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464 MD 2021

IN THE COMMONWEALTH COURT OF PENNSYLVANIA

No. 464 M.D. 2021

Carol Ann Carter; Monica Parrilla; Rebecca Poyourow; William Tung; Roseanne Milazzo; Burt Siegel; Susan Cassanelli; Lee Cassanelli; Lynn Wachman; Michael Guttman; Maya Fonkeu; Brady Hill; Mary Ellen Bachunis; Tom DeWall; Stephanie McNulty; and Janet Temin,

Petitioners,

vs.

Leigh Chapman, in Her Official Capacity as the Acting Secretary of the Commonwealth of Pennsylvania; and Jessica Mathis, in Her Official Capacity as Director of the Bureau of Election Services and Notaries,

Respondents.

No. 465 M.D. 2021

Philip T. Gressman; Ron Y. Donagi; Kristopher R. Tapp; Pamela A. Gorkin; David P. Marsh; James L. Rosenberger; Amy Myers; Eugene Boman; Gary Gordon; Liz McMahon; Timothy G. Feeman; and Garth Isaak

Petitioners,

vs.

Leigh Chapman, in her Official Capacity as the Acting Secretary of the Commonwealth of Pennsylvania ; and Jessica Mathis, in Her Official Capacity as Director of the Bureau of Election Services and Notaries,

Respondents.

CORRECTED OPENING BRIEF OF HOUSE REPUBLICAN INTERVENORS KERRY BENNINGHOFF, MAJORITY LEADER, AND BRYAN CUTLER, SPEAKER, OF THE PENNSYLVANIA HOUSE OF REPRESENTATIVES IN SUPPORT OF PROPOSED CONGRESSIONAL REDISTRICTING MAP

I. INTRODUCTION

The map offered by Intervenors Bryan Cutler, Speaker of the Pennsylvania House of Representatives, and Kerry Benninghoff, Majority Leader of the Pennsylvania House of Representatives (collectively "Republican House Leaders"), attached as Exhibit 1 to the Affidavit of Bill Schaller, attached as Exhibit I (the "Schaller Affidavit"), was passed through a transparent and full deliberative legislative process by the Pennsylvania House of Representatives ("House Plan"). Intervenors Jake Corman, President Pro Tempore, and Kim Ward, Majority Leader, of the Pennsylvania Senate are submitting the same map on behalf of the Senate. What's more, the House Plan was drawn by a Pennsylvania citizen and good government advocate – Amanda Holt – who served as the lead plaintiff in the prior litigation over the state's legislative map. The House made minimal changes to Ms. Holt's submission to increase the compactness of certain districts and to address other comments received during this open process. But 95% of the map drafted by Ms. Holt remains the same in the House Plan.

Importantly, the House Plan follows traditional redistricting principles, including the criteria in Pa. Const., Art. II, § 16, which, although applicable to legislative reapportionment, have been adopted as important considerations in

congressional redistricting in *League of Women Voters of Pa. v. Commonwealth*, 645 Pa. 1, 120-21 (2018). The House Plan has a population deviation of at most one person, is compact and contiguous, and splits only 15 counties and 16 municipalities–less than or comparable to the current map adopted by the Pennsylvania Supreme Court in 2018. There can be no dispute that the House Plan adheres to these traditional redistricting criteria.

Moreover, the House did not "use partisan data in [its] consideration of submitted maps, in the selection of Ms. Amanda Holt's citizen's map, or in [its] adjustments made to the maps through amendment."[1] Perhaps unsurprisingly, this honest and fair process produced an honest and fair map: one demonstrably fair to both political parties as measured by numerous partisan fairness metrics. Simulation analysis performed by Dr. Michael Barber demonstrates that the House Plan is predicted to result in 9 Democratic seats and 8 Republican seats using an index of statewide elections from 2012-2020, whereas the most likely outcome in the 50,000 simulated maps without using partisan data is 8 Democratic seats and 9 Republican seats. In other words, the House Plan is more favorable to Democrats than the most likely outcome of 50,000 computer drawn maps using no partisan data. Other

[1] Ltr. from Rep. Grove to Gov. Wolf, Jan. 6, 2022, at 5, copy attached as **Exhibit A,** http://repgrove.com/Display/SiteFiles/418/OtherDocuments/2022/CongressionalRedistrictingResponsetoGovWolf.pdf (the "Grove Letter") (last visited Jan. 24, 2022). *See also* Pennsylvania House of Representatives, State Government Committee Meeting, December 15, 2021, at timecode 6:30 (comments of Rep. Grove), at http://www.pahousegop.com/embed/33680/Voting-meeting-on-HB-2146-and-any-other-business-that-may-come-before-the-committee.

partisan fairness metrics prove that the House Plan is fair and will allow both parties the opportunity to translate their votes into seats.

It is the General Assembly's prerogative to redraw the state's congressional districts under Article I, § 4 of the United States Constitution and the Pennsylvania Constitution. The Pennsylvania House of Representatives passed a map that meets constitutional criteria and there is still time for the Senate to pass that map and submit it to the Governor before the January 30, 2022 deadline. If, however, the Senate does not pass the map in time, or the Governor vetoes it, the House Plan should be given deference or at least special consideration as it is the only map the truly reflects the will of the people of Pennsylvania. It is the only map that has gone through a transparent and deliberative process by the people's elected representatives.

II. DICUSSION

A. *League of Women Voters of Pa. v. Commonwealth.*

In *League of Women Voters of Pa. v. Commonwealth* ("LWV"), the Pennsylvania Supreme Court laid out the framework for evaluating the constitutionality of a congressional redistricting plan under the Pennsylvania Constitution's Free and Equal Elections Clause, Art. I, § 5. 645 Pa. 1 (2018). The Pennsylvania Supreme Court interpreted the Free and Equal Elections Clause to require that "an individual's electoral power not be diminished through any law which discriminatorily dilutes the power of his or her vote..." *LWV*, 645 Pa. at 120.

To help assess that question, the Court relied upon the Article II, Section 16 factors applicable for legislative redistricting:

> [g]iven the great concern of the delegates over the practice of gerrymandering occasioned by their recognition of the corrosive effects on our entire democratic process through the deliberate dilution of our citizenry's individual votes, the focus on these neutral factors must be viewed, then, as part of a broader effort by the delegates to that convention to establish 'the best methods of representation to secure a just expression of the popular will.' Consequently, these factors have broader applicability beyond setting standards for the drawing of electoral districts for state legislative office.

Id. at 119 (internal citation omitted). It also found that

> the use of compactness, contiguity, and the maintenance of the integrity of the boundaries of political subdivisions maintains the strength of an individual's vote in electing a congressional representative. When an individual is grouped with other members of his or her community in a congressional district for purposes of voting, the commonality of the interests shared with the other voters in the community increases the ability of the individual to elect a congressional representative for the district who reflects his or her personal preferences. This approach inures to no political party's benefit or detriment. It simply achieves the constitutional goal of fair and equal elections for all of our Commonwealth's voters.

Id. at 120-21.

The Court relied upon the Article II, Section 16 criteria as a basis to strike down the 2011 congressional plan, finding that when "it is demonstrated that, in the creation of congressional districts, these neutral criteria have been subordinated, in whole or in part, to extraneous considerations such as gerrymandering for unfair partisan political advantage, a congressional redistricting plan violates Article I,

Section 5 of the Pennsylvania Constitution." *Id*. at 122. This subordination is an effects-based test and does not "require a showing that the creators of congressional districts intentionally subordinated these traditional criteria..." *Id.*

These principles should thus guide this Court in selecting the appropriate congressional plan to govern elections for the next decade.

B. The House Plan Was Passed by the House Following a Transparent and Full Deliberative Process and Is Nearly Identical to the Map Drawn By a Citizen and Good Government Advocate.

In the most open and transparent Congressional redistricting process in recent history, the House State Government Committee held a series of eleven hearings around the Commonwealth from July 22, 2011 to October 28, 2021 to take input from the Commonwealth's citizens, as well as one joint hearing with the State Senate.[2] In addition to those hearings, the Pennsylvania State Government Committee Chair established a website with options for citizen input, including input about specific communities of interest as well as the ability to submit maps.[3]

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[2] *See* Pennsylvania House Republican Caucus, *Regional Hearings,* copy attached as **Exhibit B**, also available at http://paredistricting.com/hearingschedule (last visited Jan. 24, 2022).

[3] *See* Pennsylvania House of Representatives, Republican Caucus, Redistricting Input Site, copy attached as **Exhibit C**, also available at http://paredistricting.com/input (last visited Jan. 24, 2022) (providing access to submitted communities of interest, public comments on the 2018 Pennsylvania Supreme Court plan, and publicly submitted maps). *See also* Pennsylvania House of Representatives, House Republican Caucus, Updated Preliminary Congressional Plan, at https://app.mydistricting.com/legdistricting/pennsylvania/updated_preliminary_map (last visited Jan. 24, 2022) (listing public comments on House Bill 2146); *see also* 225 Pa. §§ 803(8) and 902(5).

House Bill 2146 was first introduced and referred to State Government Committee on December 8, 2021. The bill introduced, for what might be a first in the history of the Pennsylvania House, a plan proposed by a citizen and good-government advocate, Ms. Amanda Holt, in unaltered form. The State Government Committee selected Ms. Holt's proposal from among 19 submitted by the public because, as Rep. Seth Grove indicated, it was drawn without political influence, met constitutional standards, limited the splits of townships and other municipalities, and offered districts that were compact and contiguous.[4] These factors "were highlighted as priorities by the majority of testifiers and residents throughout the committee's extensive regional hearings and online public input process."[5]

It was amended into the current form (PN 2541) and reported from the State Government Committee on December 15, 2021. *See* Pennsylvania General Assembly, *Bill Information – History, House Bill 2146; Regular Session 2021-2022,* attached as **Exhibit E** (the "Bill History").[6] After it was released and open for public

[4] *See* Rep. Seth Grove, *Grove Announces Citizen Map Selected As Preliminary Congressional Plan, Invites Public Comment,* Dec. 8, 2021, copy attached as **Exhibit D**, also available at http://www.repgrove.com/News/22950/Latest-News/Grove-Announces-Citizen-Map-Selected-as-Preliminary-Congressional-Plan,-Invites-Public-Comment- (last visited Jan. 24, 2022); *see also* 225 Pa. §§ 803(8) and 902(5).

[5] *Id.*

[6] The Court can take judicial notice of official records, 225 Pa. Code § 201(b)(2), and this public record falls within a recognized exception to the hearsay rule, *id.* § 803(8) and 902(5).

comments, a total of 399 comments were received from citizens and numerous changes made based upon those requests.[7]

Although several changes were made, the resulting map was 95% the same as the map originally drawn by Ms. Holt in terms of population and surface area.[8] Many of the changes that were made were to increase the compactness of specific districts or to address comments received during the process.[9] In particular, certain changes were made to ensure communities of interest were kept whole and to address inclusion of certain communities within particular congressional districts at the request of citizens.[10]

HB 2146 received first consideration on December 15, 2021, but did not receive second consideration until January 11, 2022, i.e., almost a month later. Bill History, Ex. E. *See also* Pa. Const. Art. III, § 4 ("Every bill shall be considered on three different days in each House."). Under the Rules of the Pennsylvania House of Representatives, second consideration of a bill is the opportunity for any House Member to introduce and offer amendments to a bill. House Rules 21 and 23. While Members had ample to time to draft and file amendments to the bill, no amendment was timely filed to House Bill 2146, Printer's Number 2541. Bill History, Ex. E. It

[7] *See* Grove Ltr. at 2, Ex. A.
[8] *See* Video of Pennsylvania House of Representatives State Government Committee Meeting, December 15, 2021 Hearing, at 7:26, at https://s3.us-east 2.amazonaws.com/pagopvideo/366117649.mp4.
[9] *Id*.; *see also* Grove Ltr. at 3, Ex. A.
[10] *Id*.

received third consideration and final passage in the House on January 12, 2021. *Id.* So, from the time the bill was amended in the House State Government Committee on December 15, 2021, until the bill was passed by the House, the public had 28 days to view the contents of the bill and review the House's proposed congressional plan.[11] In contrast, the preliminary legislative reapportionment plan produced by the Pennsylvania Legislative Reapportionment Commission, which redistricts Pennsylvania's House and Senate Districts, released its preliminary legislative reapportionment plan on December 13, 2021 and adopted the plan on December 16, 2021, a mere three days later.

HB2146 was referred to the Senate State Government Committee, which passed it on January 12, 2022. *See* Bill History, Ex. E. The Senate gave HB 2146 first consideration on January 18, 2022 and second consideration on January 19, 2022. *Id*. The Senate is scheduled to be in session on January 24, 25, and 26, 2022, and HB 2146 is eligible for third consideration and final passage on any of those dates, or on any future legislative session that may be convened.

[11] *See Pennsylvania House of Representatives, House Republican Caucus, Updated Preliminary Plan Page,* copy attached as **Exhibit F,** *also available at* http://paredistricting.com/pcplan. House Bill 2146 was posted immediately to this website and made accessible to the public.

C. It Is the Prerogative of the General Assembly To Perform Congressional Redistricting in the First Instance. To the Extent the House Plan Adheres to Traditional Redistricting Principles, as Enunciated in *LWV v. Commonwealth*, It Should Be Given Special Consideration.

The United States and Pennsylvania Constitutions vest the General Assembly with the authority to redistrict this Commonwealth's congressional districts. Specifically, Article I, Section 4 of the United States Constitution (the "Elections Clause") provides that "[t]he Times, Places and Manner of holding Elections for Senators and Representatives, shall be prescribed in each State by the Legislature thereof...." Pursuant to the Elections Clause, as a matter of federal law, "redistricting is a legislative function, to be performed in accordance with the State's prescriptions for lawmaking." *Arizona State Legislature v. Arizona Indep. Redistricting Comm'n*, 576 U.S. 787, 808 (2015). The Commonwealth's legislative power is vested in the General Assembly. PA. CONST. ART. II, § 1.

As Petitioners concede (*see* Carter Petition ¶ 36), congressional districting plans are legislative enactments of the General Assembly, passed like any other legislation. The Pennsylvania Supreme Court has confirmed that the "primary responsibility and authority for drawing federal congressional legislative districts rests squarely with the state legislature." *League of Women Voters v. Com.*, 178 A.3d 737, 821–22 (Pa. 2018), citing *Butcher v. Bloom*, 216 A.2d 457, 458 (Pa. 1966) (identifying the General Assembly as "the organ of government with the primary

responsibility for the task of apportionment") and *Growe v. Emison*, 507 U.S. 25, 34 (1993) ("the Constitution leaves with the States primary responsibility for apportionment of their federal congressional and state legislative districts").

All impasse cases necessarily involve scenarios where the legislature and governor are unable to agree on a redistricting plan. But impasse does not mean that the General Assembly's plan—despite the failure of the Governor to sign it into law—is entitled to no special consideration when the judiciary must take up the unwelcome obligation of redistricting the Commonwealth. After all,

> The task of reapportionment is…a function which can be best accomplished by that elected branch of government. The composition of the Legislature, the knowledge which its members from every part of the state bring to its deliberations, its techniques for gathering information, and other factors inherent in the legislative process, make it the most appropriate body for the drawing of [district] lines...

Butcher v. Bloom, 203 A.2d 556, 569 (Pa. 1964). Because of the legislature's constitutionally protected role to redistrict, the Court should select a map that reflects "the policy choices of the elected representatives of the people, rather than the remedial directive of a federal court." *Tallahassee Branch of NAACP v. Leon Cty.*, 827 F.2d 1436, 1439 (11th Cir. 1987).

In *Donnelly v. Meskill*, 345 F. Supp. 962 (D. Conn. 1972), for example, the legislature passed a congressional plan that the governor vetoed. When the job of redistricting was thrust upon the court, three plans were submitted, including a plan from the legislature. The court adopted the legislature's proposed plan and explained

that "[t]he legislative adoption of Public Act 807 tips the scales in favor of the plan in Exhibit B-1, which provides districts essentially as outlined by the legislature, with adjustments necessary to bring about virtually complete population equality." *Id.* at 965. Recognizing the constitutionally protected role of the legislature in redistricting, the court emphasized that the plan it adopted had "the added advantage that it is basically the plan adopted by the legislature." *Id.*

Similarly, in *Skolnick v. State Electoral Bd. of Ill.*, 336 F. Supp. 839 (N.D. Ill. 1971), an impasse occurred after a congressional plan had passed the Illinois House but stalled out in the Senate. The court, in fashioning a remedial plan, considered four proposed plans—including one submitted by three U.S. House Representatives that "was, with one minor exception, the same as the one passed by the Illinois House and introduced into the Senate" but not passed. *Id.* at 842. The court selected that plan because it satisfied the required criteria and, in part, because it had received the "approval of one house of the legislature." *Id.* at 846.

So too, the House Plan here should receive special consideration, notwithstanding any potential Governor veto, because it best reflects state policies and the people's preferences. "[T]he fundamental principle is that reapportionment is primarily a legislative function and that the courts should defer to the legislative judgment where constitutional and statutory standards have been satisfied." *In re Ross Twp. Election Dist. Reapportionment*, 489 A.2d 297, 302–03 (1985), *aff'd*, 514

Pa. 41, 522 A.2d 553 (Pa. 1987); *see also Newbold v. Osser*, 230 A.2d 54, 59 (Pa. 1967) (recognizing "the importance of permitting reapportionment by the Legislature wherever possible").

The House Plan has been submitted by both the legislative leaders of the Pennsylvania House of Representative and the Senate for adoption by this Court so it has support of the General Assembly. The Pennsylvania House of Representatives passed a plan through a full deliberative and transparent process. And there is still time for the Senate to likewise pass the map as it has already received first and second consideration with time for third consideration before the end of the month. The House Plan, which as discussed more fully below, closely adheres to traditional redistricting principles, best reflects the will of the people as it was passed by their elected representatives. None of the other plans Republican House Leaders are aware of have been subjected to this open and democratic process, and one suspects many of the plans submitted by other parties in this case have been drawn behind closed doors without any opportunity for comment. At a minimum, the House Plan should receive special consideration. And given that the plan adheres to traditional redistricting principles as well as the Governor's stated principles, any ultimate veto by the Governor can be seen only as a partisan political ploy. This Court should adopt the House Plan regardless of whether it is ultimately vetoed by the Governor.

D. The House Plan Was Drawn Without Partisan Data and Consistent with the Traditional Redistricting Criteria in Pa. Const., Art. II, § 16 and this Court's Decision in *League of Women Voters of Pa. v. Commonwealth.*

The constitutional criteria in Art. II, § 16 of the Pennsylvania Constitution – equal population, contiguity, compactness, and avoiding political subdivisions splits except where absolutely necessary – were held in *LWV* to be appropriate benchmarks in determining whether a congressional districting plan dilutes the votes of Pennsylvania's citizens. In addition, the Governor's Redistricting Advisory Council has recognized that federal and state law require compliance with these same elements.[12] The House Plan does exceptionally well on these traditional redistricting factors.

First, the House Plan has a population deviation of +/- one, as good as can be achieved.[13] Second, the map contains contiguous and compact districts. Indeed, the average Polsby-Popper score for the proposed map is .324, which is very similar to the plan adopted by the Pennsylvania Supreme Court in 2018 which is .327.[14] In

[12] *See* Pennsylvania Redistricting Advisory Council, Redistricting Principles, attached as **Exhibit G**; also available at: https://www.governor.pa.gov/congressional-districts-map-proposals/#fair-maps (last visited Jan. 24, 2022).
[13] *See* Exhibit I, Schaller Aff., at Ex. 2, p. 1 (Report of Legislative Data Processing Center on H.B. 2146).
[14] *See* Remedial Plan Compactness Report available at: https://www.pacourts.us/Storage/media/pdfs/manual_uploads/file-6844.zip?cb=c50222 (last visited Jan. 24, 2022). *See also* Exhibit I, Schaller Aff., at Ex. 3 (Report of Compactness Scores for H.B. 2146).

other words, the House Plan is as compact as a map that the Pennsylvania Supreme Court previously adopted.

Finally, the House Plan splits only 15 counties with 18 total splits.[15] This is very similar to the current plan adopted by the Pennsylvania Supreme Court in 2018 that splits 14[16] counties 19 times. It likewise splits fewer municipalities than the current map. The proposed map splits only 16 municipalities with a total of only 18 splits.[17] The current map adopted in 2018, however, splits 18 municipalities a total of 19 times.[18] A certain number of municipal splits are necessary to reach population equality. Thus, it is not only important to examine the total splits, but which municipalities are split.

Philadelphia is the only municipality in the Commonwealth that is larger than the population of a single congressional district. Thus, it must be split into two districts. The remainder of municipalities split in the House Plan are small in population. *See* Report of Michael ("Barber Rep.") at 16, attached as **Exhibit H.**

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[15] *See* Exhibit I, Schaller Aff., at Ex. 2 (Report of Legislative Data Processing Center on H.B. 2146, "Counties Split by Congressional Districts").

[16] *See* Remedial Plan Split Report, available at: https://www.pacourts.us/Storage/media/pdfs/manual_uploads/file-6844.zip?cb=c50222 (last visited Jan. 24, 2022). In *LWV*, the Pennsylvania Supreme Court recognized that the number of counties split was only 13 because "[a]n additional county split may appear in some GIS program calculations, but that is due to the fact that a non-contiguous Chester County census block with zero population is located inside Delaware County. That census block and its adjoining water is appropriately placed inside the district that contains Delaware County." 181 A.3d 1083, 1087 n. 10 (2018).

[17] *See* Exhibit I, Schaller Aff., at Ex. 2 (Legislative Processing Data Center Report, "Places Split By Congressional Districts").

[18] *See id*.

These splits were necessary to reach population equality and have minimal, to zero, impact on the likely partisan outcomes of the map. *See also* Ex. I, Schaller Aff. at Ex. 4, Precinct Split Reports for H.B. 2146 (reflecting precinct population splits).

Additionally, although not a stated goal of HB2146, following traditional redistricting criteria also resulted in the creation of two districts with a minority voting age population greater than 50% including one with a Black voting age population over 50%. Barber Rep. at 35, Table 2.

E. Although Not a Requirement of the Constitution, the House Plan is Demonstrably Fair Under Numerous Partisan Fairness Measures.

In *League of Women Voters*, the Pennsylvania Supreme Court held that "when . . . it is demonstrated that, in the creation of congressional districts, these neutral criteria have been subordinated, in whole or in part, to extraneous considerations such as gerrymandering for unfair partisan political advantage, a congressional redistricting plan violates Article I, Section 5 of the Pennsylvania Constitution." 645 Pa. at 122. As demonstrated above, the House Plan adheres to traditional redistricting criteria. But as demonstrated further below, it also does not give any unfair political advantage to any party. To the contrary, the House Plan is fair and gives both major political parties an opportunity to translate their votes into seats.

One way to evaluate the partisan fairness of a map is by comparing it to a set of simulated maps that follow only traditional redistricting criteria. This set of simulated districts is helpful because it provides a set of maps to which one can

compare the proposed map that also accounts for the geographic distribution of voters in the state. Because voters are not distributed evenly across Pennsylvania, one cannot evaluate the fairness of a proposed plan without an apples-to-apples comparison. In other words, if a plan is not evaluated against a non-partisan set of maps, then potential issues or red flags in the map may not at all be due to partisan gerrymandering, but rather the geographic distribution of voters in the state. Barber Rep. at 11. This process has been recognized in a variety of redistricting cases including in Pennsylvania. Barber Rep. at 11-12.

Dr. Michael Barber – Associate Professor of Political Science at Brigham Young University – prepared a set of 50,000 simulated maps using only the traditional redistricting criteria of equal population, compactness, contiguity, and minimizing political subdivision splits. Barber Rep. at 13-14. Dr. Barber's results demonstrate that the House Plan follows these traditional redistricting criteria similar to that of the simulated plans. Barber Rep. at 16, Table 1. Moreover, his analysis demonstrates that, if anything, the House Plan is more favorable to Democrats.

The proposed plan is predicted to result in 9 Democratic-leaning seats and 8 Republican-leaning seats using an index of statewide elections from 2012 to 2020. Barber Rep. at 23, Figure 3. That result occurs in 32.1% of the 50,000 simulated plans. *Id*. The most common outcome, however, is 9 Republican-leaning seats and 8 Democratic-leaning seats, occurring in 34.9% of the 50,000 simulated maps. *Id*.

In other words, using that index of elections, the House Plan is predicted to result in an additional Democratic-leaning seat than the most common outcome in the 50,000 plans simulated created without use of any partisan data. As Dr. Barber concludes:

> Recall that in using the simulations we are comparing the proposed map to a set of maps drawn by the computer using only those criteria that I instructed the algorithm to follow - namely the pre-specified nonpartisan criteria of equal population, contiguity, geographic compactness and a preference for fewer county splits. Both the HB2146 plan and the simulations account for the unique political geography of Pennsylvania. Doing so shows us that the HB2146 plan is within the middle portion of simulation results and if anything leans slightly towards the Democratic party by generating 9 Democratic-leaning districts rather than 8, which is the modal outcome in the simulations. By no standard definition would the plan be considered an outlier.

Barber Rep. at 22 (emphasis added). However, using a partisan index of 2014-2020 statewide elections, the House Plan is predicted to result in 8 Democratic-leaning seats and 9 Republican-leaning seats, showing how the House Plan is fair and can flip seats depending on different election outcomes. Barber Rep. at 44 (App'x A).

Dr. Barber also analyzed the House Plan under various other partisan fairness metrics commonly utilized by political scientists to test the partisan fairness of a districting map. The downside with many of these metrics, however, is that they do not take into account the political geography of the state. Barber Rep. at 28, 31. Yet, they still all demonstrate that the House Plan is fair.

Dr. Barber calculates that the House Plan has a mean-median of -.015, which is very close to zero. Barber Rep. at 27-28 & Figure 5. "The median-mean measure

is calculated by taking the median value (the value for which half of the observations are smaller and half the observations are larger) of the partisan index across all 17 districts in a plan and subtracting from that the mean (the simple average) from the median." Barber Rep. at 27. Dr. Barber concludes that

> First, without comparing to the simulations, the HB2146 plan is very nearly unbiased. The median-mean value for the HB2146 plan is -.015, which is very close to zero. In other words, the median district and the mean district in the HB2146 plan are different by less than two percentage points. Second, when comparing the HB2146 plan to the simulations, the HB2146 plan is more favorable to Democratic voters than the vast majority of the simulated districting plans. The HB2146 plan has a median-mean value that is smaller (in absolute value) than 85 percent of the simulated plans. In other words, using only the non-partisan criteria described above to draw the simulated districts, 85% of them generate districts with a greater median-mean value, indicating a less efficient distribution of Democratic voters than the HB2146 plan contains.

Barber Rep. at 28.

Dr. Barber likewise calculates an efficiency gap for the House Plan. The efficiency gap "looks for the degree to which a party's votes statewide are translated into seats in each district." Barber Rep. at 28-29. It analyzes how the parties are wasting votes with any vote for a losing candidate and any vote above 50%+1 considered wasted. Barber Rep. at 29-30. Dr. Barber calculates the efficiency gap for the House Plan is -.02, which is also very close to zero. Barber Rep. at 31. But even more telling, the efficiency gap for the House Plan is more favorable to Democratic voters than the majority of the simulated districting plans. Barber Rep.

at 31-32, Figure 6. It is, in fact, smaller than all other outcomes in the simulated plans. Barber Rep. at 32. This demonstrates that the House Plan eliminates at least some of the natural geographic advantage of Republican voters.

Dr. Barber also performs a uniform swing analysis, which considers how a plan performs under a variety of different electoral environments by randomly adding certain percentages from previous elections uniformly to each district in the plan. Barber Rep. at 33-34. Like the other metrics, Dr. Barber's uniform swing analysis demonstrates that the House Plan is fair. The House Plan is nearly exactly in the middle of the distribution, meaning roughly half of the simulations are worse for Democrats and nearly half are better. Barber Rep. at 34, Figure 7.

In addition, and although not a requirement, the House Plan creates a number of competitive districts. Barber Rep. at 18. Based upon the same set of elections form 2012-2020, Dr. Barber concludes that six of the districts in the House Plan will be competitive – over one-third – with five of them having a partisan index between .48 and .52. Barber Rep. at 21, Figure 2. And, of these competitive districts, four of them lean Democratic. Barber Rep. at 19.

By any number of different metrics, the House Plan is demonstrably fair to both political parties. If anything, the House Plan does much to negate the natural geographic disadvantage faced by Democratic voters being packed in urban cities, and is predicted to result in more Democratic seats than the most common outcome

in the 50,000 simulated plans. By several metrics, it has also been shown that the plan fairly allows the political parties to each translate their votes into seats and creates numerous competitive districts.

In 2018, the Pennsylvania Supreme Court adopted a map that was predicted to result in 9 Republican-leaning seats and 9 Democratic-leaning seats. Indeed, that was the outcome following the 2020 election. Pennsylvania is losing one congressional seat following the 2020 Census. Yet, the House Plan is predicted to result in 9 Democratic-leaning seats and 8 Republican-leaning seats. Barber Rep. at 23, Figure 3. Any claim that the House Plan was drawn to somehow benefit Republican voters and candidates belies common sense.

Finally, although Dr. Barber's simulations were drawn without consideration of racial data, his core finding is robust even when the House Plan is compared to "race conscious" simulations under two scenarios. First, Dr. Barber examined the 1,852 simulated plans from his race-blind sample that likewise created two majority-minority districts including one majority Black district. Barber Rep. at 35-36. Second, Dr. Barber also generated another set of 5,000 simulated race conscious maps where he instructed the model to ensure that every simulated plan had at least three districts that have at least 35% non-white voting age population. Barber Rep. at 36. Dr. Barber's analysis reflects that even when using "race conscious" simulations, a map with 9 Democratic-leaning seats–the same as the House Plan–

remains the most common outcome, occurring in 70.6% of the simulations. Barber Rep. at 37-38, Figure 8.

F. This Court Should Reject Maps That Subordinate Traditional Redistricting Criteria in Favor of a Map That Seeks Proportional Representation.

In *LWV*, the Pennsylvania Supreme Court explained:

> We recognize that other factors have historically played a role in the drawing of legislative districts… However, we view these factors to be wholly subordinate to the neutral criteria of compactness, contiguity, minimization of the division of political subdivisions, and maintenance of population equality among congressional districts. These neutral criteria provide a "floor" of protection for an individual against the dilution of his or her vote in the creation of such districts.
>
> When, however, it is demonstrated that, in the creation of congressional districts, these neutral criteria have been subordinated, in whole or in part, to extraneous considerations such as gerrymandering for unfair partisan political advantage, a congressional redistricting plan violates Article I, Section 5 of the Pennsylvania Constitution.

645 Pa. at 122. Moreover, in analyzing the constitutional criteria for legislative redistricting in Article II, Section 16, the Pennsylvania Supreme Court has stated that "[t]he constitutional reapportionment scheme does not impose a requirement of balancing the representation of the political parties; it does not protect the 'integrity' of any party's political expectations. Rather, the construct speaks of the 'integrity' of political subdivisions, which bespeaks history and geography, not party affiliation or expectations." *Holt v. 2011 Legislative Reapportionment Commission*, 620 Pa. 373, 413-14 (2013).

The Pennsylvania State Government Committee, and the House Republican Caucus, did not use partisan data in consideration of submitted maps, in the selection of Ms. Amanda Holt's citizen's map, or in our adjustments made to the map through amendment. Instead, it focused on traditional redistricting criteria which, as acknowledged by the Court, provide protection against the dilution of votes. The Pennsylvania Supreme Court was very clear: the neutral criteria explicitly provided for by the Pennsylvania Constitution cannot be subordinated to partisan concerns or considerations.

But, a map prioritizing the neutral criteria found in the Pennsylvania Constitution – equal population, compactness and the avoidance of county, municipal, and ward splits unless absolutely necessary – may not result in a proportional congressional delegation due to the spatial dispersion of the political groups throughout the state. That is a fundamental reality of Pennsylvania's current political geography. According to Dave Wasserman, among the foremost nonpartisan redistricting experts in the country, developing a congressional map that provides proportional election outcomes, in Pennsylvania at least, "requires conscious pro-Dem[ocrat] mapping choices."[19] Even the *LWV* opinion acknowledged, when discussing the expert testimony presented by Petitioners'

[19] *See* https://twitter.com/redistrict/status/965719652188991488.

expert (Dr. Warshaw), that "historically Democratic voters tend to self-sort into metropolitan areas." *LWV*, 645 Pa. at 127.

Like many states, Democratic voters in Pennsylvania are clustered in cities and urban areas while Republican voters are more evenly distributed in rural areas. Thus, Democratic voters tend to be more inefficiently packed into homogeneous districts. Political science scholars have thus recognized that to overcome this natural geographic disadvantage "Democrats would need a redistricting process that intentionally carved up large cities like pizza slices or spokes of a wheel, so as to combine some very Democratic urban neighborhoods with some Republican exurbs in an effort to spread Democrats more efficiently across districts."[20] The decision in *LWV*, however, does not allow for such division of cities for political gain in subordination of the traditional redistricting criteria of preserving the lines of political subdivisions.

Thus, any map that prioritizes proportional election outcomes, such as negating a natural geographic disadvantage to achieve proportionality, at the expense of traditional redistricting criteria violates the Pennsylvania Constitution's Free and Equal Elections Clause. Additionally, the U.S. Supreme Court in *Vieth v. Jubelirer,* a case originating in Pennsylvania, stated that "[t]he Constitution provides

[20] Barber Rep. at 10 (quoting Jonathan A. Rodden, *Why Cities Lose: The Deep Roots Of The Urban-Rural Political Divide* 155 (Basic Books 2019)).

no right to proportional representation." 541 U.S. 267, syllabus ¶ 3 (2004). "It guarantees equal protection of the law to persons, not equal representation . . . to equivalently sized groups. It nowhere says that farmers or urban dwellers, Christian fundamentalists or Jews, Republicans or Democrats, must be accorded political strength proportionate to their numbers." *Id*. at 288.

Proportionality is neither a requirement nor a goal of redistricting under federal or state law; in fact, the very nature and design of our representative democracy is in many ways at odds with the pursuit of proportionality. This conflict is heightened by Pennsylvania's constitutional requirement that districts be compact and must avoid county, municipal, and ward splits unless absolutely necessary. Thus, any plan that seeks to achieve proportionality at the expense of traditional redistricting factors should be disregarded.

III. CONCLUSION

For the foregoing reasons, the Republican House Leaders respectfully request that the Court adopt the House Plan, which was passed by the Pennsylvania House of Representatives following a full transparent and deliberative process and therefore reflects the will of the people, complies with traditional redistricting criteria, and has been demonstrated to be fair based upon any number of different metrics.

Dated: January 24, 2022

Respectfully submitted,

/s/ Jeffry Duffy

BAKER & HOSTETLER, LLP
Jeffry Duffy (PA No. 081670)
BNY Mellon Center
1735 Market Street, Suite 3300
Philadelphia, PA 19103
(215) 568-3100 / Fax (215) 568-3439
jduffy@bakerlaw.com

Patrick T. Lewis (OH No. 0078314)*
127 Public Square, Suite 2000
Cleveland, OH 44114
(216) 621-0200 / Fax (216) 696-0740
plewis@bakerlaw.com

Robert J. Tucker (OH No. 0082205)*
200 Civic Center Drive, Suite 1200
Columbus, OH 43215
(614) 462-2680 / Fax (614) 462-2616
rtucker@bakerlaw.com

James G. Mann (PA 85810)
jmann@pahousegop.com
Pennsylvania House of Representatives
Republican Caucus
Main Capitol Building, Suite B-6
P.O. Box 202228
Harrisburg, PA 17120-2228
Telephone: 717.783.1510

* *Admitted Pro Hac Vice*

Counsel for Proposed Intervenors Bryan Cutler, Speaker of the Pennsylvania House of Representatives, and Kerry Benninghoff, Majority Leader of the Pennsylvania House of Representatives

EXHIBIT A

HONORABLE
SETH M. GROVE
196TH LEGISLATIVE DISTRICT

HARRISBURG OFFICE
7 EAST WING
P.O. BOX 202196
HARRISBURG. PA 17120-2196
PHONE: (7I7) 783-2655

DISTRICT OFFICE
2501 CATHERINE STREET
SUITE 10
YORK, PA 17408
PHONE: (717) 767-3947

Website: RepGrove.com
Twitter: @RepGrove
Facebook.com/RepSethGrove

House of Representatives
Commonwealth of Pennsylvania

CHAIR
STATE GOVERNMENT COMMITTEE

COMMITTEES
REPUBLICAN POLICY COMMITTEE

LEGISLATIVE APPOINTMENTS
STATE PLANNING BOARD
YAMPO

January 6, 2022

The Honorable Tom Wolf
Governor
Commonwealth of Pennsylvania
225 Main Capitol Building
Harrisburg, PA 17120

Dear Governor Wolf,

While I am disappointed you have declined my offer to publicly discuss the congressional districts proposed by HB 2146, P.N. 2541 or the Updated Preliminary Citizens' Congressional Redistricting Map, I wanted to address some serious fallacies in your letter to Speaker Culter and Leader Benninghoff. Further, I wanted to ensure you had factual information presented to you from the prime sponsor of the legislation, which I hope you will read prior to making any decisions. We both agree misinformation and disinformation are dangerous and the people of Pennsylvania deserve to know the truth. I think we can also agree that developing congressional maps is a constitutional mandate placed on the General Assembly and the Governor through legislative duties granted by our state and federal constitutions. Whether you decide to actively participate in the legislative process or to sit on the bench is wholly your decision. But if your goal is for the courts to draw the maps, then you are failing the people of Pennsylvania, your constitutional obligations, and treating the independent judiciary as your personal attorneys for hire.

