

An Undergrounding Alternative to TEP's Above-Ground Kino to DeMoss-Petrie Plan and Why Such an Alternative is Needed

The Tucson Underground Coalition Steering Committee*

The problem. No one denies the demand for added power that TEP's proposed Kino to DeMoss-Petrie project will address. We support the end goals of the project in that regard. The issue is how to construct the project, whether above-ground or underground.

The 75-to-120 foot above-ground transmission towers and lines that the proposed project currently involves will create many costly problems that undergrounding the project would remove. The financial expense of undergrounding is relatively trivial when compared to TEP's own revenue—when annualized the expense does not even come to 2/100th of TEP's most recent 6.8% rate increase. Yet, installing the lines above-ground creates significant financial risk to thousands of property owners along the proposed routes, both homeowners and businesses of every income level. Considering the damaging impact on property values alone, constructing the project above ground could well end up a lose-lose proposition and the worst of all possible alternatives for Tucson: it could leave the city with all the disadvantages of giant towers and transmission lines above ground, yet cost Tucsonans and the community an amount in the vicinity of financing and installing the project underground.

There's another decisive consideration. The City of Tucson's Development Code *expressly bans* new overhead utilities along gateway routes such as TEP has proposed for a good part of its main proposed route. The City of Tucson has made the community's values, standards, and desires clear in enacting numerous codes, ordinances, and area and neighborhood plans directing the undergrounding of utilities in certain areas, including those at issue here. In calling for undergrounding of utilities, the City of Tucson is doing nothing more than joining other cities that promote undergrounding today, recognizing the impact that a city's look and feel have on its future development, economic health, and success versus the blight of tall poles and transmission lines. Half of the main proposed route for this project includes a gateway route from the airport into the city, built by the City expressly to enhance economic development of the entire community because of its visual appeal. Every one of the proposed routes conflicts with the University Area Plan, enacted by the City thirty years ago. In addition to these issues are concerns about the many historic neighborhoods through which the project runs that go completely counter to the project's tall above-ground towers and lines as well as a number of safety concerns.

In what follows, we address the financial cost of undergrounding the project in Part 1. In Part 2 we take up the significant financial injury and equity issues that constructing the project above-

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ground project creates. Part 3 turns to a series of other fundamental issues with above-ground construction, including violation of the city’s codes and ordinances. In Part 4, we show why the alternative solution that TEP proposes, which calls for affected ratepayers to form a special district to finance the costs of undergrounding, utterly fails. We close in Part 5 by proposing an alternative solution in line with the evidence we have put forward, an alternative that we believe is fair and just to all parties. We also attach two appendices that speak specifically to concerns TEP has raised about the maintenance problems that constructing the project underground might bring and that describe how we calculated potential property damage in order to estimate the diminution of property value.

1. Low relative cost of undergrounding the project. TEP estimates the cost of undergrounding the project at approximately \$74.2 million including a 20% contingency whereas installing the project above-ground would cost an estimated \$15.4 million.¹ The difference in cost is about \$58.8 million. None of the estimates account for right-of-way acquisition costs. Even accepting TEP’s underground projection (and there are many reasons to question it as exaggerated), the cost of undergrounding the project is trivial to TEP. Again, accepting TEP’s own estimates in good faith, the annual expense to TEP for undergrounding the entire project would amount to just over 1/10th of 1% of TEP’s \$1.4 billion in annual revenues—about \$1.5 million annually.² *The expense is less than 2/100ths of TEP’s recent 6.8% rate-increase request,*³ about 14 cents per month for the average customer.⁴ It is not a significant expense or “steep cost” by any reasonable definition, relative either to TEP’s budget or to its rate increase requests. The cost of maintenance, whether for above or underground, does not alter this conclusion (see Appendix I).

¹ According to TEP, the cost for undergrounding is \$74.2 million over 5.5 miles (See: <https://www.tep.com/wp-content/uploads/TEP-138-UG-Report-Rev.-4.pdf>) (App. III-A). TEP also states that the cost of undergrounding exceeds the cost to overhead by a factor averaging 5.8 times (See: Tucson Electric Power Company, “Application for a Certificate of Environmental Compatibility, Kino to DeMoss Petrie 138Kv Transmission Line Project,” Exhibit J-54, August 2021, p. J-28; elsewhere, in Exhibit J-54, p. J-9, TEP estimates overhead to cost between \$2 million and \$2.8 million per mile *without contingencies*). If the cost to underground exceeds the cost to overhead without contingencies by a factor averaging 5.8 times, then the cost to overhead the project without contingencies is about \$12.8 million over 5.5 miles (See: \$74.2 million divided by 5.8 equals \$12.8 million, or \$2.33 million per mile). Add 20% for contingencies, as TEP did for its underground estimate, and the cost for overhead is \$15.4 million over 5.5 miles.

