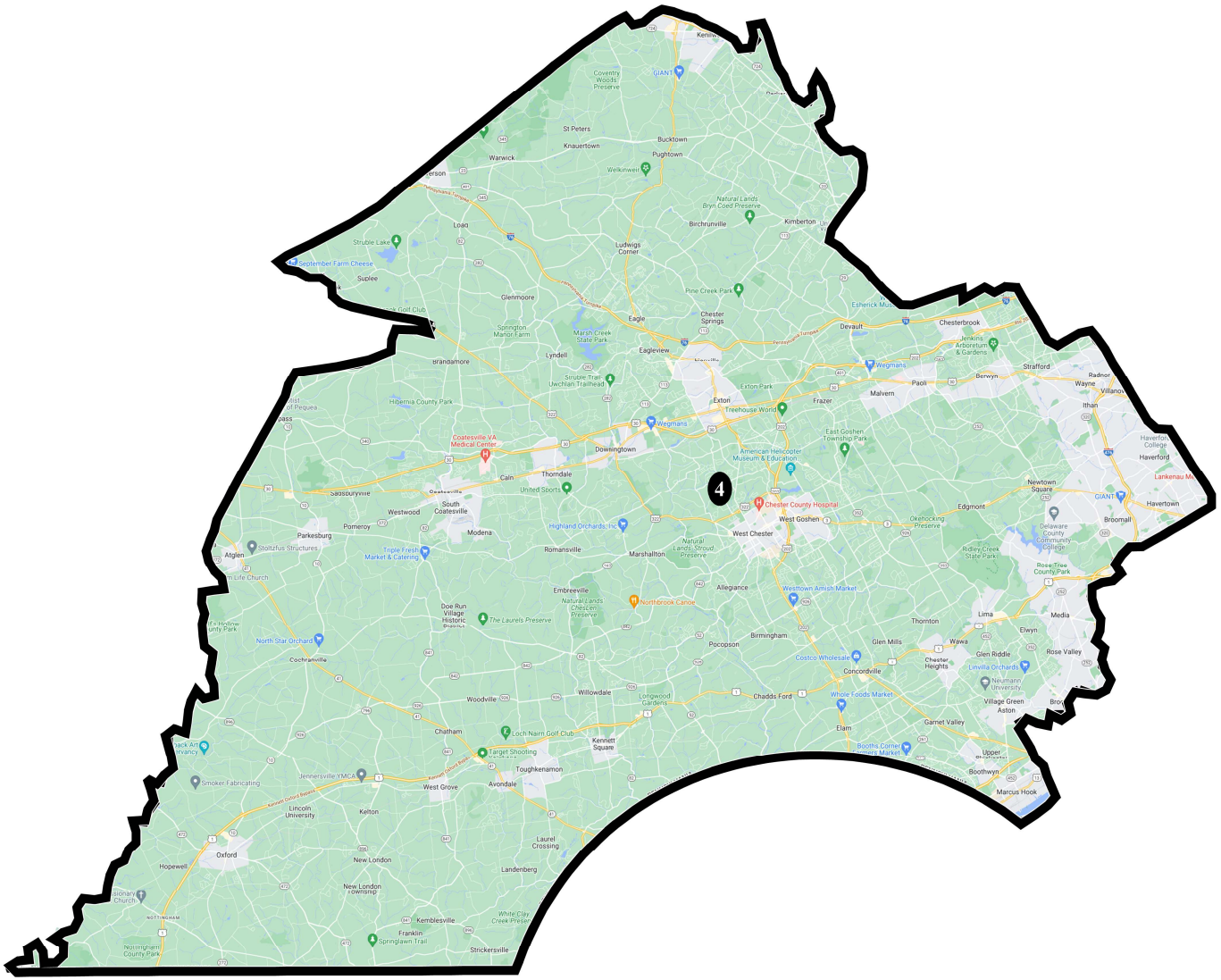


Field	Value
District	2
Population	764863
Deviation	-2
% Deviation	-0%
Alternate Schwartzberg	1.59
Polsby Popper	0.4
Perimeter	48.33
Reock	0.56
NH_Wht	187744
% NH_Wht	24.55%
AP_Blk	416233
% AP_Blk	54.42%
AP_Ind	12348
% AP_Ind	1.61%
AP_Asn	39524
% AP_Asn	5.17%
AP_Hwn	1714
% AP_Hwn	0.22%
AP_Oth	109188
% AP_Oth	14.28%
Hispanic Origin	132820
% Hispanic Origin	17.37%
18+_Pop	605795
NH18+_Wht	166234
% NH18+_Wht	27.44%
18+_AP_Blk	317920
% 18+_AP_Blk	52.48%
18+_AP_Ind	9349
% 18+_AP_Ind	1.54%
18+_AP_Asn	32533
% 18+_AP_Asn	5.37%
18+_AP_Hwn	1306
% 18+_AP_Hwn	0.22%
18+_AP_Oth	79066
% 18+_AP_Oth	13.05%
H18+_Pop	94179
% H18+_Pop	15.55%
D 20_Pres	330562.46
% D 20_Pres	89.06%

District: 3

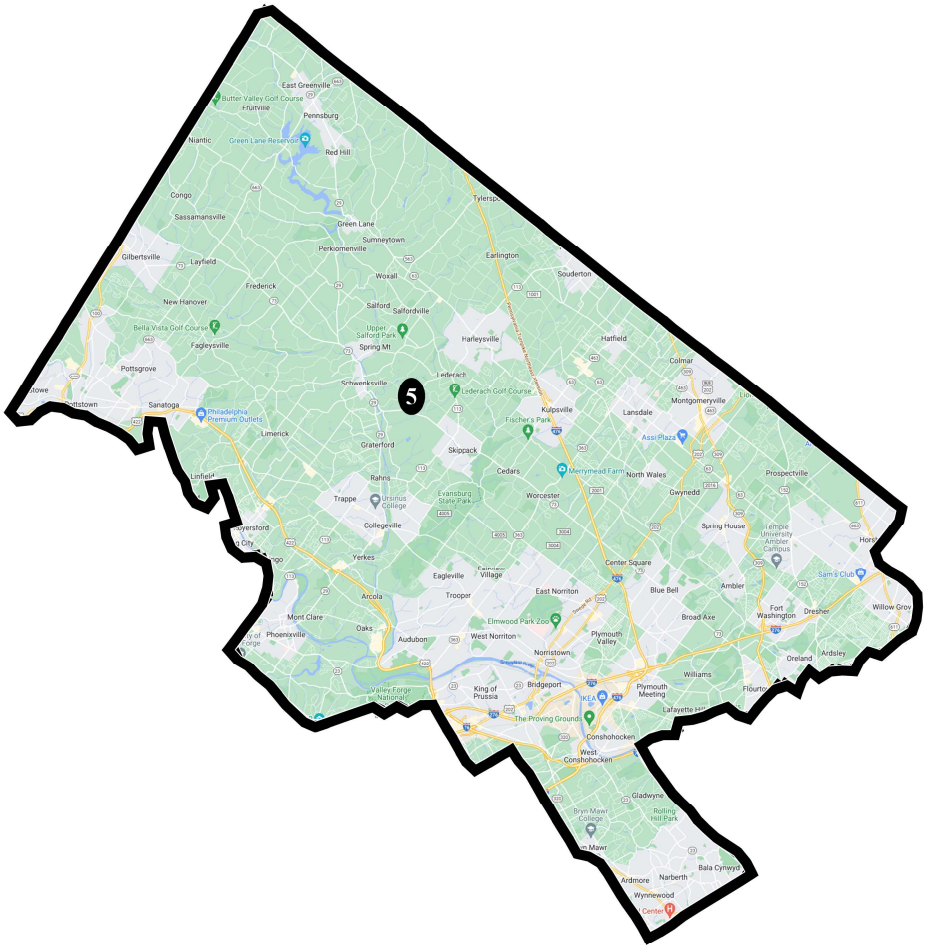
Field	Value
District	3
Population	764865
Deviation	0
% Deviation	0%
Alternate Schwartzberg	1.6
Polsby Popper	0.39
Perimeter	53.99
Reock	0.4
NH_Wht	330155
% NH_Wht	43.17%
AP_Blk	300431
% AP_Blk	39.28%
AP_Ind	10446
% AP_Ind	1.37%
AP_Asn	82043
% AP_Asn	10.73%
AP_Hwn	1090
% AP_Hwn	0.14%
AP_Oth	44945
% AP_Oth	5.88%
Hispanic Origin	50755
% Hispanic Origin	6.64%
18+_Pop	617434
NH18+_Wht	288785
% NH18+_Wht	46.77%
18+_AP_Blk	223093
% 18+_AP_Blk	36.13%
18+_AP_Ind	7778
% 18+_AP_Ind	1.26%
18+_AP_Asn	66392
% 18+_AP_Asn	10.75%
18+_AP_Hwn	821
% 18+_AP_Hwn	0.13%
18+_AP_Oth	32808
% 18+_AP_Oth	5.31%
H18+_Pop	36182
% H18+_Pop	5.86%
D 20_Pres	302081.32
% D 20_Pres	78.33%