Myth: The districts have a deviation of 9,000 people between the largest and smallest district, and this discrepancy may be successfully challenged as unconstitutional.

Fact: Fair Districts Pennsylvania[1] loaded the districts created by the Updated Preliminary Citizens' Congressional Redistricting Map to DavesRedistricting.org website[2] [3]. Here is their breakdown of population by district, when using the data set of total population provided by the 2020 Census:

[1] Preliminary Maps: Review and Offer Comment | Fair Districts PA
[2] DRA 2020 (davesredistricting.org)
[3] Comments | MyDistricting

District 1	764,865	District 10	764,865
District 2	764,865	District 11	764,865
District 3	764,865	District 12	764,865
District 4	764,865	District 13	764,864
District 5	764,865	District 14	764,865
District 6	764,865	District 15	764,864
District 7	764,864	District 16	764,865
District 8	764,864	District 17	764,865
District 9	764,864		

I can only imagine your claim has been based on an analysis of the bill using the adjusted data set approved by the Legislative Reapportionment Commission for the drawing of General Assembly maps. If that data set is applied to the plan proposed by the Updated Preliminary Citizens' Congressional Redistricting Map, it would result in the nearly 9,000 person 'deviation' you claim.

However, this 'deviation' certainly could not give rise to a claim of unconstitutionality. It has always been the practice of Pennsylvania, as well as nearly every other state, to count prisoners where they reside and where they are counted by the Census. Despite recent changes in some states, it remains obvious that states may continue to constitutionally reapportion districts on the basis of the total population numbers provided by the Census. And in fact, the vast majority of states are continuing to do so.

The unadjusted Census figures provide the data set used by Ms. Amanda Holt in designing her citizen's map, as well as the data set used in making the various improvements enacted through amendment. According to the actual Census numbers, population deviation is zeroed out.

You may wish for the map to use the adjusted data set and you may even decide using an adjusted data set is a litmus test for your approval of a Congressional mapping plan. Those discussions would be a natural part of any dialogue and negotiation between the General Assembly and your office on the basis for an agreed-upon map. That is, if you are willing to engage in any type of honest dialogue.

But you cannot and should not be dishonest with the people of Pennsylvania by claiming that the citizen's map advanced within the Updated Preliminary Citizens' Congressional Redistricting Map contains an unconstitutional population deviation. If anything, it is the constitutionality of adjusted population schemes like the one approved by the Legislative Reapportionment Commission that are more novel, and that present legal and constitutional questions still to be resolved by the courts.

Myth: "When Republican members of the House State Government Committee objected to aspects of the map submitted by Ms. Amanda Holt, Chairman Grove quickly abandoned the pretext of a citizen-selected map and redrew lines in ways that completely undermine the principles that motivated Ms. Amanda Holt's map in the first place. The result is a highly skewed map."

Fact: After the Preliminary Citizens' Congressional Redistricting Map was originally released, it was open for public comment on PaRedistricting.com[4]. There were 399 total comments submitted by citizens. The amendment in committee made changes based on requests by citizens or to increase compactness.:

[4] Comments | MyDistricting

Here are the specific changes:

- District 3 went from 49% African American Voting Age Population to 52.49%. In compliance with traditional redistricting principles, precincts were shifted between District 3 and District 2.
- District 5 was adjusted to increase compactness and we received numerous public comments from Williston Township residents requesting to be part of District 6, so while we increased the compactness of District 5, we also moved Williston Township into District 6.
- Districts 6, 10, 11, & 13 were all adjusted to increase compactness. Further, residents of the Camp Hill area filed numerous public comments requesting to be connected with the Capitol region.
- The "left-hand pinky" in District 10 was eliminated to increase compactness.
- District 9 was adjusted to increase compactness, to ensure the Susquehanna River communities were whole, and to eliminate the "zipper" in Potter County.
- District 7 was shifted back into Monroe County to increase compactness and align new boundaries with the current map developed by the PA Supreme Court.
- District 8 was adjusted to increase compactness.
- District 12 was adjusted to increase compactness, notably the zippers in Butler County were eliminated.
- District 17 was adjusted after receiving citizen feedback on Washington Borough not being in District 17. District 17 and District 14 were adjusted to meet constitutional population requirements.

I specifically addressed these changes at the House State Government Committee voting meeting on Wednesday, December 15. I do not know why your staff did not provide you this information or reach out to me to request this information.

During the committee vote on the Updated Preliminary Citizens' Congressional Redistricting Map, I addressed how the amendment makes overall adjustments to the original map submitted by Ms. Amanda Holt[5]. In both population and land area, the current map is **95%** the same as the original map.[6] [7] Here are tables for your review on comparing the two maps:

[5] http://www.paredistricting.com/Video/Redistricting

[6] Preliminary Plan and Updated Plan Comparison by Population.xlsx (paredistricting.com)

[7] Preliminary Plan and Updated Plan Compactness Comparison.pdf (paredistricting.com)

Compactness Comparison

Citizen's Map Submission				Updated Map - Amendment A03209				*Square Miles % Change Between Citizen's Map Submission & Updated Amendment*
District	*Square Miles*	*Polsby-Popper*	*Reock*	*District*	*Square Miles*	*Polsby-Popper*	*Reock*	
1	713	0.39	0.4	1	713	0.39	0.4	100%
2	65	0.25	0.32	2	65	0.22	0.3	100%
3	56	0.25	0.37	3	56	0.23	0.37	100%
4	399	0.25	0.36	4	399	0.25	0.36	100%
5	499	0.15	0.21	5	339	0.25	0.34	68%
6	1,139	0.12	0.26	6	1,246	0.19	0.38	91%
7	1,038	0.36	0.34	7	1,071	0.37	0.4	97%
8	5,071	0.36	0.42	8	4,979	0.35	0.41	98%
9	7,304	0.28	0.38	9	6,984	0.3	0.33	96%
10	1,825	0.43	0.38	10	1,557	0.44	0.44	85%
11	1,514	0.21	0.35	11	1,455	0.49	0.49	96%
12	9,977	0.23	0.57	12	10,301	0.42	0.62	97%
13	4,932	0.23	0.4	13	5,350	0.29	0.43	92%
14	5,085	0.24	0.38	14	5,051	0.24	0.38	99%
15	308	0.29	0.58	15	308	0.29	0.58	100%
16	4,877	0.4	0.37	16	4,896	0.49	0.38	100%
17	1,249	0.23	0.44	17	1,284	0.24	0.45	97%
							Average	95%

Citizen's Map Submission

Average Compactness Polsby-Popper : 0.27

Average Compactness Reock: 0.38

Updated Map - Amendment A03209

Average Compactness Polsby-Popper : 0.32

Average Compactness Reock: 0.42

Difference between Preliminary Map and Updated Preliminary Map by Population

District	Final Population	Unchanged Population	Preliminary Distrcts that Remains Unchanged
1	764,865	764,865	100.00%
2	764,865	727,974	95.18%
3	764,865	727,974	95.18%
4	764,865	764,865	100.00%
5	764,865	665,110	86.96%
6	764,865	664,660	86.90%
7	764,864	744,414	97.33%
8	764,864	745,298	97.44%
9	764,864	710,269	92.86%
10	764,865	685,726	89.65%
11	764,865	745,299	97.44%
12	764,865	720,103	94.15%
13	764,864	642,606	84.02%
14	764,865	741,290	96.92%
15	764,864	764,864	100.00%
16	764,865	755,133	98.73%
17	764,865	741,290	96.92%
		Average Same	95%

Split Analysis from LDPC					
County		**Municipal**		**Voting Precinct**	
Original	***Update***	***Original***	***Update***	***Original***	***Update***
14 County Splits	15 County Splits	16 Municipalities Split	18 Municipalities Split	11 Precincts Split	19 Precincts Split
16 Total Splits	18 Total Splits	18 Total Splits	18 Total Splits	11 Total Splits	19 Total Splits

As you can see, the Updated Preliminary Citizens' Congressional Redistricting Map is based upon the same pretext and principles as Ms. Amanda Holt's original map. Further, I would urge you to actually watch the Informational Meeting the House State Government Committee held on Thursday, December 9 with Ms. Amanda Holt: https://s3.us-east-2.amazonaws.com/pagopvideo/946333055.mp4. Again, I do not know why your staff did not provide you this information or reach out to me for this information.

Myth: ". . . the council also recommended that I review proposed maps to determine whether their expected performance is proportional to statewide voter preference. The HB 2146 map falls short on this basic measure of partisan fairness."

Fact: In *League of Women Voters of Pennsylvania et. al. vs. the Commonwealth of Pennsylvania (2018)*, the Pennsylvania Supreme Court gave specific criteria for the development of redistricting maps.[8] Specifically, the court explained:

> *"We recognize that other factors have historically played a role in the drawing of legislative districts… However, we view these factors to be wholly subordinate to the neutral criteria of compactness, contiguity, minimization of the division of political subdivisions, and maintenance of population equality among congressional districts. These neutral criteria provide a "floor" of protection for an individual against the dilution of his or her vote in the creation of such districts.*
>
> *When, however, it is demonstrated that, in the creation of congressional districts, these neutral criteria have been subordinated, in whole or in part, to extraneous considerations such as gerrymandering for unfair partisan political advantage, a congressional redistricting plan violates Article I, Section 5 of the Pennsylvania Constitution."*

The Pennsylvania State Government Committee, and the House Republican Caucus, did not use partisan data in our consideration of submitted maps, in the selection of Ms. Amanda Holt's citizen's map, or in our adjustments made to the map through amendment.

Instead, we focused on traditional redistricting criteria which, as acknowledged by the Court, provide protection against the dilution of votes. The Pennsylvania Supreme Court was very clear: the neutral criteria explicitly provided for by the Pennsylvania Constitution cannot be subordinated to partisan concerns or considerations. By demanding a map that is likely to result in a Congressional delegation proportional to some theoretical statewide vote of each party, you are essentially asking us to violate the Constitution as it was interpreted by *League of Women Voters.*

A map prioritizing the neutral criteria found in the Pennsylvania Constitution- compactness and the avoidance of county, municipal, and ward splits unless 'absolutely necessary,' will not, at this time, likely result in a proportional congressional delegation. That is a fundamental reality of Pennsylvania's current political geography. According to Dave Wasserman, among the foremost nonpartisan redistricting experts in the country, developing a congressional map that provides

[8] 194537-feb.19,2018-opinionandorderadoptingremedialplan.pdf (pacourts.us)

proportional election outcomes, in Pennsylvania at least, "requires conscious pro-Dem[ocrat] mapping choices[9]."

By demanding a map that provides proportional outcomes, you are demanding that we violate the Pennsylvania Constitution in developing any map that would be acceptable to you- by ignoring the neutral and explicit criteria found in Article II of the PA Constitution and elevating partisan data, and pro-Democratic mapping choices, above the prioritization of Pennsylvanians' communities and daily lives.

Additionally, the U.S. Supreme Court in *Vieth v. Jubelirer, 541 U.S. 267*, a case originating in Pennsylvania, already addressed concerns regarding proportionality*:*

> *"The Constitution provides no right to proportional representation . . . It guarantees equal protection of the law to persons, not equal representation . . . to equivalently sized groups. It nowhere says that farmers or urban dwellers, Christian fundamentalists or Jews, Republicans or Democrats, must be accorded political strength proportionate to their numbers."*

Proportionality is neither a requirement nor a goal of redistricting under federal or state law; in fact, the very nature and design of our representative democracy is in many ways at odds with the pursuit of proportionality. This conflict is heightened by Pennsylvania's constitutional requirement that districts be compact and must avoid county, municipal, and ward splits **unless absolutely necessary**. Even the *League of Women Voters* opinion acknowledged, when discussing the expert testimony presented by Petitioners' expert (Dr. Warshaw), that "historically Democratic voters tend to self-sort into metropolitan areas." Where the natural political geography of the Commonwealth puts the two in conflict, the pursuit of proportionality cannot prevail over neutral constitutional mandates.

You, as Governor, have constitutional legislative powers and are involved in the mapmaking process. Whether you engage in this process is your decision, but you are constitutionally bound with the General Assembly to administer your powers on an equal basis. Neither the Governor nor the General Assembly can ignore these specific directions by the Pennsylvania Supreme Court to ensure that those involved in the constitutional legislation process adopt acceptable maps.

I would further point out the hypocrisy of demanding proportionality in the name of 'fairness.' In 2018, the political data site *Fivethirtyeight* conducted a redistricting analytics project that it referred to as *The Atlas of Redistricting*.[10] This analysis makes clear that, based on Pennsylvania's recent political geography, a map drawn to pursue proportionality is no different than a map drawn to be the best possible gerrymander to advance Democratic political interests. I encourage you or any Pennsylvanian who has concerns regarding the redistricting process to access this site and see the evidence for themselves.

We have a duty to be honest with the people of Pennsylvania. It is dishonest to claim that our map does not meet your criteria for fairness, when in fact you have established criteria that can only be pursued through an unconstitutional map-making process.

[9] https://twitter.com/redistrict/status/965719652188991488

[10] https://projects.fivethirtyeight.com/redistricting-maps/pennsylvania/

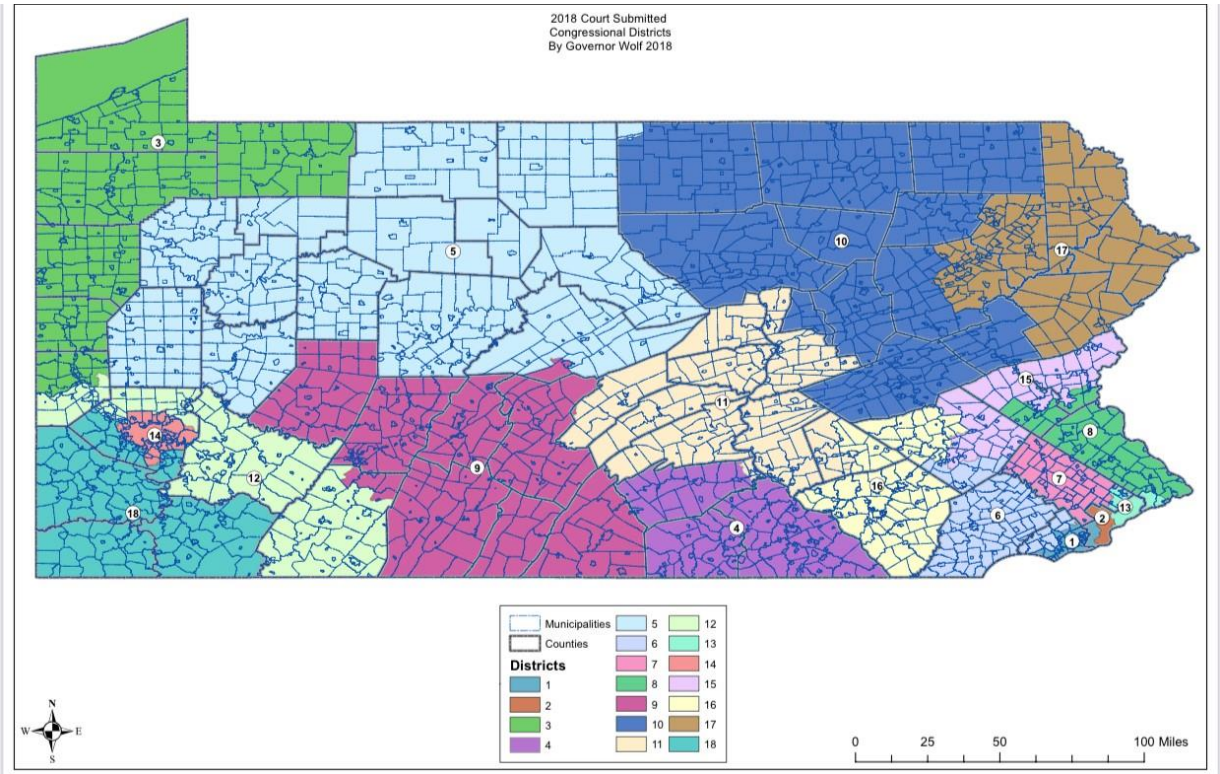
It is even more dishonest to claim that a map may only be 'fair' if it has been drawn to neglect the constitutionally required, apolitical criteria of compactness and the preservation of local communities, and instead to pursue a thinly veiled Democratic gerrymander.

That is what the prioritization of proportionality entails: partisan gerrymandering. If you do not want to participate in partisan gerrymandering, then do not base your decisions on partisan data, and certainly do not subordinate the neutral criteria found in Pennsylvania's Constitution to those partisan concerns. The House Republican Caucus is not doing so, and you should join us in avoiding these mistakes.

Myth: ". . . the revised map splits multiple communities of interest, including splits in Luzerne, Dauphin, Philadelphia, and Chester counties that do not appear to be motivated by compelling legal principles, but rather by a desire to make districts more favorable to Republican Candidates."

Fact: Neither the House State Government Committee nor the House Republican Caucus have used political data in any portion of developing the Updated Preliminary Citizens' Congressional Redistricting Map. It is our understanding that this also applies to Ms. Amanda Holt and her development of her original map. The House State Government Committee and the House Republican Caucus will not be involved in any map or development of a map which are in violation of the established principles laid in any court case, the U.S. and Pennsylvania Constitutions, and federal and state laws.

In 2018, you submitted a map to the Pennsylvania Supreme Court.[11] Three years later, not only do you not want to participate in the legislative process, but you are also going out of your way to claim that your only recourse is a veto.



[11] League of Women Voters, et al. v. the Commonwealth of Pennsylvania, et al. – 159 MM 2017 | Cases of Public Interest | News & Statistics | Unified Judicial System of Pennsylvania (pacourts.us)

Your 2018 map county split analysis:[12]

Gov. Wolf Map County Split Analysis		
Allegheny County – 2		Lehigh County – 2
Beaver County – 2		Luzerne County – 2
Berks County – 3		Mifflin County – 2
Bucks County – 2		Montogomery County – 3
Centre County – 2		Northampton County – 2
Cumberland County – 2		Philadelphia City – 3
Delaware County – 2		Somerset County – 2
Lebanon County - 2		Tioga County – 2
16 Counties Split 35 Times		

The Updated Preliminary Citizens' Congressional Redistricting Map has a total of 15 counties split with 18 total splits and only one county is split three times, where your 2018 map has three counties split three times. Further, under the Updated Preliminary Citizens' Congressional Redistricting Map, Philadelphia City is only split twice unlike your 2018 proposed congressional redistricting map. I fail to see how in 2021 you have issues with the county splits contained in the Updated Preliminary Citizens' Congressional Redistricting Map, when there are fewer splits than in your proposed 2018 congressional redistricting map. Even more puzzling, two of the counties you are questioning, Luzerne County and City of Philadelphia, were also split in your proposed map.

Myth: ". . . the manner in which Chairman Grove has conducted the recent steps of the crucial process has been disgraceful. Despite his promise to conduct the "most open and transparent congressional redistricting process sin PA history," it is not clear that he consulted with even the Republican members of his own Committee prior to selecting the Ms. Amanda Holt map – much less the Democratic members, who have been completely cut out of the process. And despite Chairman Grove's attempt make up a narrative as he goes, there is no explanation for the changes that were made beyond the fact that some of them seem to correlate with complaints aired by members of his Committee when the original map was released."

Fact: If you or your staff took the time to engage in the process, you would find we did institute the most open and transparent congressional redistricting process in the history of the commonwealth. As a matter of fact, it has been so good, you copied it.[13]


The Center Square

TOP STORY

Pennsylvania governor launches familiar public congressional redistricting effort

Gov. Tom Wolf Commonwealth Media Services

By Christen Smith | The Center Square

Sep 13, 2021

(The Center Square) – Pennsylvania Gov. Tom Wolf launched a website on Monday to collect public input about the state's new congressional district map in an effort that resembles House Republicans' own **strategy** for redrawing the boundaries.

[12] md-report.pdf (pa.gov)

[13] https://www.thecentersquare.com/pennsylvania/pennsylvania-governor-launches-familiar-public-congressional-redistricting-effort/article_3e9deb4e-14dd-11ec-af4e-8310de694fa1.html

If you or your staff want any information on the House redistricting process, just go to www.PaRedistricting.com. It has all the testimony received from our hearings, citizen drawn communities of interest, public comment, all the verified citizens drawn maps, all the pertinent information on the preliminary map including the testimony from Ms. Amanda Holt, and the voting meeting of the Updated Preliminary Citizens' Congressional Redistricting Map, during which I went into specific detail on the amendment to HB 2146. House Democrats, your Administration and the public had full access to this information. Unfortunately, you and your staff also failed to engage me or the committee at any time thus I am not surprised by these egregious accusations.

As this letter already contains the exact explanation I will not reiterate, but recommend you view these two hearings, both of which are found on www.PaRedistricting.com:

- House State Government Committee Information Hearing with Ms. Amanda Holt: https://s3.us-east-2.amazonaws.com/pagopvideo/946333055.mp4
- House State Government Committee Voting Meeting on HB 2146: http://www.paredistricting.com/Video/Redistricting

Myth: ". . . I have significant concern about the timeline for the final passage of this map. As Acting Secretary Degraffenreid noted in a June 28, 2021 letter to the leaders of the four legislative caucuses as well as the Chair of the Legislative Reapportionment Commission, the Department of State and county boards of elections have historically needed at least three weeks to prepare the Statewide Uniform Registry of Electors ("SURE") to facilitate the nomination petition process, which is statutorily mandated to begin on February 15, 2022."

Fact: When the PA Supreme Court adopted their maps in 2018, it took the Department of State far less time to update the SURE system. I have full confidence we will get a congressional redistricting map to your desk within your department's arbitrary date of January 24th.

In closing, we have a historic opportunity to sign a non-partisan, citizens' Congressional redistricting map into law. We have a historic opportunity to reset how we develop and approve Congressional redistricting maps. I am willing to work with you and hope you are able to put any issues you have with me aside for the greater good of our beloved Commonwealth. The decision is yours. I hope you side with the people of Pennsylvania over political partisanship.

Sincerely,

Seth Grove

Seth M. Grove
State Representative
196th District

Cc: Speaker Bryan Cutler
House Majority Leader Kerry Benninghoff
President Pro Tempe Jake Corman
Senate Majority Leader Kim Ward
Geoff Moulton, Court Administrator of Pennsylvania

EXHIBIT B

Regional Hearings

Each hearing link includes video of the completed hearing, schedule and written testimony, and counties included in the region.

Disclaimer: The general geographic regions are being provided for guidance only to help Pennsylvania residents determine the regional hearing(s) in which they want to participate. Generally, testifiers should participate in the hearing(s) most closely associated with their primary place of residence.

COMPLETED HEARINGS

Congressional Redistricting 101: Harrisburg
Thursday, July 22

Stakeholder Input: Harrisburg
Thursday, July 22

Regional Hearing: Northwest
Tuesday, August 24

Regional Hearing: Allegheny
Wednesday, August 25

Regional Hearing: Southwest
Thursday, August 26

Regional Hearing: North Central
Tuesday, Oct. 12

Regional Hearing: South Central
Wednesday, Oct 13

Regional Hearing: Northeast
Monday, Oct. 18

Regional Hearing: Southeast
Tuesday, Oct. 19

Regional Hearing: Philadelphia
Wednesday, Oct. 20

Hearing on Congressional Redistricting and Census Data Analysis
Thursday, Oct. 28

Informational Meeting on Citizen Map
Thursday, Dec. 9

Voting Meeting on Preliminary Plan
Monday, Dec. 13

Voting Meeting on Citizens Map
Wednesday, Dec. 15

Sign up for updates here.

EXHIBIT C

Thank You for Providing Your Input

Thank you to every resident who submitted their own congressional district map for consideration, shared with the Chair of the House State Government Committee about their community of interest or took the time to comment on the 2018 Supreme Court map with our online mapping tool. Your involvement to date in this once-in-a-decade process has been very much appreciated.

While the window for providing input into map development is closed, residents can view previously submitted maps, communities of interest and public comments at the links below:

Click here to view validated, publicly submitted maps.

Click here to view communities of interest identified by Pennsylvanians across the Commonwealth.

Click here to read the comments received on the current congressional district map, drawn by the PA Supreme Court in 2018.

Click here to view additional public comments received by the Chair.

EXHIBIT D

Grove Announces Citizen Map Selected as Preliminary Congressional Plan, Invites Public Comment

DEC. 08, 2021

HARRISBURG – Rep. Seth Grove (R-York), chairman of the House State Government Committee, announced today that following the most open and transparent congressional redistricting process in Pennsylvania history, the committee has selected a citizen map as its preliminary congressional plan. The preliminary plan, submitted through the committee's online mapping tool by Lehigh County resident Amanda Holt, is now posted for public comment.

"Over the last several months, advocates and every-day Pennsylvanians told us they didn't want the process of years' past," Grove said. "The people of Pennsylvania asked for increased public involvement, a map that was drawn by people, not by politicians, and the opportunity to offer comment on a preliminary plan before a final vote was taken."

"Today, I am proud to announce that a citizen's map, not a map drawn by legislators, has been introduced for consideration by the General Assembly, and for the first time in Pennsylvania history is posted for public view and comment."

Holt's map was one of the 19 verified statewide maps submitted to the committee through its online mapping tool. To view the preliminary map, residents should visit paredistricting.com and click on "Preliminary Map." There, users will be able to view the map and offer public comments.

"The introduction of this map is a starting point, and we look forward to hearing the thoughts of residents across Pennsylvania about how this map would impact their community and how they are represented in Washington, D.C.," Grove said.

Holt's map was introduced by Grove because it was drawn without political influence; complies with constitutionally mandated criteria; satisfies equal population requirements; limits splits of townships, municipalities and other local subdivisions; and is comprised of districts that are compact and contiguous, all of which were highlighted as priorities by the majority of testifiers and residents throughout the committee's extensive regional hearings and online public input process.

"This is a historic step forward in transparency and good government," Grove said.

Grove also announced the House State Government Committee would be holding two meetings in Harrisburg on the preliminary plan:

- **Informational meeting** on Thursday, Dec. 9, at 5:30 p.m. in Room G50, Irvis Office Building.
- **Voting meeting** on Monday, Dec. 13, at 8 a.m. in Room 523, Irvis Office Building.

The meetings will also be livestreamed at paredistricting.com.

"I look forward to kicking off the legislative process and getting a map before the people of Pennsylvania for feedback and consideration," Grove said.

In addition to the ability to comment on the preliminary citizen map, residents can also watch or read testimony from one of the 12 previously held hearings and view previously submitted statewide maps, communities of interest and public comments.

Representative Seth Grove
196th District

ggross@pahousegop.com
RepGrove.com / Facebook.com/RepSethGrove

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District Office

2501 Catherine St.
York, PA 17408
717-767-3947
Mon – Fri 8:30 a.m. - 4:30 p.m.

Capitol Office

7 East Wing
PO Box 202196
Harrisburg, PA 17120
717-783-2655

EXHIBIT E

Pennsylvania General Assembly
https://www.legis.state.pa.us/cfdocs/billinfo/bill_history.cfm?syear=2021&sind=0&body=H&type=B&bn=2146
01/24/2022 01:46 PM

Bill Information - History

House Bill 2146; Regular Session 2021-2022

Sponsors: GROVE

Printer's No.(PN): 2541* , 2491

Short Title: An Act apportioning this Commonwealth into congressional districts in conformity with constitutional requirements; providing for the nomination and election of Congressmen; and requiring publication of notice of the establishment of congressional districts following the Federal decennial census.

Actions:

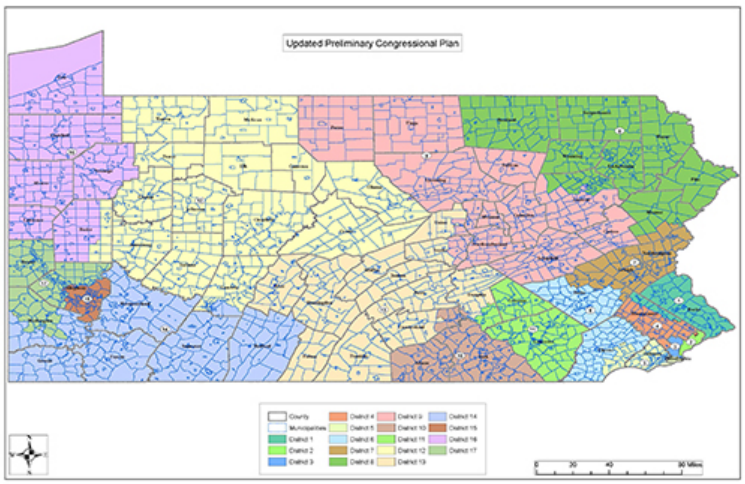
PN 2491	Referred to STATE GOVERNMENT, Dec. 8, 2021
PN 2541	Reported as amended, Dec. 15, 2021
	First consideration, Dec. 15, 2021
	Laid on the table, Dec. 15, 2021
	Removed from table, Jan. 10, 2022
	Second consideration, Jan. 11, 2022
	Re-committed to APPROPRIATIONS, Jan. 11, 2022
	Re-reported as committed, Jan. 12, 2022
	Third consideration and final passage, Jan. 12, 2022 (110-91)
	(Remarks see House Journal Page), Jan. 12, 2022
	In the Senate
	Referred to STATE GOVERNMENT, Jan. 12, 2022
	Reported as committed, Jan. 18, 2022
	First consideration, Jan. 18, 2022
	Second consideration, Jan. 19, 2022
	Re-referred to APPROPRIATIONS, Jan. 24, 2022

* denotes current Printer's Number
How to Read a Bill About PDF Documents

EXHIBIT F

Updated Preliminary Congressional Plan

On Dec. 8, 2021, Chairman Grove announced a citizen map was selected as the preliminary congressional plan. On Dec. 15, the citizen's map was updated in committee to incorporate additional public feed back.



Click here for larger map

VIEW AND COMMENT ON THE UPDATED PRELIMINARY PLAN

To view and comment on the updated preliminary congressional plan, click here.

Click here to download the updated preliminary plan shapefiles.

Click here to download the preliminary plan block equivalency file.

Click here to view a preliminary plan and updated plan comparison by population.

Click here to view a compactness comparison between the preliminary plan and the updated plan.

Click here to view additional public comments received to date on the updated preliminary plan outside of the online mapping tool.

The updated preliminary plan took into consideration input from the citizens across Pennsylvania. To read the comments received on the initial preliminary plan, click here.

Click here to watch previously held informational meetings and hearings on the preliminary plan.

EXHIBIT G

Pennsylvania Redistricting Advisory Council

Redistricting Principles

Under existing state law, Pennsylvania's congressional districts are drawn by the General Assembly and passed as a regular statute, subject to veto by the Governor. On September 13, 2021, Governor Wolf issued Executive Order 2021-05 establishing the Pennsylvania Redistricting Advisory Council and charging the Council with developing recommendations for the Governor in evaluating a congressional district map passed by the General Assembly.

The Council has identified three types of principles that it believes the Governor should adopt in determining the fairness and propriety of any proposed congressional map presented by the General Assembly. The first are legal principles, drawn from settled constitutional and legal requirements, that serve as a minimal floor of protection against improper maps. Second are principles of representation, three in particular, as described below, that are crucial to assuring equal representation and fairness in a resulting map. Finally, there are procedural principles that should be in place to ensure that Pennsylvania's congressional districts are drawn through a fair and transparent process.

Legal Principles

As an initial step in analyzing a proposed congressional map, the Council believes that the Governor should evaluate the map's fidelity to traditional neutral criteria that form a "floor" of protection against the dilution of votes in the creation of districts. The Free and Equal Elections Clause of the Pennsylvania Constitution requires that each congressional district be composed of compact and contiguous territory and minimize the division of political subdivisions as practicable.

The Pennsylvania Supreme Court has noted that the goal is to create "representational districts that both maintain the geographical and social cohesion of the communities in which people live and conduct the majority of their day-to-day affairs." In addition, any proposed map must comply with the requirements of federal law, including most specifically, the constitutional requirement to maintain population equality among congressional districts and the provisions of the Voting Rights Act as they apply in Pennsylvania. *These federal and state legal principles require that, in evaluating a proposed Congressional map, the Governor ensure that these legally mandated elements are complied with, along with other principles noted below.*

- Maintenance of population equality among congressional districts refers to the principle that that each district should be as nearly equal in population as practicable. As a result of the 2020 Census, the ideal Congressional district in Pennsylvania will contain 764,865 residents. *In evaluating a map, the Governor should ensure that the deviations in populations between districts comply with the requirements of the Constitution.*

- Assurance of contiguity refers to the principle that all territory within a district connect to the rest of the district. *In evaluating a map, the Governor should ensure that all parts of the district are in contact with another part of the district and should disfavor any proposed map in which territory is only connected at a narrow single point.*

- Maintaining compactness refers to the principle that the boundaries of a district should not be irregularly shaped or sprawl unnecessarily from a central area. Evaluation of compactness tends to focus formulaically on the relationship of the district's perimeter to its area, or the extent to which the district spreads from a central core. *In evaluating a proposed map, the Governor should prioritize plan level geographic compactness unless dispersion is required to advance another positive districting principle, such as preserving communities of interest or avoiding political-subdivision splits.*

- Minimization of division of political subdivisions refers to the principle that local political subdivisions–such as counties or, where possible, municipalities and school districts– not be arbitrarily split into multiple districts. *In evaluating a proposed map, the Governor should prioritize fewer subdivision splits unless a division is necessary to preserve a cohesive–and clearly identified–community of interest.*

- Finally, in certain circumstances, but only in those circumstances, the Voting Rights Act requires the creation of "majority-minority" districts to prevent the denial or abridgement of the right to vote based on race, color, or membership in a language minority. *In evaluating a proposed map, the Governor should independently consider whether the Voting Rights Act requires the creation of proposed majority-minority districts.*

Principles of Representation

Assuming a proposed congressional map from the General Assembly complies with the principles above, the Governor should further evaluate the map to ensure that it does not unfairly dilute the power of a particular group's vote. Essential to this evaluation are three additional principles of representation which contribute to the ultimate fairness of a proposed map: communities of interest should be maintained, the composition of the congressional delegation should be proportional to statewide voter preference, and the map should be responsive to changing voter preference. These principles operate as a further check on the two features of partisan gerrymandering: the splitting of communities of voters across several districts to dilute their voting power (cracking), and squeezing as many voters of one political interest into just one or a few districts, thereby wasting their votes in those districts, which decreases the likelihood of success elsewhere (packing). *In evaluating a proposed map, the Governor should consider the extent to which these principles of representation are met, when compared to other potential maps that could have been drawn.*

- Communities of interest are contiguous geographic areas or neighborhoods in which residents share common socio-economic and cultural interests which the residents of the region may seek to translate into effective representation. Examples of shared interests include those common to rural, urban, industrial or agricultural areas, where residents have similar work opportunities, share similar standards of living, use the same transportation facilities, or share common environmental, healthcare, or educational concerns, among others. In statewide listening sessions held by the Council, Pennsylvanians frequently emphasized communities of interest focused around school districts, colleges, industrial corridors, and commuting patterns, and urged particular attention to emerging communities of interest and demographic groups that are growing in Pennsylvania. While a community of interest may be contained within a single political subdivision, they often extend across borders within a region, and may be better represented by regional planning entities such as Councils of Governments. *In evaluating a proposed map, the Governor should consider the extent to which a map preserves cohesive communities of interest, particularly where failure to do so cannot be easily explained by compelling neutral factors outlined above.*

- Ensuring partisan fairness and proportionality requires that parties have the opportunity to translate their popular support into legislative representation with approximately equal efficiency such that the proportion of districts whose voters favor each political party should correlate to the statewide preferences of the voters. Partisan fairness requires preventing structural advantage from being baked into the map so as to allow one party to more efficiently translate votes into seats in the delegation. *In evaluating a proposed map, the Governor should analyze how it would have performed in a full range of prior statewide elections when compared to other potential maps which could have been drawn. A map with expected performance proportional to statewide voter preference should be favored as comporting with broad principles of fairness.*

- Responsiveness and competitiveness require that there are enough districts “in play” that changes in electoral sentiment can translate into clear changes in the overall composition of the congressional delegation. A competitive district is one in which the electoral outcome is close enough that the district can change with shifting voter preferences. A responsive map is one with enough competitive districts to allow for changes in the composition of the delegation with changes in proportion of votes for the parties. Voters should not be deprived of their choice and a fair opportunity to elect candidates they support. *In evaluating a proposed map, the Governor should analyze how it would have performed in a full range of prior statewide elections and favor a map with districts where partisan swings were reflected in changes in the congressional delegation.*

Principles of Process

Beyond both the floor of protection and the additional checks on a partisan gerrymander endorsed above, it is critical that the map passed by the General Assembly be the result of a process that provides an opportunity for meaningful public input, comment, and participation. In the Council's listening sessions, many participants pointed to the public processes that have accompanied citizen-mapping efforts over the past several months as exemplifying the level of transparency that is expected. Procedural fairness begins with strong engagement with members of the public as to their priorities for the redistricting process, with particular focus on hearing about what ordinary Pennsylvanians identify as their communities of interest.