² According to TEP’s estimates, the cost of undergrounding is \$74.2 million over 5.5 miles, including 20% for unknowns, with overhead at \$15.4 million, so about \$58.8 million more than overhead would cost. (See: <https://www.tep.com/wp-content/uploads/TEP-138-UG-Report-Rev.-4.pdf>) (App. III-A) On an income statement, at the ACC prescribed 1.69% annual rate of transmission asset depreciation, a \$58.8 million project would be expensed at about \$993,000 annually. See Part II, Item 8, note 3 of <https://www.sec.gov/Archives/edgar/data/100122/000010012220000006/tep10k12312019.htm>. (App. III-B) Note that in August 2020 TEP borrowed \$300M at 1.5%. (See: https://sec.report/Document/0000100122-20-000026/?_gl=1*tcgpa2*_ga*V19TM213U0dhQkFOaFBQbGdLRFRUOC1tLVFZbDRDcW1wckhUc0pIRklMDEycFpLSjhrT29KVjk5TURqM2NzeQ) (App. III-C). Putting together the depreciation of \$58.8 million at 1.69% and amortization at 1.5% on all unpaid part of the debt, a \$58.8 million project would be expensed at approximately \$1.5 million annually.

³ https://tucson.com/business/tucson-electric-powers-99-5m-rate-increase-proposal-hits-residential-customers-hardest/article_4897bcfc-83ed-51ee-9c86-e6c1f6cedd01.html (App. III-D)

⁴ https://tucson.com/business/tucson-electric-powers-99-5m-rate-increase-proposal-hits-residential-customers-hardest/article_4897bcfc-83ed-51ee-9c86-e6c1f6cedd01.html (App. III-D) TEP’s 6.8% rate increase associated with a \$6.80/month increase; 1/50th (or 2%) of that is 14 cents.

It should be noted that underground projects elsewhere, including in Arizona, have been completed at much lower cost than TEP's projections. There have been two underground transmission projects in Scottsdale in the last few years that were undertaken by APS: 1) a nearly one-mile long project that was funded by a tax district; and, 2) a two-mile long project that was not.^{5/6}

Prior to construction, the nearly mile-long undergrounding in Scottsdale was estimated by APS to cost \$4 million, without a contingency.⁷ It ended up costing \$3 million.⁸ This compared to the APS estimate of an above-ground cost of \$1 million. So, in a real-world example from 90 miles away, undergrounding was only three times more than overhead—and 25% less than APS's original \$4 million estimate. One major difference with our project is 69kV in Scottsdale versus 138kV here. Both projects are trenched. This will make material costs higher for TEP's project, and costs involving avoiding other utilities underground might also be higher (though Scottsdale did have to dodge existing utilities), but it's difficult to imagine these differences quadrupling the cost per mile over Scottsdale.

If TEP is also overestimating the cost by 25%, the cost difference for undergrounding would then be \$40.3 million⁹ In its submission to the ACC, TEP itself has acknowledged that its estimates can be inaccurate by as much as a factor of 2.¹⁰

Consider, too, experience that comes from outside Arizona. For example, a project from Wisconsin in 2011 puts the price of undergrounding a 138kV XLPE line at \$2 million per mile.¹¹

2. Undergrounding is a far more equitable answer. While agreeing that damage to private property values is relevant and should be considered, TEP has not included any such damage in its comparison of the costs of overhead versus underground. It is true that studies of damage to property value vary. Yet, TEP itself approvingly cites studies with estimates indicating that private property devaluation from overhead lines can reach 10% within 500-1,000ft of the proposed right-of-way,¹² especially in urban/suburban environments with overhead lines that fail to blend into the

⁵ <https://www.scottsdaleaz.gov/construction/underground-utility-facilities-improvement-district> (App. III-E)

⁶ <https://www.scottsdaleaz.gov/AssetFactory.aspx?did=69969> (App. III-F)

⁷ <https://eservices.scottsdaleaz.gov/edmviewer/15115258>, Attachment 5. (App. III-G)

⁸ <https://www.scottsdaleaz.gov/Assets/ScottsdaleAZ/Construction/Underground+Utility+Facilities+Improvement/3-20-2018-city-council-report.pdf> (App. III-H)

⁹ If the TEP estimate is 25% too high as APS's estimate was, then the cost of undergrounding will be 75% of the TEP's \$72.4 million projected cost, or \$55.7 million. TEP estimates that the above-ground cost for the project will be \$15.4 million. If so, then the added cost required to underground would be \$15.4 million less than \$55.7 million, or \$40.3 million.