District: 4



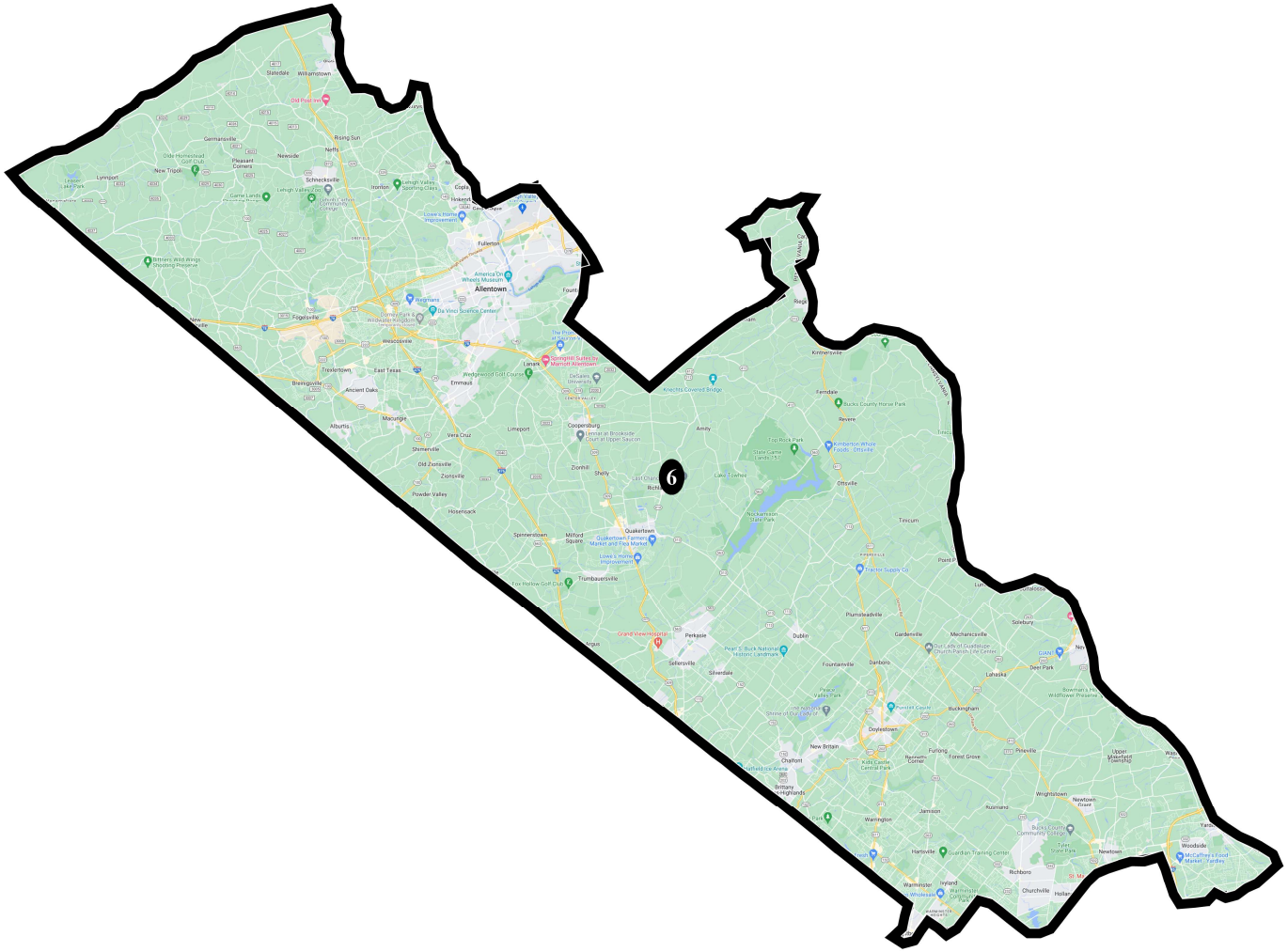
Field	Value
District	4
Population	764863
Deviation	-2
% Deviation	-0%
Alternate Schwartzberg	1.74
Polsby Popper	0.33
Perimeter	182.09
Reock	0.46
NH_Wht	593714
% NH_Wht	77.62%
AP_Blk	50949
% AP_Blk	6.66%
AP_Ind	8717
% AP_Ind	1.14%
AP_Asn	59917
% AP_Asn	7.83%
AP_Hwn	762
% AP_Hwn	0.1%
AP_Oth	46802
% AP_Oth	6.12%
Hispanic Origin	49144
% Hispanic Origin	6.43%
18+_Pop	596123
NH18+_Wht	477635
% NH18+_Wht	80.12%
18+_AP_Blk	36653
% 18+_AP_Blk	6.15%
18+_AP_Ind	6102
% 18+_AP_Ind	1.02%
18+_AP_Asn	40900
% 18+_AP_Asn	6.86%
18+_AP_Hwn	498
% 18+_AP_Hwn	0.08%
18+_AP_Oth	31660
% 18+_AP_Oth	5.31%
H18+_Pop	32338
% H18+_Pop	5.42%
D 20_Pres	268065.01
% D 20_Pres	57.95%

District: 5



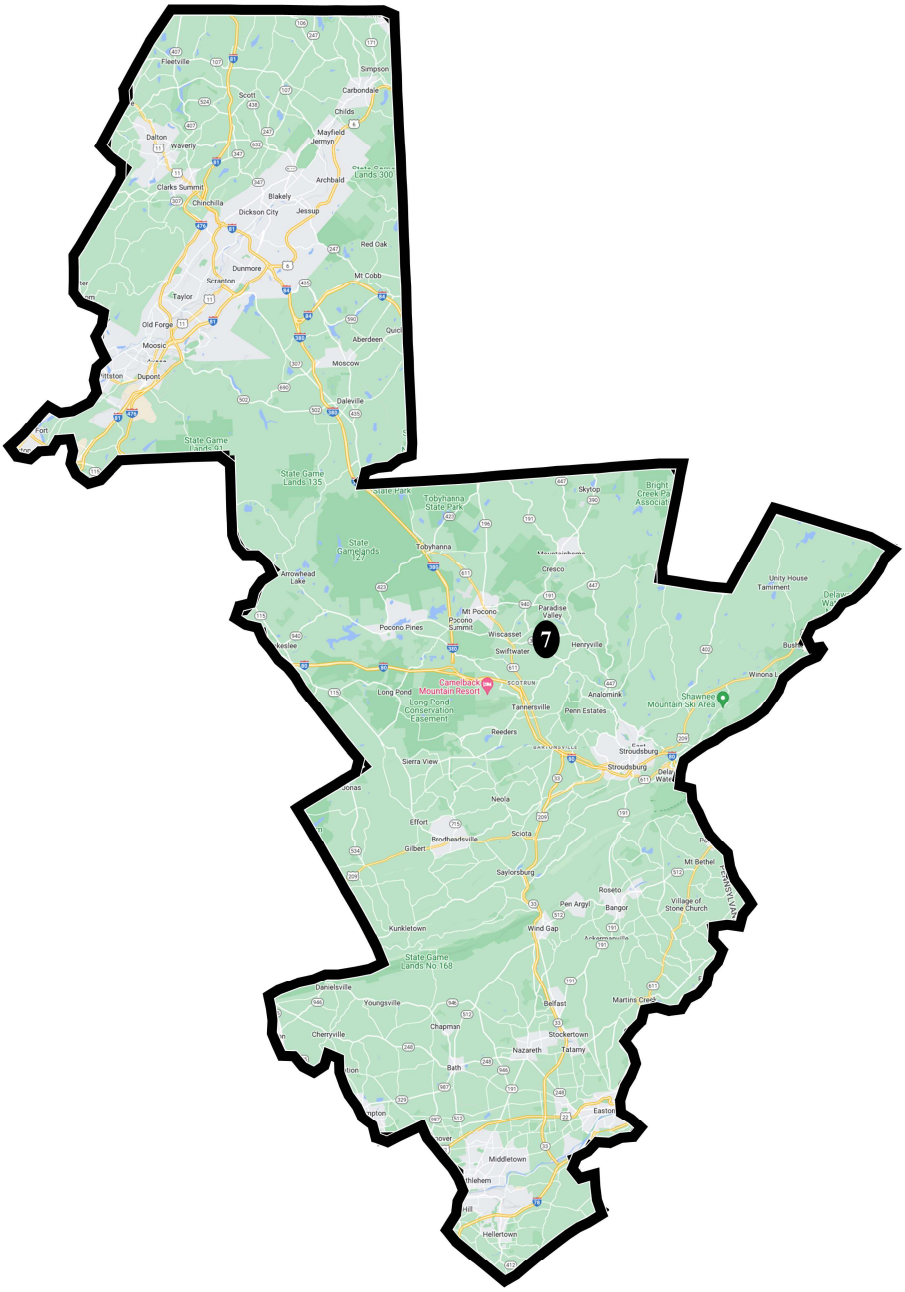
Field	Value
District	5
Population	764864
Deviation	-1
% Deviation	-0%
Alternate Schwartzberg	1.6
Polsby Popper	0.39
Perimeter	121.67
Reock	0.47
NH_Wht	558581
% NH_Wht	73.03%
AP_Blk	76461
% AP_Blk	10%
AP_Ind	9461
% AP_Ind	1.24%
AP_Asn	69989
% AP_Asn	9.15%
AP_Hwn	857
% AP_Hwn	0.11%
AP_Oth	47864
% AP_Oth	6.26%
Hispanic Origin	50797
% Hispanic Origin	6.64%
18+_Pop	601075
NH18+_Wht	454958
% NH18+_Wht	75.69%
18+_AP_Blk	54271
% 18+_AP_Blk	9.03%
18+_AP_Ind	6688
% 18+_AP_Ind	1.11%
18+_AP_Asn	51232
% 18+_AP_Asn	8.52%
18+_AP_Hwn	611
% 18+_AP_Hwn	0.1%
18+_AP_Oth	32217
% 18+_AP_Oth	5.36%
H18+_Pop	33108
% H18+_Pop	5.51%
D 20_Pres	277552.90
% D 20_Pres	61.5%
R 20_Pres	169035.19
% R 20_Pres	37.45%
O 20_Pres	4742.23
% O 20_Pres	1.05%
20_Pres	451330.32