And when the General Assembly's proposed map is shared publicly, a process of robust public engagement and transparency dictates that there be a public record accompanying the map setting forth why specific decisions were made as they were. For instance, if certain counties were split in the map the public is entitled to know the justification for doing so. Likewise, if the proposed map prioritizes specific communities of interest, the public should be told what those communities are and how they were defined. If majority-minority districts are created, there should be a discussion of the factors that resulted in the minority group's denial of equal opportunity to participate in the political processes. *In evaluating a proposed map, the Governor should disfavor any map that is made public and passed quickly with limited legislative debate or opportunity for public consideration. In addition, the Governor should more closely scrutinize any map that is not accompanied by a public record or narrative which explains the rationale for decisions which were made.*

EXHIBIT H

Report on Proposed Congressional Redistricting Plan from the Pennsylvania House Republican Caucus

Dr. Michael Barber
Brigham Young University
724 Spencer W. Kimball Tower
Provo, UT 84604
barber@byu.edu

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1 Introduction and Qualifications

I have been asked by counsel to review the Pennsylvania House of Representatives Republican Caucus' proposed congressional redistricting plan (hereafter, "HB2146 plan") and compare it to a set of simulated redistricting plans across a number of factors commonly considered in the redistricting process and in redistricting litigation. To do this, I implement a publicly available and peer-reviewed redistricting simulation algorithm to generate 50,000 simulated district maps, each containing 17 congressional districts. The redistricting algorithm generates a representative sample of districts by following neutral redistricting criteria without regard to partisan data. In this way, the simulated districts establish a comparison set of plans that use purely non-partisan redistricting inputs. I then compare the simulated plans against the proposed plan using a number of commonly used redistricting criteria to assess whether the proposed plan is consistent with what one would expect to see in a redistricting plan composed without reference to any racial or partisan considerations.[1] Across all measures, the proposed plan is well within the distribution of simulated plans and is unbiased, with a slight lean towards favoring Democratic candidates.

I am an associate professor of political science at Brigham Young University and faculty fellow at the Center for the Study of Elections and Democracy in Provo, Utah. I received my PhD in political science from Princeton University in 2014 with emphases in American politics and quantitative methods/statistical analyses. My dissertation was awarded the 2014 Carl Albert Award for best dissertation in the area of American Politics by the American Political Science Association.

I teach a number of undergraduate courses in American politics and quantitative research methods.[2] These include classes about political representation, Congressional elections, statistical methods, and research design.

I have worked as an expert witness in a number of cases in which I have been asked

[1] In a later section I consider the impact of considering only the simulations that meet certain thresholds with regards to the racial composition of some districts.

[2] The political science department at Brigham Young University does not offer any graduate degrees.

to analyze and evaluate various political and elections-related data and statistical methods. Cases in which I have testified at trial or by deposition are listed in my CV, which is attached to the end of this report. I have previously provided expert reports in a number of cases related to voting, redistricting, and election-related issues: *Nancy Carola Jacobson, et al., Plaintiffs, vs. Laurel M. Lee, et al., Defendants. Case No. 4:18-cv-00262 MW-CAS (U.S. District Court for the Northern District of Florida); Common Cause, et al., Plaintiffs, vs. Lewis, et al., Defendants. Case No. 18-CVS-14001 (Wake County, North Carolina); Kelvin Jones, et al., Plaintiffs, v. Ron DeSantis, et al., Defendants, Consolidated Case No. 4:19-cv-300 (U.S. District Court for the Northern District of Florida); Community Success Initiative, et al., Plaintiffs, v. Timothy K. Moore, et al., Defendants, Case No. 19-cv-15941 (Wake County, North Carolina); Richard Rose et al., Plaintiffs, v. Brad Raffensperger, Defendant, Civil Action No. 1:20-cv-02921-SDG (U.S. District Court for the Northern District of Georgia); Georgia Coalition for the People's Agenda, Inc., et. al., Plaintiffs, v. Brad Raffensberger, Defendant. Civil Action No. 1:18-cv-04727-ELR (U.S. District Court for the Northern District of Georgia); Alabama, et al., Plaintiffs, v. United States Department of Commerce; Gina Raimondo, et al., Defendants. Case No. CASE NO. 3:21-cv-00211-RAH-ECM-KCN (U.S. District Court for the Middle District of Alabama Eastern Division); League of Women Voters of Ohio, et al., Relators, v. Ohio Redistricting Commission, et al., Respondents. Case No. 2021-1193 (Supreme Court of Ohio); Harper, et al., Plaintiffs, v. Hall et al., Defendants. Case No. 21-CVS-015426 (Wake County North Carolina).* I have also recently testified before the Pennsylvania Legislative Reapportionment Commission regarding the LRC's proposed map for the Pennsylvania House of Representatives.

In my position as a professor of political science, I have conducted research on a variety of election- and voting-related topics in American politics and public opinion. Much of my research uses advanced statistical methods for the analysis of quantitative data. I have worked on a number of research projects that use "big data" that include millions of observations, including a number of state voter files, campaign contribution lists, and data

from the US Census. I have also used geographic information systems and other mapping techniques in my work with political data.

Much of this research has been published in peer-reviewed journals. I have published nearly 20 peer-reviewed articles, including in our discipline's flagship journal, *The American Political Science Review* as well as the inter-disciplinary journal, *Science Advances*. My CV, which details my complete publication record, is attached to this report as Appendix A.

The analysis and opinions I provide in this report are consistent with my education, training in statistical analysis, and knowledge of the relevant academic literature. These skills are well-suited for this type of analysis in political science and quantitative analysis more generally. My conclusions stated herein are based upon my review of the information available to me at this time. I reserve the right to alter, amend, or supplement these conclusions based upon further study or based upon the availability of additional information. The opinions in this report are my own, and do not represent the view of Brigham Young University.

2 Summary of Conclusions

Based on the evidence and analysis presented below, my opinions regarding the HB2146 plan for congressional districts in Pennsylvania can be summarized as follows:

- The contemporary political geography of Pennsylvania is such that Democratic majorities are geographically clustered in the largest cities of the state while Republican voters dominate the suburban and rural portions of the state.

- This geographic clustering in cities puts the Democratic Party at a natural disadvantage when single-member districts are drawn. Specifically, districts drawn to be contiguous, compact, and contain minimal county and municipal splits will naturally create several districts in the Philadelphia and Pittsburgh areas that contain substantial Democratic majorities with many "wasted votes."

- Based on a comparison between the HB2146 plan, and a set of 50,000 simulated maps, the HB2146 plan is a fair plan with no evidence of partisan gerrymandering across a number of different measures used to assess the fairness of a map.

- Based on an index of statewide elections from 2012-2020, the HB2146 plan generates nine Democratic-leaning districts and eight Republican-leaning districts.

- Based on the same index of statewide elections from 2012-2020, six of the districts in the HB2146 plan will likely be competitive with candidates from both parties having a realistic possibility of winning the seats. Five of these competitive districts are *extremely* competitive, with a partisan index within two percentage points of an even 50/50 split.

- Compared to a second set of simulations that explicitly consider the creation of minority opportunity districts, the HB2146 plan is similarly unbiased. The race-conscious simulations reduce the variation in Democratic-leaning districts substantially, making nine Democratic-leaning districts the overwhelmingly most likely outcome in the simulations.

- Based on these commonly-used measures of redistricting fairness, the HB2146 plan is unbiased, and when compared to the simulations on these same metrics is balanced between occasionally having a slight Republican benefit and occasionally providing a slight benefit to Democratic voters.

3 Political Geography of Pennsylvania

Scholarship in political science has noted that the spatial distribution of voters throughout a state can have an impact on the partisan outcomes of elections when a state is, by necessity, divided into a number of legislative districts. This is largely the case because Democratic-leaning voters tend to cluster in dense, urban areas while Republican-leaning voters tend to be more evenly distributed across the remainder of the state.[3] One prominent study of the topic (Chen and Rodden, 2013) finds that "Democrats are highly clustered in dense central city areas, while Republicans are scattered more evenly through the suburban, exurban, and rural periphery...Precincts in which Democrats typically form majorities tend to be more homogenous and extreme than Republican-leaning precincts. When these Democratic precincts are combined with neighboring precincts to form legislative districts, the nearest neighbors of extremely Democratic precincts are more likely to be similarly extreme than is true for Republican precincts. As a result, when districting plans are completed, Democrats tend to be inefficiently packed into homogenous districts" (pg. 241).[4]

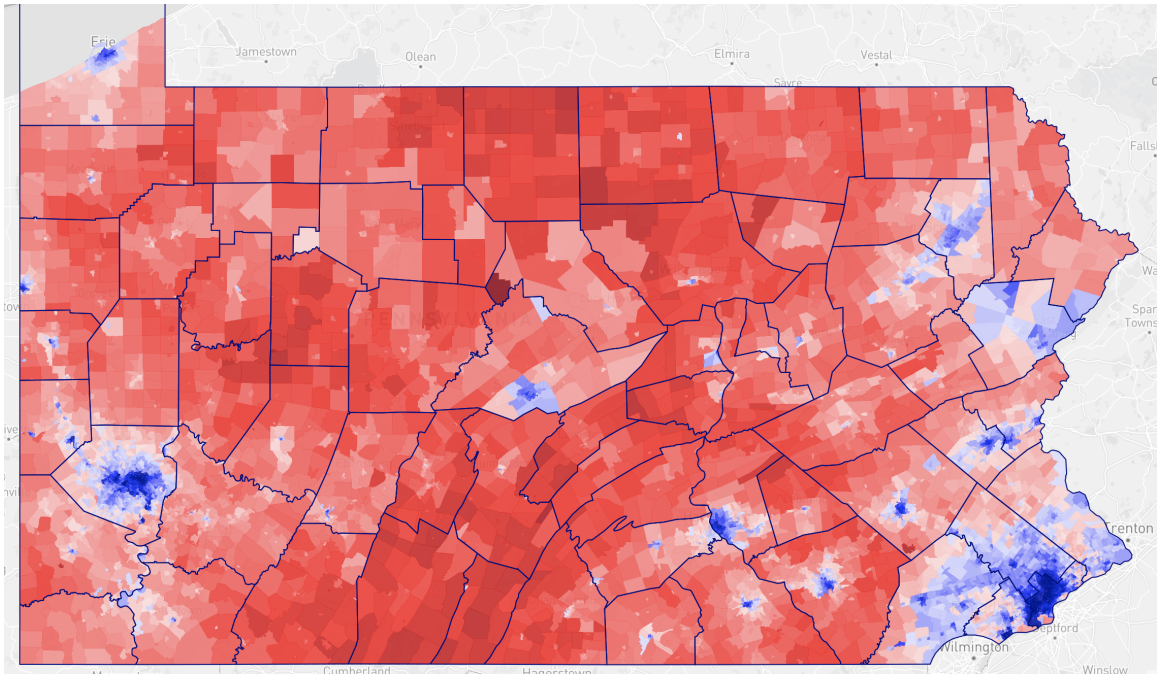
The map below confirms that this is the case in Pennsylvania. There are extremely large Democratic majorities shown in dark blue in and around Philadelphia and Pittsburgh. The remainder of the state contains smaller cities that are Democratic-leaning and large swaths of the state that are solidly Republican.

The upshot of this pattern is that a political party stands at a disadvantage when its voters are not "efficiently" distributed across the state. To understand what I mean by efficient, imagine two different scenarios. First, imagine a party with a slim majority of

[3]See for example Stephanopoulos, N. O. and McGhee, E. M., Partisan Gerrymandering and the Efficiency Gap, *The University of Chicago Law Review* 82: 831-900, (2015); Chen, J. and Rodden, J., Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures, *Quarterly Journal of Political Science* 8: 239-269, (2013); Nall, C., The Political Consequences of Spatial Policies: How Interstate Highways Facilitated Geographic Polarization, *Journal of Politics*, 77(2): 394-406, (2015); Gimple, J. and Hui, I., . Seeking politically compatible neighbors? The role of neighborhood partisan composition in residential sorting, *Political Geography* 48: 130-142 (2015); Bishop, B., *The Big Sort: Why the Clustering of Like-Minded America is Tearing Us Apart*, Houghton Mifflin Press (2008); and Jacobson, G. C., and Carson, J. L., *The Politics of Congressional Elections*, 9th ed. Lanham, MD: Rowman and Littlefield (2016).

[4]Chen, J. and Rodden, J., Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures, *Quarterly Journal of Political Science* 8: 239-269, (2013)

Figure 1: **Distribution of People and Partisan Preferences in Pennsylvania**



Note: Distribution of Partisan Preferences in Pennsylvania based on the average of statewide partisan elections. Blue = Democratic, Red = Republican

voters statewide in which every precinct's vote share perfectly reflected the overall state. In other words, the party has a slight majority in every precinct that adds up to a slight majority statewide. In this case, this party's voters are extremely efficiently distributed in such a way that the party will win every single district despite only a slim majority statewide. Now imagine a different arrangement: a party that still holds a slim majority statewide, but whose voters are heavily concentrated in a few areas and sparsely populated throughout the rest of the state. In this case, despite holding a majority of votes statewide, the party will only win a few seats where their voters are heavily concentrated. The political geography of Pennsylvania closely resembles this second scenario.

The geographic concentration of a party's voters tends to harm that party when single-member districts are drawn by creating districts that favor that party by very large margins, thus "wasting" many votes by running up large majorities far beyond 50%+1.[5]

[5]McGhee, E. (2017). Measuring Efficiency in Redistricting. Election Law Journal: Rules, Politics, and Policy, 16(4), 417–442. doi:10.1089/elj.2017.0453

This occurs in Pennsylvania at the scale of congressional districts in the two largest cities of the state - Pittsburgh and Philadelphia. The overwhelming margins for the Democratic Party in these cities are what drives "wasted votes," which in turn translate to fewer seats than the statewide proportion of votes would suggest.[6]

For example, Philadelphia is large enough to constitute roughly 2.1 congressional districts. Thus, a plan that attempts to avoid splitting counties will draw two districts entirely within the city of Philadelphia.[7] In the HB2146 plan Districts 2 and 3 are completely contained in Philadelphia. In the 2020 presidential election, the city of Philadelphia supported the Democratic candidate, Joe Biden, by an 81.4% to 17.9% margin. As a result, the two congressional districts that will be contained within the city, whatever their configuration, will be overwhelmingly Democratic and contain hundreds of thousands of wasted votes that could be used more efficiently if they were geographically distributed more evenly across the state.

The story is very similar in Pittsburgh and Allegheny County as well. Pittsburgh is not large enough to contain a single congressional district. However, its population is roughly 40% of the size required for a congressional district in 2020. Allegheny County's population is larger than a congressional district (its 2020 population was roughly equal to 1.6 congressional districts), and thus a plan that draws district boundaries that are geographically compact and avoid splitting counties and cities will contain a congressional district within Allegheny County that also contains the city of Pittsburgh. In the HB2146 plan District 15 contains the city of Pittsburgh and is entirely contained in Allegheny County. Both Pittsburgh and Allegheny County are very Democratic leaning. In the 2020 presidential election, the city supported Joe Biden by a 78% to 20.9% margin and Allegheny County supported Biden by a 59.7% to 39.2% margin. As a result, whichever congressional district Pittsburgh

[6]The term "wasted votes" in political science is not to imply that a person's vote is not important or counted, but rather that the vote is not helpful in gaining an additional seat for their preferred party if it is an additional vote in favor of a candidate that has already won a majority of the votes in their district. Technically, all votes beyond 50%+1 are "wasted". However, parties are interested in winning by majorities larger than 50%+1, but not by margins beyond the point at which their candidate is quite certain to win.

[7]Philadelphia city and county are coterminous.

is drawn into will be extremely Democratic as a result of the strong support for Democratic candidates in Pittsburgh and its immediate suburbs within Allegheny County.

Taken together, this suggests that any plan that follows the non-partisan criteria of drawing maps that are geographically compact and avoid splitting counties and cities will begin with three districts (2 in Philadelphia and 1 in Allegheny County centered in Pittsburgh) that are extremely Democratic leaning with an abundance of wasted votes. The spillover effect of this natural packing of Democratic voters is that the remaining 14 congressional districts will be more favorable to Republican voters than if the Democratic voters in these two large cities were more evenly distributed across the state.

The inefficient distribution of voters in Pennsylvania would not be a problem for Democrats if district boundaries were able to amble about the state and divide counties and municipalities to create districts that had less overwhelming Democratic support. Rodden (2019) notes this by saying: "Democrats would need a redistricting process that intentionally carved up large cities like pizza slices or spokes of a wheel, so as to combine some very Democratic urban neighborhoods with some Republican exurbs in an effort to spread Democrats more efficiently across districts" (pg. 155).[8] However, the provisions governing redistricting in Pennsylvania run counter to either of these strategies. The Pennsylvania Supreme Court's decision in *League of Women Voters of Pa. v. Commonwealth* establishes that congressional redistricting plans must adhere to traditional redistricting rules that require districts to be geographically compact and to avoid county and municipal divisions. It thus prohibits the type of meandering districts that Rodden describes above. In the end, this means that Republicans begin the redistricting process with a natural geographic advantage due to the constraints of where and how districts can be lawfully drawn combined with the particular spatial distribution of their voters.

[8]Rodden, Jonathan A. Why cities lose: The deep roots of the urban-rural political divide. Hachette UK, 2019.

4 Methods

To gauge the degree to which the HB2146 plan is a partisan gerrymander, I conduct simulated districting analyses to allow me to produce a large number of districting plans that follow traditional redistricting criteria using small geographic units as building blocks for hypothetical legislative districts. This simulation process ignores all partisan and racial considerations when drawing districts. Instead, the computer simulations are programmed to create districting plans that follow traditional districting goals without paying attention to partisanship, race, the location of incumbent legislators, or other political factors. This set of simulated districts is helpful because it provides a set of maps to which we can compare the HB2146 map that also accounts for the geographic distribution of voters. Because voters are not distributed evenly across the state (as discussed in the previous section), we cannot evaluate the fairness of a proposed plan without an apples-to-apples comparison. In other words if a plan is not evaluated against a comparison set of maps that also use the same political geography of the state, then potential issues or red flags in the map may not at all be due to partisan gerrymandering, but rather the geographic distribution of voters in the state. By comparing a proposed map to a set of alternative maps that are drawn using only non-partisan districting criteria that *also* consider the same geographic distribution of voters, we can identify if oddities or patterns in the proposed plan are due to the political geography of the state because the simulated maps are drawn *using the same political geography.* In other words, by comparing the HB2146 map to the simulated districts, we are comparing the proposal to a set of alternative maps that we know to be unbiased that holds constant the political geography of the state. If the HB2146 map produces a similar outcome as the alternative set of maps, we may reasonably conclude that the HB2146 plan is unbiased. Alternatively, if the HB2146 plan significantly diverges from the set of simulated maps, it suggests that some other criteria that were not used in drawing the comparison set of maps may have guided the decisions made in drawing the proposed map.

The process of simulating districting plans has been recognized and used in a variety

of redistricting litigation, including in Pennsylvania.[9] While different people employ slightly different methods, the overall process is much the same. For my simulations, I use a program developed by Fifield et al. (2020).[10]

A significant advantage of the simulation-based approach is the ability to provide a representative sample of possible districting plans that accounts for the unique political geography of a state, such as the spatial distribution of voters or the location and number of administrative boundaries, such a counties. Simulation methods can also to a degree incorporate each state's unique redistricting rules. The simulation-based approach therefore permits us to compare a particular plan to a large number of representative districting plans in Pennsylvania. In the simulations I run, I instruct the model to generate plans that adhere to the redistricting criteria discussed in the *League of Women Voters* case: equal population, compactness, and minimzing political subdivision splits.

A major factor in the validity of the simulated maps is whether or not they constitute a representative sample of the trillions of possible maps that could be drawn.[11] If the sample produced by the simulations is not representative, then we may be comparing the proposed map to a biased selection of alternative maps, which renders the value of the comparison much less useful.

A specific benefit of the particular algorithm I use here is that the authors show math-

[9]See League of Women Voters of Ohio v. Ohio Redistricting Commission (2021); Harper v. Hall (2021); Common Cause v. Lewis (2019); Harper v. Lewis (2019); League of Women Voters of Pennsylvania v. Commonwealth of Pennsylvania (2018); City of Greensboro v. Guilford County Board of Elections (2017); January 6, 2022 testimony for PA LRC from Kosuke Imai and Michael Barber.

[10]Fifield, Benjamin, , Michael Higgins, Kosuke Imai, and Alexander Tarr. "Automated redistricting simulation using Markov chain Monte Carlo." Journal of Computational and Graphical Statistics 29, no. 4 (2020): 715-728.

Fifield, Benjamin, Kosuke Imai, Jun Kawahara, and Christopher T Kenny. 2020. "The essential role of empirical validation in legislative redistricting simulation." Statistics and Public Policy 7 (1): 52–68.

Kenny, Christopher T., Cory McCartan, Benjamin Fifield, and Kosuke Imai. 2020. redist: Computational Algorithms for Redistricting Simulation. https://CRAN.R-project.org/package= redist.

McCartan, Cory, and Kosuke Imai. 2020. "Sequential Monte Carlo for sampling balanced and compact redistricting plans." arXiv preprint arXiv:2008.06131.

[11]Tam Cho, Wendy K., and Yan Y. Liu. "Toward a talismanic redistricting tool: A computational method for identifying extreme redistricting plans." Election Law Journal 15, no. 4 (2016): 351-366. Cho, Wendy K. Tam, and Bruce E. Cain. "Human-centered redistricting automation in the age of AI." Science 369, no. 6508 (2020): 1179-1181. McCartan, Cory, and Kosuke Imai. "Sequential Monte Carlo for sampling balanced and compact redistricting plans." arXiv preprint arXiv:2008.06131 (2020).

ematically and in a small-scale validation study that their method produces a representative sample of maps. With regards to this issue, the authors state:

> Yet, until recently, surprisingly few simulation algorithms have existed in the published scholarship. In fact, most of these existing studies use essentially the same Monte Carlo simulation algorithm where a geographical unit is randomly selected as a "seed" for each district and then neighboring units are added to contiguously grow this district until it reaches the pre-specified population threshold (e.g., Cirincione, Darling, and O'Rourke 2000; Chen and Rodden 2013). Unfortunately, no theoretical justification is given for these simulation algorithms, and hence they are unlikely to yield a representative sample of redistricting plans for a target population....Unlike the aforementioned standard simulation algorithms, the proposed algorithms are designed to yield a representative sample of redistricting plans under contiguity and equal population constraints.[12]

Specifically, the model is constrained to conduct 50,000 simulations in which each simulation generates 17 districts that are of roughly equal population (<0.5% deviation above or below the target population of 764,865). While congressional districts are constrained to contain a truly equal population, it is not possible to place such a strict constraint on the model. Because of this, I relax the constraint to allow for a 0.5% deviation, or a roughly 3,800 person deviation. This is common in redistricting simulations of congressional districts, including in litigation presented to, and relied upon by the Pennsylvania Supreme Court in the 2018 *League of Women Voters* case. The process for zeroing out population on any given simulation map would have minimal to no impact on the partisan outcomes.[13]

[12]Cirincione, C., Darling, T. A., and O'Rourke, T. G. (2000), "Assessing South Carolina's 1990s Congressional Districting," Political Geography, 19, 189–211. DOI: 10.1016/S0962-6298(99)00047-5. Chen, J., and Rodden, J. (2013), "Unintentional Gerrymandering: Political Geography and Electoral Bias in Legislatures," Quarterly Journal of Political Science, 8, 239–269. DOI: 10.1561/100.00012033.

[13]See for example: Expert report of Dr. Wesley Pegden in League of Women Voters of Pennsylvania case, whose simulations use a 2% population constraint. Expert report of Dr. Jonathan Mattingly in Harper v. Hall in North Carolina, whose congressional simulations use a 1% population constraint and states, "We have verified in previous work in related settings that the small changes needed to make the districting plan

The algorithm generates 17 congressional districts with each run by assembling small geographic units — electoral precincts — into larger groups until a group of precincts is large enough to constitute a new legislative district. It then repeats this process 50,000 times, generating a different set of 17 districts with each run of the model. In each of the 50,000 iterations, the model is instructed to generate geographically compact districts that do not divide cities, boroughs, townships, and other municipal corporations. No city in Pennsylvania is larger than a congressional district aside from Philadelphia. As a result, there are no split precincts or municipalities (aside from the necessity of dividing Philadelphia into multiple districts due to its population) in the simulated districts. I constrain the model to not split municipalities because of the constitutional instructions in Article II, Section 16 that no city, incorporated town, borough, township or ward shall be divided unless "absolutely necessary". Although Article II Section 16 does not on its face apply to congressional redistricting, the *League of Women Voters* case held that an "essential part" of an inquiry into whether a congressional plan is constitution under the Free and Equal Elections Clause is if the districts created under the plan are: "composed of compact and contiguous territory; as nearly equal in population as practicable; and which do not divide any county, city, incorporated town, borough, township, or ward, except where necessary to ensure equality of population" (645 Pa. 1, 123, 2018). Later, the court described this principle as the "minimization of the division of political subdivisions" (Id). Thus, if it is possible to generate districts that do not split municipalities and stay within the 0.5% population constraint, it is therefore not "absolutely necessary" to split municipalities aside from Philadelphia when constructing simulated districts. The process for zeroing out population on any given simulation map would, of course, require the division of some municipal corporations, but not many. The model is also instructed to draw districts that cross county boundaries as few times as

have perfectly balanced populations do not change the results." See also expert report of Daniel Magleby in Harper v. Hall in North Carolina. Also, expert report of Kouske Imai in League of Women Voters of Ohio v. Ohio Redistricting Commission, who uses a 0.5% population deviation and states, "Although this deviation is greater than the population deviation used in the enacted plan, it only accounts for less than 4,000 people and hence has no impact on the conclusions of my analysis."

possible. County populations do not always add up to round units of districts, and thus some county boundaries will be need to be traversed. The model is further instructed that when a county boundary needs to be crossed, it should avoid splitting the county more times than necessary.

Once the simulated district plans are complete, only then do I compute the partisan composition of each district in each plan. For the partisan composition of each district I rely on the election results from statewide elections disaggregated to the level of the election precinct. I then reassemble these election results for each of the simulated districts in each of the 50,000 simulations to compute the proportion of votes across all statewide elections conducted between 2012 and 2020 that were won by the Democratic and Republican candidates in those districts.[14] In other words, the partisan index is the average vote share for Democratic candidates in each district for the statewide elections considered between 2012-2020. I choose the period 2012-2020 because it represents an entire decade of elections between decennial censuses when redistricting traditionally occurs. Averages of multiple elections have the benefit of "washing out" the impact of any particular election, since individual elections can vary due to particular idiosyncratic candidate features. Furthermore, particular years can vary due to national electoral waves (i.e. 2018 was an especially good year for Democrats while 2016 was an especially good year for Republicans nationwide). Later in the report I also display the results using a variety of alternative election indices.

[14]The particular races are 2020: President, Auditor, Attorney General, Treasurer; 2018: Governor, US Senate; 2016: President, US Senate, Auditor, Attorney General, Treasurer; 2014. I do not include statewide judicial elections in the index. It is uncommon in political science to use judicial elections to measure voters' partisan preferences as research suggests voters treat judicial elections very differently, even when judges run under party labels, than they do partisan elections to legislative and executive positions. Other commonly used measures indices such as Dave's Redistricting and PlanScore.com also omit judicial elections from their partisan indices.

5 Results

5.1 Population, Boundary Splits, and Compactness

Table 1 below compares the HB2146 plan to the distribution of simulations for boundary splits, and compactness. The HB2146 plan splits 15 counties, which is within the range of county splits in the simulations. The HB2146 plan divides only 16 municipalities, one of which would be Philadelphia, which is required to be divided because the city's population is larger than a single congressional district. Furthermore, the requirement that the proposal contain exact population equality will require the division of some municipalities since the combination of cities into districts will not necessarily lead to the exact population needed for a congressional district. Finally, the HB2146 plan has only nine precinct splits. On the whole, the plan performs exceptionally well at having few county, municipal, and precinct splits. With regards to district compactness, the HB2146 plan's average district compactness score closely aligns with the results of the simulations. District-by-district measures of compactness as well as a list of specific counties and municipalities that are split are contained in the appendix of this report.

Table 1: HB2146 plan and 50,000 Simulations: Subdivision Splits, and Compactness

	HB2146 plan	Simulations Median	Simulations Range
Boundary Splits			
Counties Split:	15	12	[7, 15]
Municipalities Split:	16	1	[1, 1]
Precincts Split:	9	0	[0, 0]
Compactness			
Average Polsby-Popper:	0.32	0.28	[0.22, 0.35]

Note: As described above, the simulations are constrained to not divide municipalities, aside from Philadelphia, which is too large to be contained within one district. However, exact population equality requires some municipalities be split in the proposed plan.

5.2 Partisan Lean of Districts

Before comparing the proposal to the simulations, I first present the results of the partisan index for each district in the HB2146 plan. Figure 2 shows this for the 17 districts in the plan. Districts are ordered from least Democratic at the bottom to most Democratic at the top. Districts with a partisan index less than 0.50 are Republican leaning and districts with a partisan index greater than 0.50 are Democratic leaning. A vertical dashed line is placed at 0.50 for reference. In the plan there are eight Republican-leaning districts with an index less than 0.50 (on the left side of the dashed line at .50) and nine Democratic-leaning districts with an index greater than 0.50 (on the right side of the dashed line at .50). The grey horizontal lines around each point show the range of election outcomes for all of the statewide elections used to generate the index. Districts in which the Republican candidate for statewide elections won the majority of the two-party vote share in all of the statewide races in that district are shown as red squares while districts where the Democratic candidate for statewide elections won the majority of the two-party vote share in all of the statewide races in that district are shown as blue triangles. Districts where both parties have won a majority of the two-party vote share in these statewide races in the district are displayed as green circles. Looking at the range across the index, there are six districts colored red (reliably Republican), five blue districts (reliable Democratic), and six green districts (competitive) in the plan. Using an alternative definition of competitiveness based on the closeness of the index to 0.50, there are five districts with an index between 0.48 and 0.52. A range of two percentage points is a commonly used measure of competitiveness in congressional elections.

A few key points come out of this figure. First, we see the result of the natural clustering of Democratic voters in Philadelphia and Pittsburgh. Districts 3 and 2 are the most Democratic leaning and are entirely contained within Philadelphia in the HB2146 plan. District 15 is the third most Democratic leaning district and contains the entirety of Pittsburgh and some of its surrounding suburbs in Allegheny County. These districts are

overwhelmingly Democratic leaning. In fact, they are much more Democratic than the degree to which the most Republican-leaning districts lean towards Republicans. For example, the most Democratic district (District 3) has a partisan index of 0.92 while the most Republican district (District 13) has a partisan index of 0.35 (0.35 is much closer to .50 than 0.92 is to 0.50). This illustrates the idea that geographic clustering of voters when divided into single member districts that are compact and avoid dividing counties and cities generally lead to more wasted votes for Democrats than for Republicans.

The second major point is that the HB2146 plan generates a significant number of competitive districts. Electoral competitiveness is an essential component of a liberal democracy. The threat of electoral defeat is critical to creating a democratic government in which elected officials are responsive to public opinion and are held accountable for their decisions while in office.[15]

I use two different metrics to measure competitiveness.

The first measure considers a district competitive if both a Democratic and Republican candidate for statewide federal office between 2012-2020 have won a majority of the two-party vote share in that district. Figure 2 shows these districts as green circles. Note how the grey line in each of these districts crosses the 0.50 line, indicating that both Republican and Democratic candidates for statewide office have won a majority of votes in that district. This approach has the virtue of considering the candidate-specific characteristics that a partisan average or index would not measure. For example, particular candidates from either party might outperform their party's average candidate performance. This is important to consider because actual elections are determined by which candidate wins the most votes, not the result of an average of votes cast, and individual elections in individual

[15]Mayhew, David R., 1974. Congress: The Electoral Connection. New Haven, CT: Yale University Press.
Gordon, Sanford C., and Gregory Huber. "The effect of electoral competitiveness on incumbent behavior." Quarterly Journal of Political Science 2, no. 2 (2007): 107-138.
Ansolabehere, Stephen, David Brady, and Morris Fiorina. "The vanishing marginals and electoral responsiveness." British Journal of Political Science 22, no. 1 (1992): 21-38.
Dropp, Kyle, and Zachary Peskowitz. "Electoral security and the provision of constituency service." The Journal of Politics 74, no. 1 (2012): 220-234.

districts are influenced by the characteristics and qualities of individual candidates. Using this metric, there are 6 competitive districts (Districts 16, 8, 17, 7, 6, and 1).

The second measure of competitiveness uses the partisan index and simply looks at districts where the partisan index is within two percentage points of 50% of the two-party vote share. Scholars have often used two percentage points as a heuristic for hyper-close races in which unforeseen or "knife-edge electoral shifts" can change election results.[16] Furthermore, recent studies of the legislative incumbency advantage have suggested a decline in the benefit afforded to incumbents by voters with more recent estimates being between 3 and 4 percentage points, which divided symmetrically would yield roughly 2 points on either side of the 50% vote margin.[17] Using this metric, there are five competitive districts (Districts 8, 17, 7, 6, and 1).

Unlike the first metric described above, this measure of competitiveness is based on the average performance of candidates. Both metrics have their benefits and drawbacks. The virtue of using the average is that it "washes out" the impact of any one particular candidate by aggregating multiple election results together. The virtue of the "bipartisan victories" metric described above is that it captures the fact that particular candidates often perform very differently from what a partisan index would predict. Thus, the virtues of the first are in many ways the drawbacks of the second, and vice versa. As a result, including both presents a more complete picture. In either case, the HB2146 plan creates a substantial number of competitive districts.

A final point to note is that among these competitive districts, four of them lean Democratic. In other words, while both parties will likely win these districts some of the time, Democratic candidates are slightly favored in four of the five (or six depending on the measure of competitiveness) competitive districts in the plan.

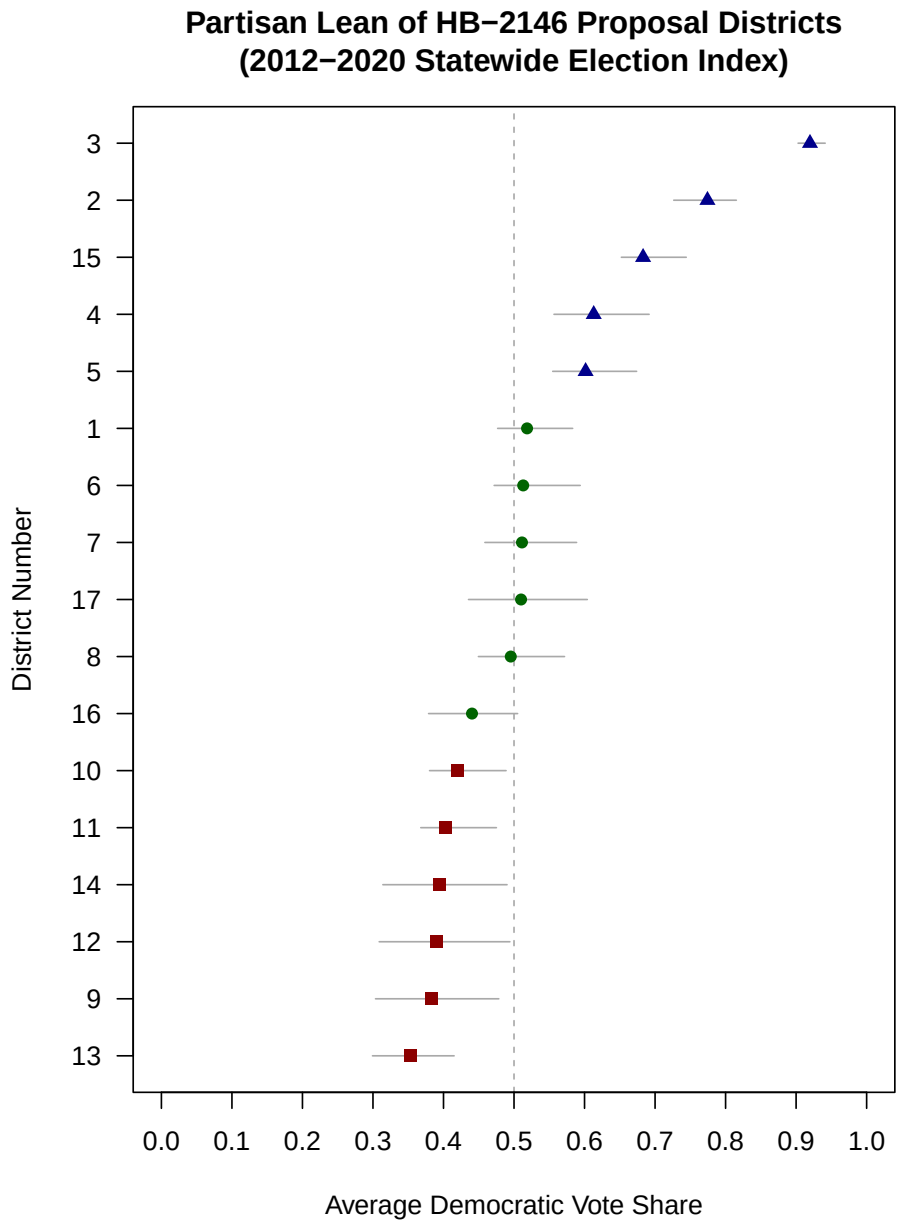
It is important to note that partisan averages — such as the ones I have created here

[16]Erikson, Robert S., and Rocío Titiunik. "Using regression discontinuity to uncover the personal incumbency advantage." Quarterly Journal of Political Science 10, no. 1 (2015): 101-119.

[17]Jacobson, Gary C. "It's nothing personal: The decline of the incumbency advantage in US House elections." The Journal of Politics 77, no. 3 (2015): 861-873.