¹⁰ For example, TEP recently reduced its estimate of the underground/overground cost differential from a multiple of 10-to-15 times to a multiple of 4.8-to-6.8 times, a factor of 2.15. Tucson Electric Power Company, "Application for a Certificate of Environmental Compatibility, Kino to DeMoss Petrie 138Kv Transmission Line Project," Exhibit J-54, August 2021, p. J-28 (App. III-A)

¹¹ <https://psc.wi.gov/Documents/Brochures/Under%20Ground%20Transmission.pdf>, Page 17. (App. III-I)

¹² See: <https://eplanning.blm.gov/eplanning-ui/project/97103/570>, the estimates and analyses are found in Appendix D. (App. III-J) When clicking on the link there, then click on the word "documents" at the far left. In defending its position, TEP has cited this study (See: <https://www.tep.com/wp-content/uploads/Kino-DMP-CWG-Meeting-4.pdf>, slide/page 12.(App. III-K).

setting or may interfere with future high-density development--such as is the case here now and will be for decades to come. Other studies suggest the property devaluation could be even more, from 13% to 31%.¹³ It would only be reasonable, then, to gain some sense of the possible cost of such damage when comparing overhead to underground. We have done so and find that the damage to property values could well be considerable, in the tens of millions of dollars on each proposed route.

Using Zillow to make estimates (see Appendix II), we compiled the prices of properties on either side of TEP's preferred routes for 750 feet (a distance well within figures found in the study that TEP cites), identifying a total property value of approximately \$944 million within that distance for Route 1B and \$893 million for Route 5A. If we assume 5% in lost value for residential property (only *half* the rate in lost value that estimates in the TEP-cited study say can occur with residential property¹⁴), and half of that for commercial property, the reduction in value of property arising from the project would amount to about \$36.2 million for Route 1B, taking it as an example. This is comparable to TEP's *upper* estimate of the cost difference to underground (\$40.3 million), assuming APS's level of error. If the damage to property value is at the 10% estimate that the TEP-cited study indicates can occur, the lost value from the TEP project over the route would total about \$73 million, which exceeds TEP's \$58.8 million highest estimate of the extra cost required to underground.

TEP has previously commented that these damages disappear within five years. However, the sole study it cites for that claim does not fit the circumstances here, and the study's own authors doubt the claim. In that study, an already existing transmission line was upgraded whereas, here, an entirely new transmission line is being installed. The authors of the study themselves go on to say, "[t]hese studies do not isolate variables that could statistically explain why the effects diminish." In fact, other studies the authors reference state, "the [devaluing] effects of being proximate to towers does not diminish over time."¹⁵

It is not possible from the available studies to state with certainty the exact cost that the above-ground project will inflict in reduced property values. Even so, although no exact determination is possible, the studies do lead to the conclusion that *the reduction in property value could easily run into the tens of millions of dollars over the distance of the route, and TEP cannot be certain that it will not*. The only solution TEP proposes to avert such damage and inequity is that property owners in neighborhoods nearby the route form a special district to pay higher rates in order to

¹³ Properties Near Power Lines and Valuation Issues: Condemnation or Inverse Condemnation (David Bolton, MAI. Southwestern Legal Foundation. 1993), pp. 13-16. See: <http://bolton-realestate.com/wp-content/uploads/articlePowerLines.pdf> (App. III-L)

¹⁴ In the document of analyses TEP cites, <https://eplanning.blm.gov/eplanning-ui/project/97103/570>, see p. 3 in Appendix D, which presents the analyses. It states: "Bond (1995) (Sims and Dent 2005) reported real estate agents appeared to have a more negative opinion of HVOTLs than appraisers, but both groups estimated a diminution of property values of approximately 10 percent. ... An analysis of transaction data for the same location conducted later did find this estimate was reasonably accurate (Bond and Hopkins 2000; Sims and Dent 2005)...". For the distances an effect can occur, see Appendix D, p. 9. (App. III-J)

¹⁵https://eplanning.blm.gov/public_projects/97103/200381782/20022863/250029067/Appendix_D_GV230kV_Draft_EA_20200717_508_Compliant_clean.pdf, p. D-8. (App. III-J)

finance undergrounding of the project. We refute this TEP proposed alternative of a special district, below, in Part 4.