District: 6



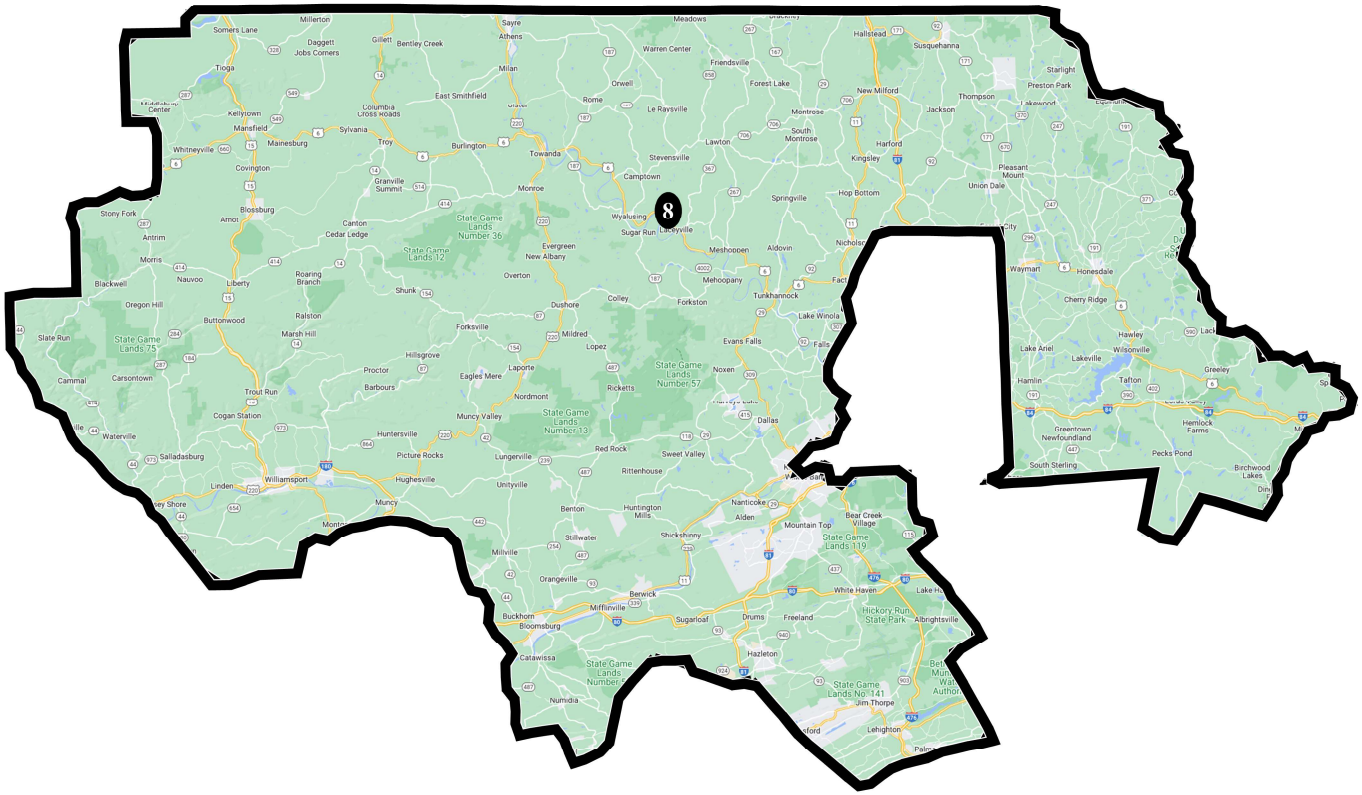
Field	Value
District	6
Population	764864
Deviation	-1
% Deviation	-0%
Alternate Schwartzberg	1.85
Polsby Popper	0.29
Perimeter	193.72
Reock	0.25
NH_Wht	561472
% NH_Wht	73.41%
AP_Blk	48030
% AP_Blk	6.28%
AP_Ind	9881
% AP_Ind	1.29%
AP_Asn	38788
% AP_Asn	5.07%
AP_Hwn	928
% AP_Hwn	0.12%
AP_Oth	95342
% AP_Oth	12.47%
Hispanic Origin	115074
% Hispanic Origin	15.05%
18+_Pop	602636
NH18+_Wht	462967
% NH18+_Wht	76.82%
18+_AP_Blk	32260
% 18+_AP_Blk	5.35%
18+_AP_Ind	7032
% 18+_AP_Ind	1.17%
18+_AP_Asn	27367
% 18+_AP_Asn	4.54%
18+_AP_Hwn	656
% 18+_AP_Hwn	0.11%
18+_AP_Oth	66058
% 18+_AP_Oth	10.96%
H18+_Pop	77006
% H18+_Pop	12.78%
D 20_Pres	229961.04
% D 20_Pres	52.22%

District: 7



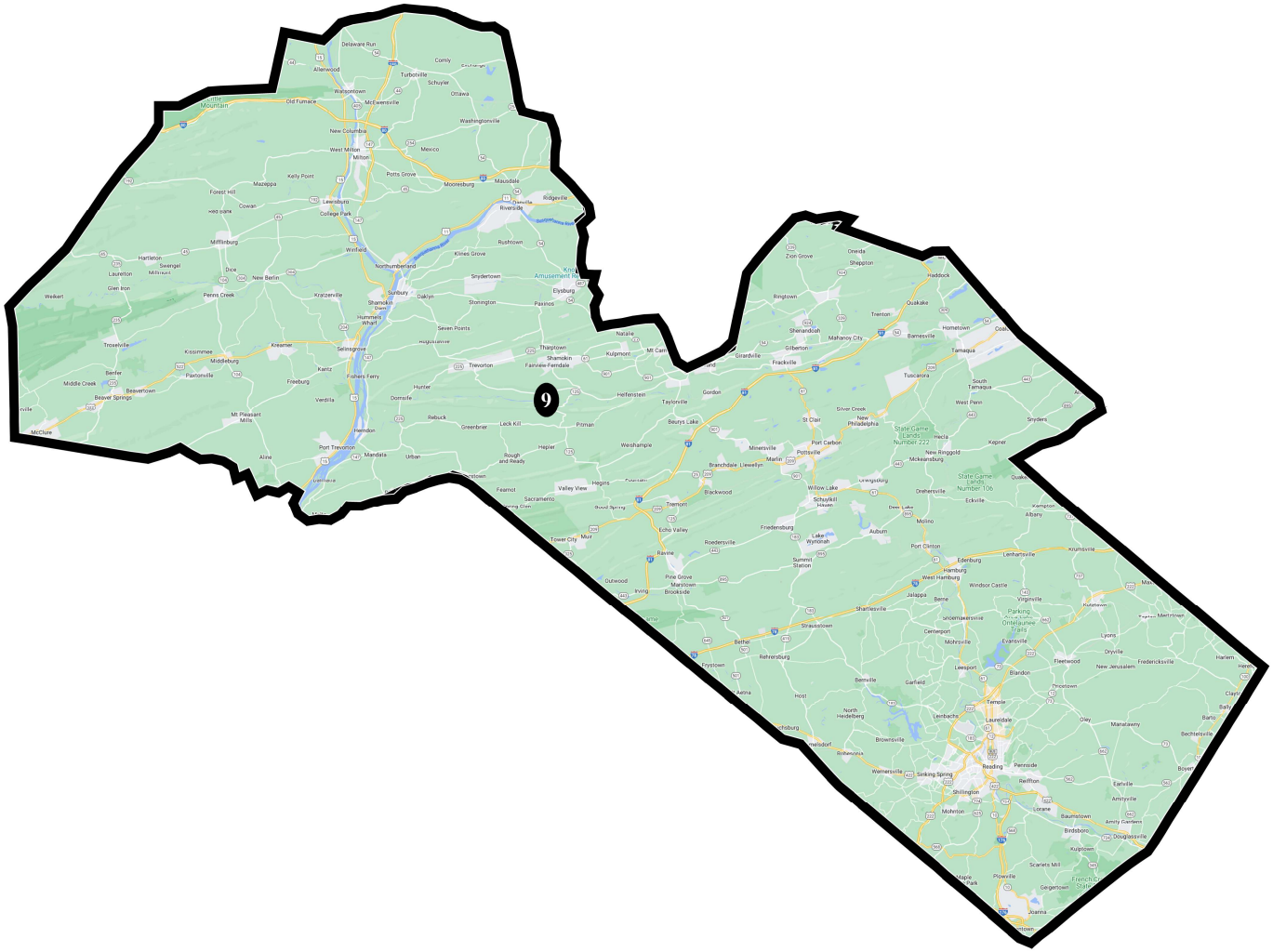
Field	Value
District	7
Population	764864
Deviation	-1
% Deviation	-0%
Alternate Schwartzberg	2.16
Polsby Popper	0.21
Perimeter	302.38
Reock	0.32
NH_Wht	563152
% NH_Wht	73.63%
AP_Blk	73454
% AP_Blk	9.6%
AP_Ind	11800
% AP_Ind	1.54%
AP_Asn	27261
% AP_Asn	3.56%
AP_Hwn	1070
% AP_Hwn	0.14%
AP_Oth	77160
% AP_Oth	10.09%
Hispanic Origin	96719
% Hispanic Origin	12.65%
18+_Pop	614923
NH18+_Wht	474143
% NH18+_Wht	77.11%
18+_AP_Blk	49995
% 18+_AP_Blk	8.13%
18+_AP_Ind	8515
% 18+_AP_Ind	1.38%
18+_AP_Asn	20439
% 18+_AP_Asn	3.32%
18+_AP_Hwn	717
% 18+_AP_Hwn	0.12%
18+_AP_Oth	54192
% 18+_AP_Oth	8.81%
H18+_Pop	64694
% H18+_Pop	10.52%
D 20_Pres	208734.96
% D 20_Pres	51.58%
R 20_Pres	191468.75
% R 20_Pres	47.31%
O 20_Pres	4482.90
% O 20_Pres	1.11%
20_Pres	404686.60