— are useful, but not perfect. Every congressional race is different. Individual candidate factors such as prior elected experience, professional background, gender, and ties to the local community are all important factors in determining candidate success. Campaigns and the issues and policies that candidates choose to emphasize and endorse are also important. These factors all contribute to making each race unique and slightly different from what an index of statewide election results might predict. In other words, no election will perfectly mirror the partisan average for that district based on an index of election results, and in some cases that difference could be quite large.

Figure 2: **Partisan Index of HB2146 plan Congressional Districts**



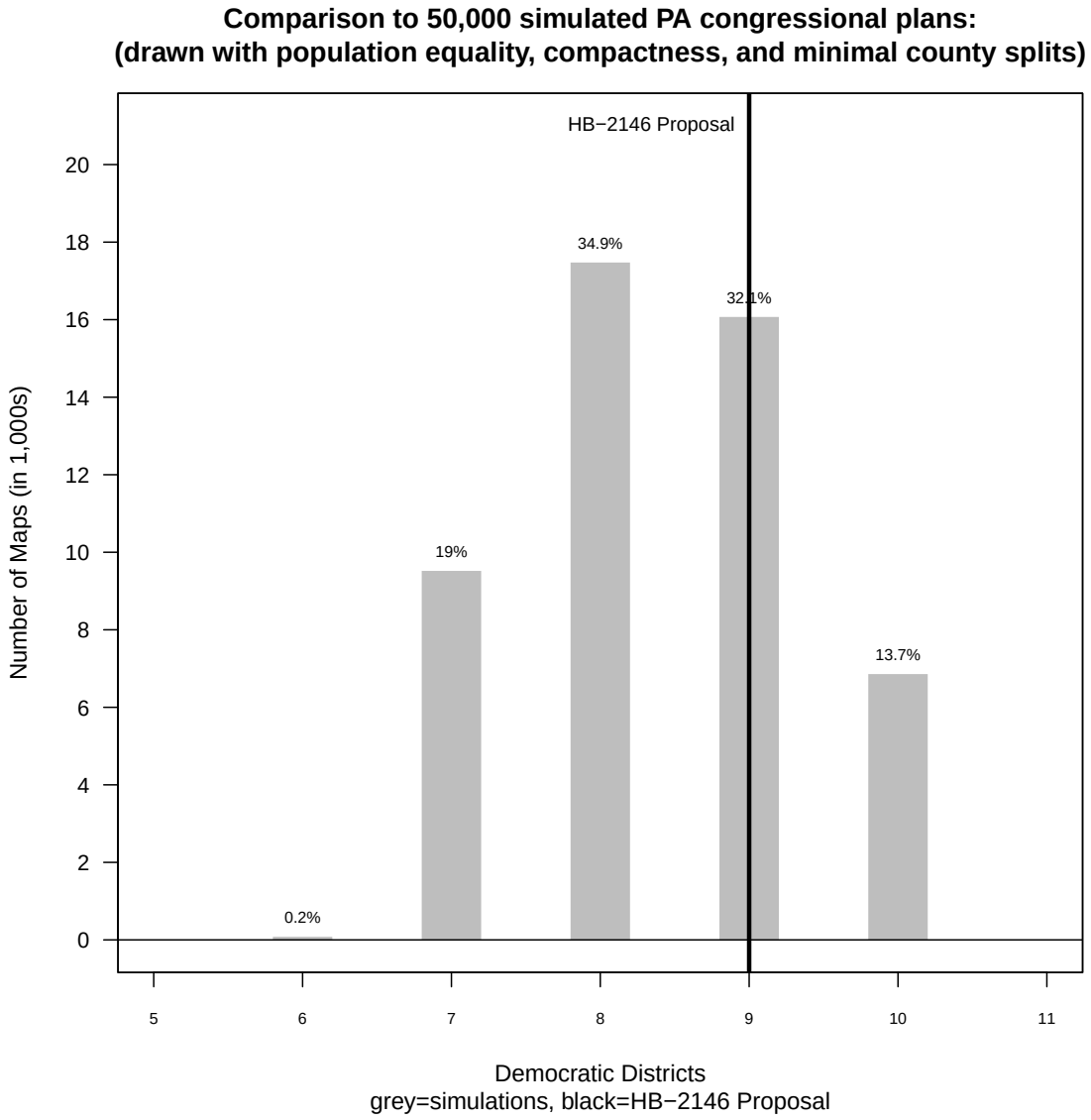
Note: Partisan Index based on the average of statewide partisan races between 2012-2020. Districts with a partisan index less than 0.50 are Republican leaning and districts with a partisan index greater than 0.50 are Democratic leaning. A vertical dashed line is placed at 0.50 for reference. The grey horizontal lines around each point show the range of election outcomes for all of the statewide elections used to generate the index. Districts in which the Republican candidate for statewide elections won the majority of the two-party vote share in all of the statewide races are shown as red triangles (there are 6 of them) while districts where the Democratic candidate for statewide elections won the majority of the two-party vote share in all of the stateside races are shown as blue triangles (there are 5 of them). Districts where both parties have won a majority of the two-party vote share in these statewide races are displayed as green circles (there are 6 of them).

5.3 Partisan Lean of Districts Compared to Simulations

Figure 3 displays the distribution of Democratic-leaning districts in both the simulations and the HB2146 plan using the 2012-2020 partisan index discussed above. If a district in the simulations or in the HB2146 plan has a partisan index greater than 0.50, I call that a Democratic-leaning district. Likewise, if a districts in the simulations has a partisan index less than 0.50, I call that a Republican-leaning district. The grey histogram shows the distribution of Democratic-leaning seats generated by the simulations. The simulations generate between six and ten Democratic-leaning districts, and the numbers above each bar in the histogram display the proportion of simulated maps that generate each outcome. For example, in 34.9% of the simulations there are eight Democratic-leaning districts (and therefore nine Republican-leaning districts). The solid black vertical line shows the results of calculating the partisan index for the HB2146 plan. The HB2146 plan generates nine Democratic leaning districts, which is in line with the distribution of Democratic-leaning seats generated by the simulations (32.1% of the simulations generate this result). As noted above, the most common outcome in the simulations is eight Democratic-leaning seats, which is one less than the HB2146 plan generates.

Recall that in using the simulations we are comparing the proposed map to a set of maps drawn by the computer using only those criteria that I instructed the algorithm to follow - namely the pre-specified nonpartisan criteria of equal population, contiguity, geographic compactness and a preference for fewer county splits. Both the HB2146 plan and the simulations account for the unique political geography of Pennsylvania. Doing so shows us that the HB2146 plan is within the middle portion of simulation results and if anything leans slightly towards the Democratic party by generating nine Democratic-leaning districts rather than eight, which is the modal outcome in the simulations. By no standard definition would the plan be considered an outlier.

Figure 3: **Partisan Composition of HB2146 plan and Simulations**



Note: The grey distribution is the number of Democratic seats generated from the 50,000 simulations. The vertical black line is the number of Democratic leaning seats in the HB2146 plan. The HB2146 plan generates 9 Democratic leaning districts. The partisan lean of districts in the simulations and the HB2146 plan are calculated as the two-party vote share of statewide partisan elections from 2012-2020.

5.4 District-by-District Comparisons

While Figure 3 shows the position of the HB2146 plan in relation to the simulations overall, it is also instructive to look at a district-by-district level to see if any particular district stands out as an outlier. Figure 4 below does this for each of the 17 districts in

the state. The figure plots the partisan lean of each district across all of the simulations ordered from least Democratic at the top to most Democratic at the bottom of the figure. The simulation results are displayed in grey and generate a "cloud" or range of partisan outcomes for each district. The black dots in the figure show the partisan lean of each of the districts in the HB2146 plan and their relative position within the simulations. Next to each district is text showing the position of the HB2146 plan in relation to the simulations. For example, in the most Republican-leaning district (District 13) at the top of the figure, the HB2146 plan is more Democratic than 64% of the simulations in that district.

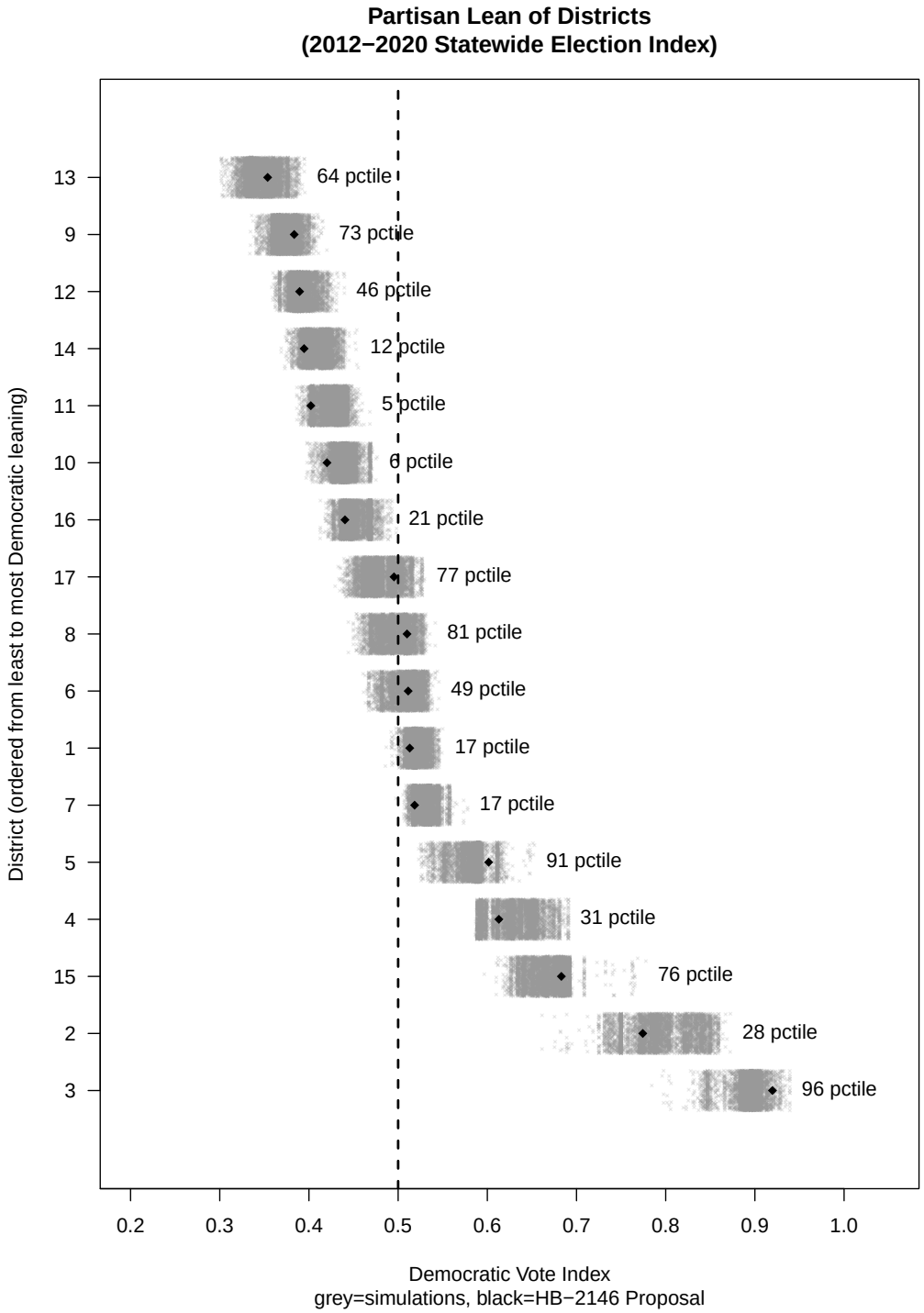
Looking district by district, we see that in most cases the HB2146 plan sits well within the middle of the distribution of simulations. In a few cases it stands out as an outlier, and I consider each of these cases one by one. In the 5th and 6th most Republican districts (Districts 11 and 10 in the HB2146 plan, as labelled on the vertical axis of the figure) the HB2146 plan is at the Republican edge of the simulation results indicating that the HB2146 plan is more Republican than only five and six percent of the simulations in these two districts, respectively. However, both of these districts are squarely Republican leaning, even in the simulations that are more favorable to Democrats.

In the 5th most Republican district (District 11 in the HB2146 plan) the partisan index of the HB2146 plan is 0.40 while the median simulation has a partisan index of 0.42. In other words, District 11 is only two points away from the median simulation in this district, and a partisan index or 0.40 or 0.42 would be a safely Republican districts in either case.

The same is true of the 6th most Republican district in the simulations, which is District 10 in the HB2146 plan. This district has a partisan index of 0.42 in the HB2146 plan while the median simulation has a partisan index of 0.435. In other words, District 10 is only 1.5 percentage points away from the median simulation in this district, and a partisan index or 0.42 or 0.435 would be a safely Republican districts in either case. In other words, in these two districts, the position of the HB2146 plan in relation to the median simulation will have minimal real-world impact on the electoral outcomes in those districts.

As described above, the HB2146 plan produces five districts that are extremely competitive with a partisan index within two percentage points of 0.50 (Districts 17, 8, 6, 1, and 7). In two of those five districts, the proposal is more Democratic than the median partisan index in the simulations (Districts 17 and 8), is very near the median simulation in one of the districts (District 6), and in two of these districts (Districts 1 and 7) the HB2146 plan is more Republican than the median simulation. Thus, in the districts where a shift of a few percentage points really could make a difference in the party that wins a congressional seat, the HB2146 plan is balanced between favoring Democrats in 2 of the districts, Republicans in 2 of the districts, and neither party in 1 of the districts when compared to the distribution of simulation results.

Figure 4: **Partisan Composition of HB2146 plan and Simulations**



Note: The grey 'clusters' show the range of vote margins for each district, ordered from least Democratic to most Democratic in the 50,000 simulations. The black dot inside of each cluster shows the partisan index for the HB2146 plan. Next to each cluster is the percentile, or relative position of the HB2146 plan within each cluster of simulation results for each district.

5.5 Median-Mean Difference

Another common measure of the partisan slant of a districting plan is the median-mean difference.[18] The median-mean measure is calculated by taking the median value of the partisan index across all 17 districts in a plan (the value for which half of the observations are smaller and half the observations are larger) and subtracting from that the mean partisan index (the simple average) of all of the districts from the median. Consider a simple example in which there are three districts in a plan with partisan indices of 0.91, 0.46, and 0.40. To find the median we simply look for the district for which there is one district larger and one district smaller (0.46 in this case). To find the mean, we simply take the average by dividing the sum of the partisan indices by the number of districts. In this case, (0.91+0.46+0.40)/3 = 0.59. The median-mean value would then be 0.46-0.59 = -0.13. As in this example, in Figure 5 I take the Democratic vote share of the median district minus the mean Democratic vote share for all 17 districts in the HB2146 plan. Negative numbers indicate a districting plan that favors Republicans and positive numbers indicate a slant in favor of Democrats.

The median-mean test is essentially a test of skew, or in the context of redistricting packing voters into legislative districts. If voters of one party are packed into few districts, those districts will have very high vote shares for one party and will pull the value of the mean district partisanship away from the district partisan index of the median district.[19] This indicates that the party that is packed into the districts with overwhelming majorities will have a harder time translating their votes into seats.[20]

[18]See Best, Robin E., Shawn J. Donahue, Jonathan Krasno, Daniel B. Magleby, and Michael D. McDonald. "Considering the prospects for establishing a packing gerrymandering standard." Election Law Journal 17, no. 1 (2018): 1-20. Warrington, Gregory S. "A comparison of partisan-gerrymandering measures." Election Law Journal: Rules, Politics, and Policy 18, no. 3 (2019): 262-281. Wang, Samuel S-H. "Three tests for practical evaluation of partisan gerrymandering." Stan. L. Rev. 68 (2016): 1263. McDonald, Michael D., and Robin E. Best. "Unfair partisan gerrymanders in politics and law: A diagnostic applied to six cases." Election Law Journal 14, no. 4 (2015): 312-330.

[19]A helpful analogy is to imagine a representative group of 100 Americans gathered at a restaurant. The median and mean incomes of the 100 customers are likely quite similar. If Bill Gates walks into the restaurant, the median income of the now 101 patrons will not shift by much at all, but the mean income will jump significantly, possibly by several million dollars.

[20]McDonald, Michael D., and Robin E. Best. "Unfair partisan gerrymanders in politics and law: A diagnostic applied to six cases." Election Law Journal 14, no. 4 (2015): 312-330.

One drawback of the median-mean test is that it does not account for the natural clustering of voters that occurs in Pennsylvania and other states. This can be remedied by also computing the median-mean difference for the simulated districting plans that also consider for the geographic distribution of voters in the state. This allows us to make an apples-to-apples comparison that holds the political geography of the state constant. Figure 5 displays the results of the median-mean measure for the simulations (in grey) and the HB2146 plan (solid black line). The fact that the distribution of results from the simulations is mostly less than zero shows that the geography of Pennsylvania leads to a natural advantage for Republicans due to the dense clustering of Democratic voters in Philadelphia and Pittsburgh even when districts are drawn using strictly non-partisan criteria.

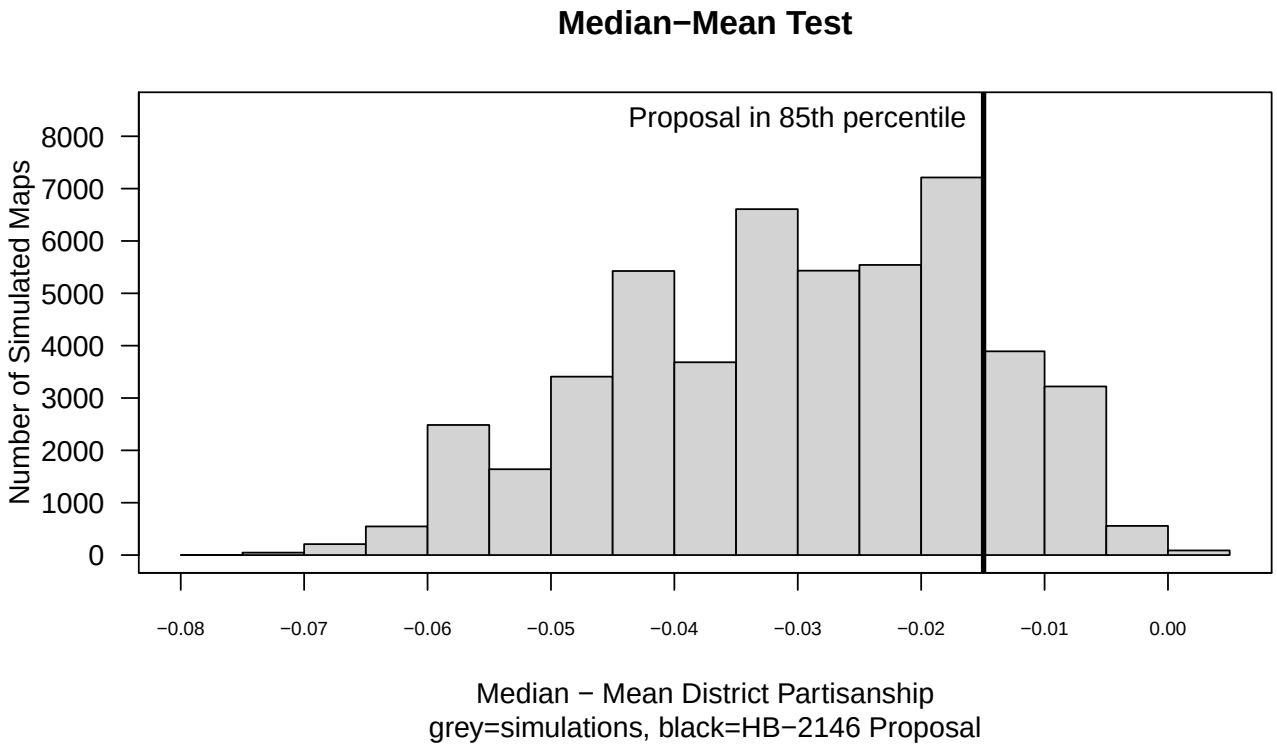
The solid black line shows the results of the HB2146 plan. There are two major points to take away from the results. First, without comparing to the simulations, the HB2146 plan is very nearly unbiased. The median-mean value for the HB2146 plan is -0.015, which is very close to zero.[21] In other words, the median district and the mean district in the HB2146 plan are different by less than two percentage points. Second, when comparing the HB2146 plan to the simulations, the HB2146 plan is more favorable to Democratic voters than the vast majority of the simulated districting plans. The HB2146 plan has a median-mean value that is smaller (in absolute value) than 85 percent of the simulated plans. In other words, using only the non-partisan criteria described above to draw the simulated districts, 85% of them generate districts with a greater median-mean value, indicating a less efficient distribution of Democratic voters than the HB2146 plan contains.

5.6 Efficiency Gap

The efficiency gap is another common redistricting metric and is similar to the median-mean measure in that it looks for the degree to which a party's votes statewide are translated

[21] For example, the congressional plan that was challenged in the *League of Women Voters of Pennsylvania* case in 2017-2018 showed the congressional district plan had a median-mean difference of -0.059. The post-LWV case 2020 congressional plan had a median-mean difference of tktk.

Figure 5: **Median-Mean Measure of HB2146 plan and Simulations**



Note: Values calculated by taking the Democratic partisan index of the median district minus the mean of all 17 districts' partisan indices. Negative numbers indicate a districting plan that favors Republicans and positive numbers indicate a slant in favor of Democrats. The grey histogram shows the results for each of the simulations. The black bar shows the results for the HB2146 plan. The proposal shows very little absolute bias (it is very close to zero) and is more favorable to Democrats than 85% of the simulated districts.

into seats in each district.[22] A description of this measure provided by the Brennen Center for Justice summarizes it well: "[T]he efficiency gap counts the number of votes each party wastes in an election to determine whether either party enjoyed a systematic advantage in turning votes into seats. Any vote cast for a losing candidate is considered wasted, as are all the votes cast for a winning candidate in excess of the number needed to win."[23] In other words, the ideal strategy for a political to maximize the impact of their voters is to distribute

[22]McGhee, Eric. "Measuring efficiency in redistricting." Election Law Journal: Rules, Politics, and Policy 16, no. 4 (2017): 417-442. Veomett, Ellen. "Efficiency gap, voter turnout, and the efficiency principle." Election Law Journal: Rules, Politics, and Policy 17, no. 4 (2018): 249-263. Plener Cover, Benjamin. "Quantifying partisan gerrymandering: An evaluation of the efficiency gap proposal." Stan. L. Rev. 70 (2018): 1131.

[23]`https://www.brennancenter.org/sites/default/files/legal-work/How_the_Efficiency_Gap_Standard_Works.pdf`

them as evenly as possible across districts so as to win by a narrow margin in the district they win and lose by very large margins in the districts where they lose. Put another way, 'win by a little, lose by a lot" is the ideal strategy for a party to maximize their impact of their voters.[24]

The Brennen Center provides a simple example of how the efficiency gap is calculated:

> To understand how the efficiency gap works, consider a hypothetical state with 500 residents that is divided into five legislative districts, each with 100 voters. In the most recent election cycle, Democrats won Districts 1 and 2 by wide margins, while Republicans won Districts 3, 4, and 5 in closer races. Overall, Democratic candidates received 55 percent of the statewide vote but won just 40 percent of the legislative seats, while Republican candidates received 45 percent and won 60 percent of the seats. The table below shows the election results for each district.[25]

District	D votes	R Votes	Result
1	75	25	D wins
2	60	40	D wins
3	43	57	R wins
4	48	52	R wins
5	49	51	R wins
Total:	275	225	

Once we have the election results, the first step is to consider the number of "wasted votes" in each district. Because the Republican candidate in this example lost in District 1, all 25 of the votes cast for that candidates are wasted. The Democratic candidate in District 1 won, but by 24 more votes than would be necessary (since all that is needed is 51 votes to win). Thus, there are 24 wasted Democratic votes in this district. Taking the difference indicates that there was a net of 1 Republican wasted vote in this district.

[24]Of course, parties have other priorities and winning by a single vote might not be their ideal scenario in reality.

[25]`https://www.brennancenter.org/sites/default/files/legal-work/How_the_Efficiency_Gap_Standard_Works.pdf`

The efficiency gap is then calculated as Efficiency Gap = (Total Democratic Wasted Votes - Total Republican Wasted Votes) / Total Votes. In order to account for uneven turnout across districts and elections, the efficiency gap formula can be re-expressed as the following equation: Efficiency Gap = (Seat Margin – 50%) – 2(Vote Margin – 50%) where the seat margin is the fraction of seats won by Democrats minus 0.50 and the vote margin is the fraction of votes won by Democratic candidates statewide minus 0.50.[26]

In this example and in Figure 5 I use the Democratic seat and vote margins which means that negative efficiency gap numbers indicate a districting plan that favors Republican voters and positive numbers indicate a plan that favors Democratic voters. As with the median-mean test, the efficiency gap has the drawback of not accounting for the natural clustering of Democratic voters in Pennsylvania and other states. However, as before I remedy this by also computing the efficiency gap for the simulated districting plans that also must account for the geographic distribution of voters in the state. This allows us to make an apples-to-apples comparison that accounts for political geography. Figure 6 displays the results of the efficiency-gap measure for the simulations (in grey) and the HB2146 plan (solid black line). The distribution of results from the simulations show that the geography of Pennsylvania leads to a naturally arising advantage for Republicans due to the dense clustering of Democratic voters in Philadelphia and Pittsburgh.[27]

The solid black line shows the results of the HB2146 plan. There are two major points to take away from the results. First, the HB2146 plan is very nearly unbiased. The efficiency gap for the HB2146 plan is -0.02, which is very close to zero.[28] In other words, in the HB2146 plan Democratic votes are not much more likely than Republican votes to be "wasted" across the districts. Second, when comparing the HB2146 plan to the simulations, the HB2146

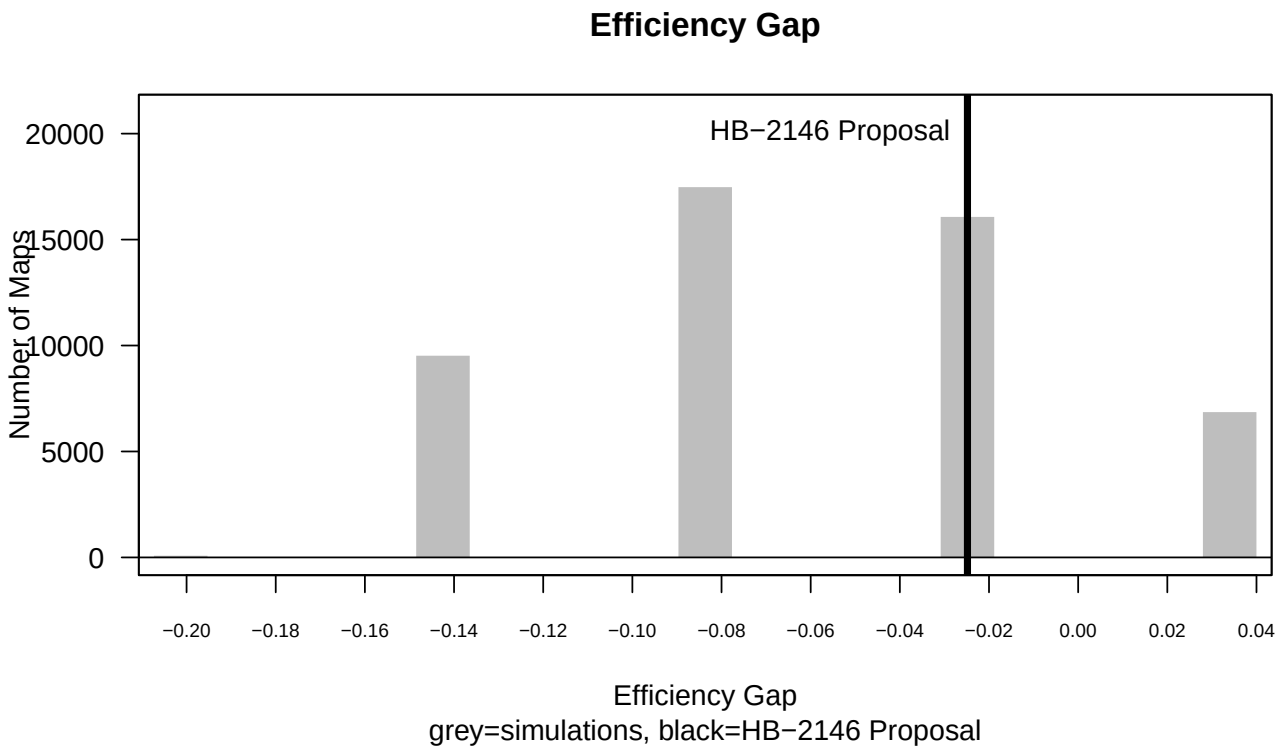
[26]See McGhee, Eric. "Measuring efficiency in redistricting." Election Law Journal: Rules, Politics, and Policy 16, no. 4 (2017): 417-442.

[27]Because the efficiency gap is a measure of seat shares, it will be a 'chunky' measure with values for each seat won or lost in a plan, unlike the median-mean measure which is a more continuous measure that changes based on small changes in the margin of victory in each district.

[28]For example, the congressional plan that was challenged in the *League of Women Voters of Pennsylvania* case in 2018 showed the congressional district plan had a pro-Republican efficiency gap of between -0.15 and -0.20. The post-LWV 2020 congressional map had an efficiency gap of tktk.

plan is more favorable to Democratic voters than the majority of the simulated districting plans. The HB2146 plan has an efficiency gap that is smaller (in absolute value) than all other outcomes in the simulated plans. While some of the simulated plans generate pro-Democratic efficiency gaps, they are larger in absolute terms and would be more biased than the HB2146 plan in favor of Democrats instead of the very slight lean towards Republicans exhibited in the HB2146 plan. In other words, using only the non-partisan criteria described above to draw the simulated districts, the HB2146 plan is in agreement with the least biased outcome in the simulations.

Figure 6: **Efficiency Gap Measure of HB2146 plan and Simulations**



Note: Distribution of efficiency gap among simulations shown in grey and the HB2146 plan shown as the solid black line. Negative values indicate plans that are have a Republican advantage and positive values indicate plans that have a Democratic advantage. The HB2146 plan has a very small efficiency gap of -0.02 and is more favorable to Democratic voters than the majority of the non-partisan simulations, which have larger (more negative) efficiency gap values.

5.7 Expected Seats from Uniform Swing

Another measure of redistricting considers how a plan performs, on average, under a variety of different electoral environments. While the partisan index does this to a degree by averaging across a number of elections and years, I present another measure here where I report the results of applying a randomly chosen uniform swing to the election results in the HB2146 plan and the simulations. A uniform swing is simply a way of asking what would the election results in the districts look like if a certain percentage were added uniformly to each district in the plan.[29] In other words, a uniform swing of 1.3 points in the Democratic direction would simply add 0.013 to the partisan index of each district while a uniform swing of 2.5 points in the Republican direction would simply subtract 0.025 from the partisan index of each district. Of course, a swing of 1 points is more likely than a swing of 5 or 6 points as large wave elections are more rare than elections that perform closer to the average performance of each party. To account for this, I randomly apply 10,000 uniform swings to the simulations and the partisan index of the HB2146 plan and calculate the average of the number of seats that are held by Democrats in the HB2146 plan and each of the 50,000 simulations. The value of the uniform swing is chosen from a normal distribution that is centered at zero with a standard deviation of 3 percentage points.[30] Thus, small swings are more likely than large swings, but large swings of 3, 4, 5, and even 6 percentage points are possible, just as we occasionally observe large electoral waves in national politics. This gives us an idea of how a plan performs, on average, under a variety of potential electoral environments.

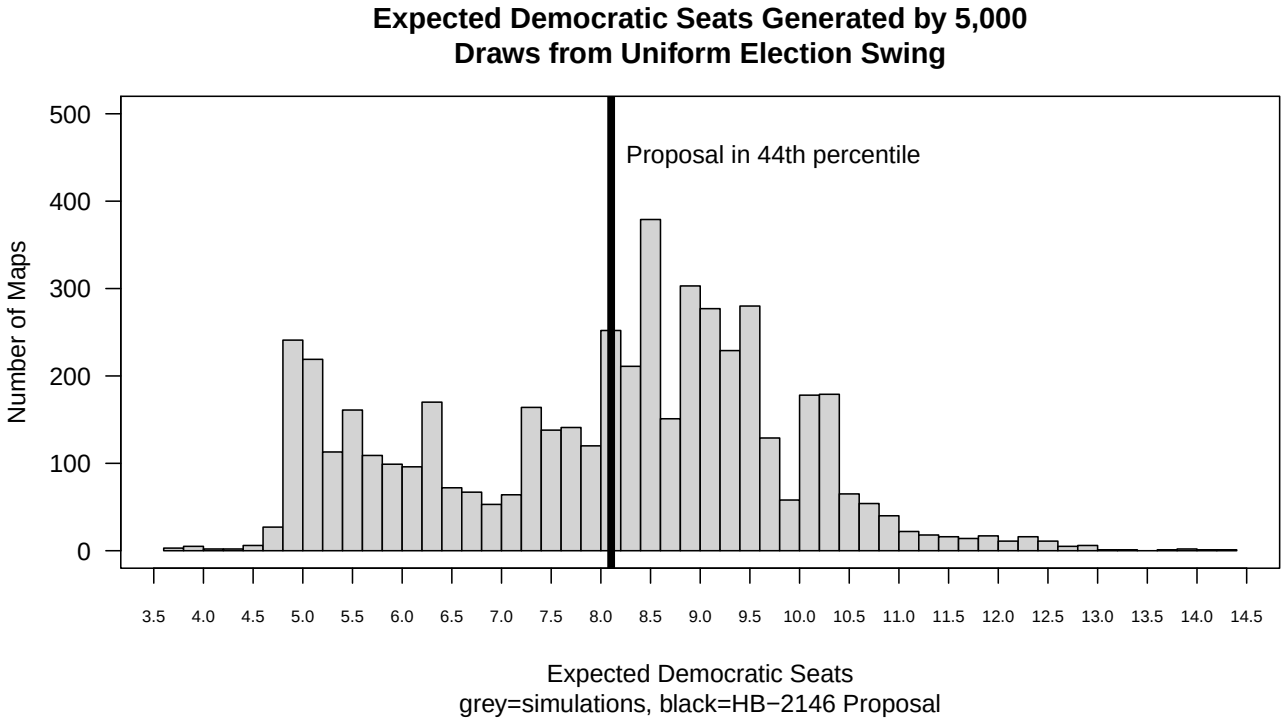
The result of this process is a measure of the expected number of Democratic seats that a plan will produce under a variety of different electoral conditions — some good for

[29]See Jackman, Simon. "The predictive power of uniform swing." PS: Political Science & Politics 47, no. 2 (2014): 317-321 for a discussion of the concept of a uniform swing in elections. See Expert Report of Dr. Wesley Pegden in *Harper v. Hall*, Wake County North Carolina, No. 21 CVS 500085 for another example of using a uniform swing to calculate expected seat shares in redistricting.

[30]3 percentage points is approximately the standard deviation of all of the statewide election results used in creating the 2012-2020 partisan index.

one party, some good for the other party, and some that are about average for both parties. Figure 7 shows the results of this process. The grey distribution shows the expected number of Democratic seats after applying the 5,000 draws from the uniform swing to the 50,000 simulations. Some of the simulated plans are very favorable to Republicans (with expected Democratic seat shares near 5) while other plans are very favorable to Democrats (with expected seat shares of 12 Democratic seats). The HB2146 plan, however, is nearly exactly in the middle of this distribution. The proposal generates an expected seats of 8.10 and is in the 44th percentile of the distribution of the simulated results. In other words, 44 percent of the simulations are worse for Democrats and 55 percent the simulations are better for Democrats compared to the HB2146 plan. The plan is positioned nearly in the middle of the non-partisan simulations on this measure.

Figure 7: **Expected Seats from Uniform Swing of HB2146 plan and Simulations**



Note: Distribution of expected seats in the HB2146 plan (black line) and the simulations (grey distribution) after applying 5,000 uniform swings to the partisan index. The value of each uniform swing is chosen from a normal distribution that is centered at zero with a standard deviation of 3 percentage points.

5.8 Considerations of Race

Table 3 shows the non-Hispanic Black voting age population percent of each district and the non-White voting age population percent of each district in the HB2146 plan. The districts are ordered from lowest to highest percentage in each category. The HB2146 plan contains one district (District 3) in Philadelphia that is just shy of being majority Black with a 49.82% non-Hispanic Black voting age population. Additionally, District 2 has a 59.60% non-White voting age population. District 15 has a 32.5% non-White voting age population.

Table 2: District-by-District Racial Composition of HB2146 plan

District rank	District Number	NHBVAP	District Number	Non-White
17	12	2.1%	14	7.2%
16	9	2.3%	12	9.0%
15	14	2.4%	16	10.8%
14	11	3.3%	9	11.6%
13	1	3.8%	17	12.2%
12	17	3.9%	13	13.8%
11	16	3.9%	1	18.1%
10	13	4.9%	11	18.1%
9	7	5.2%	8	18.3%
8	6	5.3%	10	20.0%
7	8	5.4%	4	25.6%
6	10	6.8%	6	26.4%
5	4	9.6%	7	27.5%
4	15	17.5%	15	28.3%
3	5	19.2%	5	32.8%
2	2	21.9%	2	57.1%
1	3	52.2%	3	68.6%

One potential criticism that some may raise of the simulations is that they do not take into account racial data when drawing district boundaries, and that once this constraint is imposed it may shift the partisan composition of the remaining districts in a way that the distribution of simulations may look different when racial factors are explicitly considered. This criticism, however, is unwarranted, as the explicit consideration of race, if anything, actually brings the distribution of simulations more in line with the HB2146 plan.