As we said above, if the project is constructed above-ground, it may well end up involving financial costs to Tucson and its citizens that are in the vicinity of or possibly even the same as constructing the project underground.

3. Other Reasons also call for undergrounding the project. As the primary representative of most of TEP’s ratepayers, the City Council of Tucson has voted on numerous occasions to establish both guidelines and specific policies calling for placing new utilities underground. *In fact, the City of Tucson’s Development Code specifically prohibits the construction of new utilities above-ground along gateway routes in the City.*¹⁶ About 80% of the TEP’s main proposed route, 1B, would violate this Code by placing new transmission towers and lines above ground along gateway routes. A significant portion of Routes 1B and 5A also conflict with the University-Area Plan (UAP), enacted by the Tucson City Council in 1989. As the City’s Zoning Examiner has found, “the UAP specifically directs that utility lines be placed underground where possible to mitigate the impacts on adjacent uses.”¹⁷ There’s little question, too, that the tall transmission towers and lines are completely out of keeping with the character of the many historic neighborhoods of Tucson they will either cut through or border (Figure 1).

¹⁶ See Tucson Unified Development Code, Section 5.5.4,B1a:
https://codelibrary.amlegal.com/codes/tucson/latest/tucson_az_udc/0-0-0-3522 (App. III-M)

¹⁷ See Zoning Examiner Decision, May 13, 2021, at p.8;
see https://www.tucsonaz.gov/files/pdsd/plans/University_Area_Plan.pdf , p. 30. (App. III-N)

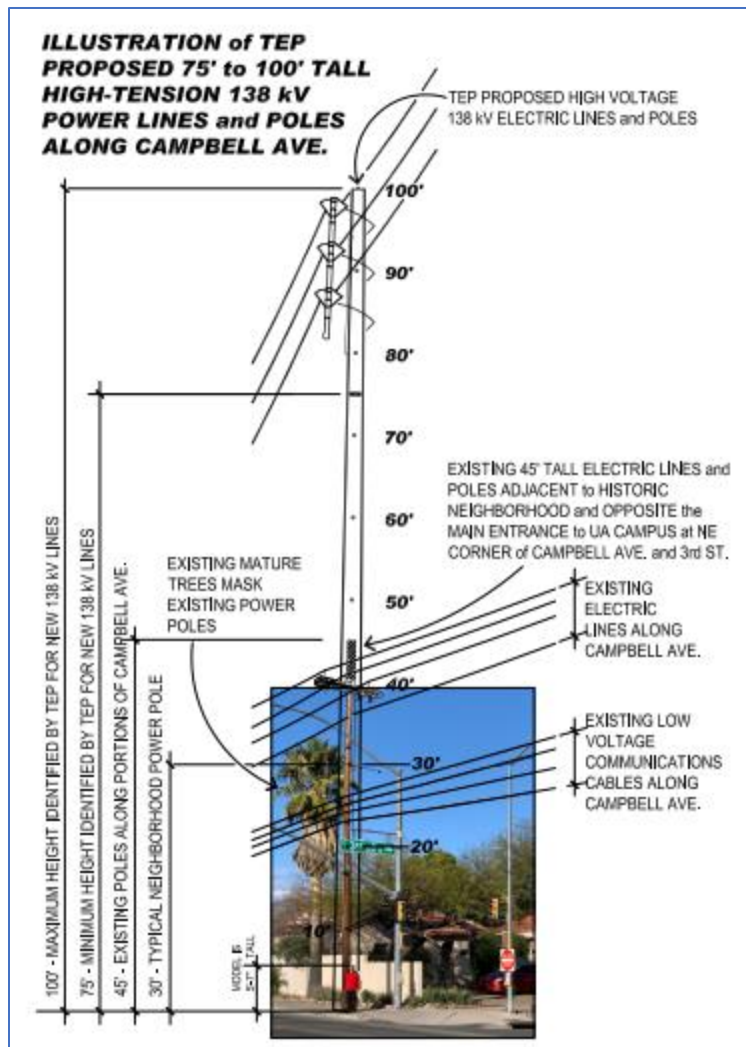


Figure 1. Proposed poles dwarf existing poles and homes along the proposed route.