District: 8



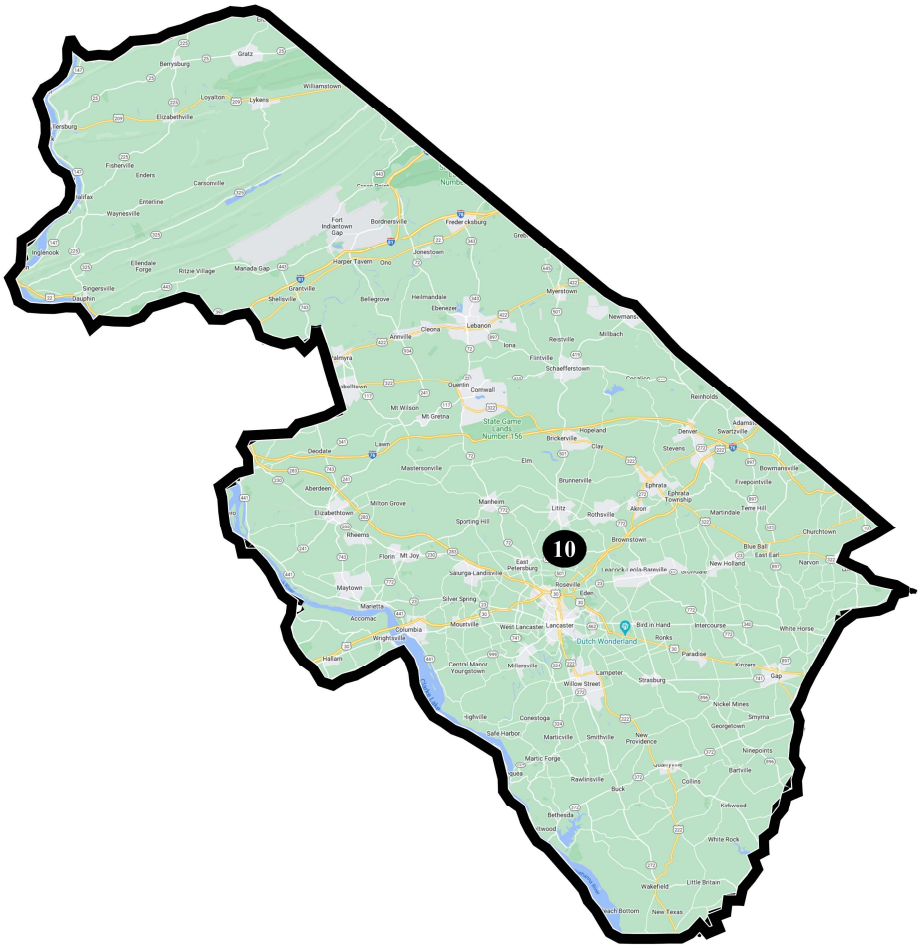
Field	Value
District	8
Population	764874
Deviation	9
% Deviation	0%
Alternate Schwartzberg	2.02
Polsby Popper	0.24
Perimeter	633.03
Reock	0.44
NH_Wht	644495
% NH_Wht	84.26%
AP_Blk	36165
% AP_Blk	4.73%
AP_Ind	13038
% AP_Ind	1.7%
AP_Asn	10267
% AP_Asn	1.34%
AP_Hwn	959
% AP_Hwn	0.13%
AP_Oth	53958
% AP_Oth	7.05%
Hispanic Origin	61533
% Hispanic Origin	8.04%
18+_Pop	615560
NH18+_Wht	533656
% NH18+_Wht	86.69%
18+_AP_Blk	23842
% 18+_AP_Blk	3.87%
18+_AP_Ind	9467
% 18+_AP_Ind	1.54%
18+_AP_Asn	7408
% 18+_AP_Asn	1.2%
18+_AP_Hwn	627
% 18+_AP_Hwn	0.1%
18+_AP_Oth	36934
% 18+_AP_Oth	6%
H18+_Pop	40701
% H18+_Pop	6.61%
D 20_Pres	129646.81
% D 20_Pres	33.74%

District: 9



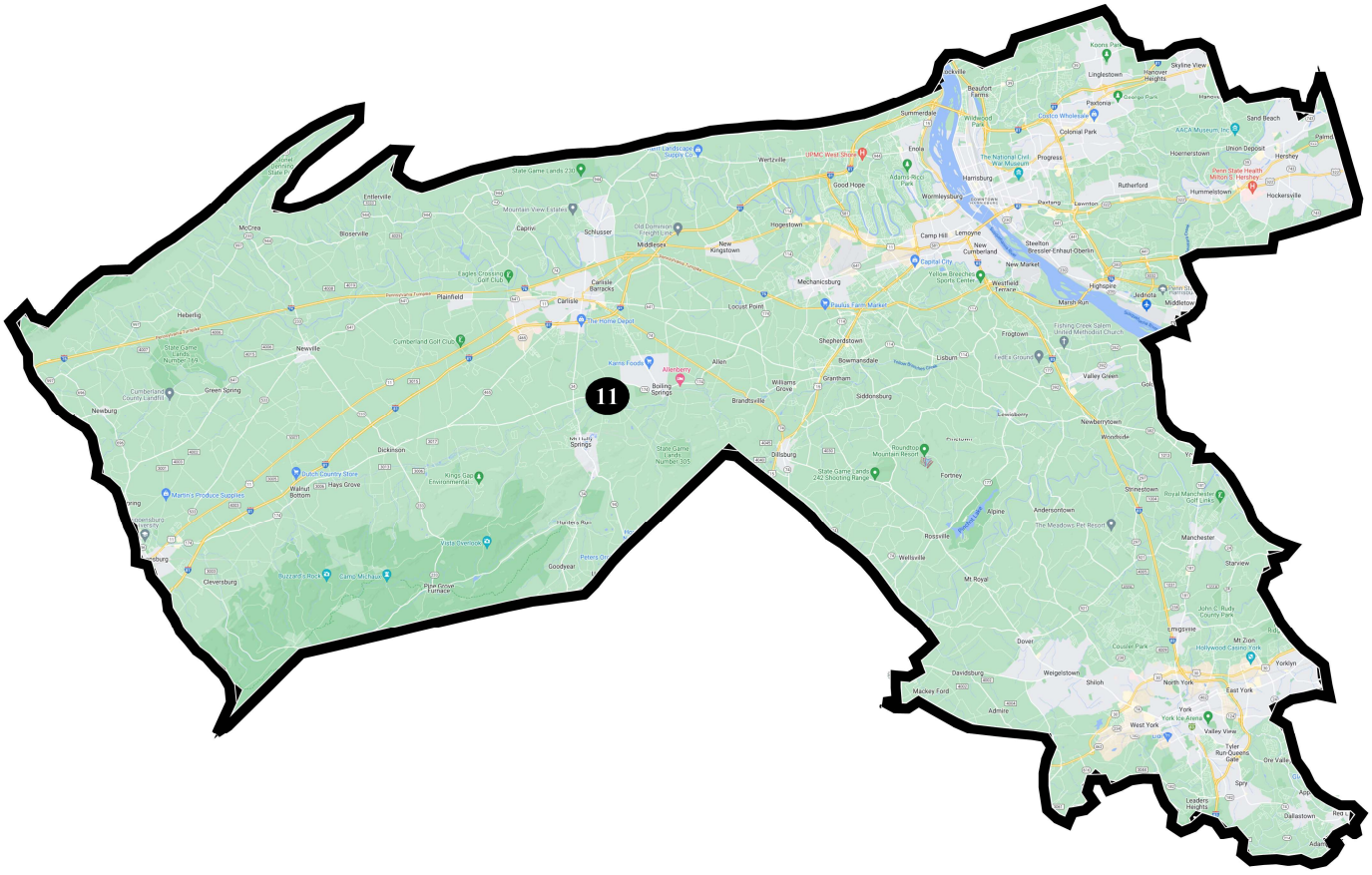
Field	Value
District	9
Population	764876
Deviation	11
% Deviation	0%
Alternate Schwartzberg	1.65
Polsby Popper	0.37
Perimeter	315.78
Reock	0.37
NH_Wht	588999
% NH_Wht	77.01%
AP_Blk	45736
% AP_Blk	5.98%
AP_Ind	12794
% AP_Ind	1.67%
AP_Asn	13039
% AP_Asn	1.7%
AP_Hwn	1197
% AP_Hwn	0.16%
AP_Oth	90414
% AP_Oth	11.82%
Hispanic Origin	115271
% Hispanic Origin	15.07%
18+_Pop	603719
NH18+_Wht	483537
% NH18+_Wht	80.09%
18+_AP_Blk	32013
% 18+_AP_Blk	5.3%
18+_AP_Ind	9001
% 18+_AP_Ind	1.49%
18+_AP_Asn	9435
% 18+_AP_Asn	1.56%
18+_AP_Hwn	836
% 18+_AP_Hwn	0.14%
18+_AP_Oth	61394
% 18+_AP_Oth	10.17%
H18+_Pop	75494
% H18+_Pop	12.5%
D 20_Pres	142819.87
% D 20_Pres	38.77%