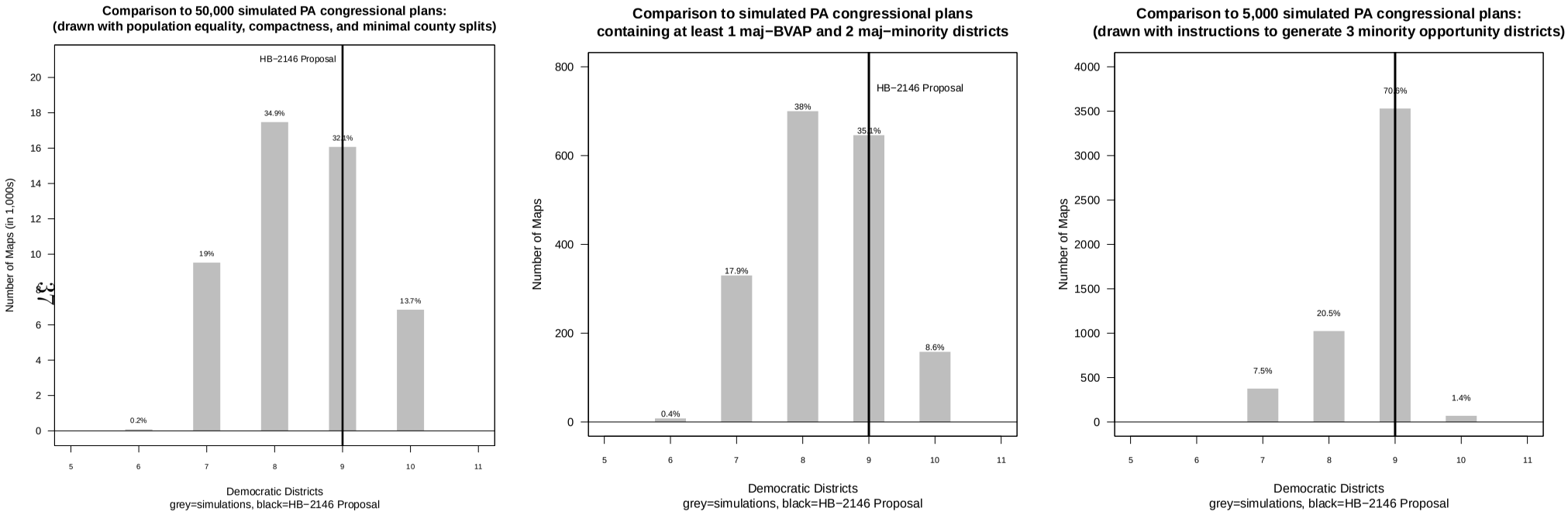
Figure 8 below shows this. The left panel of Figure 8 is the same as Figure 3 in

the earlier section of this report and shows the partisan distribution of the simulations and the location of the HB2146 plan. The middle panel of the figure subsets the race-blind simulations to the 1,842 plans that, while race was not explicitly considered, nevertheless contain both a majority-black district as well as an additional majority-minority district.[31] Comparing the two panels shows that the distributions are extremely similar. The probability of a 9-D map, which is what the HB2146 plan generates, is nearly identical across the two sets of simulations (35.1% in the race-blind simulations, 32.1% in the race-filtered simulations).

The right panel in Figure 8 is the distribution of Democratic-leaning seats derived from a separate set of simulations that explicitly consider race. In this race-conscious set of simulations I instruct the model to ensure that every plan contains three districts that have at least a 35% non-white voting age population. These districts are often referred to as minority oppfortunity districts. I choose to instruct the model to generate three of these districts as it is similar to the number of minority opportunity districts generated by the HB2146 plan and the plans put forward recently by Governor Wolf. Other than the use of racial data to inform the construction of minority opportunity districts, the other parameters and data used in the two sets of simulations are identical in every other way. The right panel of Figure 8 shows that the results of the race-conscious simulations is a general reduction in the variation in the number of Democratic-leaning seats generated by the simulations. The probability of a 7-D or 8-D map has decreased substantially while there are no simulations that generate a 6-D map and only 1.4% of the simulations generate a 10-D map. A map with 9 Democratic-leaning districts is now the most common outcome with 70.6% of the simulations generating this result.

[31] While a reduction from 50,000 to 1,842 simulated plans is substantial, 1,842 is still a large number of plans to compare against and is larger than many simulations presented in other expert reports in recent redistricting litigation and is still large enough to provide a sufficient sample of maps to compare to.

Figure 8: **Seats Carried by Democrats in Race-Blind and Race-Conscious Simulations**



Note: The left panel contains the results of the 50,000 simulations that do not consider race when districts are drawn. The middle panel considers the 1,832 districts that, even though they were drawn without any racial data, nevertheless contain a majority Black district and an additional majority minority district. The right panel is the distribution from 5,000 simulations that are drawn with racial data and instructions to generate three districts with at least a 35% minority voting age population.

6 Conclusion

Based on the evidence and analysis presented above, my opinions regarding the HB2146 plan for congressional districts in Pennsylvania can be summarized as follows:

- The contemporary political geography of Pennsylvania is such that Democratic majorities are geographically clustered in the largest cities of the state while Republican voters dominate the suburban and rural portions of the state.

- This geographic clustering in cities puts the Democratic Party at a natural disadvantage when single-member districts are drawn. Specifically, districts drawn to be contiguous, compact, and contain minimal county and municipal splits will naturally create several districts in the Philadelphia and Pittsburgh areas that contain substantial Democratic majorities with many "wasted votes."

- Based on a comparison between the HB2146 plan, and a set of 50,000 simulated maps, the HB2146 plan is a fair plan with no evidence of partisan gerrymandering across a number of different measures used to assess the fairness of a map.

- Based on an index of statewide elections from 2012-2020, the HB2146 plan generates nine Democratic-leaning districts and eight Republican-leaning districts.

- Based on the same index of statewide elections from 2012-2020, six of the districts in the HB2146 plan will likely be competitive with candidates from both parties having a realistic possibility of winning the seats. Five of these competitive districts are *extremely* competitive, with a partisan index within two percentage points of an even 50/50 split.

- Compared to a second set of simulations that explicitly consider the creation of minority opportunity districts, the HB2146 plan is similarly unbiased. The race-conscious simulations reduce the variation in Democratic-leaning districts substantially, mak-

ing nine Democratic-leaning districts the overwhelmingly most likely outcome in the simulations.

- Based on these commonly-used measures of redistricting fairness, the HB2146 plan is unbiased, and when compared to the simulations on these same metrics is balanced between occasionally having a slight Republican benefit and occasionally providing a slight benefit to Democratic voters.

I am being compensated for my time in preparing this report at an hourly rate of $400/hour. My compensation is in no way contingent on the conclusions reached as a result of my analysis.

Michael Jay Barber

7 Appendix A: Additional Statistics

Table 3: District-by-District Compactness - Polsby-Popper

District rank	District Number	Polsby-Popper
17	6	0.20
16	2	0.23
15	3	0.24
14	14	0.24
13	17	0.24
12	4	0.25
11	5	0.26
10	13	0.29
9	15	0.29
8	9	0.30
7	8	0.35
6	7	0.37
5	1	0.40
4	12	0.42
3	10	0.45
2	16	0.49
1	11	0.50

Split Municipalities:

- Philadelphia*
- Stowe Township, Allegheny County
- Centre Township, Berks County
- Summit Township, Butler County
- East Hanover Township, Butler County
- Stonycreek Township, Cambria County
- West Whiteland Township, Chester County
- Pine Creek Township, Clinton County
- Silver Spring Township, Cumberland County
- Stroud Township, Dauphin County
- Luzerne Borough, Luzerne County
- Horsham Township, Montgomery County
- Buffalo Township, Union County
- Amwell Township, Washington County
- Independence Township, Washington County
- North Franklin Township, Washington County

*Population of the city is larger than a single congressional district and therefore will need to be split between multiple districts.

Split Counties:

- Allegheny County*
- Berks County
- Butler County
- Cambria County
- Chester County
- Clinton County
- Cumberland County
- Dauphin County
- Luzerne County
- Monroe County
- Montgomery County*
- Philadelphia County*
- Snyder County
- Union County
- Washington County

*Population of the county is larger than a single congressional district and therefore will need to be split between multiple districts.

Number of Democratic-leaning Districts using Alternative Election Indices:

- All 2012-2020 statewide elections: 9
- All 2014-2020 statewide elections: 8
- 2016-2020 index used by Dave's Redistricting: 9
- Index used by Planscore.com: 8

Appendix B: Curriculum Vitae

Michael Jay Barber

CONTACT INFORMATION

Brigham Young University
Department of Political Science
724 KMBL
Provo, UT 84602

barber@byu.edu
http://michaeljaybarber.com
Ph: (801) 422-7492

ACADEMIC APPOINTMENTS

Brigham Young University, Provo, UT

August 2020 - present Associate Professor, Department of Political Science
2014 - July 2020 Assistant Professor, Department of Political Science
2014 - present Faculty Scholar, Center for the Study of Elections and Democracy

EDUCATION

Princeton University Department of Politics, Princeton, NJ

Ph.D., Politics, July 2014

- Advisors: Brandice Canes-Wrone, Nolan McCarty, and Kosuke Imai
- Dissertation: "Buying Representation: the Incentives, Ideology, and Influence of Campaign Contributions on American Politics"
- 2015 Carl Albert Award for Best Dissertation, Legislative Studies Section, American Political Science Association (APSA)

M.A., Politics, December 2011

Brigham Young University, Provo, UT

B.A., International Relations - Political Economy Focus, April, 2008

- *Cum Laude*

RESEARCH INTERESTS

American politics, congressional polarization, political ideology, campaign finance, survey research

PUBLICATIONS

19. **"Ideological Disagreement and Pre-emption in Municipal Policymaking"** with Adam Dynes
Forthcoming at *American Journal of Political Science*
18. **"Comparing Campaign Finance and Vote Based Measures of Ideology"**
Forthcoming at *Journal of Politics*
17. **"The Participatory and Partisan Impacts of Mandatory Vote-by-Mail"**, with John Holbein
Science Advances, 2020. Vol. 6, no. 35, DOI: 10.1126/sciadv.abc7685
16. **"Issue Politicization and Interest Group Campaign Contribution Strategies"**, with Mandi Eatough
Journal of Politics, 2020. Vol. 82: No. 3, pp. 1008-1025

15. **"Campaign Contributions and Donors' Policy Agreement with Presidential Candidates"**, with Brandice Canes-Wrone and Sharece Thrower
Presidential Studies Quarterly, 2019, 49 (4) 770–797

14. **"Conservatism in the Era of Trump"**, with Jeremy Pope
Perspectives on Politics, 2019, 17 (3) 719–736

13. **"Legislative Constraints on Executive Unilateralism in Separation of Powers Systems"**, with Alex Bolton and Sharece Thrower
Legislative Studies Quarterly, 2019, 44 (3) 515–548
Awarded the Jewell-Loewenberg Award for best article in the area of subnational politics published in *Legislative Studies Quarterly* in 2019

12. **"Electoral Competitiveness and Legislative Productivity"**, with Soren Schmidt
American Politics Research, 2019, 47 (4) 683–708

11. **"Does Party Trump Ideology? Disentangling Party and Ideology in America"**, with Jeremy Pope
American Political Science Review, 2019, 113 (1) 38–54

10. **"The Evolution of National Constitutions"**, with Scott Abramson
Quarterly Journal of Political Science, 2019, 14 (1) 89–114

9. **"Who is Ideological? Measuring Ideological Responses to Policy Questions in the American Public"**, with Jeremy Pope
The Forum: A Journal of Applied Research in Contemporary Politics, 2018, 16 (1) 97–122

8. **"Status Quo Bias in Ballot Wording"**, with David Gordon, Ryan Hill, and Joe Price
The Journal of Experimental Political Science, 2017, 4 (2) 151–160.

7. **"Ideologically Sophisticated Donors: Which Candidates Do Individual Contributors Finance?"**, with Brandice Canes-Wrone and Sharece Thrower
American Journal of Political Science, 2017, 61 (2) 271–288.

6. **"Gender Inequalities in Campaign Finance: A Regression Discontinuity Design"**, with Daniel Butler and Jessica Preece
Quarterly Journal of Political Science, 2016, Vol. 11, No. 2: 219–248.

5. **"Representing the Preferences of Donors, Partisans, and Voters in the U.S. Senate"**
Public Opinion Quarterly, 2016, 80: 225–249.

4. **"Donation Motivations: Testing Theories of Access and Ideology"**
Political Research Quarterly, 2016, 69 (1) 148–160.

3. **"Ideological Donors, Contribution Limits, and the Polarization of State Legislatures"**
Journal of Politics, 2016, 78 (1) 296–310.

2. **"Online Polls and Registration Based Sampling: A New Method for Pre-Election Polling"** with Quin Monson, Kelly Patterson and Chris Mann.
Political Analysis 2014, 22 (3) 321–335.

1. **"Causes and Consequences of Political Polarization"** In *Negotiating Agreement in Politics*. Jane Mansbridge and Cathie Jo Martin, eds., Washington, DC: American Political Science Association: 19–53. with Nolan McCarty. 2013.

- Reprinted in *Solutions to Political Polarization in America*, Cambridge University Press. Nate Persily, eds. 2015
- Reprinted in *Political Negotiation: A Handbook*, Brookings Institution Press. Jane Mansbridge and Cathie Jo Martin, eds. 2015

Available Working Papers

"Misclassification and Bias in Predictions of Individual Ethnicity from Administrative Records" (Revise and Resubmit at *American Political Science Review*)

"Taking Cues When You Don't Care: Issue Importance and Partisan Cue Taking"
with Jeremy Pope (Revise and Resubmit)

"A Revolution of Rights in American Founding Documents"
with Scott Abramson and Jeremy Pope (Conditionally Accepted)

"410 Million Voting Records Show the Distribution of Turnout in America Today"
with John Holbein (Revise and Resubmit)

"Partisanship and Trolleyology"
with Ryan Davis (Under Review)

"Who's the Partisan: Are Issues or Groups More Important to Partisanship?"
with Jeremy Pope (Revise and Resubmit)

"Race and Realignment in American Politics"
with Jeremy Pope (Revise and Resubmit)

"The Policy Preferences of Donors and Voters"

"Estimating Neighborhood Effects on Turnout from Geocoded Voter Registration Records."
with Kosuke Imai

"Super PAC Contributions in Congressional Elections"

Works in Progress

"Collaborative Study of Democracy and Politics"
with Brandice Canes-Wrone, Gregory Huber, and Joshua Clinton

"Preferences for Representational Styles in the American Public"
with Ryan Davis and Adam Dynes

"Representation and Issue Congruence in Congress"
with Taylor Petersen

"Education, Income, and the Vote for Trump"
with Edie Ellison

Invited Presentations

"Are Mormons Breaking Up with Republicanism? The Unique Political Behavior of Mormons in the 2016 Presidential Election"

- Ivy League LDS Student Association Conference - Princeton University, November 2018, Princeton, NJ

"Issue Politicization and Access-Oriented Giving: A Theory of PAC Contribution Behavior"

- Vanderbilt University, May 2017, Nashville, TN

"Lost in Issue Space? Measuring Levels of Ideology in the American Public"

- Yale University, April 2016, New Haven, CT

"The Incentives, Ideology, and Influence of Campaign Donors in American Politics"

- University of Oklahoma, April 2016, Norman, OK

"Lost in Issue Space? Measuring Levels of Ideology in the American Public"

- University of Wisconsin - Madison, February 2016, Madison, WI

"Polarization and Campaign Contributors: Motivations, Ideology, and Policy"

- Hewlett Foundation Conference on Lobbying and Campaign Finance, October 2014, Palo Alto, CA

"Ideological Donors, Contribution Limits, and the Polarization of State Legislatures"

- Bipartisan Policy Center Meeting on Party Polarization and Campaign Finance, September 2014, Washington, DC

"Representing the Preferences of Donors, Partisans, and Voters in the U.S. Senate"

- Yale Center for the Study of American Politics Conference, May 2014, New Haven, CT

Conference Presentations

Washington D.C. Political Economy Conference (PECO):

- 2017 discussant

American Political Science Association (APSA) Annual Meeting:

- 2014 participant and discussant, 2015 participant, 2016 participant, 2017 participant, 2018 participant

Midwest Political Science Association (MPSA) Annual Meeting:

- 2015 participant and discussant, 2016 participant and discussant, 2018 participant

Southern Political Science Association (SPSA) Annual Meeting:

- 2015 participant and discussant, 2016 participant and discussant, 2017 participant

Teaching Experience

Poli 315: Congress and the Legislative Process

- Fall 2014, Winter 2015, Fall 2015, Winter 2016, Summer 2017

Poli 328: Quantitative Analysis

- Winter 2017, Fall 2017, Fall 2019, Winter 2020, Fall 2020, Winter 2021

Poli 410: Undergraduate Research Seminar in American Politics

- Fall 2014, Winter 2015, Fall 2015, Winter 2016, Summer 2017

Awards and Grants

2019 BYU Mentored Environment Grant (MEG), American Ideology Project, $30,000

2017 BYU Political Science Teacher of the Year Award

2017 BYU Mentored Environment Grant (MEG), Funding American Democracy Project, $20,000

2016 BYU Political Science Department, Political Ideology and President Trump (with Jeremy Pope), $7,500

2016 BYU Office of Research and Creative Activities (ORCA) Student Mentored Grant x 3

- Hayden Galloway, Jennica Peterson, Rebecca Shuel

2015 BYU Office of Research and Creative Activities (ORCA) Student Mentored Grant x 3

- Michael-Sean Covey, Hayden Galloway, Sean Stephenson

2015 BYU Student Experiential Learning Grant, American Founding Comparative Constitutions Project (with Jeremy Pope), $9,000

2015 BYU Social Science College Research Grant, $5,000

2014 BYU Political Science Department, 2014 Washington DC Mayoral Pre-Election Poll (with Quin Monson and Kelly Patterson), $3,000

2014 BYU Social Science College Award, 2014 Washington DC Mayoral Pre-Election Poll (with Quin Monson and Kelly Patterson), $3,000

2014 BYU Center for the Study of Elections and Democracy, 2014 Washington DC Mayoral Pre-Election Poll (with Quin Monson and Kelly Patterson), $2,000

2012 Princeton Center for the Study of Democratic Politics Dissertation Improvement Grant, $5,000

2011 Princeton Mamdouha S. Bobst Center for Peace and Justice Dissertation Research Grant, $5,000

2011 Princeton Political Economy Research Grant, $1,500

Other Scholarly Activities

Expert Witness in Nancy Carola Jacobson, et al., Plaintiffs, vs. Laurel M. Lee, et al., Defendants. Case No. 4:18-cv-00262 MW-CAS (U.S. District Court for the Northern District of Florida)

Expert Witness in Common Cause, et al., Plaintiffs, vs. LEWIS, et al., Defendants. Case No. 18-CVS-14001 (Wake County, North Carolina)

Expert Witness in Kelvin Jones, et al., Plaintiffs, v. Ron DeSantis, et al., Defendants, Consolidated Case No. 4:19-cv-300 (U.S. District Court for the Northern District of Florida)

Expert Witness in Community Success Initiative, et al., Plaintiffs, v. Timothy K. Moore, et al., Defendants, Case No. 19-cv-15941 (Wake County, North Carolina)

Expert Witness in Richard Rose et al., Plaintiffs, v. Brad Raffensperger, Defendant, Civil Action No. 1:20-cv-02921-SDG (U.S. District Court for the Northern District of Georgia)

Georgia Coalition for the People's Agenda, Inc., et. al., Plaintiffs, v. Brad Raffensberger, Defendant. Civil Action No. 1:18-cv-04727-ELR (U.S. District Court for the Northern District of Georgia)

Expert Witness in Alabama, et al., Plaintiffs, v. United States Department of Commerce; Gina Raimondo, et al., Defendants. Case No. CASE No. 3:21-cv-00211-RAH-ECM-KCN (U.S. District Court for the Middle District of Alabama Eastern Division)

Expert Witness in League of Women Voters of Ohio, et al., Relators, v. Ohio Redistricting Commission, et al., Respondents. Case No. 2021-1193 (Supreme Court of Ohio)

Expert Witness in Regina Adams, et al., Relators, v. Governor Mike DeWine, et al., Respondents. Case No. 2021-1428 (Supreme Court of Ohio)

Expert Witness in Rebecca Harper, et al., Plaintiffs, v. Representative Destin Hall, et al., Defendants (Consolidated Case). Case No. 21 CVS 500085 (Wake County, North Carolina)

Additional Training

EITM 2012 at Princeton University - Participant and Graduate Student Coordinator

Computer Skills

Statistical Programs: R, Stata, SPSS, parallel computing

Updated January 7, 2022

EXHIBIT I

IN THE COMMONWEALTH COURT OF PENNSYLVANIA

No. 464 M.D. 2021

Carol Ann Carter; Monica Parrilla; Rebecca Poyourow; William Tung; Roseanne Milazzo; Burt Siegel; Susan Cassanelli; Lee Cassanelli; Lynn Wachman; Michael Guttman; Maya Fonkeu; Brady Hill; Mary Ellen Balchunis; Tom DeWall; Stephanie McNulty; and Janet Temin,

Petitioners,

vs.

Leigh Chapman, in Her Capacity as Acting Secretary of the Commonwealth of Pennsylvania; and Jessica Mathis, in Her Capacity as Director of the Bureau of Election Services and Notaries,

Respondents.

No. 465 M.D. 2021

Philip T. Gressman; Ron Y. Donagi; Kristopher R. Tapp; Pamela A. Gorkin; David P. Marsh; James L. Rosenberger; Amy Myers; Eugene Boman; Gary Gordon; Liz McMahon; Timothy G. Feeman; and Garth Isaak

Petitioners,

vs.

Leigh Chapman, in Her Capacity as Acting Secretary of the Commonwealth of Pennsylvania; and Jessica Mathis, in Her Capacity as Director of the Bureau of Election Services and Notaries,

Respondents.

AFFIDAVIT OF BILL SCHALLER

I, Bill Schaller, depose and state the following:

1. I am over eighteen years of age and I have personal knowledge of the matters set forth herein.

2. I am employed as Director of Republican Reapportionment Department for the Republican Caucus of the Pennsylvania House of Representatives, and have been employed by the Pennsylvania House of Representatives for 26.5 years.

3. As part of my responsibilities, I am familiar with the congressional redistricting plan passed by the Pennsylvania House of Representatives, House Bill 2146, in the 2021-2022 Session thereof.

4. A true, accurate, and complete rendering of the plan is attached hereto as Exhibit 1.

5. Our office received from the Legislative Data Processing Center (the "LDPC") of the Pennsylvania General Assembly a report that analyzes House Bill 2146. This report was prepared in the ordinary course of business by a person with knowledge, and it is reliable. A true, accurate, and complete copy of the LDPC report is attached hereto as Exhibit 2.

6. A staff member under my direct supervision used our Autobound Edge GIS software to produce a report of the compactness of the House Bill 2146

congressional plan. This report was prepared in the ordinary course of business by a person with knowledge, and it is reliable. A true, accurate, and complete copy of this report is attached hereto as Exhibit 3.

7. A staff member under my direct supervision used our Autobound Edge GIS software to produce a report of the precinct split population breakdowns by district in the House Bill 2146 plan. This report was prepared in the ordinary course of business by a person with knowledge, and it is reliable. A true, accurate, and complete copy of this report is attached hereto as Exhibit 4.

I hereby verify that the foregoing is true and correct to the best of my knowledge, information, and belief. This verification is made subject to the penalties of 18 Pa.C.S. § 4904, relating to unsworn falsification to authorities.

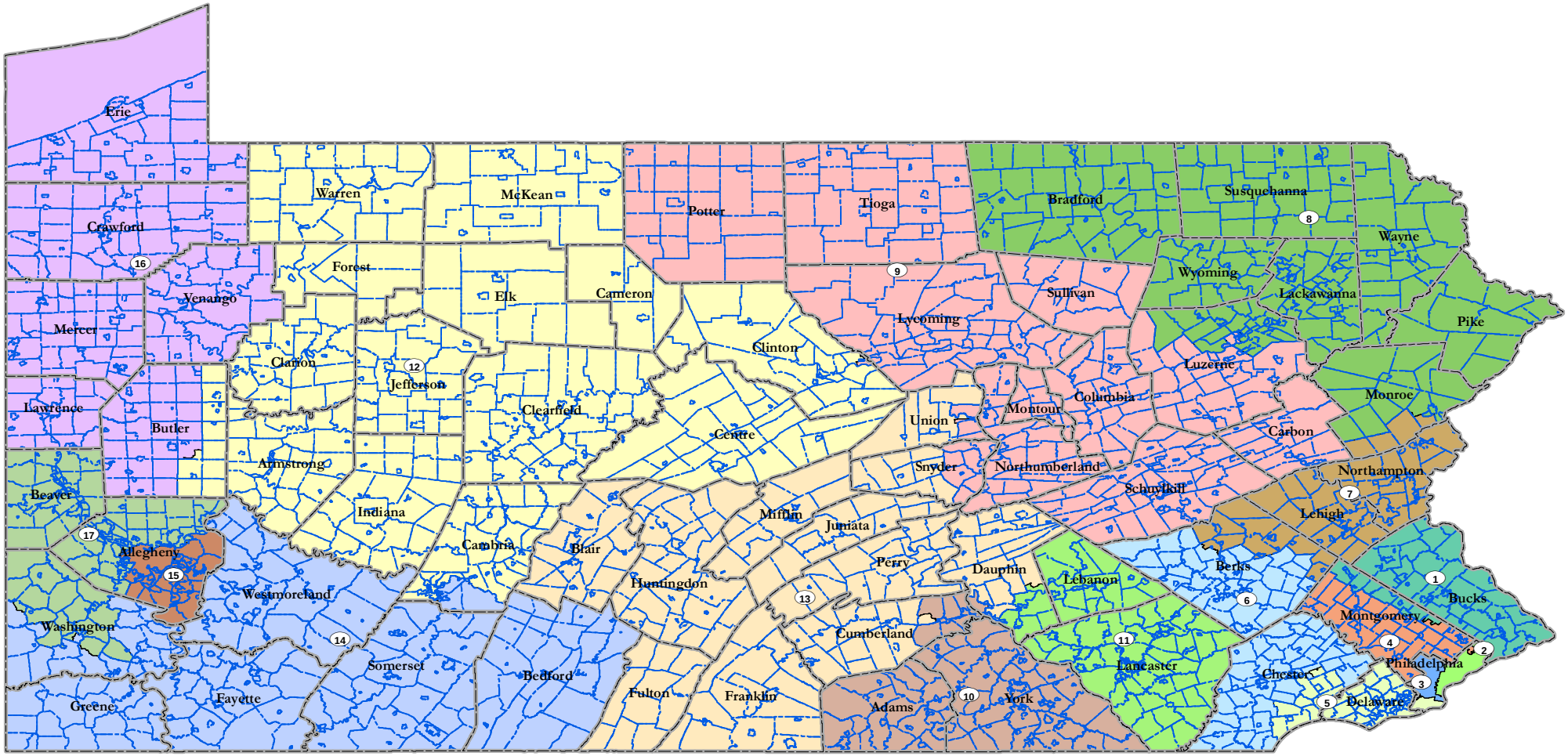
January 24, 2022
Harrisburg, PA

Bill Schaller
Bill Schaller

122042.000003 4889-9930-6763

Exhibit 1

Preliminary Congressional Plan Amendment
Based on Holt Map



County
Municipalities
District 1
District 2
District 3
District 4
District 5
District 6
District 7
District 8
District 9
District 10
District 11
District 12
District 13
District 14
District 15
District 16
District 17

N
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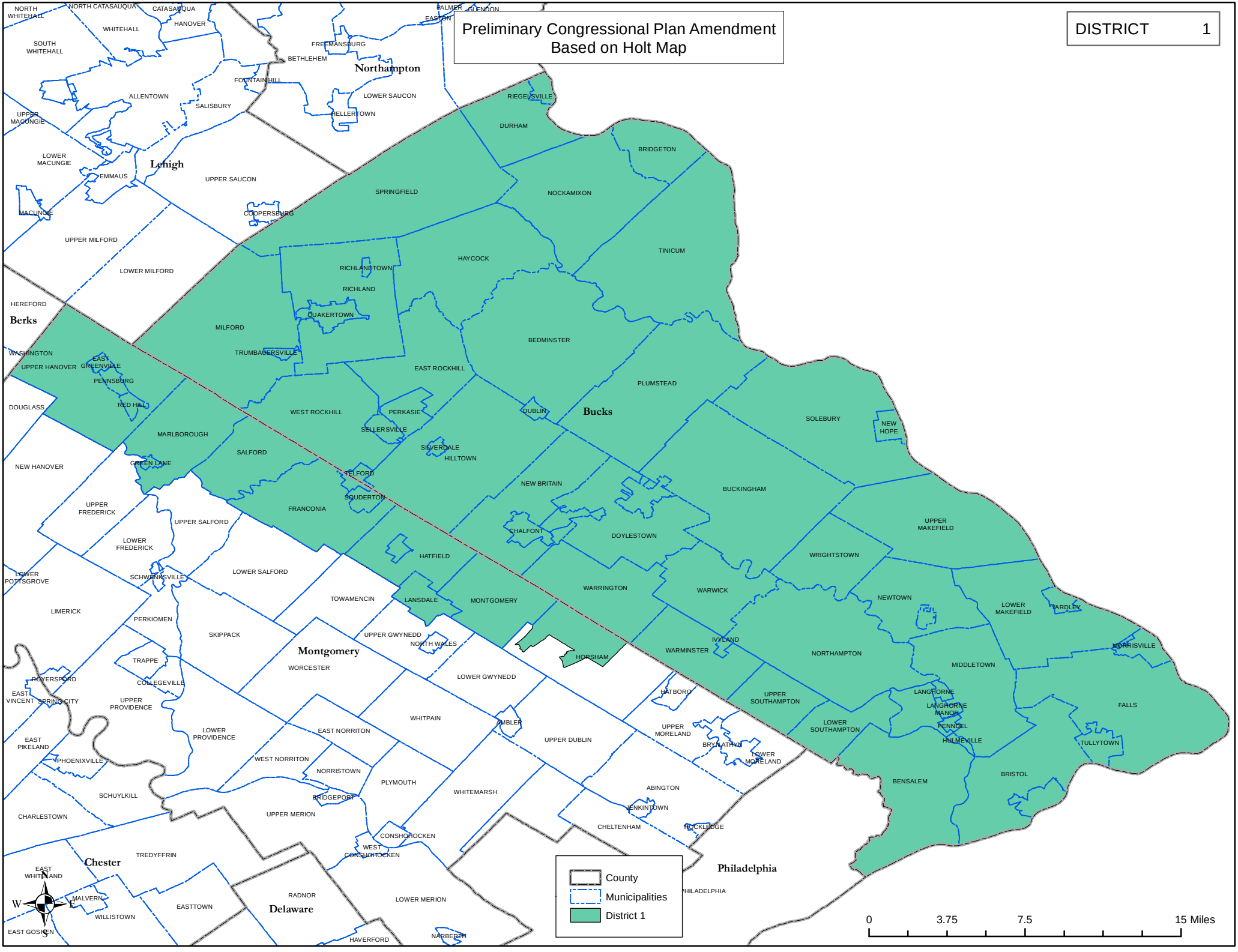
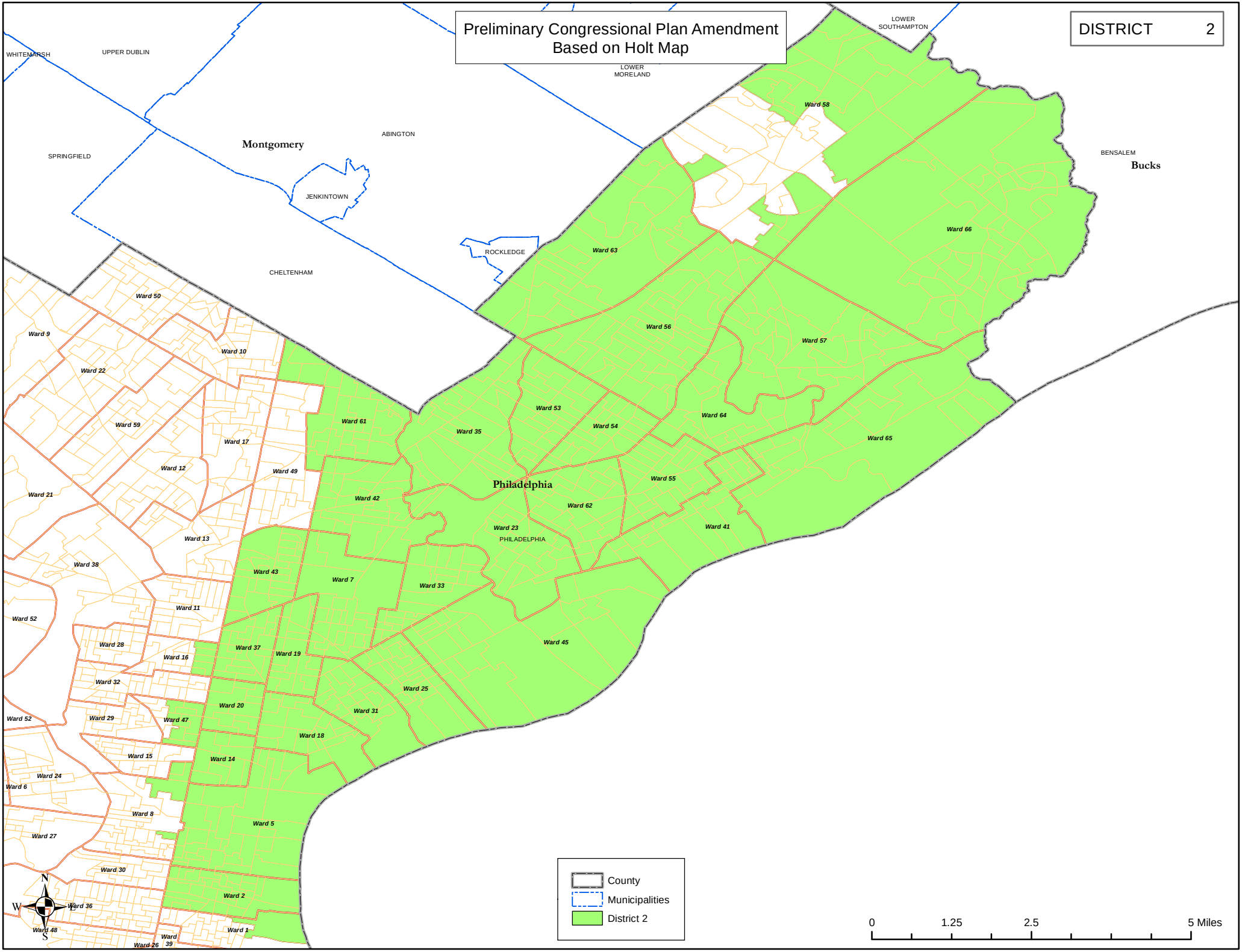
0 25 50 100 Miles


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 1
Northampton
Lehigh
Berks
Bucks
Montgomery
Chester
Delaware
Philadelphia
NORTH WHITEHALL
NORTH CATASAUQUA
CATASAUQUA
WHITEHALL
HANOVER
SOUTH WHITEHALL
FREEMANSBURG
BETHLEHEM
PALMER
EASTON
FOUNTAIN HILL
ALLENTOWN
SALISBURY
LOWER SAUCON
HELLERTOWN
UPPER MACUNGIE
LOWER MACUNGIE
EMMAUS
UPPER SAUCON
MACUNGIE
COOPERSBURG
UPPER MILFORD
LOWER MILFORD
HEREFORD
RIEGELSVILLE
DURHAM
BRIDGETON
SPRINGFIELD
NOCKAMIXON
TINICUM
HAYCOCK
RICHLANDTOWN
RICHLAND
QUAKERTOWN
MILFORD
TRUMBAUERSVILLE
BEDMINSTER
EAST ROCKHILL
PLUMSTEAD
WASHINGTON
UPPER HANOVER
EAST GREENVILLE
PENNSBURG
RED HILL
DOUGLASS
WEST ROCKHILL
PERKASIE
DUBLIN
SOLEBURY
NEW HOPE
MARLBOROUGH
SELLERSVILLE
SILVERDALE
HILLTOWN
SALFORD
GREEN LANE
NEW HANOVER
TELFORD
SOUDERTON
NEW BRITAIN
BUCKINGHAM
UPPER FREDERICK
FRANCONIA
UPPER MAKEFIELD
UPPER SALFORD
CHALFONT
DOYLESTOWN
LOWER FREDERICK
HATFIELD
WRIGHTSTOWN
LOWER POTTSGROVE
SCHWENKSVILLE
LOWER SALFORD
WARRINGTON
WARWICK
NEWTOWN
LOWER MAKEFIELD
YARDLEY
TOWAMENCIN
LANSDALE
MONTGOMERY
LIMERICK
PERKIOMEN
SKIPPACK
UPPER GWYNEDD
NORTH WALES
IVYLAND
WARMINSTER
NORTHAMPTON
MORRISVILLE
HORSHAM
MIDDLETOWN
TRAPPE
WORCESTER
ROYERSFORD
COLLEGEVILLE
LOWER GWYNEDD
HATBORO
LANGHORNE
EAST VINCENT
SPRING CITY
UPPER PROVIDENCE
UPPER SOUTHAMPTON
LANGHORNE MANOR
FALLS
WHITPAIN
AMBLER
LOWER PROVIDENCE
EAST NORRITON
UPPER DUBLIN
UPPER MORELAND
PENNDEL
HULMEVILLE
TULLYTOWN
EAST PIKELAND
BRYN ATHYN
LOWER SOUTHAMPTON
LOWER MORELAND
PHOENIXVILLE
WEST NORRITON
NORRISTOWN
PLYMOUTH
WHITEMARSH
ABINGTON
BENSALEM
BRISTOL
SCHUYLKILL
BRIDGEPORT
JENKINTOWN
CHARLESTOWN
UPPER MERION
CHELTENHAM
ROCKLEDGE
CONSHOHOCKEN
WEST CONSHOHOCKEN
TREDYFFRIN
EAST WHITELAND
MALVERN
WILLISTOWN
EASTTOWN
RADNOR
LOWER MERION
PHILADELPHIA
EAST GOSHEN
HAVERFORD
NARBERTH
County
Municipalities
District 1
0
3.75
7.5
15 Miles
N
W
E
S