Apart from these issues, at least six facilities defined as “sensitive receptors” containing occupants deemed at special risk especially susceptible to being harmed by the project, the highest sensitivity level, fall within the advised protected 300-foot buffer zone in the case of TEP’s main proposed route, 1B (St. Peter and Paul Catholic Church and their elementary school, Our Saviors Lutheran Church, Banner UMC Hospital, El Rio Clinic, and University of Arizona athletic facilities). There are seven major sensitive receptors within the 300-foot zone along the other proposed route, 5A (Banner UMC Hospital, El Rio Clinic, First Christian Church, Pilgrim Rest Baptist Church, Tucson Magnet High School, University of Arizona’s Coronado Dormitory, and University of Arizona’s Arbol de la Vida Dormitory).

Finally, there are significant aesthetic considerations. The main route that TEP has chosen runs up Kino Parkway to Campbell Avenue. The Kino-Campbell corridor is unique in Tucson. The corridor was originally constructed, at a considerable financial cost, partly because it significantly improved a visitor’s first impression of Tucson as the gateway into the city from the airport as well as for the enjoyment of all who travelled the route. As such, it was believed that this new, scenic entryway would support and promote Tucson’s economic development and future economic

health, surely important to the business interest of TEP let alone the entire community. Up to this point, the City has been able to keep above-ground utilities off much of the route. As mentioned earlier, the route is specifically protected by ordinances from the construction of further above-ground utilities. It is the case with the other routes, too, that 75-to-120-foot-high above-ground transmission towers and lines will scar the routes and serve at least as a suggestion that Tucson and its citizens give little priority to their community's appearance (Figure 2).



Figure 2. The proposed poles invite graffiti.

Undergrounding TEP's proposed project, which would avoid *all* the overground issues described above, could be accomplished either by TEP undertaking a community-minded action and

absorbing the cost itself or by the Arizona Corporation Commission sanctioning a small general rate increase. TEP often speaks of its community-mindedness and its engagement in programs that involve it making financial contributions in the community's interest. In a recent announcement, TEP said: "TEP's dedication to service extends beyond providing safe, reliable power. For more than 125 years, we've remained true to our vision of improving the quality of life in the communities we serve. TEP's financial, in-kind and volunteer contributions have significant, measurable impact in our community."¹⁸ TEP goes on to say that it absorbs costs such as these within its established rates.

4. If TEP declines to absorb the cost of undergrounding, and the ACC concurs, there should be a small general rate increase to finance the cost. TEP's position the entire time has been that it is happy to underground the project but that in order for the proposed project to be installed underground, a special district must be formed. According to TEP's position, the residents and business owners within the special district should pay the entire difference in cost between placing the transmission lines above-ground and underground.

There is an obvious problem that undermines this proposal. A primary purpose of undergrounding does not have the objective of benefiting individuals. Rather, it seeks to uphold the law, to benefit the community as a whole, to further established and codified policies designed to protect Tucson's long-term aesthetic and economic interests, and to avoid residential and business owners who are located nearby the route of the towers and lines incurring significant financial damage to their property values. This is not a new housing development, where a developer is seeking to enhance values. These are stabilized neighborhoods that have existed for decades, which a new above ground utility project will *devalue*, and enforcement of the undergrounding requirements will avoid. There is every likelihood the new transmission towers and lines will reduce the value of the combined affected properties in the many millions of dollars—very likely in the tens of millions of dollars—which undergrounding the project will avert. *Surely TEP's position and the position of TEP's ratepayers cannot be that the adjacent and affected property owners must themselves pay the cost of undergrounding in order to keep TEP from damaging their property value.* Absent undergrounding, the only other way to address such financial damage is to require each owner to take the time, energy, financial resources, and experience the prolonged stress and aggravation needed to bring cases to court. As the value impact analysis above shows, such a process could well result in TEP having to pay damages in an amount comparable to the expense of undergrounding in the first instance.

In addition, to the degree that aesthetics and the community's character and sense of pride affect the future development, economic health, and welfare of the City of Tucson as a whole, TEP's ratepayers at large stand to benefit from undergrounding the massive transmission towers and lines through the city's historic residential areas as well as a recognized gateway route vital to the ongoing revitalization of the City's core and the Rio Nuevo improvements, all of which impact the City's long term economic interests. In this regard, undergrounding the project is for the benefit of everyone in the community and all ratepayers, not simply owners residing adjacent to the project.