District: 10



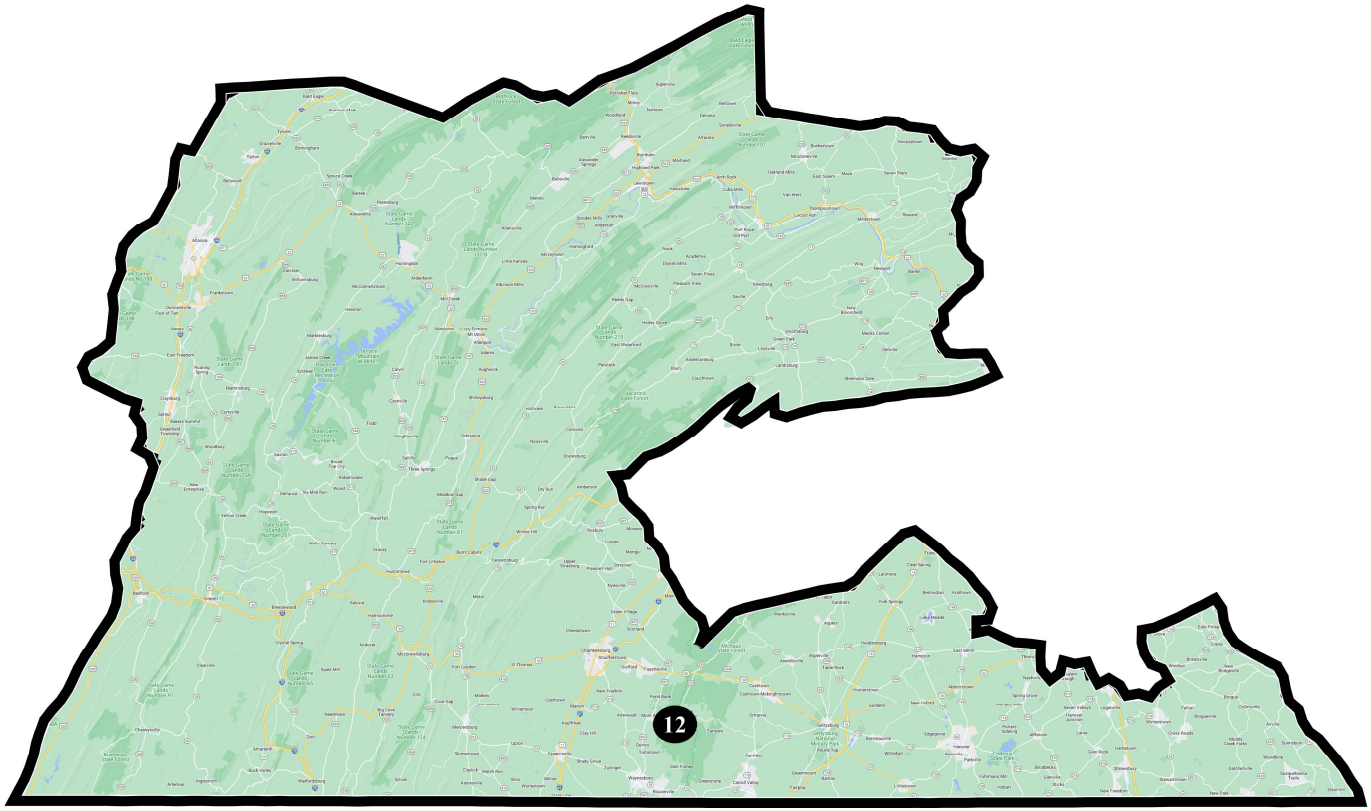
Field	Value
District	10
Population	764860
Deviation	-5
% Deviation	-0%
Alternate Schwartzberg	1.77
Polsby Popper	0.32
Perimeter	266.08
Reock	0.39
NH_Wht	617008
% NH_Wht	80.67%
AP_Blk	39287
% AP_Blk	5.14%
AP_Ind	9672
% AP_Ind	1.26%
AP_Asn	21230
% AP_Asn	2.78%
AP_Hwn	965
% AP_Hwn	0.13%
AP_Oth	66794
% AP_Oth	8.73%
Hispanic Origin	83963
% Hispanic Origin	10.98%
18+_Pop	590652
NH18+_Wht	491283
% NH18+_Wht	83.18%
18+_AP_Blk	25177
% 18+_AP_Blk	4.26%
18+_AP_Ind	6955
% 18+_AP_Ind	1.18%
18+_AP_Asn	14906
% 18+_AP_Asn	2.52%
18+_AP_Hwn	632
% 18+_AP_Hwn	0.11%
18+_AP_Oth	45636
% 18+_AP_Oth	7.73%
H18+_Pop	54971
% H18+_Pop	9.31%
D 20_Pres	150688.09
% D 20_Pres	38.73%
R 20_Pres	232682.86
% R 20_Pres	59.8%
O 20_Pres	5704.69
% O 20_Pres	1.47%
20_Pres	389075.63

District: 11



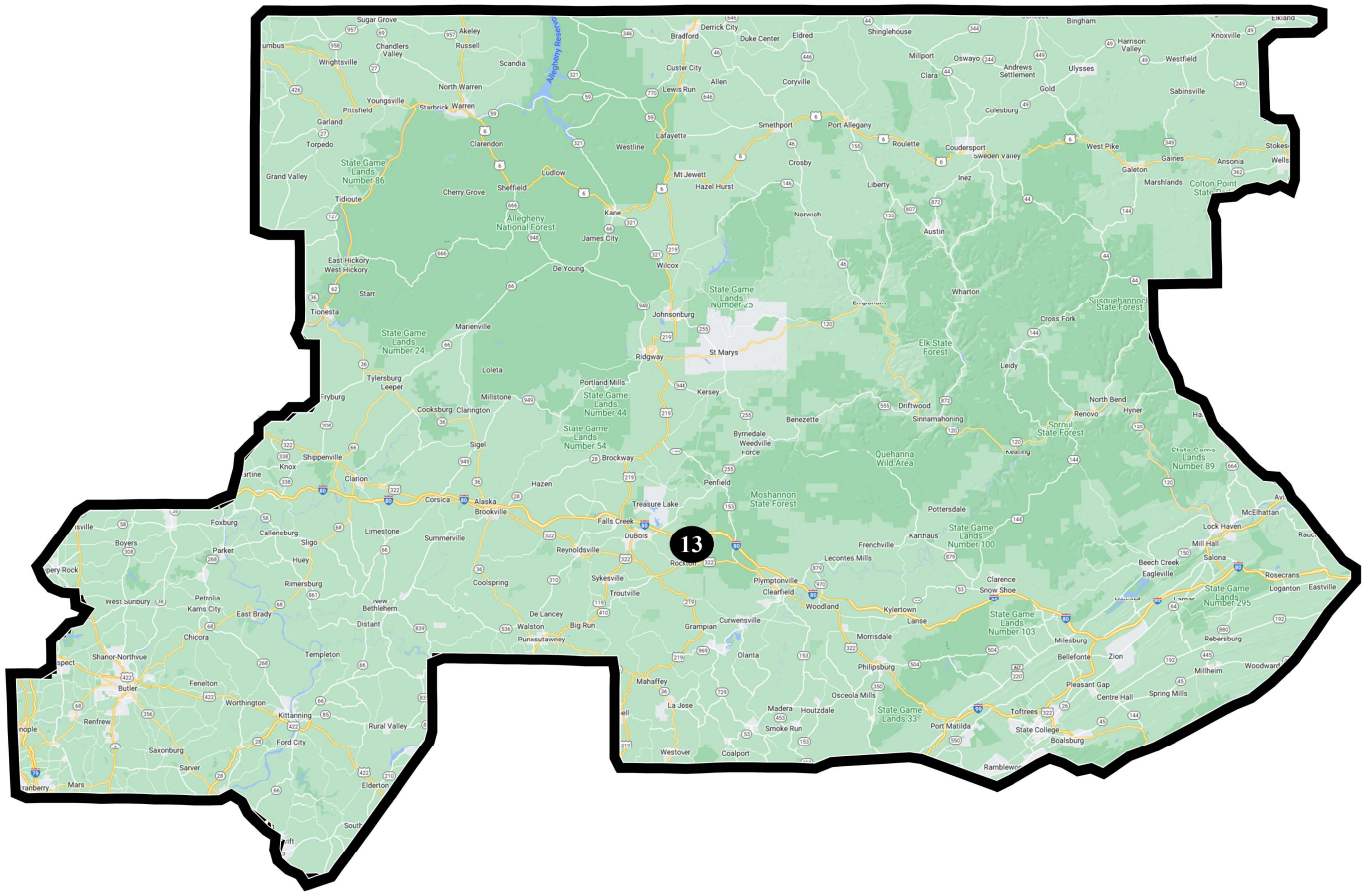
Field	Value
District	11
Population	764864
Deviation	-1
% Deviation	-0%
Alternate Schwartzberg	2.08
Polsby Popper	0.23
Perimeter	233.49
Reock	0.36
NH_Wht	540610
% NH_Wht	70.68%
AP_Blk	104126
% AP_Blk	13.61%
AP_Ind	12153
% AP_Ind	1.59%
AP_Asn	41981
% AP_Asn	5.49%
AP_Hwn	1185
% AP_Hwn	0.15%
AP_Oth	59654
% AP_Oth	7.8%
Hispanic Origin	73594
% Hispanic Origin	9.62%
18+_Pop	600528
NH18+_Wht	445696
% NH18+_Wht	74.22%
18+_AP_Blk	70548
% 18+_AP_Blk	11.75%
18+_AP_Ind	8790
% 18+_AP_Ind	1.46%
18+_AP_Asn	30223
% 18+_AP_Asn	5.03%
18+_AP_Hwn	791
% 18+_AP_Hwn	0.13%
18+_AP_Oth	40834
% 18+_AP_Oth	6.8%
H18+_Pop	48119
% H18+_Pop	8.01%
D 20_Pres	190858.70
% D 20_Pres	48.18%