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 2
WHITEMARSH
UPPER DUBLIN
LOWER SOUTHAMPTON
LOWER MORELAND
Montgomery
ABINGTON
SPRINGFIELD
JENKINTOWN
ROCKLEDGE
CHELTENHAM
BENSALEM
Bucks
Philadelphia
PHILADELPHIA
Ward 1
Ward 2
Ward 5
Ward 6
Ward 7
Ward 8
Ward 9
Ward 10
Ward 11
Ward 12
Ward 13
Ward 14
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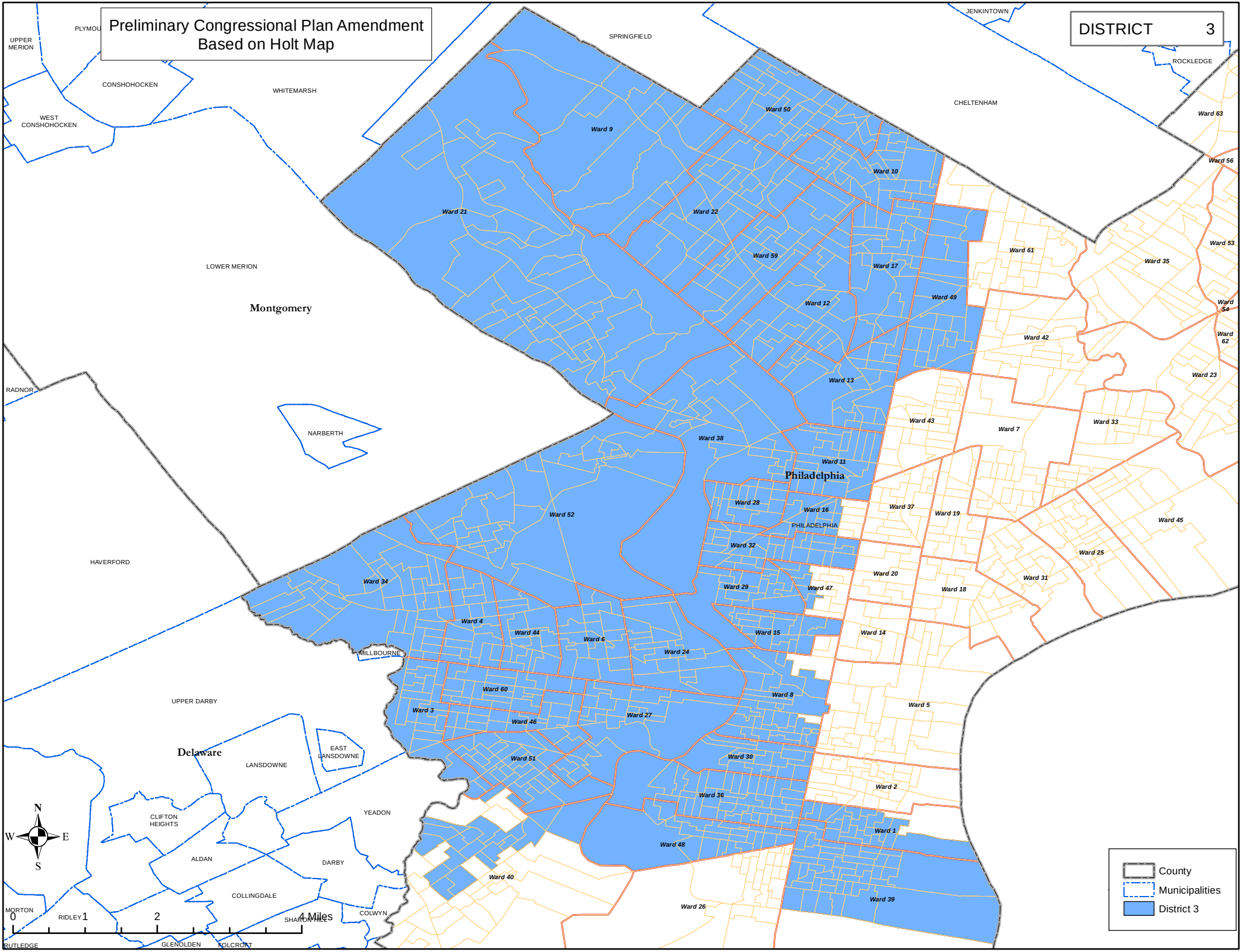
Ward 55
Ward 56
Ward 57
Ward 58
Ward 59
Ward 61
Ward 62
Ward 63
Ward 64
Ward 65
Ward 66
N
W
E
S
County
Municipalities
District 2
0
1.25
2.5
5 Miles


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 3
PLYMOUTH
UPPER MERION
CONSHOHOCKEN
WEST CONSHOHOCKEN
WHITEMARSH
SPRINGFIELD
JENKINTOWN
ROCKLEDGE
CHELTENHAM
LOWER MERION
Montgomery
RADNOR
NARBERTH
HAVERFORD
Philadelphia
PHILADELPHIA
MILLBOURNE
UPPER DARBY
Delaware
LANSDOWNE
EAST LANSDOWNE
YEADON
CLIFTON HEIGHTS
ALDAN
DARBY
COLLINGDALE
MORTON
RIDLEY
SHARON HILL
COLWYN
RUTLEDGE
GLENOLDEN
KOLCROFT
Ward 9
Ward 50
Ward 10
Ward 21
Ward 22
Ward 59
Ward 17
Ward 12
Ward 49
Ward 61
Ward 35
Ward 53
Ward 54
Ward 62
Ward 42
Ward 13
Ward 23
Ward 43
Ward 7
Ward 33
Ward 38
Ward 11
Ward 28
Ward 16
Ward 37
Ward 19
Ward 45
Ward 52
Ward 32
Ward 25
Ward 20
Ward 31
Ward 34
Ward 29
Ward 47
Ward 18
Ward 4
Ward 44
Ward 6
Ward 15
Ward 14
Ward 24
Ward 60
Ward 8
Ward 5
Ward 3
Ward 46
Ward 27
Ward 51
Ward 30
Ward 2
Ward 36
Ward 1
Ward 48
Ward 40
Ward 39
Ward 26
Ward 63
Ward 56
N
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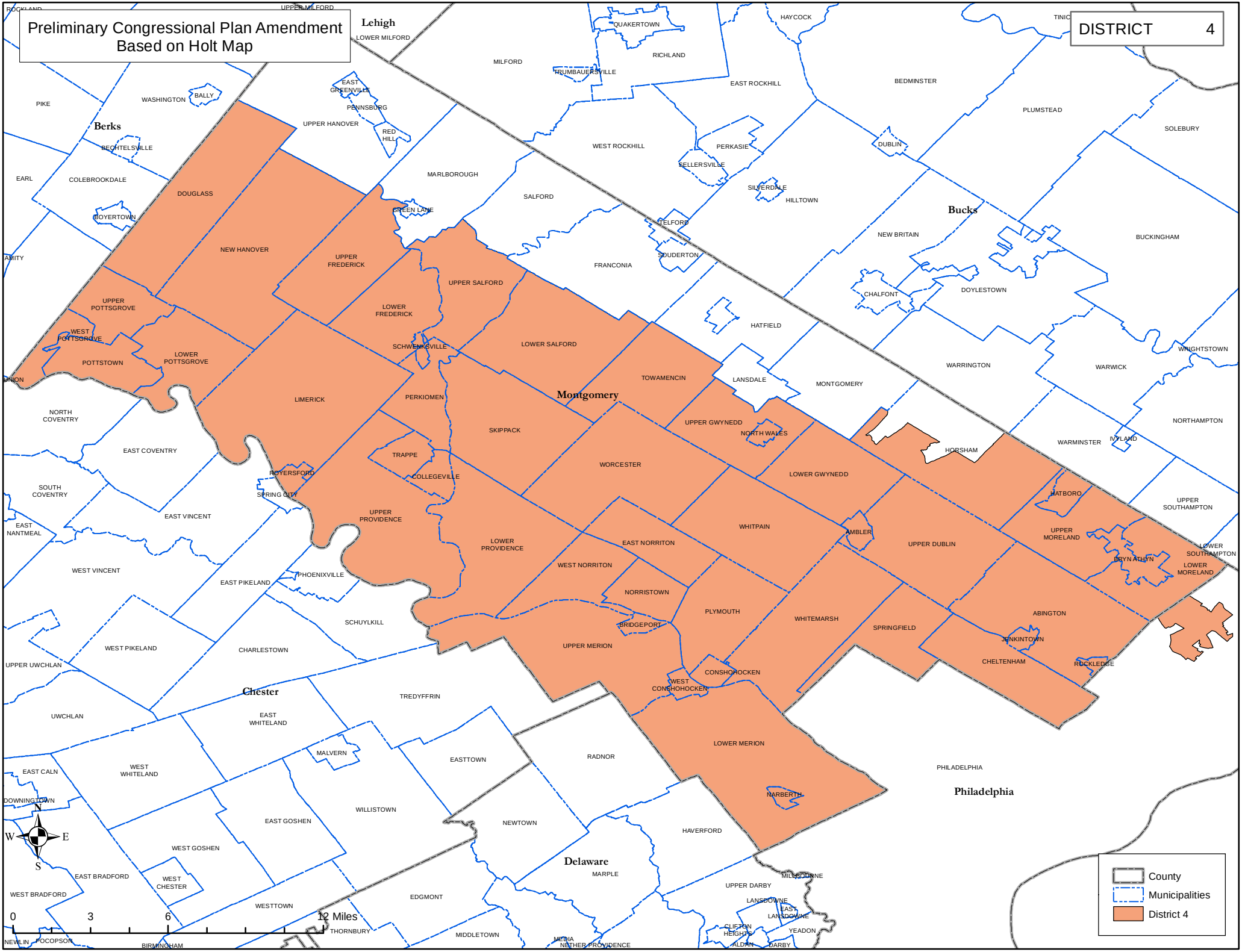
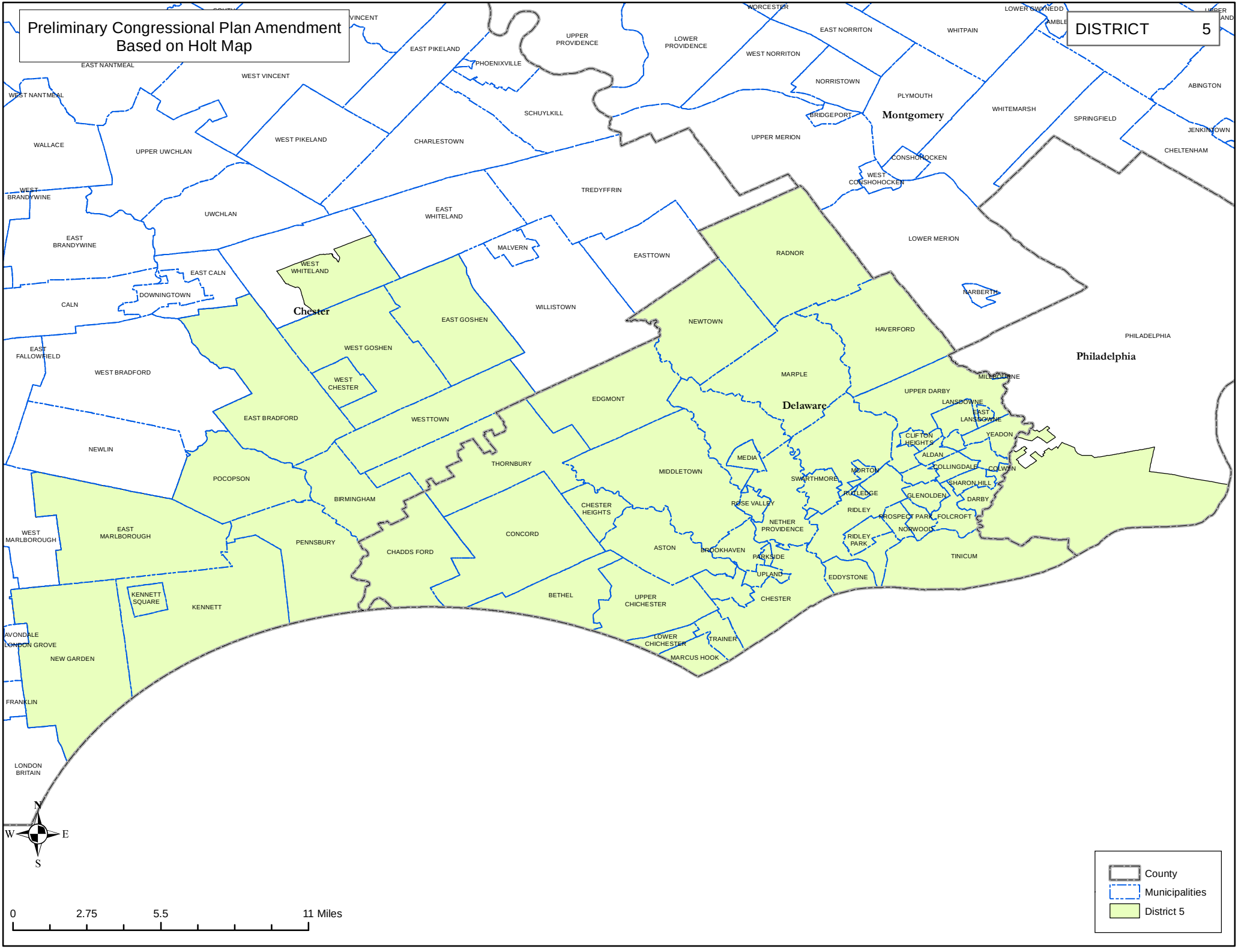
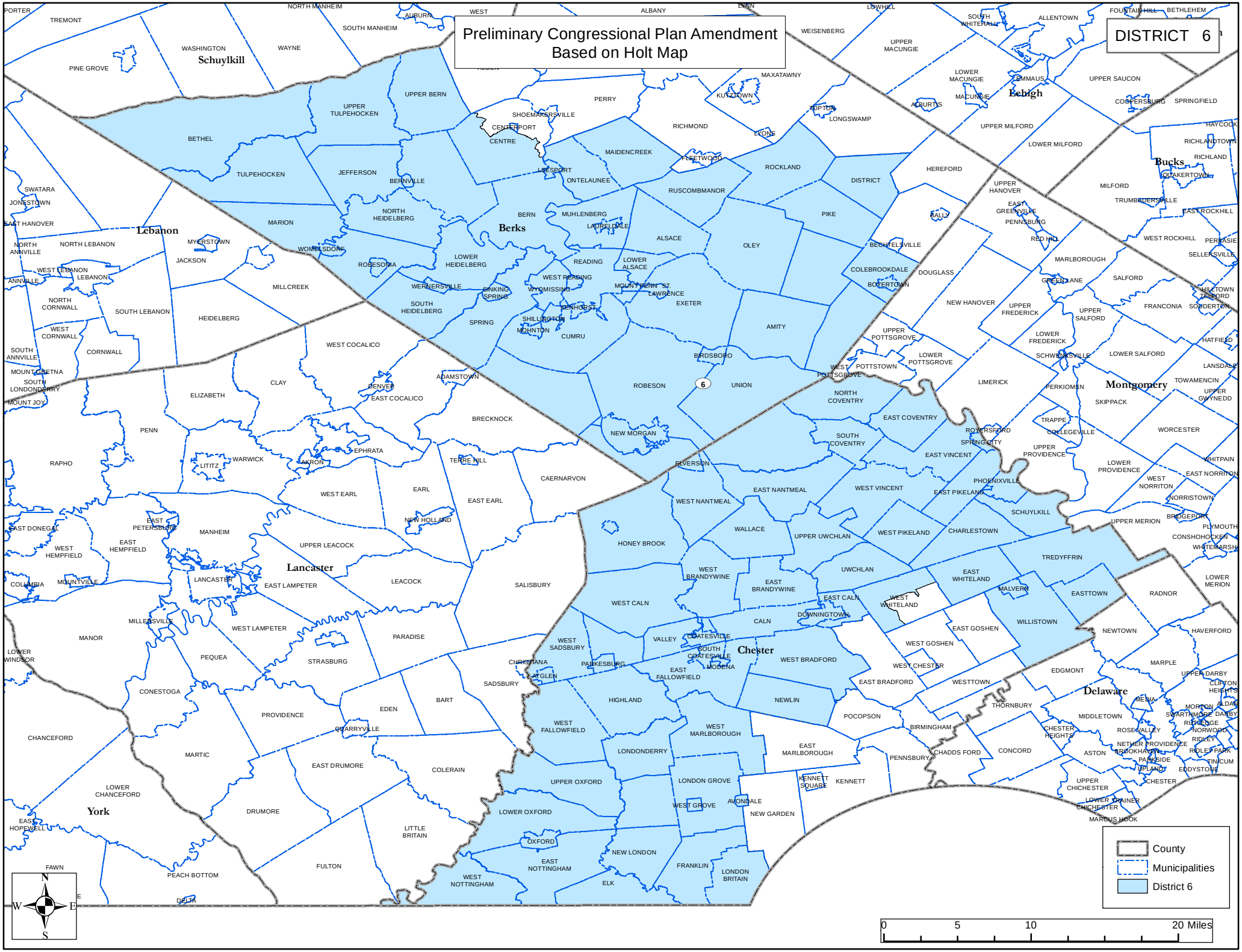
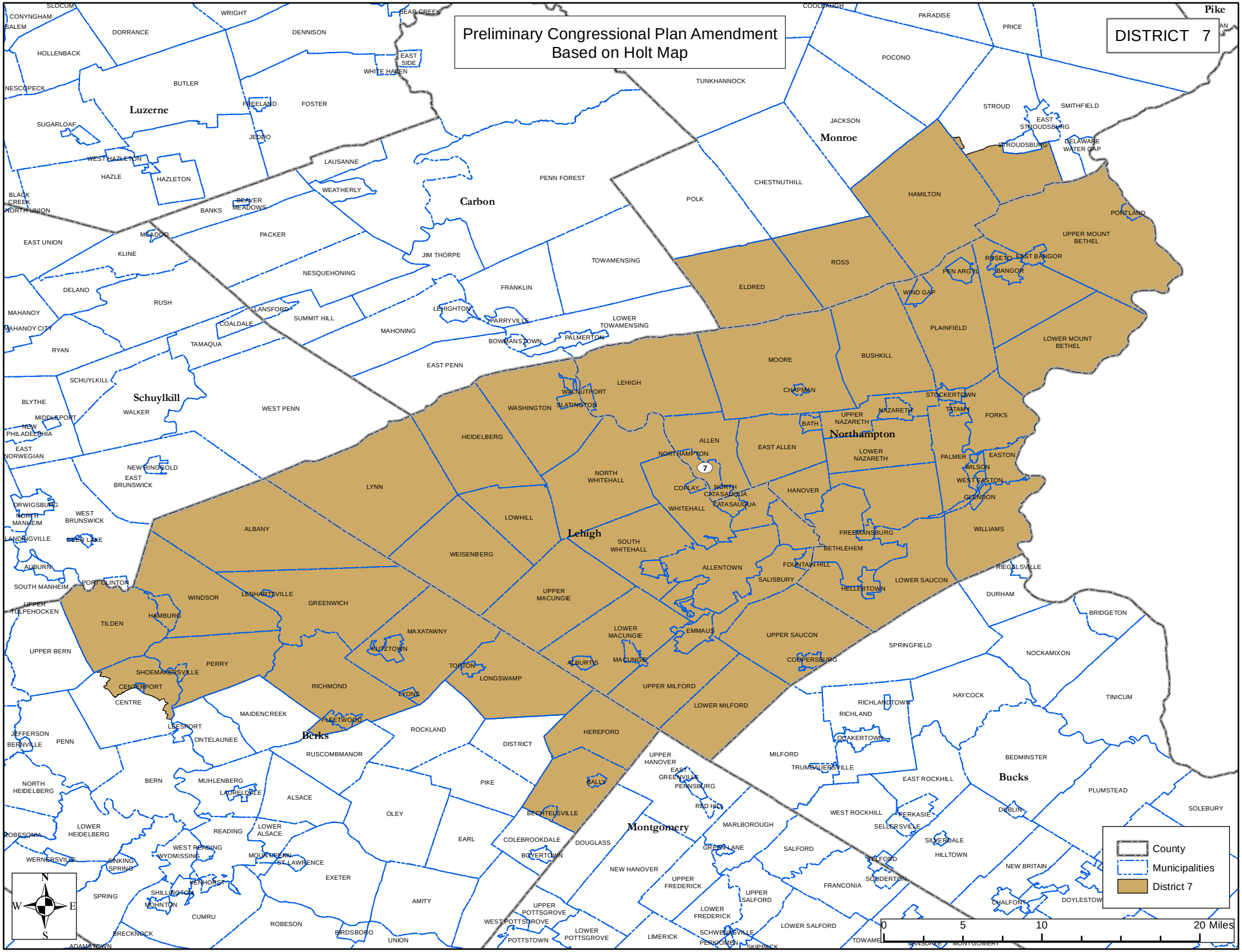
0
1
2
4 Miles
County
Municipalities
District 3


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 4
Berks
Lehigh
Montgomery
Bucks
Chester
Delaware
Philadelphia
ROCKLAND
UPPER MILFORD
LOWER MILFORD
MILFORD
QUAKERTOWN
HAYCOCK
TINICUM
RICHLAND
TRUMBAUERSVILLE
EAST ROCKHILL
BEDMINSTER
PLUMSTEAD
SOLEBURY
DUBLIN
PERKASIE
SELLERSVILLE
WEST ROCKHILL
SILVERDALE
HILLTOWN
NEW BRITAIN
BUCKINGHAM
DOYLESTOWN
CHALFONT
NEW BRITAIN
PIKE
WASHINGTON
BALLY
EAST GREENVILLE
PENNSBURG
UPPER HANOVER
RED HILL
BECHTELSVILLE
EARL
COLEBROOKDALE
BOYERTOWN
AMITY
DOUGLASS
NEW HANOVER
UPPER FREDERICK
LOWER FREDERICK
MARLBOROUGH
SALFORD
GREEN LANE
TELFORD
SOUDERTON
FRANCONIA
UPPER SALFORD
LOWER SALFORD
HATFIELD
UPPER POTTSGROVE
WEST POTTSGROVE
POTTSTOWN
LOWER POTTSGROVE
SCHWENKSVILLE
UNION
NORTH COVENTRY
LIMERICK
PERKIOMEN
TOWAMENCIN
LANSDALE
MONTGOMERY
WARRINGTON
WARWICK
WRIGHTSTOWN
NORTHAMPTON
WARMINSTER
IVYLAND
HORSHAM
UPPER GWYNEDD
NORTH WALES
SKIPPACK
EAST COVENTRY
TRAPPE
COLLEGEVILLE
SPRING CITY
ROYERSFORD
WORCESTER
LOWER GWYNEDD
HATBORO
UPPER SOUTHAMPTON
SOUTH COVENTRY
EAST NANTMEAL
EAST VINCENT
UPPER PROVIDENCE
LOWER PROVIDENCE
WHITPAIN
AMBLER
UPPER DUBLIN
UPPER MORELAND
BRYN ATHYN
LOWER SOUTHAMPTON
LOWER MORELAND
EAST NORRITON
WEST NORRITON
WEST VINCENT
EAST PIKELAND
PHOENIXVILLE
NORRISTOWN
PLYMOUTH
WHITEMARSH
SPRINGFIELD
ABINGTON
JENKINTOWN
CHELTENHAM
ROCKLEDGE
SCHUYLKILL
BRIDGEPORT
UPPER MERION
WEST PIKELAND
CHARLESTOWN
UPPER UWCHLAN
CONSHOHOCKEN
WEST CONSHOHOCKEN
TREDYFFRIN
EAST WHITELAND
UWCHLAN
LOWER MERION
NARBERTH
MALVERN
EASTTOWN
RADNOR
PHILADELPHIA
EAST CALN
WEST WHITELAND
DOWNINGTOWN
WILLISTOWN
NEWTOWN
HAVERFORD
EAST GOSHEN
WEST GOSHEN
EAST BRADFORD
WEST CHESTER
WEST BRADFORD
MARPLE
MILLBOURNE
UPPER DARBY
LANSDOWNE
EAST LANSDOWNE
CLIFTON HEIGHTS
YEADON
EDGMONT
WESTTOWN
THORNBURY
MIDDLETOWN
MEDIA
NETHER PROVIDENCE
ALDAN
DARBY
NEWLIN
POCOPSON
BIRMINGHAM
N
S
E
W
0
3
6
12 Miles
County
Municipalities
District 4

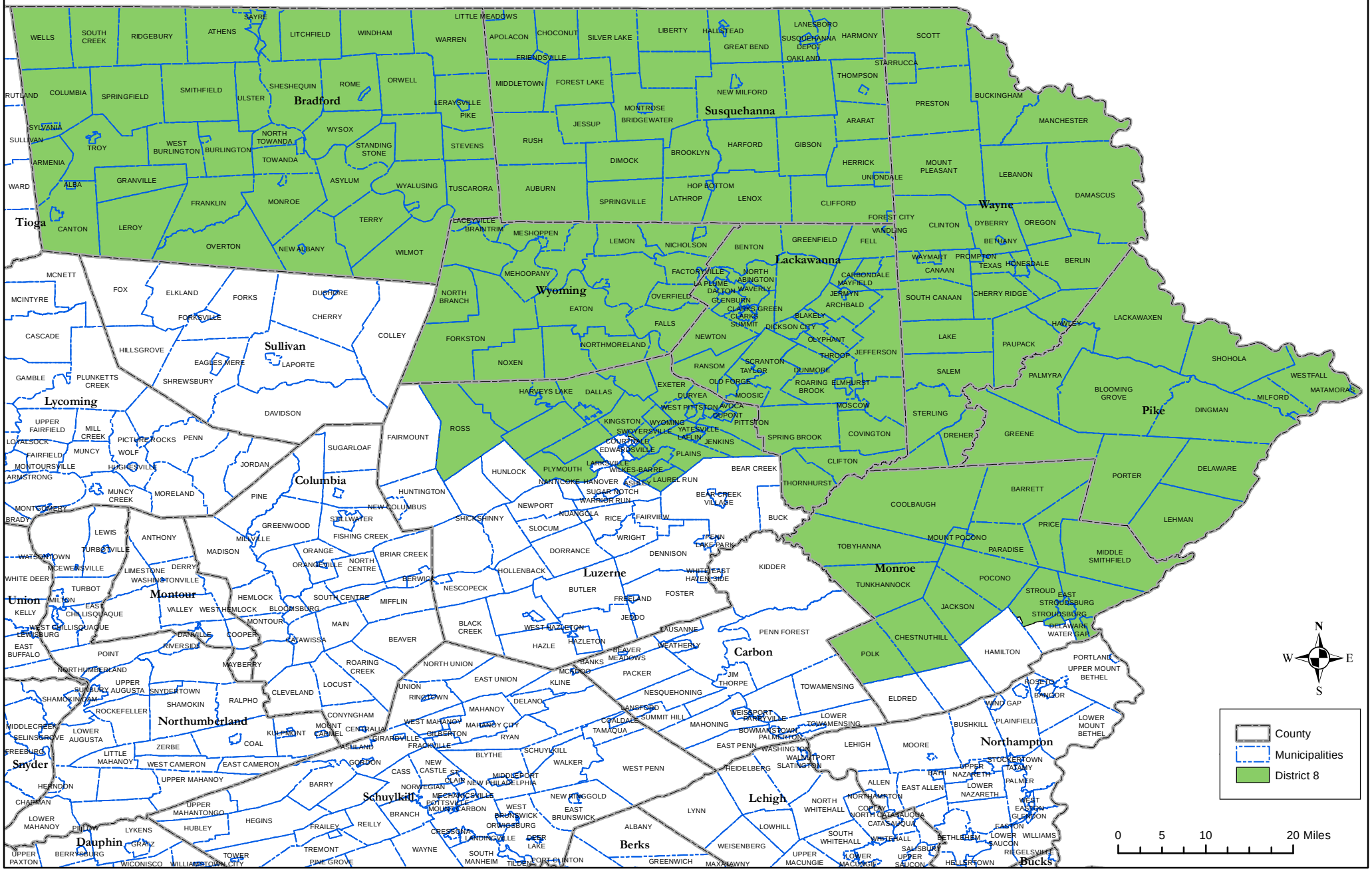

Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 5
EAST NANTMEAL
WEST NANTMEAL
WEST VINCENT
EAST PIKELAND
PHOENIXVILLE
UPPER PROVIDENCE
LOWER PROVIDENCE
WORCESTER
WEST NORRITON
EAST NORRITON
NORRISTOWN
WHITPAIN
LOWER GWYNEDD
ABINGTON
PLYMOUTH
BRIDGEPORT
Montgomery
WHITEMARSH
SPRINGFIELD
JENKINTOWN
CHELTENHAM
SCHUYLKILL
UPPER MERION
CONSHOHOCKEN
WEST CONSHOHOCKEN
WALLACE
UPPER UWCHLAN
WEST PIKELAND
CHARLESTOWN
TREDYFFRIN
WEST BRANDYWINE
UWCHLAN
EAST WHITELAND
EAST BRANDYWINE
EAST CALN
WEST WHITELAND
MALVERN
EASTTOWN
RADNOR
LOWER MERION
NARBERTH
DOWNINGTOWN
CALN
Chester
WILLISTOWN
NEWTOWN
HAVERFORD
PHILADELPHIA
Philadelphia
EAST FALLOWFIELD
WEST BRADFORD
EAST GOSHEN
WEST GOSHEN
WEST CHESTER
EDGMONT
MARPLE
Delaware
MILLBOURNE
UPPER DARBY
LANSDOWNE
EAST LANSDOWNE
YEADON
CLIFTON HEIGHTS
ALDAN
COLLINGDALE
COLWYN
NEWLIN
EAST BRADFORD
WESTTOWN
THORNBURY
MEDIA
MIDDLETOWN
SWARTHMORE
NORTON
SHARON HILL
RUTLEDGE
GLENOLDEN
DARBY
POCOPSON
BIRMINGHAM
CHESTER HEIGHTS
ROSE VALLEY
RIDLEY
PROSPECT PARK
FOLCROFT
NETHER PROVIDENCE
NORWOOD
RIDLEY PARK
WEST MARLBOROUGH
EAST MARLBOROUGH
PENNSBURY
CONCORD
CHADDS FORD
ASTON
BROOKHAVEN
PARKSIDE
TINICUM
UPLAND
EDDYSTONE
KENNETT SQUARE
KENNETT
BETHEL
UPPER CHICHESTER
CHESTER
AVONDALE
LONDON GROVE
NEW GARDEN
LOWER CHICHESTER
TRAINER
MARCUS HOOK
FRANKLIN
LONDON BRITAIN
N
W
E
S
0
2.75
5.5
11 Miles
County
Municipalities
District 5


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 6
Schuylkill
Lebanon
Berks
Lehigh
Bucks
Lancaster
Chester
Montgomery
Delaware
York
6
County
Municipalities
District 6
0
5
10
20 Miles
N
S
E
W


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 7
Pike
Luzerne
Carbon
Monroe
Schuylkill
Lehigh
Northampton
Berks
Montgomery
Bucks
County
Municipalities
District 7
0
5
10
20 Miles
N
S
E
W

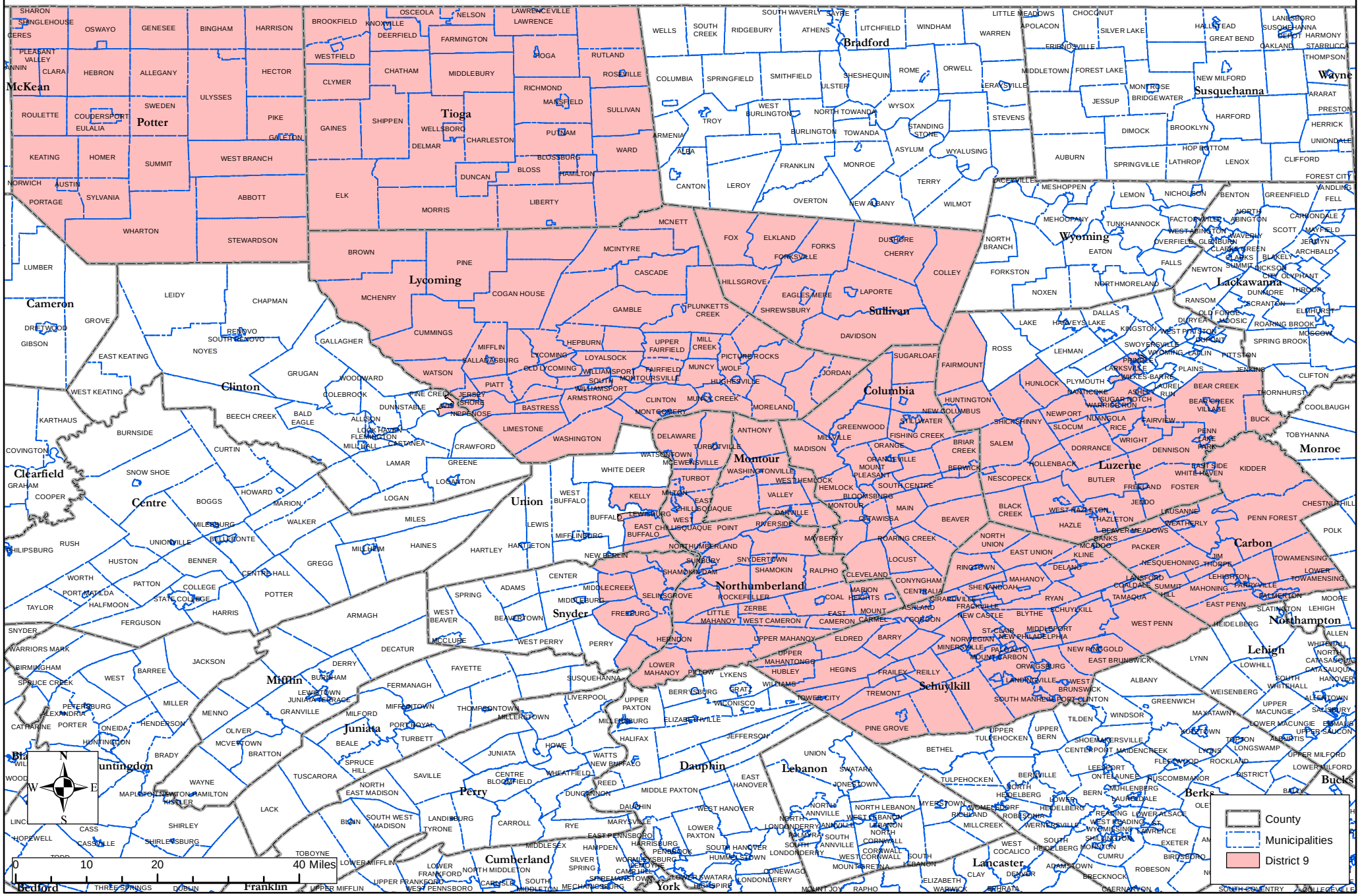
Preliminary Congressional Plan Amendment
Based on Holt Map