District: 12



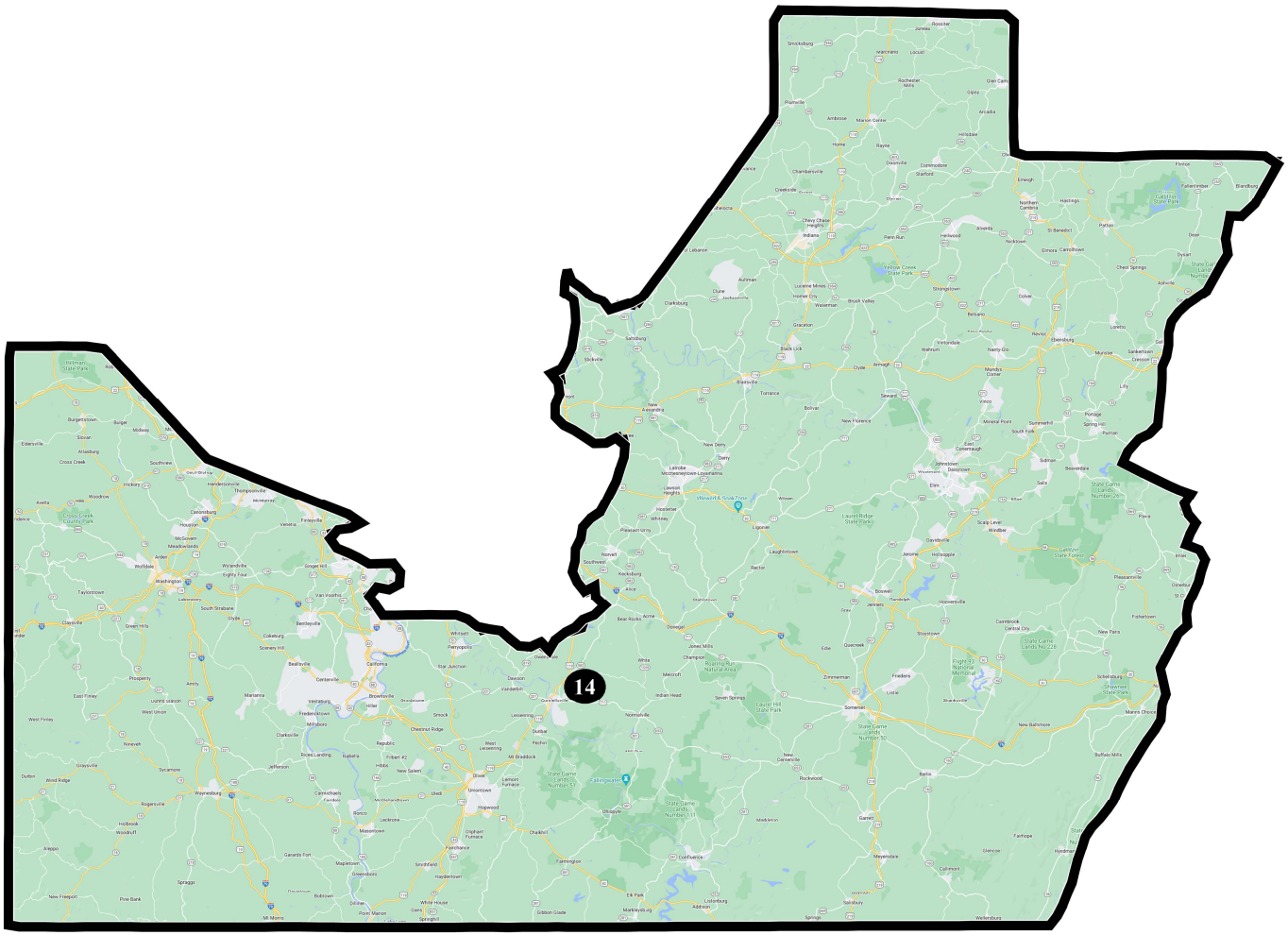
Field	Value
District	12
Population	764866
Deviation	1
% Deviation	0%
Alternate Schwartzberg	2.05
Polsby Popper	0.24
Perimeter	553.18
Reock	0.39
NH_Wht	683280
% NH_Wht	89.33%
AP_Blk	25940
% AP_Blk	3.39%
AP_Ind	12893
% AP_Ind	1.69%
AP_Asn	9018
% AP_Asn	1.18%
AP_Hwn	778
% AP_Hwn	0.1%
AP_Oth	29173
% AP_Oth	3.81%
Hispanic Origin	31248
% Hispanic Origin	4.09%
18+_Pop	604466
NH18+_Wht	550156
% NH18+_Wht	91.02%
18+_AP_Blk	16843
% 18+_AP_Blk	2.79%
18+_AP_Ind	9320
% 18+_AP_Ind	1.54%
18+_AP_Asn	6195
% 18+_AP_Asn	1.02%
18+_AP_Hwn	480
% 18+_AP_Hwn	0.08%
18+_AP_Oth	19298
% 18+_AP_Oth	3.19%
H18+_Pop	19351
% H18+_Pop	3.2%
D 20_Pres	109596.05
% D 20_Pres	26.99%

District: 13



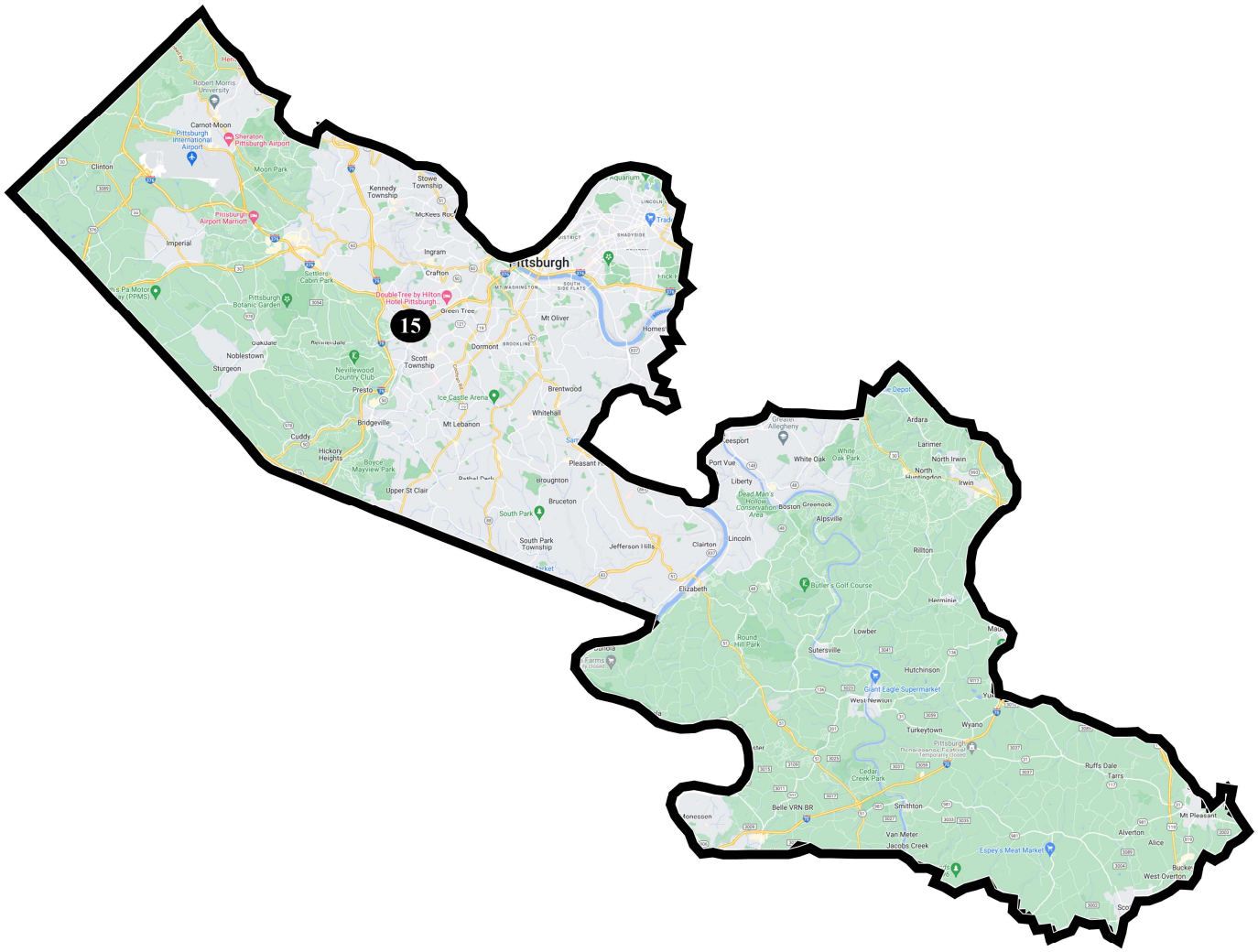
Field	Value
District	13
Population	764865
Deviation	0
% Deviation	0%
Alternate Schwartzberg	1.6
Polsby Popper	0.39
Perimeter	589.4
Reock	0.44
NH_Wht	692558
% NH_Wht	90.55%
AP_Blk	18782
% AP_Blk	2.46%
AP_Ind	11098
% AP_Ind	1.45%
AP_Asn	20199
% AP_Asn	2.64%
AP_Hwn	860
% AP_Hwn	0.11%
AP_Oth	18240
% AP_Oth	2.38%
Hispanic Origin	16049
% Hispanic Origin	2.1%
18+_Pop	623259
NH18+_Wht	567111
% NH18+_Wht	90.99%
18+_AP_Blk	14445
% 18+_AP_Blk	2.32%
18+_AP_Ind	8215
% 18+_AP_Ind	1.32%
18+_AP_Asn	16422
% 18+_AP_Asn	2.63%
18+_AP_Hwn	655
% 18+_AP_Hwn	0.11%
18+_AP_Oth	13548
% 18+_AP_Oth	2.17%
H18+_Pop	12153
% H18+_Pop	1.95%
D 20_Pres	130388.17
% D 20_Pres	32.42%

District: 14



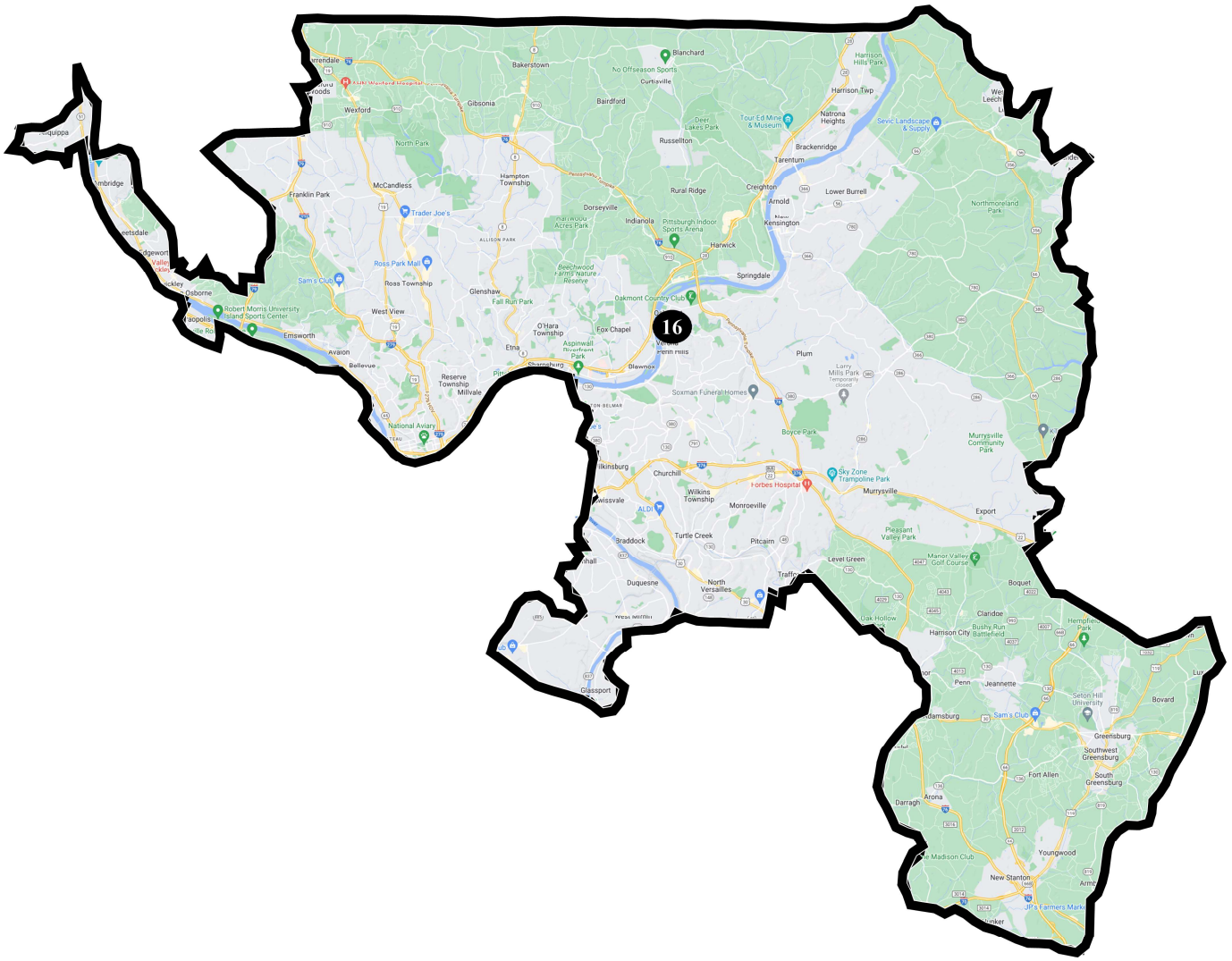
Field	Value
District	14
Population	764863
Deviation	-2
% Deviation	-0%
Alternate Schwartzberg	1.75
Polsby Popper	0.33
Perimeter	470.68
Reock	0.41
NH_Wht	693519
% NH_Wht	90.67%
AP_Blk	33907
% AP_Blk	4.43%
AP_Ind	11333
% AP_Ind	1.48%
AP_Asn	7249
% AP_Asn	0.95%
AP_Hwn	798
% AP_Hwn	0.1%
AP_Oth	17011
% AP_Oth	2.22%
Hispanic Origin	12269
% Hispanic Origin	1.6%
18+_Pop	622556
NH18+_Wht	571902
% NH18+_Wht	91.86%
18+_AP_Blk	23426
% 18+_AP_Blk	3.76%
18+_AP_Ind	8267
% 18+_AP_Ind	1.33%
18+_AP_Asn	5228
% 18+_AP_Asn	0.84%
18+_AP_Hwn	506
% 18+_AP_Hwn	0.08%
18+_AP_Oth	12136
% 18+_AP_Oth	1.95%
H18+_Pop	8382
% H18+_Pop	1.35%
D 20_Pres	130079.28
% D 20_Pres	31.79%

District: 15



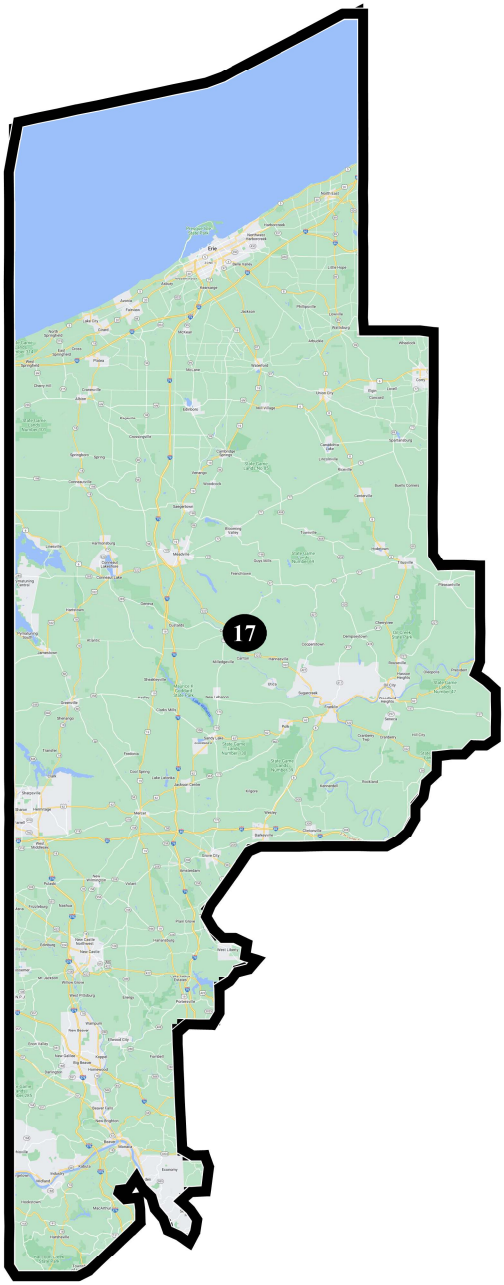
Field	Value
District	15
Population	764863
Deviation	-2
% Deviation	-0%
Alternate Schwartzberg	2.29
Polsby Popper	0.19
Perimeter	183.87
Reock	0.25
NH_Wht	591003
% NH_Wht	77.27%
AP_Blk	91258
% AP_Blk	11.93%
AP_Ind	9810
% AP_Ind	1.28%
AP_Asn	47612
% AP_Asn	6.22%
AP_Hwn	781
% AP_Hwn	0.1%
AP_Oth	24597
% AP_Oth	3.22%
Hispanic Origin	21752
% Hispanic Origin	2.84%
18+_Pop	629366
NH18+_Wht	501391
% NH18+_Wht	79.67%
18+_AP_Blk	65555
% 18+_AP_Blk	10.42%
18+_AP_Ind	7109
% 18+_AP_Ind	1.13%
18+_AP_Asn	36853
% 18+_AP_Asn	5.86%
18+_AP_Hwn	512
% 18+_AP_Hwn	0.08%
18+_AP_Oth	17545
% 18+_AP_Oth	2.79%
H18+_Pop	15743
% H18+_Pop	2.5%
D 20_Pres	251207.82
% D 20_Pres	58.09%

District: 16



Field	Value
District	16
Population	764861
Deviation	-4
% Deviation	-0%
Alternate Schwartzberg	2.41
Polsby Popper	0.17
Perimeter	218
Reock	0.35
NH_Wht	594114
% NH_Wht	77.68%
AP_Blk	115452
% AP_Blk	15.09%
AP_Ind	10536
% AP_Ind	1.38%
AP_Asn	24960
% AP_Asn	3.26%
AP_Hwn	757
% AP_Hwn	0.1%
AP_Oth	21013
% AP_Oth	2.75%
Hispanic Origin	17240
% Hispanic Origin	2.25%
18+_Pop	617664
NH18+_Wht	497292
% NH18+_Wht	80.51%
18+_AP_Blk	81229
% 18+_AP_Blk	13.15%
18+_AP_Ind	7662
% 18+_AP_Ind	1.24%
18+_AP_Asn	17488
% 18+_AP_Asn	2.83%
18+_AP_Hwn	517
% 18+_AP_Hwn	0.08%
18+_AP_Oth	14471
% 18+_AP_Oth	2.34%
H18+_Pop	11489
% H18+_Pop	1.86%
D 20_Pres	239026.82
% D 20_Pres	53.41%