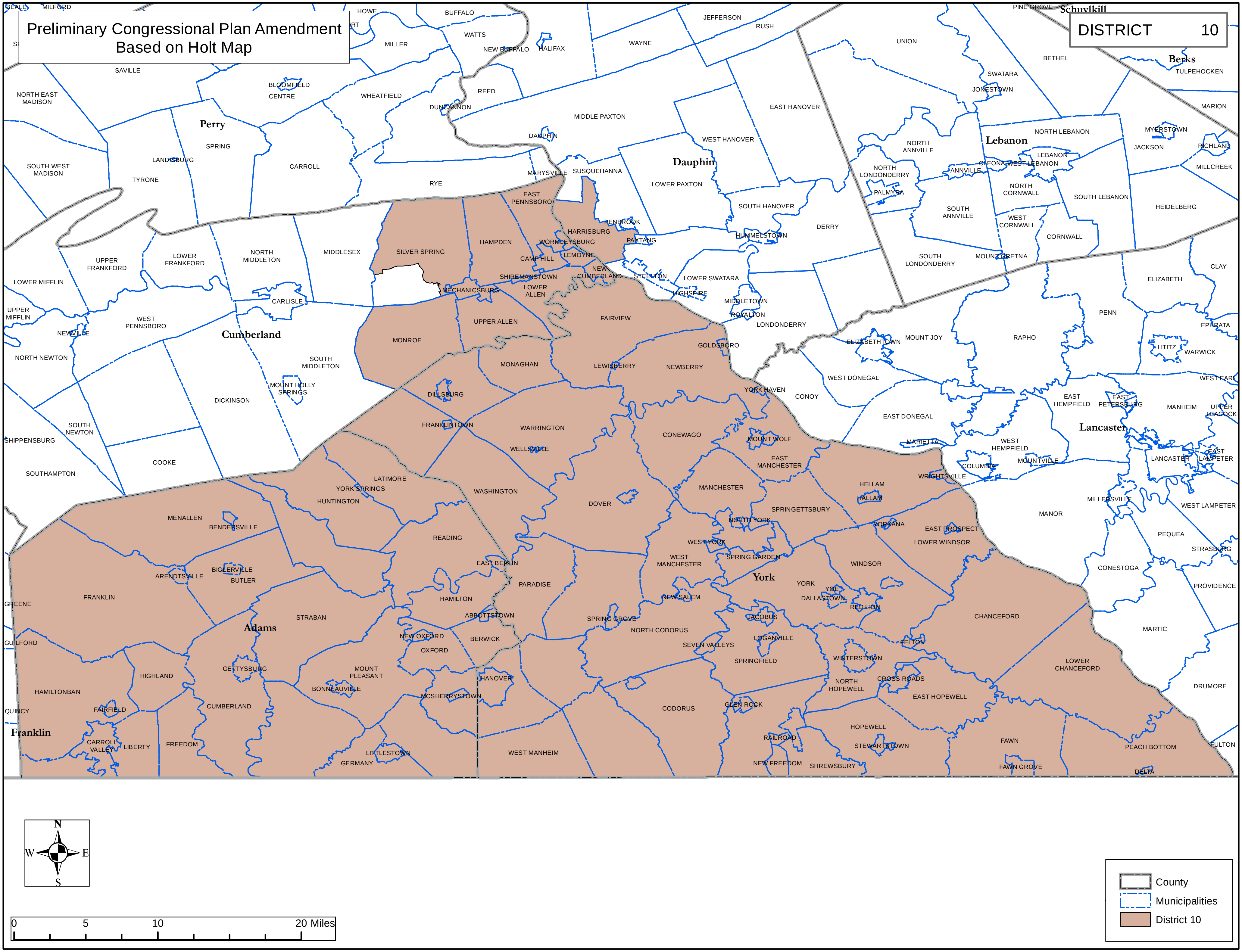
DISTRICT 8

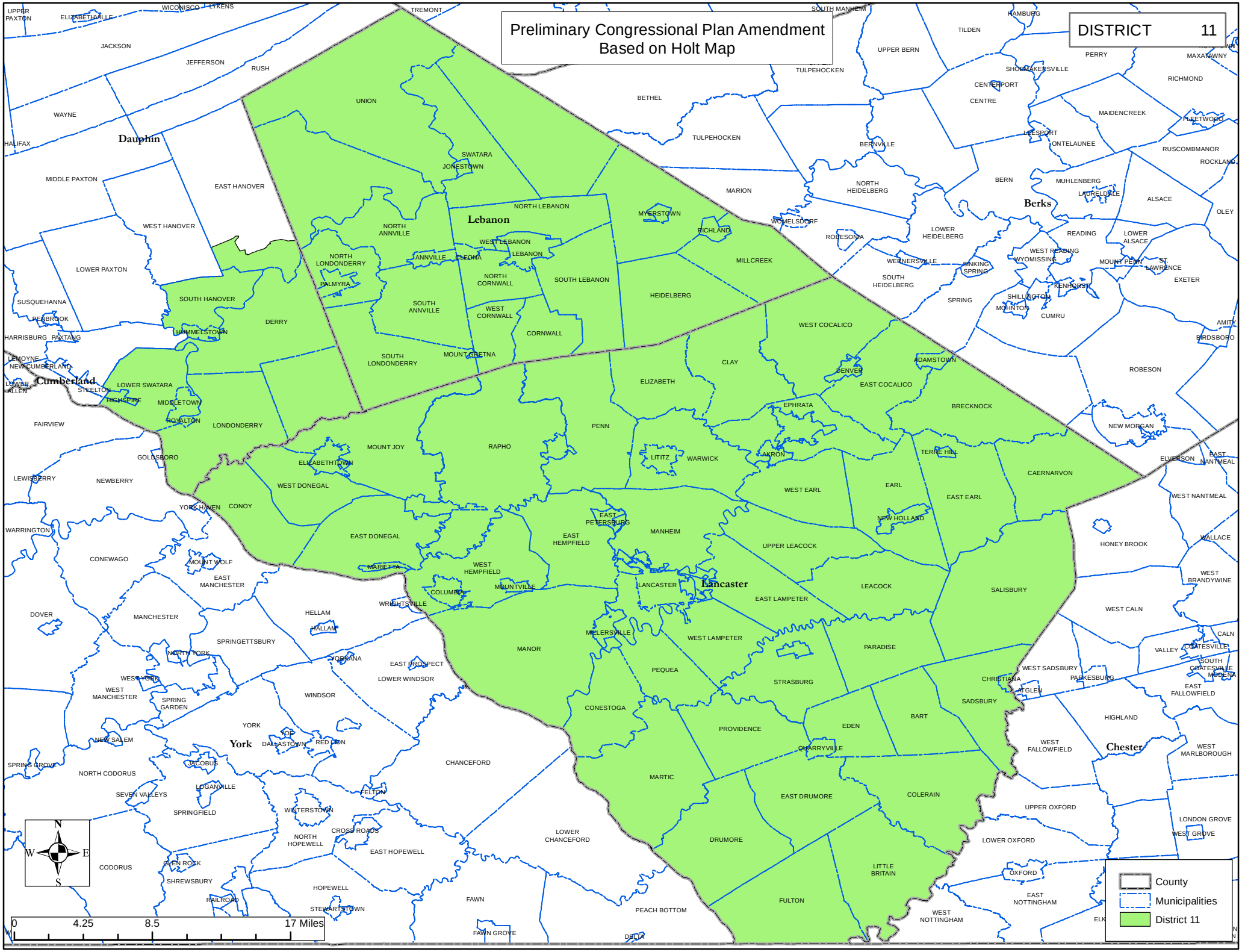


Preliminary Congressional Plan Amendment
Based on Holt Map

DISTRICT 9

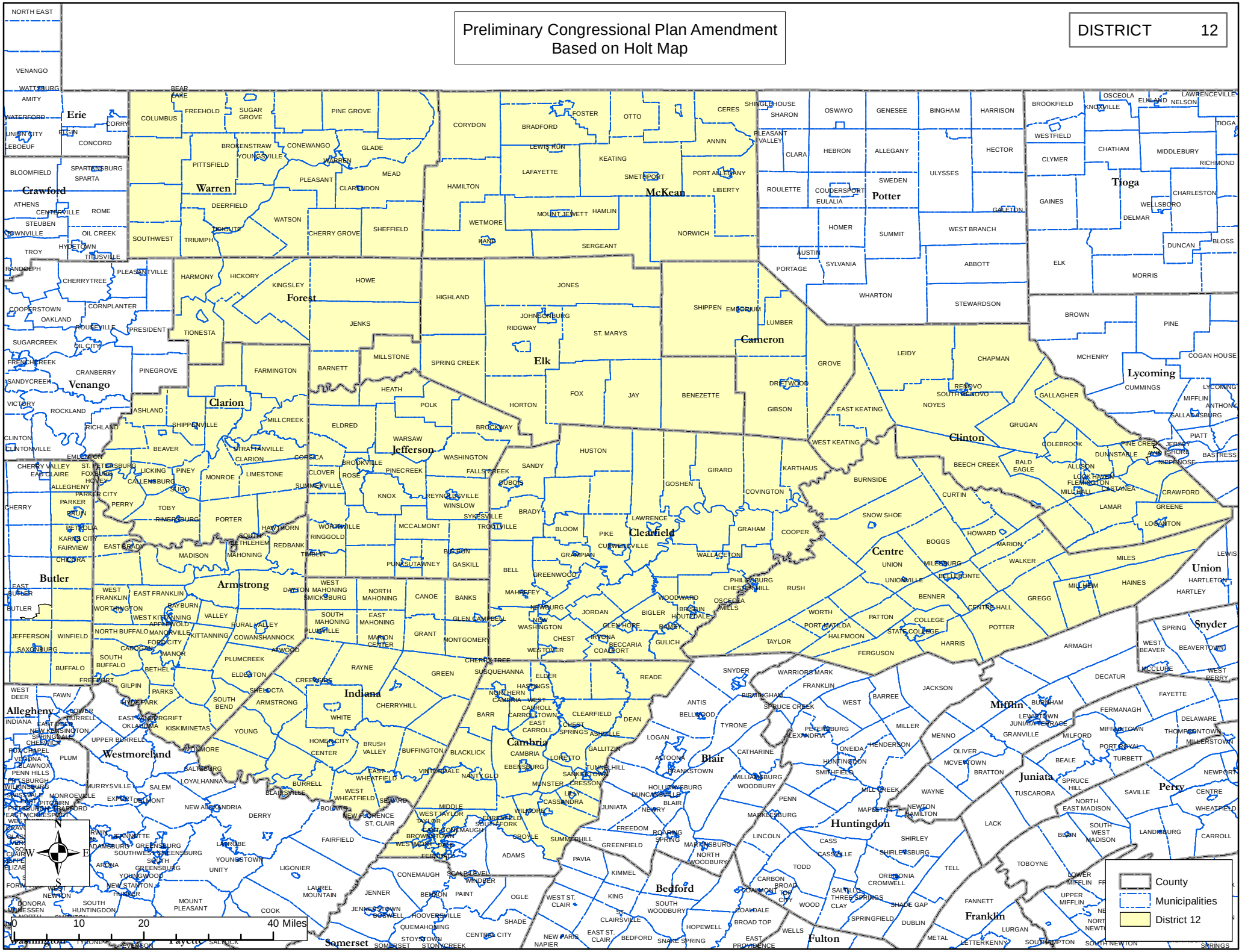


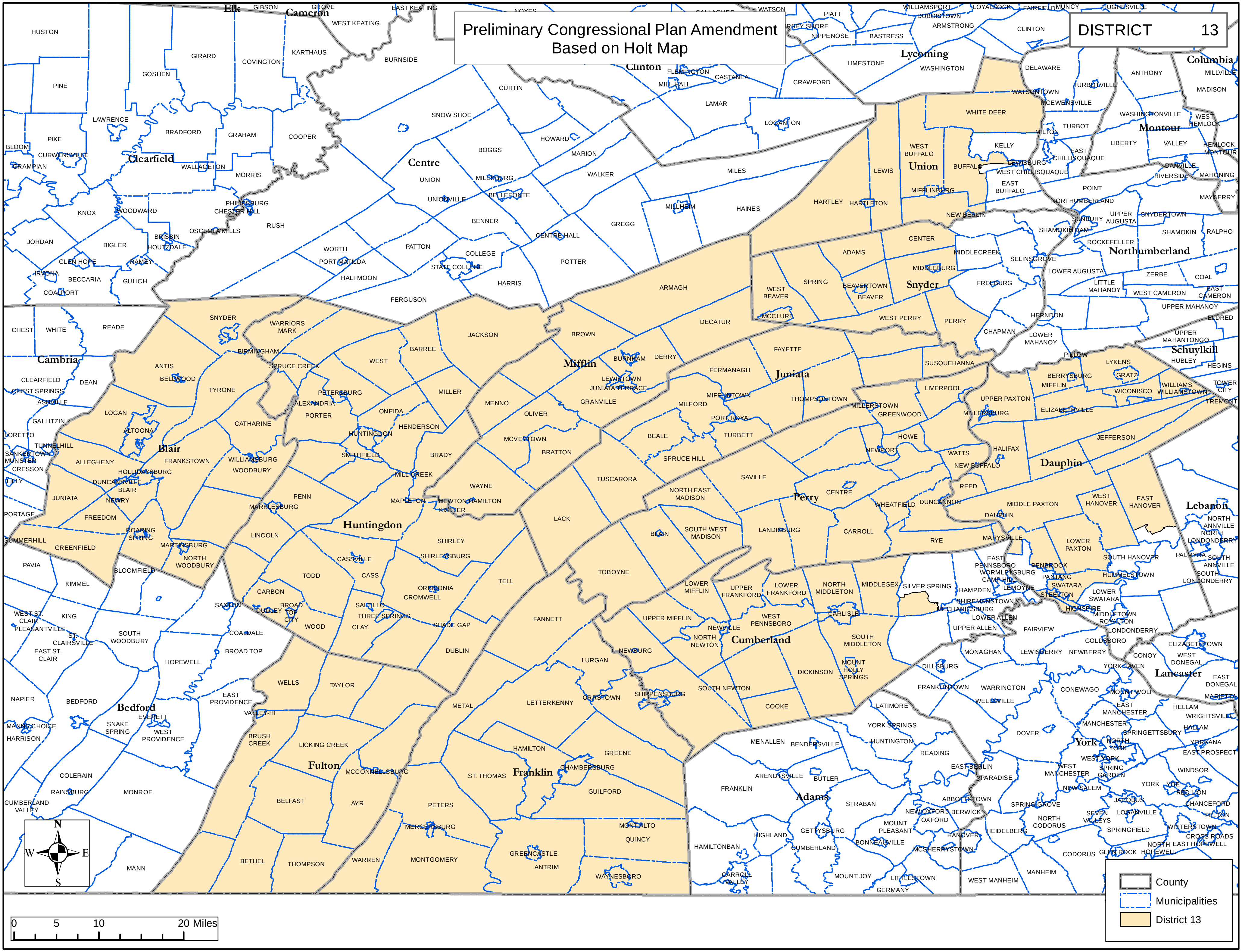

Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 10
Perry
Dauphin
Lebanon
Berks
Schuylkill
Cumberland
Lancaster
Adams
York
Franklin
N
W
E
S
0
5
10
20 Miles
County
Municipalities
District 10

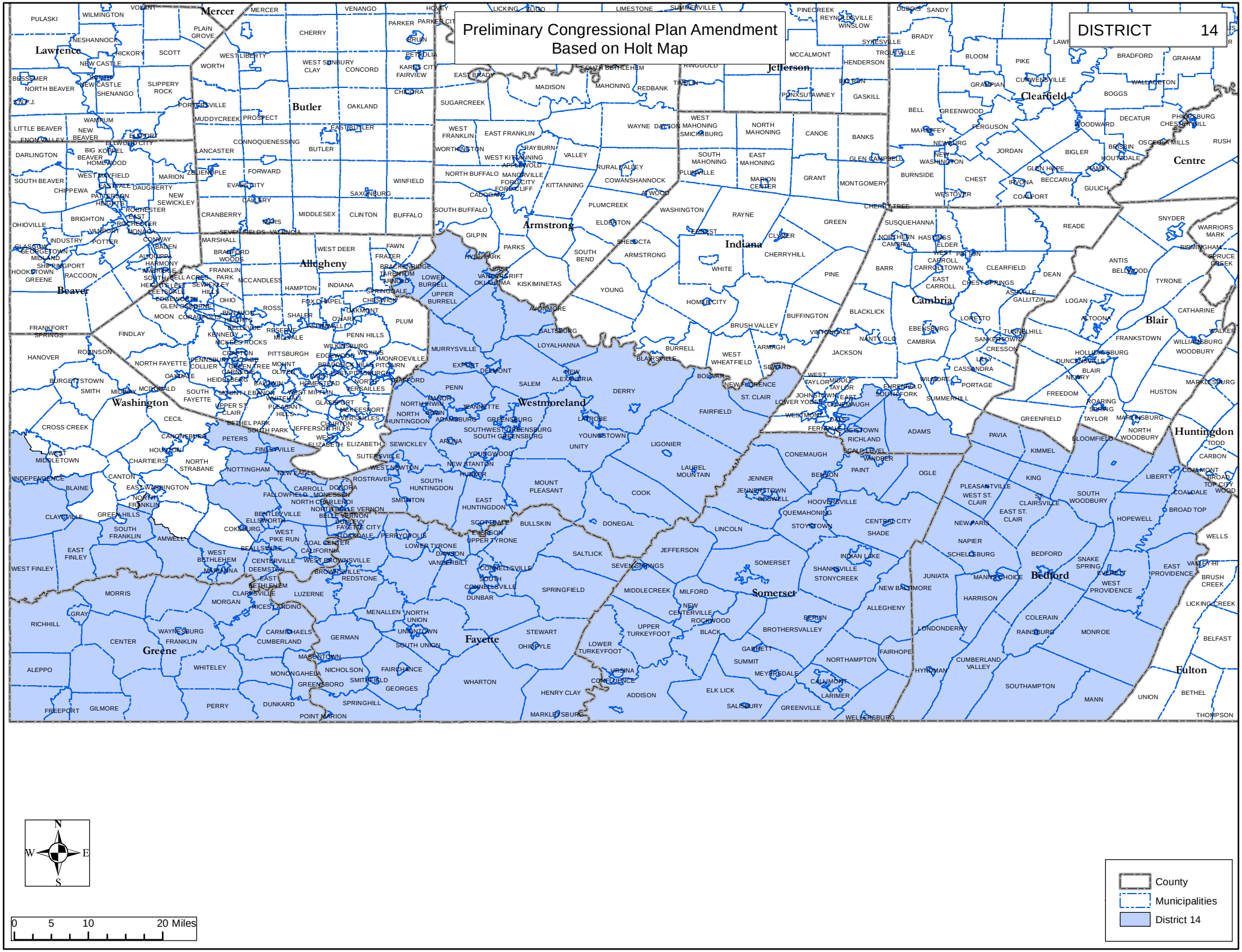

Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 11
Dauphin
Lebanon
Berks
Cumberland
York
Lancaster
Chester
UNION
SWATARA
JONESTOWN
NORTH LEBANON
MYERSTOWN
RICHLAND
MILLCREEK
SOUTH LEBANON
HEIDELBERG
WEST COCALICO
CLAY
ELIZABETH
DENVER
ADAMSTOWN
EAST COCALICO
EPHRATA
BRECKNOCK
PENN
RAPHO
MOUNT JOY
LITITZ
WARWICK
AKRON
TERRE HILL
CAERNARVON
WEST EARL
EARL
EAST EARL
NEW HOLLAND
MANHEIM
EAST PETERSBURG
EAST HEMPFIELD
UPPER LEACOCK
LANCASTER
LEACOCK
SALISBURY
EAST LAMPETER
WEST HEMPFIELD
MOUNTVILLE
MARIETTA
COLUMBIA
WRIGHTSVILLE
MANOR
MILLERSVILLE
WEST LAMPETER
PARADISE
PEQUEA
STRASBURG
CONESTOGA
PROVIDENCE
EDEN
BART
SADSBURY
CHRISTIANA
WEST SADSBURY
ATGLEN
QUARRYVILLE
MARTIC
EAST DRUMORE
COLERAIN
DRUMORE
LOWER CHANCEFORD
UPPER OXFORD
LOWER OXFORD
OXFORD
LITTLE BRITAIN
FULTON
PEACH BOTTOM
FAWN
FAWN GROVE
DELTA
EAST NOTTINGHAM
WEST NOTTINGHAM
NORTH ANNVILLE
ANNVILLE
CLEONA
WEST LEBANON
NORTH LONDONDERRY
PALMYRA
NORTH CORNWALL
SOUTH ANNVILLE
WEST CORNWALL
CORNWALL
MOUNT GRETNA
SOUTH LONDONDERRY
DERRY
HUMMELSTOWN
SOUTH HANOVER
LOWER SWATARA
STEELTON
HIGHSPIRE
MIDDLETOWN
ROYALTON
LONDONDERRY
WEST HANOVER
EAST HANOVER
MIDDLE PAXTON
LOWER PAXTON
HALIFAX
WAYNE
JACKSON
JEFFERSON
RUSH
TREMONT
WICONISCO
LYKENS
ELIZABETHVILLE
UPPER PAXTON
SUSQUEHANNA
PENBROOK
HARRISBURG
PAXTANG
LEMOYNE
NEW CUMBERLAND
LOWER ALLEN
FAIRVIEW
GOLDSBORO
ELIZABETHTOWN
LEWISBERRY
NEWBERRY
WEST DONEGAL
YORK HAVEN
CONOY
EAST DONEGAL
WARRINGTON
CONEWAGO
MOUNT WOLF
EAST MANCHESTER
DOVER
MANCHESTER
HELLAM
SPRINGETTSBURY
NORTH YORK
YORKANA
EAST PROSPECT
LOWER WINDSOR
WEST YORK
WEST MANCHESTER
SPRING GARDEN
WINDSOR
NEW SALEM
SPRING GROVE
NORTH CODORUS
JACOBUS
SEVEN VALLEYS
LOGANVILLE
SPRINGFIELD
WINTERSTOWN
FELTON
CROSS ROADS
NORTH HOPEWELL
EAST HOPEWELL
CODORUS
GLEN ROCK
SHREWSBURY
RAILROAD
HOPEWELL
STEWARTSTOWN
CHANCEFORD
TULPEHOCKEN
BETHEL
MARION
NORTH HEIDELBERG
WOMELSDORF
ROBESONIA
WERNERSVILLE
SINKING SPRING
SOUTH HEIDELBERG
SPRING
LOWER HEIDELBERG
READING
WEST READING
WYOMISSING
SHILLINGTON
MOHNTON
CUMRU
KENHORST
MOUNT PENN
ST. LAWRENCE
EXETER
LOWER ALSACE
ALSACE
BERN
MUHLENBERG
LAURELDALE
BERNVILLE
LEESPORT
ONTELAUNEE
CENTRE
CENTERPORT
SHOEMAKERSVILLE
UPPER BERN
TILDEN
HAMBURG
PERRY
MAXATAWNY
RICHMOND
MAIDENCREEK
FLEETWOOD
RUSCOMBMANOR
ROCKLAND
OLEY
AMITY
BIRDSBORO
ROBESON
NEW MORGAN
ELVERSON
EAST NANTMEAL
WEST NANTMEAL
WALLACE
HONEY BROOK
WEST BRANDYWINE
WEST CALN
CALN
COATESVILLE
VALLEY
SOUTH COATESVILLE
MODENA
PARKESBURG
EAST FALLOWFIELD
HIGHLAND
WEST FALLOWFIELD
WEST MARLBOROUGH
LONDON GROVE
WEST GROVE
SOUTH HEIDELBERG
0 4.25 8.5 17 Miles
N
W
E
S
County
Municipalities
District 11

Preliminary Congressional Plan Amendment
Based on Holt Map

DISTRICT 12




Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 13
Elk
Cameron
Clinton
Lycoming
Columbia
Montour
Clearfield
Centre
Union
Northumberland
Snyder
Cambria
Blair
Mifflin
Juniata
Schuylkill
Perry
Dauphin
Lebanon
Huntingdon
Cumberland
Lancaster
Bedford
Fulton
Franklin
Adams
York
County
Municipalities
District 13
0
5
10
20 Miles
N
W
E
S


Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 14
Lawrence
Mercer
Butler
Allegheny
Beaver
Washington
Greene
Fayette
Westmoreland
Armstrong
Indiana
Jefferson
Clearfield
Centre
Cambria
Blair
Huntingdon
Bedford
Somerset
Fulton
County
Municipalities
District 14
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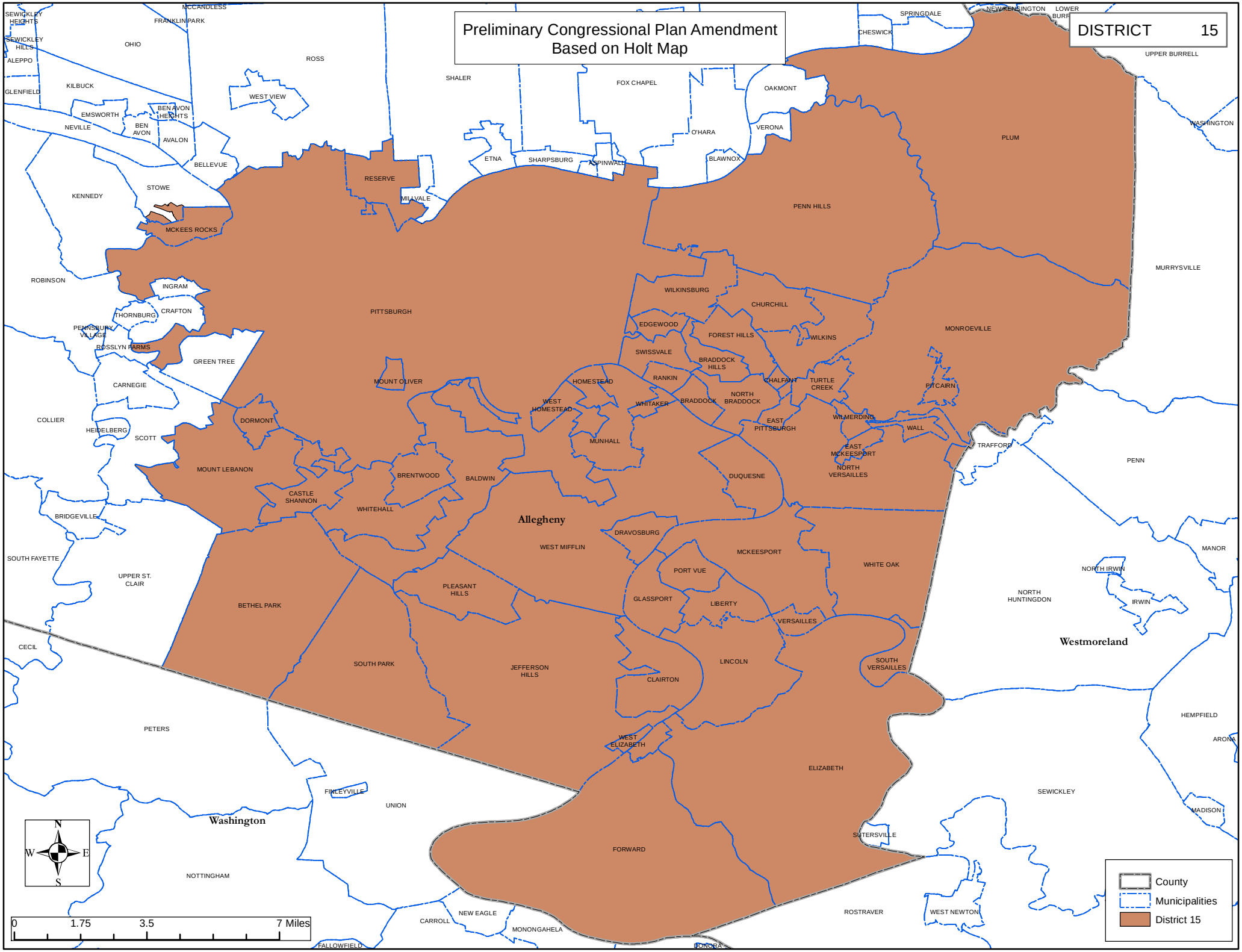
Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 15
SEWICKLEY HEIGHTS
SEWICKLEY HILLS
ALEPPO
GLENFIELD
KILBUCK
EMSWORTH
NEVILLE
BEN AVON HEIGHTS
BEN AVON
AVALON
BELLEVUE
STOWE
KENNEDY
ROBINSON
INGRAM
THORNBURG
CRAFTON
PENNSBURY VILLAGE
ROSSLYN FARMS
GREEN TREE
CARNEGIE
COLLIER
HEIDELBERG
SCOTT
MOUNT LEBANON
BRIDGEVILLE
SOUTH FAYETTE
UPPER ST. CLAIR
CECIL
PETERS
NOTTINGHAM
FALLOWFIELD
CARROLL
NEW EAGLE
MONONGAHELA
FINLEYVILLE
UNION
Washington
BETHEL PARK
SOUTH PARK
JEFFERSON HILLS
PLEASANT HILLS
CASTLE SHANNON
WHITEHALL
BRENTWOOD
BALDWIN
DORMONT
MOUNT OLIVER
PITTSBURGH
MCKEES ROCKS
RESERVE
MILLVALE
ETNA
SHARPSBURG
ASPINWALL
SHALER
FOX CHAPEL
OAKMONT
VERONA
O'HARA
BLAWNOX
PENN HILLS
PLUM
WASHINGTON
UPPER BURRELL
LOWER BURRELL
NEW KENSINGTON
SPRINGDALE
CHESWICK
MURRYSVILLE
MONROEVILLE
WILKINSBURG
CHURCHILL
EDGEWOOD
FOREST HILLS
WILKINS
SWISSVALE
BRADDOCK HILLS
RANKIN
HOMESTEAD
WEST HOMESTEAD
WHITAKER
BRADDOCK
NORTH BRADDOCK
CHALFANT
TURTLE CREEK
PITCAIRN
EAST PITTSBURGH
WILMERDING
WALL
EAST MCKEESPORT
NORTH VERSAILLES
TRAFFORD
PENN
MUNHALL
DUQUESNE
Allegheny
WEST MIFFLIN
DRAVOSBURG
MCKEESPORT
PORT VUE
GLASSPORT
LIBERTY
VERSAILLES
WHITE OAK
MANOR
NORTH IRWIN
IRWIN
NORTH HUNTINGDON
Westmoreland
LINCOLN
SOUTH VERSAILLES
CLAIRTON
WEST ELIZABETH
ELIZABETH
FORWARD
SUTERSVILLE
SEWICKLEY
MADISON
HEMPFIELD
ARONA
ROSTRAVER
WEST NEWTON
DONORA
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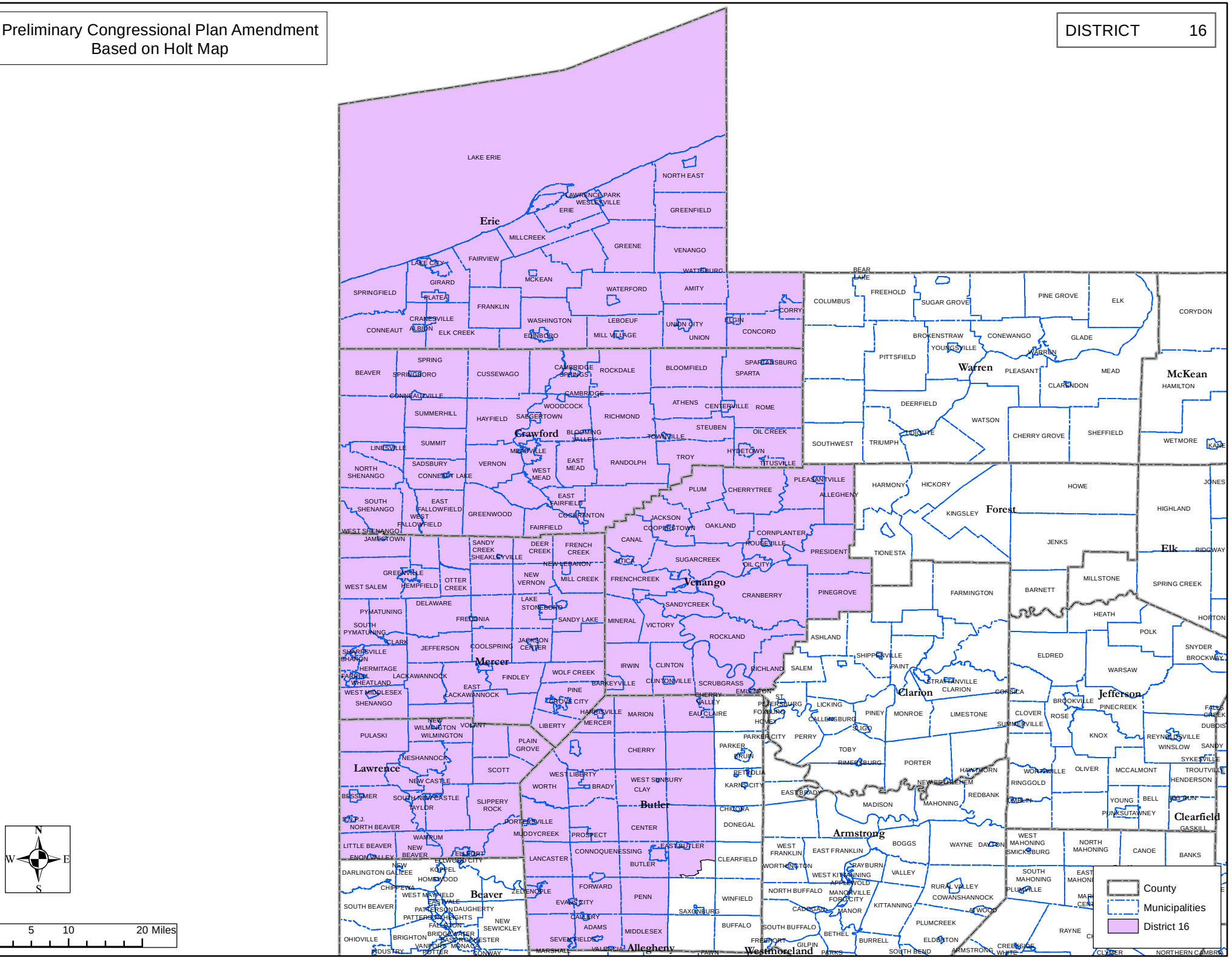
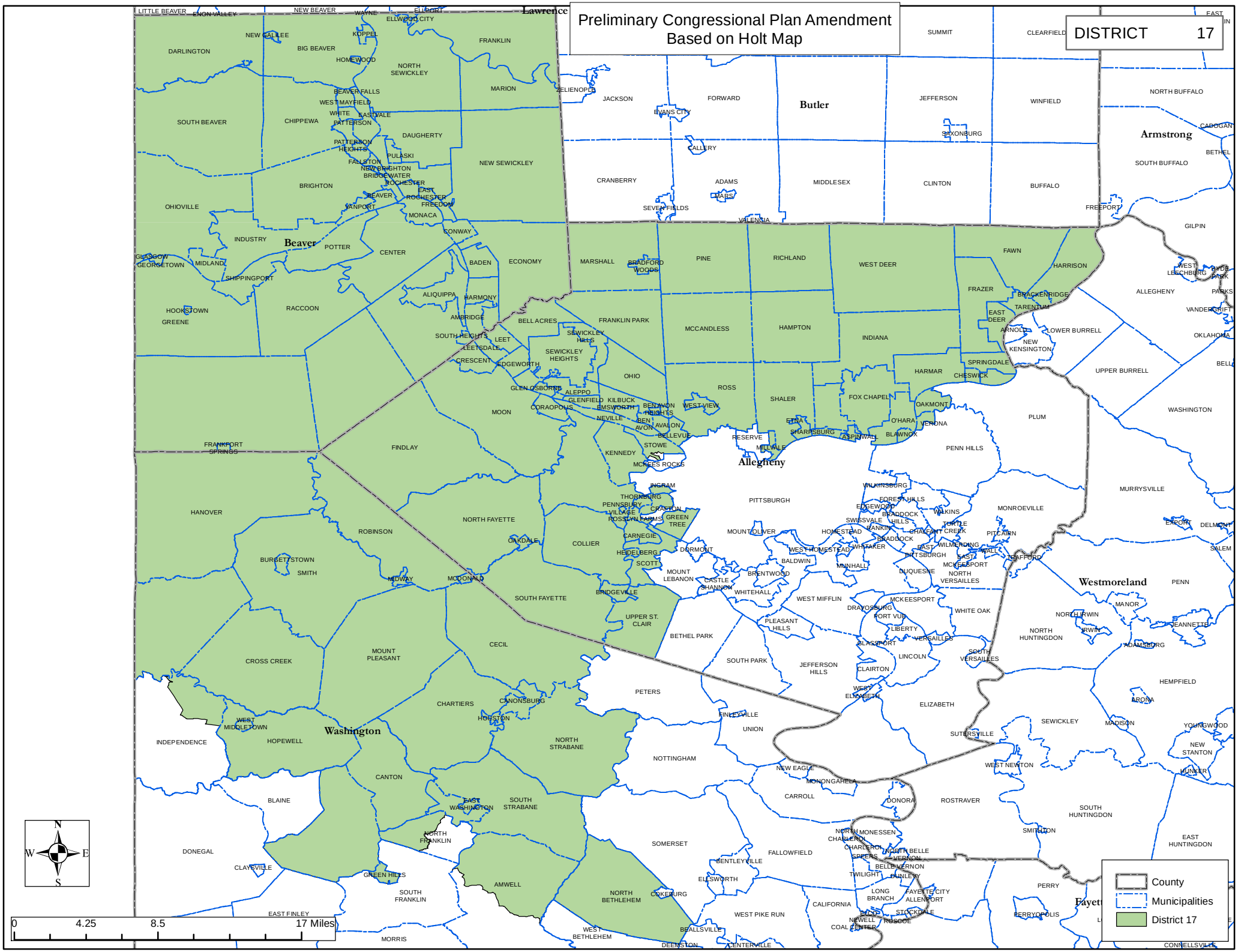
1.75
3.5
7 Miles
County
Municipalities
District 15

Preliminary Congressional Plan Amendment
Based on Holt Map

DISTRICT 16




Preliminary Congressional Plan Amendment
Based on Holt Map
DISTRICT 17
Lawrence
Butler
Armstrong
Beaver
Allegheny
Washington
Westmoreland
Fayette
LITTLE BEAVER
ENON VALLEY
NEW BEAVER
WAYNE
ELLPORT
ELLWOOD CITY
NEW GALILEE
KOPPEL
FRANKLIN
DARLINGTON
BIG BEAVER
HOMEWOOD
NORTH SEWICKLEY
MARION
BEAVER FALLS
WEST MAYFIELD
WHITE
EASTVALE
PATTERSON
SOUTH BEAVER
CHIPPEWA
DAUGHERTY
PATTERSON HEIGHTS
PULASKI
FALLSTON
NEW BRIGHTON
BRIDGEWATER
ROCHESTER
BRIGHTON
EAST ROCHESTER
BEAVER FREEDOM
OHIOVILLE
VANPORT
MONACA
NEW SEWICKLEY
ZELIENOPLE
JACKSON
FORWARD
EVANS CITY
JEFFERSON
WINFIELD
SUMMIT
CLEARFIELD
NORTH BUFFALO
SAXONBURG
CALLERY
CRANBERRY
ADAMS
MIDDLESEX
CLINTON
BUFFALO
MARS
SEVEN FIELDS
VALENCIA
FREEPORT
SOUTH BUFFALO
CABOGAN
BETHEL
GILPIN
INDUSTRY
POTTER
CENTER
CONWAY
GLASGOW
GEORGETOWN
MIDLAND
SHIPPINGPORT
BADEN
ECONOMY
MARSHALL
BRADFORD WOODS
PINE
RICHLAND
WEST DEER
FAWN
HARRISON
FRAZER
BRACKENRIDGE
TARENTUM
EAST DEER
ARNOLD
LOWER BURRELL
NEW KENSINGTON
ALLEGHENY
PARKS
VANDERGRIFT
OKLAHOMA
HOOKSTOWN
GREENE
RACCOON
ALIQUIPPA
HARMONY
AMBRIDGE
BELL ACRES
FRANKLIN PARK
MCCANDLESS
HAMPTON
INDIANA
SOUTH HEIGHTS
LEET
LEETSDALE
SEWICKLEY HILLS
SEWICKLEY HEIGHTS
CRESCENT
EDGEWORTH
SPRINGDALE
HARMAR
CHESWICK
UPPER BURRELL
OHIO
GLEN OSBORNE
ALEPPO
GLENFIELD
KILBUCK
EMSWORTH
BENAVON HEIGHTS
WEST VIEW
ROSS
SHALER
FOX CHAPEL
OAKMONT
MOON
CORAOPOLIS
NEVILLE
BEN AVON
AVALON
BELLEVUE
ETNA
O'HARA
VERONA
SHARPSBURG
ASPINWALL
BLAWNOX
RESERVE
PLUM
WASHINGTON
FRANKFORT SPRINGS
FINDLAY
KENNEDY
STOWE
MILLVALE
PENN HILLS
MCKEES ROCKS
INGRAM
WILKINSBURG
MURRYSVILLE
THORNBURG
PENNSBURY VILLAGE
ROSSLYN FARMS
CRAFTON
GREEN TREE
PITTSBURGH
FOREST HILLS
EDGEWOOD
BRADDOCK HILLS
WILKINS
MONROEVILLE
SWISSVALE
RANKIN
BRADDOCK
TURTLE CREEK
CHALFANT
PITCAIRN
EXPORT
DELMONT
HANOVER
NORTH FAYETTE
ROBINSON
CARNEGIE
MOUNT OLIVER
HOMESTEAD
WEST HOMESTEAD
WHITAKER
EAST PITTSBURGH
WILMERDING
TRAFFORD
SALEM
OAKDALE
COLLIER
HEIDELBERG
DORMONT
SCOTT
BALDWIN
MINHALL
MCKEESPORT
NORTH VERSAILLES
DUQUESNE
BURGETTSTOWN
SMITH
MOUNT LEBANON
CASTLE SHANNON
BRENTWOOD
MIDWAY
MCDONALD
BRIDGEVILLE
WHITEHALL
WEST MIFFLIN
MCKEESPORT
DRAVOSBURG
PENN
MANOR
NORTH IRWIN
SOUTH FAYETTE
UPPER ST. CLAIR
PORT VUE
WHITE OAK
JEANNETTE
PLEASANT HILLS
LIBERTY
VERSAILLES
NORTH HUNTINGDON
IRWIN
ADAMSBURG
BETHEL PARK
CECIL
MOUNT PLEASANT
CROSS CREEK
SOUTH PARK
JEFFERSON HILLS
GLASSPORT
LINCOLN
CLAIRTON
SOUTH VERSAILLES
HEMPFIELD
PETERS
WEST ELIZABETH
ELIZABETH
ARONA
CHARTIERS
CANONSBURG
HORSTON
FINLEYVILLE
SEWICKLEY
MADISON
YOUNGWOOD
WEST MIDDLETOWN
INDEPENDENCE
HOPEWELL
UNION
SUTERSVILLE
NORTH STRABANE
NOTTINGHAM
NEW EAGLE
WEST NEWTON
NEW STANTON
HUNKER
CANTON
MONONGAHELA
BLAINE
EAST WASHINGTON
SOUTH STRABANE
CARROLL
DONORA
ROSTRAVER
SOUTH HUNTINGDON
NORTH FRANKLIN
SOMERSET
NORTH MONESSEN
CHARLEROI
SPEERS
NORTH BELLE VERNON
BELLE VERNON
TWILIGHT
DUNLEVY
SMITHTON
EAST HUNTINGDON
DONEGAL
CLAYSVILLE
GREEN HILLS
SOUTH FRANKLIN
AMWELL
BENTLEYVILLE
FALLOWFIELD
ELLSWORTH
NORTH BETHLEHEM
COKEBURG
LONG BRANCH
FAYETTE CITY
ALLENPORT
PERRY
CALIFORNIA
BROWNSVILLE
STOCKDALE
ROSCOE
NEWELL
COAL CENTER
FERRYOPOLIS
WEST PIKE RUN
EAST FINLEY
MORRIS
WEST BETHLEHEM
BEALLSVILLE
DEEMSTON
CENTERVILLE
CONNELLSVILLE
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4.25
8.5
17 Miles
County
Municipalities
District 17

Exhibit 2

The Statewide population = 13,002,700		
The Average population per district = 764,865		
DISTRICT	**POPULATION**	**DEVIATION**
1	764,865	+0 (0.00%)
2	764,865	+0 (0.00%)
3	764,865	+0 (0.00%)
4	764,865	+0 (0.00%)
5	764,865	+0 (0.00%)
6	764,865	+0 (0.00%)
7	764,864	-1 (0.00%)
8	764,864	-1 (0.00%)
9	764,864	-1 (0.00%)
10	764,865	+0 (0.00%)
11	764,865	+0 (0.00%)
12	764,865	+0 (0.00%)
13	764,864	-1 (0.00%)
14	764,865	+0 (0.00%)
15	764,864	-1 (0.00%)
16	764,865	+0 (0.00%)
17	764,865	+0 (0.00%)

LEGISLATIVE DATA PROCESSING CENTER

COMPOSITE LISTING

OF

CONGRESSIONAL DISTRICTS

DISTRICT NUMBER	DESCRIPTION
Dist. 01	BUCKS and MONTGOMERY Counties. All of BUCKS County and Part of MONTGOMERY County consisting of the TOWNSHIPS of Franconia, Hatfield, Horsham (PART, Districts 02 [PART, Divisions 01, 01 and 03] and 04 [PART, Divisions 02 and 03]), Marlborough, Montgomery, Salford and Upper Hanover and the BOROUGHS of East Greenville, Green Lane, Hatfield, Lansdale, Pennsburg, Red Hill, Souderton and Telford (Montgomery County Portion). Total population: 764,865
Dist. 02	PHILADELPHIA County. Part of PHILADELPHIA County consisting of the CITY of Philadelphia (PART, Wards 01 [PART, Division 17], 02, 05, 07, 08 [PART, Divisions 26, 30, 32 and 34], 14, 16 [PART, Divisions 01, 02, 03, 04 and 05], 18, 19, 20, 23, 25, 31, 33, 35, 37, 41, 42, 43, 45, 47 [PART, Divisions 01, 02, 03, 04, 05, 06, 07, 08 and 12], 53, 54, 55, 56, 57, 58 [PART, Divisions 02, 04, 05, 06, 12, 13, 14, 20, 21, 22, 23, 24, 25, 28, 29, 31, 34, 35, 37, 39, 40, 41 and 42], 61, 62, 63, 64, 65 and 66). Total population: 764,865

Dist. 03 **PHILADELPHIA County.**
Part of PHILADELPHIA County consisting of the CITY of Philadelphia (PART, Wards 01 [PART, Divisions 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20 and 21], 03, 04, 06, 08 [PART, Divisions 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 31, 33 and 35], 09, 10, 11, 12, 13, 15, 16 [PART, Divisions 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17 and 18], 17, 21, 22, 24, 27, 28, 29, 30, 32, 34, 36, 38, 39 [PART, Divisions 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45 and 46], 40 [PART, Divisions 02, 03, 04, 06, 07, 10, 12, 13, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 32 and 33], 44, 46, 47 [PART, Divisions 09, 10, 11, 13 and 14], 48, 49, 50, 51, 52, 59 and 60).
Total population: 764,865

Dist. 04 **MONTGOMERY and PHILADELPHIA Counties.**
Part of MONTGOMERY County consisting of the TOWNSHIPS of Abington, Cheltenham, Douglass, East Norriton, Horsham (PART, Districts 01, 02 [PART, Divisions 02 and 04], 03 and 04 [PART, Divisions 01, 02 and 04]), Limerick, Lower Frederick, Lower Gwynedd, Lower Merion, Lower Moreland, Lower Pottsgrove, Lower Providence, Lower Salford, New Hanover, Perkiomen, Plymouth, Skippack, Springfield, Towamencin, Upper Dublin, Upper Frederick, Upper Gwynedd, Upper Merion, Upper Moreland, Upper Pottsgrove, Upper Providence, Upper Salford, West Norriton, West Pottsgrove, Whitemarsh, Whitpain and Worcester and the BOROUGHS of Ambler, Bridgeport, Bryn Athyn, Collegeville, Conshohocken, Hatboro, Jenkintown, Narberth, Norristown, North Wales, Pottstown, Rockledge, Royersford, Schwenksville, Trappe and West Conshohocken and Part of PHILADELPHIA County consisting of the CITY of Philadelphia (PART, Ward 58 [PART, Divisions 01, 03, 07, 08, 09, 10, 11, 15, 16, 17, 18, 19, 26, 27, 30, 32, 33, 36, 38, 43 and 44]).
Total population: 764,865

Dist. 05 **CHESTER, DELAWARE and PHILADELPHIA Counties.**
Part of CHESTER County consisting of the TOWNSHIPS of Birmingham, East Bradford, East Goshen, East Marlborough, Kennett, New Garden, Pennsbury, Pocopson, Thornbury, West Goshen, West Whiteland (PART, Precincts 01, 02, 03 and 04 (all blocks except 1016 and 3000 of tract 302205)) and Westtown and the BOROUGHS of Kennett Square and West Chester; All of DELAWARE County and Part of PHILADELPHIA County consisting of the CITY of Philadelphia (PART, Wards 26, 39 [PART, Division 14] and 40 [PART, Divisions 01, 05, 08, 09, 11, 14, 15, 16, 27, 28, 29, 30, 31, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50 and 51]).
Total population: 764,865

Dist. 06 **BERKS and CHESTER Counties.**
Part of BERKS County consisting of the CITY of Reading and the TOWNSHIPS of Alsace, Amity, Bern, Bethel, Brecknock, Caernarvon, Centre (PART, Precincts 01 and 02 (only blocks 1029, 1030, 1031, 1033, 1034, 1039, 1044, 1045, 1046, 3010, 3012, 3013, 3014, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3037, 3042, 3050, 3056, 3059 and 3066 of tract 010201)), Colebrookdale, Cumru, District, Douglass, Earl, Exeter, Heidelberg, Jefferson, Lower Alsace, Lower Heidelberg, Maidencreek, Marion, Muhlenberg, North Heidelberg, Oley, Ontelaunee, Penn, Pike, Robeson, Rockland, Ruscombmanor, South Heidelberg, Spring, Tulpehocken, Union, Upper Bern and Upper Tulpehocken and the BOROUGHS of Adamstown (Berks County Portion), Bernville, Birdsboro, Boyertown, Kenhorst, Laureldale, Leesport, Mohnton, Mount Penn, New Morgan, Robesonia, Shillington, Sinking Spring, St. Lawrence, Wernersville, West Reading, Womelsdorf and Wyomissing and Part of CHESTER County consisting of the CITY of Coatesville and the TOWNSHIPS of Caln, Charlestown, East Brandywine, East Caln, East Coventry, East Fallowfield, East Nantmeal, East Nottingham, East Pikeland, East Vincent, East Whiteland, Easttown, Elk, Franklin, Highland, Honey Brook, London Britain, London Grove, Londonderry, Lower Oxford, New London, Newlin, North Coventry, Penn, Sadsbury, Schuylkill, South Coventry, Tredyffrin, Upper Oxford, Upper Uwchlan, Uwchlan, Valley, Wallace, Warwick, West Bradford, West Brandywine, West Caln, West Fallowfield, West Marlborough, West Nantmeal, West Nottingham, West Pikeland, West Sadsbury, West Vincent, West Whiteland (PART, Precincts 04 (only blocks 1016 and 3000 of tract 302205), 05, 06 and 07) and Willistown and the BOROUGHS of Atglen, Avondale, Downingtown, Elverson, Honey Brook, Malvern, Modena, Oxford, Parkesburg, Phoenixville, South Coatesville, Spring City and West Grove.
Total population: 764,865

CONGRESSIONAL DISTRICTS

Dist. 07 **BERKS, LEHIGH, MONROE and NORTHAMPTON Counties.
Part of BERKS County consisting of the TOWNSHIPS of Albany, Centre (PART, Precinct 02 (all blocks except 1029, 1030, 1031, 1033, 1034, 1039, 1044, 1045, 1046, 3010, 3012, 3013, 3014, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3037, 3042, 3050, 3056, 3059 and 3066 of tract 010201)), Greenwich, Hereford, Longswamp, Maxatawny, Perry, Richmond, Tilden, Washington and Windsor and the BOROUGHS of Bally, Bechtelsville, Centerport, Fleetwood, Hamburg, Kutztown, Lenhartsville, Lyons, Shoemakersville and Topton; All of LEHIGH County; Part of MONROE County consisting of the TOWNSHIPS of Eldred, Hamilton, Ross and Stroud (PART, Districts 05 (only blocks 2015, 2016, 2017 and 2018 of tract 301002), 06 and 07) and All of NORTHAMPTON County.
Total population: 764,864**

Dist. 08 **BRADFORD, LACKAWANNA, LUZERNE, MONROE, PIKE, SUSQUEHANNA, WAYNE and WYOMING Counties.**
All of BRADFORD County; All of LACKAWANNA County; Part of LUZERNE County consisting of the CITIES of Pittston and Wilkes-Barre and the TOWNSHIPS of Dallas, Exeter, Franklin, Jackson, Jenkins, Kingston, Lake, Lehman, Pittston, Plains, Plymouth, Ross and Wilkes-Barre and the BOROUGHS of Avoca, Dallas, Dupont, Duryea, Exeter, Forty Fort, Harveys Lake, Hughestown, Kingston, Laflin, Laurel Run, Luzerne (PART, (all blocks except 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3018, 3019, 3026, 3027 and 3028 of tract 212300)), Swoyersville, West Pittston, West Wyoming, Wyoming and Yatesville; Part of MONROE County consisting of the TOWNSHIPS of Barrett, Chestnuthill, Coolbaugh, Jackson, Middle Smithfield, Paradise, Pocono, Polk, Price, Smithfield, Stroud (PART, Districts 01, 02, 03, 04 and 05 (all blocks except 2015, 2016, 2017 and 2018 of tract 301002)), Tobyhanna and Tunkhannock and the BOROUGHS of Delaware Water Gap, East Stroudsburg, Mount Pocono and Stroudsburg; All of PIKE County; All of SUSQUEHANNA County; All of WAYNE County and All of WYOMING County.
Total population: 764,864

Dist. 09 CARBON, CLINTON, COLUMBIA, LUZERNE, LYCOMING, MONTOUR, NORTHUMBERLAND, POTTER, SCHUYLKILL, SNYDER, SULLIVAN, TIOGA and UNION Counties.
All of CARBON County; Part of CLINTON County consisting of the TOWNSHIP of Pine Creek (PART, District 01 (all blocks except 1007, 1008, 1010, 1011, 1037, 1064, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2013, 2015, 2016, 2022, 2023, 2024, 2025, 2027, 2028, 2057, 2059, 3000 and 3021 of tract 030400)) and the BOROUGH of Avis; All of COLUMBIA County; Part of LUZERNE County consisting of the CITIES of Hazleton and Nanticoke and the TOWNSHIPS of Bear Creek, Black Creek, Buck, Butler, Conyngham, Dennison, Dorrance, Fairmount, Fairview, Foster, Hanover, Hazle, Hollenback, Hunlock, Huntington, Nescopeck, Newport, Rice, Salem, Slocum, Sugarloaf, Union and Wright and the BOROUGHS of Ashley, Bear Creek Village, Conyngham, Courtdale, Edwardsville, Freeland, Jeddo, Larksville, Luzerne (PART, (all blocks except 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 3000, 3001, 3002, 3014, 3015, 3016, 3017, 3020, 3021, 3022, 3023, 3024 and 3025 of tract 212300)), Nescopeck, New Columbus, Nuangola, Penn Lake Park, Plymouth, Pringle, Shickshinny, Sugar Notch, Warrior Run, West Hazleton and White Haven; All of LYCOMING County; All of MONTOUR County; All of NORTHUMBERLAND County; All of POTTER County; All of SCHUYLKILL County; Part of SNYDER County consisting of the TOWNSHIPS of Chapman, Jackson, Middlecreek, Monroe, Penn, Union and Washington and the BOROUGHS of Freeburg, Selinsgrove and Shamokin Dam; All of SULLIVAN County; All of TIOGA County and Part of UNION County consisting of the TOWNSHIPS of Buffalo (PART, District 01 (only blocks 2034, 2035, 2036, 2037, 2044, 2045, 2047, 2056, 2057, 2058, 2059, 2060, 2061, 2062 and 2063 of tract 090502)), East Buffalo, Kelly and Union and the BOROUGH of Lewisburg.
Total population: 764,864

CONGRESSIONAL DISTRICTS

Dist. 10 **ADAMS, CUMBERLAND, DAUPHIN and YORK Counties.**
All of ADAMS County; Part of CUMBERLAND County consisting of the TOWNSHIPS of East Pennsboro, Hampden, Lower Allen, Monroe, Silver Spring (PART, Precincts 02 (all blocks except 2020, 2021, 2026, 2027, 2028, 2029 and 2030 of tract 011806), 03, 04, 05, 06, 07, 08 and 09) and Upper Allen and the BOROUGHS of Camp Hill, Lemoyne, Mechanicsburg, New Cumberland, Shiremanstown and Wormleysburg; Part of DAUPHIN County consisting of the CITY of Harrisburg and All of YORK County.
Total population: 764,865

Dist. 11 **DAUPHIN, LANCASTER and LEBANON Counties.**
Part of DAUPHIN County consisting of the TOWNSHIPS of Conewago, Derry, East Hanover (PART, Precinct 01 (only blocks 2077, 2078, 2081, 2082, 2083, 2084, 3013, 3014, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043 and 3044 of tract 024502)), Londonderry, Lower Swatara and South Hanover and the BOROUGHS of Highspire, Hummelstown, Middletown and Royalton; All of LANCASTER County and All of LEBANON County.
Total population: 764,865

Dist. 12 **ARMSTRONG, BUTLER, CAMBRIA, CAMERON, CENTRE, CLARION, CLEARFIELD, CLINTON, ELK, FOREST, INDIANA, JEFFERSON, MCKEAN and WARREN Counties.**

All of ARMSTRONG County; Part of BUTLER County consisting of the TOWNSHIPS of Allegheny, Buffalo, Clearfield, Clinton, Donegal, Fairview, Jefferson, Parker, Summit (PART, District South (only blocks 1012, 1013, 1015, 1016, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 3042, 3049, 3050 and 3051 of tract 911200)) and Winfield and the BOROUGHS of Bruin, Chicora, Fairview, Karns City, Petrolia and Saxonburg; Part of CAMBRIA County consisting of the CITY of Johnstown and the TOWNSHIPS of Allegheny, Barr, Blacklick, Cambria, Chest, Clearfield, Cresson, Croyle, Dean, East Carroll, East Taylor, Elder, Gallitzin, Jackson, Lower Yoder, Middle Taylor, Munster, Portage, Reade, Stonycreek (PART, District 02), Summerhill, Susquehanna, Upper Yoder, Washington, West Carroll, West Taylor and White and the BOROUGHS of Ashville, Brownstown, Carrolltown, Cassandra, Chest Springs, Cresson, Daisytown, Dale, East Conemaugh, Ebensburg, Ehrenfeld, Ferndale, Franklin, Gallitzin, Hastings, Lilly, Lorain, Loretto, Nanty Glo, Northern Cambria, Patton, Portage, Sankertown, South Fork, Southmont, Summerhill, Tunnelhill (Cambria County Portion), Vintondale, Westmont and Wilmore; All of CAMERON County; All of CENTRE County; All of CLARION County; All of CLEARFIELD County; Part of CLINTON County consisting of the CITY of Lock Haven and the TOWNSHIPS of Allison, Bald Eagle, Beech Creek, Castanea, Chapman, Colebrook, Crawford, Dunnstable, East Keating, Gallagher, Greene, Grugan, Lamar, Leidy, Logan, Noyes, Pine Creek (PART, Districts 01 (only blocks 1007, 1008, 1010, 1011, 1037, 1064, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2013, 2015, 2016, 2022, 2023, 2024, 2025, 2027, 2028, 2057, 2059, 3000 and 3021 of tract 030400) and 02), Porter, Wayne, West Keating and Woodward and the BOROUGHS of Beech Creek, Flemington, Loganton, Mill Hall, Renovo and South Renovo; All of ELK County; All of FOREST County; All of INDIANA County; All of JEFFERSON County; All of MCKEAN County and All of WARREN County.

Total population: 764,865

Dist. 13 **BLAIR, CUMBERLAND, DAUPHIN, FRANKLIN, FULTON, HUNTINGDON, JUNIATA, MIFFLIN, PERRY, SNYDER and UNION Counties.**

All of BLAIR County; Part of CUMBERLAND County consisting of the TOWNSHIPS of Cooke, Dickinson, Hopewell, Lower Frankford, Lower Mifflin, Middlesex, North Middleton, North Newton, Penn, Shippensburg, Silver Spring (PART, Precincts 01 and 02 (only blocks 2020, 2021, 2026, 2027, 2028, 2029 and 2030 of tract 011806)), South Middleton, South Newton, Southampton, Upper Frankford, Upper Mifflin and West Pennsboro and the BOROUGHS of Carlisle, Mount Holly Springs, Newburg, Newville and Shippensburg (Cumberland County Portion); Part of DAUPHIN County consisting of the TOWNSHIPS of East Hanover (PART, Precincts 01 (all blocks except 2077, 2078, 2081, 2082, 2083, 2084, 3013, 3014, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043 and 3044 of tract 024502) and 02), Halifax, Jackson, Jefferson, Lower Paxton, Lykens, Middle Paxton, Mifflin, Reed, Rush, Susquehanna, Swatara, Upper Paxton, Washington, Wayne, West Hanover, Wiconisco and Williams and the BOROUGHS of Berrysburg, Dauphin, Elizabethville, Gratz, Halifax, Lykens, Millersburg, Paxtang, Penbrook, Pillow, Steelton and Williamstown; All of FRANKLIN County; All of FULTON County; All of HUNTINGDON County; All of JUNIATA County; All of MIFFLIN County; All of PERRY County; Part of SNYDER County consisting of the TOWNSHIPS of Adams, Beaver, Center, Franklin, Perry, Spring, West Beaver and West Perry and the BOROUGHS of Beavertown, McClure and Middleburg and Part of UNION County consisting of the TOWNSHIPS of Buffalo (PART, Districts 01 (all blocks except 2034, 2035, 2036, 2037, 2044, 2045, 2047, 2056, 2057, 2058, 2059, 2060, 2061, 2062 and 2063 of tract 090502) and 02), Gregg, Hartley, Lewis, Limestone, West Buffalo and White Deer and the BOROUGHS of Hartleton, Mifflinburg and New Berlin.

Total population: 764,864

Dist. 14 BEDFORD, CAMBRIA, FAYETTE, GREENE, SOMERSET, WASHINGTON and WESTMORELAND Counties.
All of BEDFORD County; Part of CAMBRIA County consisting of the TOWNSHIPS of Adams, Conemaugh, Richland and Stonycreek (PART, Districts 01, 03 and 04) and the BOROUGHS of Geistown and Scalp Level; All of FAYETTE County; All of GREENE County; All of SOMERSET County; Part of WASHINGTON County consisting of the CITY of Monongahela and the TOWNSHIPS of Amwell (PART, District 02), Blaine, Carroll, Donegal, East Bethlehem, East Finley, Fallowfield, Independence (PART, District 01), Morris, North Franklin (PART, District 01), Nottingham, Peters, Somerset, South Franklin, Union, West Bethlehem, West Finley and West Pike Run and the BOROUGHS of Allenport, Beallsville, Bentleyville, California, Centerville, Charleroi, Claysville, Coal Center, Cokeburg, Deemston, Donora, Dunlevy, Elco, Ellsworth, Finleyville, Long Branch, Marianna, New Eagle, North Charleroi, Roscoe, Speers, Stockdale, Twilight and West Brownsville and All of WESTMORELAND County.
Total population: 764,865

Dist. 15 ALLEGHENY County.
Part of ALLEGHENY County consisting of the CITIES of Clairton, Duquesne, McKeesport and Pittsburgh and the TOWNSHIPS of Baldwin, Elizabeth, Forward, Mount Lebanon, North Versailles, Penn Hills, Reserve, South Park, South Versailles, Stowe (PART, Wards 01, 02 [PART, Division 01], 06 and 09) and Wilkins and the BOROUGHS of Baldwin, Bethel Park, Braddock, Braddock Hills, Brentwood, Castle Shannon, Chalfant, Churchill, Dormont, Dravosburg, East McKeesport, East Pittsburgh, Edgewood, Elizabeth, Forest Hills, Glassport, Homestead, Jefferson Hills, Liberty, Lincoln, McKees Rocks, Monroeville, Mount Oliver, Munhall, North Braddock, Pitcairn, Pleasant Hills, Plum, Port Vue, Rankin, Swissvale, Trafford (Allegheny County Portion), Turtle Creek, Versailles, Wall, West Elizabeth, West Homestead, West Mifflin, Whitaker, White Oak, Whitehall, Wilkinsburg and Wilmerding.
Total population: 764,864

Dist. 16 **BUTLER, CRAWFORD, ERIE, LAWRENCE, MERCER and VENANGO Counties.**
Part of BUTLER County consisting of the CITY of Butler and the TOWNSHIPS of Adams, Brady, Butler, Center, Cherry, Clay, Concord, Connoquenessing, Cranberry, Forward, Franklin, Jackson, Lancaster, Marion, Mercer, Middlesex, Muddycreek, Oakland, Penn, Slippery Rock, Summit (PART, Districts North and South (all blocks except 1012, 1013, 1015, 1016, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 3042, 3049, 3050 and 3051 of tract 911200)), Venango, Washington and Worth and the BOROUGHS of Callery, Cherry Valley, Connoquenessing, East Butler, Eau Claire, Evans City, Harmony, Harrisville, Mars, Portersville, Prospect, Seven Fields, Slippery Rock, Valencia, West Liberty, West Sunbury and Zelienople; All of CRAWFORD County; All of ERIE County; All of LAWRENCE County; All of MERCER County and All of VENANGO County.
Total population: 764,865

Dist. 17 ALLEGHENY, BEAVER and WASHINGTON Counties.
Part of ALLEGHENY County consisting of the TOWNSHIPS of Aleppo, Collier, Crescent, East Deer, Fawn, Findlay, Frazer, Hampton, Harmar, Harrison, Indiana, Kennedy, Kilbuck, Leet, Marshall, McCandless, Moon, Neville, North Fayette, O'Hara, Ohio, Pine, Richland, Robinson, Ross, Scott, Shaler, South Fayette, Springdale, Stowe (PART, Wards 02 [PART, Division 02], 03, 04, 05, 07 and 08), Upper St. Clair and West Deer and the BOROUGHS of Aspinwall, Avalon, Bell Acres, Bellevue, Ben Avon, Ben Avon Heights, Blawnox, Brackenridge, Bradford Woods, Bridgeville, Carnegie, Cheswick, Coraopolis, Crafton, Edgeworth, Emsworth, Etna, Fox Chapel, Franklin Park, Glen Osborne, Glenfield, Green Tree, Haysville, Heidelberg, Ingram, Leetsdale, McDonald (Allegheny County Portion), Millvale, Oakdale, Oakmont, Pennsbury Village, Rosslyn Farms, Sewickley, Sewickley Heights, Sewickley Hills, Sharpsburg, Springdale, Tarentum, Thornburg, Verona and West View; All of BEAVER County and Part of WASHINGTON County consisting of the CITY of Washington and the TOWNSHIPS of Amwell (PART, District 01), Buffalo, Canton, Cecil, Chartiers, Cross Creek, Hanover, Hopewell, Independence (PART, District 02), Jefferson, Mount Pleasant, North Bethlehem, North Franklin (PART, Districts 02 and 03), North Strabane, Robinson, Smith and South Strabane and the BOROUGHS of Burgettstown, Canonsburg, East Washington, Green Hills, Houston, McDonald (Washington County Portion), Midway and West Middletown.
Total population: 764,865

Population of all districts: 13,002,700

COUNTIES SPLIT BY CONGRESSIONAL DISTRICTS

15 TOTAL COUNTIES	18 TOTAL SPLITS
ALLEGHENY	015 017
BERKS	006 007
BUTLER	012 016
CAMBRIA	012 014
CHESTER	005 006
CLINTON	009 012
CUMBERLAND	010 013
DAUPHIN	010 011 013
LUZERNE	008 009
MONROE	007 008
MONTGOMERY	001 004
PHILADELPHIA	002 003 004 005
SNYDER	009 013
UNION	009 013
WASHINGTON	014 017

PLACES SPLIT BY CONGRESSIONAL DISTRICTS

16 TOTAL PLACES 18 TOTAL SPLITS

ALLEGHENY COUNTY		
STOWE	TOWNSHIP	015 017
BERKS COUNTY		
CENTRE	TOWNSHIP	006 007
BUTLER COUNTY		
SUMMIT	TOWNSHIP	012 016
CAMBRIA COUNTY		
STONYCREEK	TOWNSHIP	012 014
CHESTER COUNTY		
WEST WHITELAND	TOWNSHIP	005 006
CLINTON COUNTY		
PINE CREEK	TOWNSHIP	009 012
CUMBERLAND COUNTY		
SILVER SPRING	TOWNSHIP	010 013
DAUPHIN COUNTY		
EAST HANOVER	TOWNSHIP	011 013
LUZERNE COUNTY		
LUZERNE	BOROUGH	008 009
MONROE COUNTY		
STROUD	TOWNSHIP	007 008
MONTGOMERY COUNTY		
HORSHAM	TOWNSHIP	001 004
PHILADELPHIA COUNTY		
PHILADELPHIA	CITY	002 003 004 005
UNION COUNTY		
BUFFALO	TOWNSHIP	009 013

PLACES SPLIT BY CONGRESSIONAL DISTRICTS

WASHINGTON COUNTY

AMWELL	TOWNSHIP	014 017
INDEPENDENCE	TOWNSHIP	014 017
NORTH FRANKLIN	TOWNSHIP	014 017

WARDS SPLIT BY CONGRESSIONAL DISTRICTS

19 TOTAL WARDS 19 TOTAL SPLITS

ALLEGHENY COUNTY		
STOWE	TOWNSHIP	
WARD 02		015 017
BERKS COUNTY		
CENTRE	TOWNSHIP	
WARD 02		006 007
BUTLER COUNTY		
SUMMIT	TOWNSHIP	
WARD SOUTH		012 016
CHESTER COUNTY		
WEST WHITELAND	TOWNSHIP	
WARD 04		005 006
CLINTON COUNTY		
PINE CREEK	TOWNSHIP	
WARD 01		009 012
CUMBERLAND COUNTY		
SILVER SPRING	TOWNSHIP	
WARD 02		010 013
DAUPHIN COUNTY		
EAST HANOVER	TOWNSHIP	
WARD 01		011 013
LUZERNE COUNTY		
LUZERNE	BOROUGH	
WARD		008 009
MONROE COUNTY		
STROUD	TOWNSHIP	
WARD 05		007 008
MONTGOMERY COUNTY		
HORSHAM	TOWNSHIP	
WARD 02		001 004
WARD 04		001 004

WARDS SPLIT BY CONGRESSIONAL DISTRICTS

PHILADELPHIA COUNTY		
PHILADELPHIA	CITY	
WARD 01		002 003
WARD 08		002 003
WARD 16		002 003
WARD 39		003 005
WARD 40		003 005
WARD 47		002 003
WARD 58		002 004
UNION COUNTY		
BUFFALO	TOWNSHIP	
WARD 01		009 013

Exhibit 3

Compactness Report

HB2146

For more information on compactness calculations Click Here

Compactness measure: Polsby–Popper

District	District Area (SQM)	Perimeter (Miles)	Area of Circle with Same Perimeter	Perimeter of	Compactness Value
1	713	151	1,807	95	0.39
2	65	61	291	29	0.22
3	56	55	241	27	0.23
4	399	142	1,606	71	0.25
5	339	129	1,331	65	0.25
6	1,246	284	6,424	125	0.19
7	1,071	192	2,921	116	0.37
8	4,979	421	14,125	250	0.35
9	6,984	539	23,120	296	0.30
10	1,557	211	3,536	140	0.44
11	1,455	193	2,954	135	0.49
12	10,301	557	24,711	360	0.42
13	5,350	483	18,585	259	0.29
14	5,051	520	21,491	252	0.24
15	308	116	1,070	62	0.29
16	4,896	354	9,979	248	0.49
17	1,284	260	5,383	127	0.24

Most Compact: **0.49 For District: 16** 0.32

Least Compact: **0.19 For District: 6**

Compactness measure: Schwartzberg

District	District Area (SQM)	Perimeter (Miles)	Area of Circle with Same Perimeter	Perimeter of	Compactness Value
1	713	151	1,807	95	0.63
2	65	61	291	29	0.47
3	56	55	241	27	0.48
4	399	142	1,606	71	0.50
5	339	129	1,331	65	0.50
6	1,246	284	6,424	125	0.44
7	1,071	192	2,921	116	0.61
8	4,979	421	14,125	250	0.59
9	6,984	539	23,120	296	0.55
10	1,557	211	3,536	140	0.66
11	1,455	193	2,954	135	0.70
12	10,301	557	24,711	360	0.65
13	5,350	483	18,585	259	0.54
14	5,051	520	21,491	252	0.48
15	308	116	1,070	62	0.54
16	4,896	354	9,979	248	0.70
17	1,284	260	5,383	127	0.49

Most Compact: **0.7 For District: 16** 0.56

Least Compact: **0.44 For District: 6**

Compactness measure: Reock Score

District	District Area	Perimeter	Area of Circle with	Perim	Compactness

District	District Area (SQM)	Perimeter (Miles)	Area of Circle with Same Perimeter	Perimeter of	Compactness Value
1	713	151	1,807	95	0.40
2	65	61	291	29	0.30
3	56	55	241	27	0.37
4	399	142	1,606	71	0.36
5	339	129	1,331	65	0.34
6	1,246	284	6,424	125	0.38
7	1,071	192	2,921	116	0.40
8	4,979	421	14,125	250	0.41
9	6,984	539	23,120	296	0.33
10	1,557	211	3,536	140	0.44
11	1,455	193	2,954	135	0.49
12	10,301	557	24,711	360	0.62
13	5,350	483	18,585	259	0.43
14	5,051	520	21,491	252	0.38
15	308	116	1,070	62	0.58
16	4,896	354	9,979	248	0.38
17	1,284	260	5,383	127	0.45
Most Compact:	**0.62 For District: 12**				0.42
Least Compact:	**0.3 For District: 2**				

Exhibit 4

Precinct Splits Population Breakdowns by District

Summit Township, Butler County, Population Total: 4,504

District 12	District 16
3,678	826

Pine Creek Township, Clinton County, Population Total: 3,416

District 9	District 12
1,289	2,127

Buffalo Township, Union County, Population total: 3,593

District 9	District 13
340	3,253

Silver Spring Township, Cumberland County. Population Total: 19,557

District 10	District 13
17,009	2,548

East Hanover Township, Dauphin County, Population Total: 6,019

District 11	District 11
1,370	4,649

Luzerne Borough, Luzerne County, Population Total: 2,711

District 8	District 9
1,196	1,515

Stroud Township, Monroe County, Population total: 19,834

District 7	District 8
2,898	16,936

Centre Township, Berks County, Population: 3,938

District 6	District 7
2,678	1,260

West Whiteland Township, Chester County, Population total: 19,632

District 5	District 6
10,509	9,123

CERTIFICATE OF COMPLIANCE

I hereby certify that this filing complies with the provisions of the Case Records Public Access Policy of the Unified Judicial System of Pennsylvania that require filing confidential information and documents differently than non-confidential information and documents.

/s/ Jeffry Duffy
Jeffry Duffy (PA No. 081670)

CERTIFICATE OF SERVICE

I hereby certify that on January 24, 2022, a copy of the foregoing filing was served on all counsel of record via PACFile.

/s/ Jeffry Duffy
Jeffry Duffy (PA No. 081670)

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