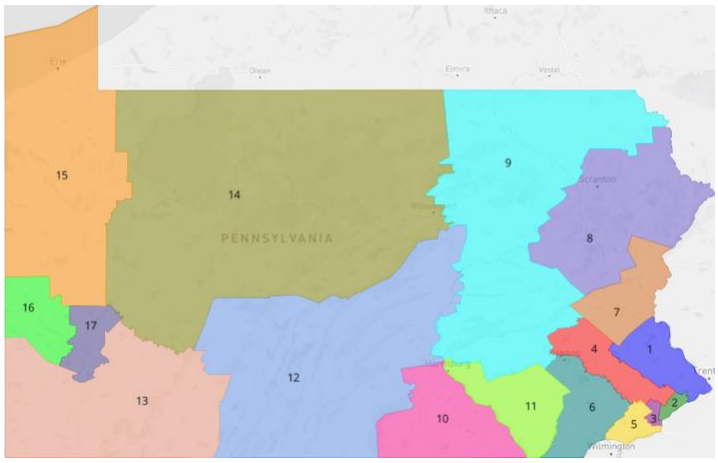
District: 17



Field	Value
District	17
Population	764859
Deviation	-6
% Deviation	-0%
Alternate Schwartzberg	1.72
Polsby Popper	0.34
Perimeter	425.49
Reock	0.29
NH_Wht	660489
% NH_Wht	86.35%
AP_Blk	51768
% AP_Blk	6.77%
AP_Ind	13047
% AP_Ind	1.71%
AP_Asn	13052
% AP_Asn	1.71%
AP_Hwn	666
% AP_Hwn	0.09%
AP_Oth	23529
% AP_Oth	3.08%
Hispanic Origin	20285
% Hispanic Origin	2.65%
18+_Pop	611042
NH18+_Wht	541452
% NH18+_Wht	88.61%
18+_AP_Blk	33114
% 18+_AP_Blk	5.42%
18+_AP_Ind	9442
% 18+_AP_Ind	1.55%
18+_AP_Asn	8947
% 18+_AP_Asn	1.46%
18+_AP_Hwn	449
% 18+_AP_Hwn	0.07%
18+_AP_Oth	15990
% 18+_AP_Oth	2.62%
H18+_Pop	12668
% H18+_Pop	2.07%
D 20_Pres	161911.12
% D 20_Pres	40.14%
R 20_Pres	236175.79
% R 20_Pres	58.55%
O 20_Pres	5287.03
% O 20_Pres	1.31%
20_Pres	403373.94

APPENDIX 2

Description: Below is an image of the governor's proposed map as well as statistics about each district. Source: *The Governor's Map*, Dave's Redistricting App (last visited Mar. 28, 2022), https://davesredistricting.org/maps#viewmap::fe2ff034-a707-4d2f-a781-60eb79ea8b7d.



ID	Total Pop	Deviation	Total VAP	White	Minority	Hispanic	Black	Asian	Native	Pacific	
Un	0	0	0	0	0	0	0	0	0	0	
1	764865	0	608372	0.8285	0.1715	0.0477	0.0441	0.0642	0.0109	0.0009	
2	764864	0	588479	0.4116	0.5884	0.2249	0.262	0.1047	0.0146	0.0023	
3	764864	0	633198	0.3517	0.6483	0.0504	0.5145	0.0815	0.0134	0.0015	
4	764864	0	604027	0.7591	0.2409	0.0605	0.1041	0.065	0.0115	0.001	
5	764865	0	596526	0.641	0.359	0.0442	0.2267	0.0793	0.0104	0.0011	
6	764865	0	588036	0.7274	0.2726	0.1398	0.0736	0.0526	0.0148	0.0014	
7	764864	0	606101	0.7032	0.2968	0.1711	0.0858	0.0386	0.0143	0.0013	
8	764865	0	615551	0.8047	0.1953	0.1	0.0644	0.0216	0.0138	0.0012	
9	764864	0	610530	0.8971	0.1029	0.0456	0.027	0.0142	0.013	0.0009	
10	764865	0	602454	0.8355	0.1645	0.0612	0.0572	0.0307	0.0152	0.0011	
11	764865	0	590769	0.7516	0.2484	0.1	0.1016	0.0418	0.0129	0.0012	
12	764865	0	607791	0.9171	0.0829	0.026	0.0283	0.01	0.0139	0.0008	
13	764865	0	622764	0.9167	0.0833	0.0134	0.0384	0.0098	0.013	0.0008	
14	764865	0	623684	0.9024	0.0976	0.0199	0.0312	0.0249	0.0141	0.0011	
15	764865	0	610738	0.8941	0.1059	0.0202	0.0477	0.0146	0.0147	0.0007	
16	764865	0	614236	0.8356	0.1644	0.0232	0.082	0.0412	0.0127	0.0009	
17	764865	0	630292	0.7607	0.2393	0.0217	0.1558	0.0467	0.012	0.0008	
Summary	764865	0	609032	0.7615	0.2385	0.068	0.1148	0.0434	0.0132	0.0011	

APPENDIX 3

Description: Below is an image of the enacted 2022 map as well as statistics on diversity and statistics comparing the map's compactness with the 2018 map. Sources: *Carter Petitioners' Map*, Dave's Redistricting App (last visited Mar. 28, 2022), https://davesredistricting.org/maps#viewmap::f90e83ef-f6e1-422e-8f9c-ac3a38c6011b; *Carter v. Chapman*, Carter Br. Consol., No. 465 (M.D. Pa. 2021).

ID	Total Pop	Devation	Total VAP	White	Minority	Hispanic	Black	Asian	Native	Pacific	
Un	0	0	0	0	0	0	0	0	0	0	
1	764866	0	608853	0.8225	0.1775	0.0498	0.0453	0.067	0.011	0.0009	
2	764865	0	592591	0.4132	0.5868	0.2216	0.2624	0.1059	0.0143	0.0023	
3	764864	0	629365	0.3534	0.6466	0.0534	0.5098	0.0816	0.0136	0.0016	
4	764865	0	605135	0.7857	0.2143	0.0481	0.0899	0.0644	0.0103	0.0008	
5	764866	0	594459	0.6156	0.3844	0.0533	0.2467	0.076	0.0115	0.0012	
6	764864	0	588040	0.7273	0.2727	0.1399	0.0736	0.0526	0.0148	0.0014	
7	764865	0	606167	0.7267	0.2733	0.1617	0.0731	0.0358	0.0139	0.0012	
8	764866	0	615677	0.7818	0.2182	0.109	0.0768	0.0245	0.0141	0.0012	
9	764864	0	610368	0.8945	0.1055	0.0465	0.0304	0.0118	0.0137	0.001	
10	764864	0	600698	0.7474	0.2526	0.0787	0.1148	0.0491	0.0146	0.0013	
11	764864	0	591963	0.8417	0.1583	0.0777	0.0455	0.025	0.013	0.001	
12	764864	0	629692	0.7581	0.2419	0.0242	0.1512	0.0517	0.0121	0.0009	
13	764864	0	608305	0.9129	0.0871	0.0289	0.0297	0.0095	0.0145	0.0008	
14	764866	0	624593	0.9162	0.0838	0.0133	0.0394	0.0088	0.0133	0.0008	
15	764864	0	621955	0.9075	0.0925	0.0206	0.026	0.0249	0.0138	0.0011	

16	764865	0	610144	0.8914	0.1086	0.0209	0.0484	0.0163	0.0144	0.0007	
17	764864	0	615543	0.8424	0.1576	0.0201	0.0833	0.0361	0.0124	0.0008	
Summary	764865	0	609032	0.7615	0.2385	0.068	0.1148	0.0434	0.0132	0.0011	

District	Reock, Carter	Reock, 2018 plan	Schwartzberg, Carter	Schwartzberg, 2018 plan	Polsby-Popper, Carter	Polsby-Popper, 2018 plan	Population Polygon, Carter	Population Polygon, 2018 plan	Area/Convex Hull, Carter	Area/Convex Hull, 2018 plan
1	0.4	0.43	1.5	1.43	0.4	0.46	0.75	0.78	0.82	0.83
2	0.33	0.37	1.49	1.42	0.42	0.47	0.92	0.96	0.84	0.86
3	0.4	0.43	1.72	1.63	0.32	0.36	0.78	0.8	0.72	0.74
4	0.27	0.41	2.29	1.73	0.17	0.31	0.51	0.64	0.68	0.81
5	0.41	0.44	1.86	1.54	0.27	0.38	0.6	0.69	0.72	0.84
6	0.45	0.45	1.68	1.69	0.29	0.29	0.83	0.82	0.73	0.72
7	0.57	0.41	1.45	1.5	0.42	0.42	0.92	0.95	0.78	0.83
8	0.47	0.49	1.67	1.73	0.28	0.28	0.91	0.88	0.74	0.75
9	0.41	0.55	1.83	1.94	0.28	0.25	0.54	0.53	0.74	0.74
10	0.49	0.49	1.76	1.72	0.27	0.29	0.86	0.88	0.71	0.76
11	0.45	0.45	1.49	1.51	0.37	0.37	0.79	0.78	0.88	0.88
12 (18)	0.63	0.46	2.13	2.21	0.18	0.18	0.75	0.75	0.78	0.72
13	0.56	0.4	1.56	1.81	0.39	0.26	0.68	0.75	0.83	0.79
14	0.47	0.54	1.76	1.63	0.3	0.34	0.35	0.37	0.76	0.77
15	0.57	0.67	1.49	1.46	0.43	0.42	0.74	0.69	0.86	0.86
16	0.36	0.32	1.42	1.43	0.39	0.38	0.92	0.87	0.87	0.8
17	0.51	0.51	1.85	1.8	0.26	0.28	0.6	0.6	0.76	0.76
Average	**0.46**	**0.46**	**1.7**	**1.67**	**0.32**	**0.33**	**0.73**	**0.74**	**0.78**	**0.79**