¹⁸ <https://www.tep.com/investing-in-our-community/> (App. III-O)

For these reasons, if at some time the ACC concludes that TEP should not absorb the cost, a minimus rate increase that would result from the undergrounding is an option available to it, rather than a speculative, financially untenable, and highly unlikely future formation of a special district funded by massive special assessments on a small group of residents. If there is concern about the effect on low-income ratepayers, such a concern would also apply to a special district and hit low-income ratepayers within the district even harder. In any case, there is a solution. TEP has a rebate available for low-income ratepayers covering far more than the amount of any rate increase.¹⁹ The rebate is available to any and all such ratepayers. For those low-income ratepayers already in the program, either TEP or the City of Tucson could finance the amount necessary to offset the small increase in the rate that undergrounding the project would cost those ratepayers.

5. Solution. Based on the above considerations taken together, we call upon the Arizona Corporation Commission: (a) to require undergrounding of TEP’s proposed project; (b) to determine whether the cost does or does not justify an increase in general rates; (c) to act accordingly in deciding how to finance the undergrounding; and (d), in the event of a small general rate increase, to deploy TEP’s program for low-income ratepayers so that help is available for any ratepayer in need.

¹⁹ <https://www.tep.com/new-rates/> TEP offers an \$18 monthly rebate to any residential customer who applies with an income beneath 200% of the poverty line (about \$53,000 per year for a family of four). (App. III-P)

Appendix I: Maintenance Issues

TEP has expressed the view that undergrounding as a solution brings difficult maintenance problems that create greater maintenance costs. It argues that with overhead lines, if there's an outage, downtime is shorter, less expensive, and does not require tearing up a street. The impression left is that both the maintenance problems and the costs they involve render undergrounding of the lines prohibitive.

The TEP engineer's report on undergrounding, however, indicates otherwise.²⁰ Two of the five conduits the report plans to install are spare ones. One of those conduits will contain a spare XLPE wire, meaning that the spare can be used as a replacement while repairs are made on the damaged wire such that down time is comparable to overhead. Furthermore, as a segment of a loop with power flowing from both directions, a power failure at one point will not result in an outage. The TEP plan also calls for man vaults every 2,000 feet to enable repairs from the vaults themselves so that most repairs should not require any tearing up of streets.²¹ Only a very rare failure is not repairable from a vault and, such a failure would be covered by the redundant conduits.

Even the most common repairs are infrequent. The previously referenced report from Public Service Commission of Wisconsin indicates from examining trouble rates that the risk of the most common repair involved with underground XLPE wires occurs, at the most, at a 1-in-1000 chance per mile per year.¹⁵ A failure that would take down the underground transmission line for a lengthy period of time would require something rare to happen in three conduits simultaneously such that the two spare conduits would be insufficient, so several similar failures would have to occur at the same time.²²

It deserves mention as well, from the standpoint of practical experience, that when Scottsdale and APS agreed to underground lines the costs of maintenance as compared to overhead lines were considered insignificant enough that they were excluded from the agreement.²³ Examining expenses for maintenance, a Virginia Commission found that the difference in cost between maintaining overhead and underground lines averages to \$5,200 per year per mile.²⁴ *It isn't as if undergrounding is an uncommon way for cities and utilities to handle the installation of new transmission lines.*

Based on TEP's own engineering report, on the Wisconsin study, on the Virginia report, and on the experience of APS in Scottsdale, we question much of what TEP claims regarding the many prohibitive problems and costs involved in maintaining underground lines. If we are correct, the problems are solvable and the costs are not prohibitive but instead can be fairly absorbed.

²⁰ See: <https://www.tep.com/wp-content/uploads/TEP-138-UG-Report-Rev.-0-signed.pdf> (App. III-Q)

²¹ TEP's report also includes 2,100ft of spare cable to be kept on a reel in case of a rare failure.

²² Were the chances completely independent of one another, then the chance of several failures at once would be $1:(1,000*1,000*1,000) = 1$ in 1,000,000,000 per mile per year. And the calculation here is about the odds of a common repair. A failure that takes down an entire conduit is rarer than 1 in 1,000.

²³ <https://www.scottsdaleaz.gov/Assets/ScottsdaleAZ/Construction/Underground+Utility+Facilities+Improvement/Development+Agreement+and+Financing+Contract.PDF> (App. III-R)

²⁴ $\$1,970,000 / 5 \text{ miles} / 70 \text{ years} = \$5,629$; $\$138,000 / 5 \text{ miles} / 70 \text{ years} = \394 ; $\$5,629 - \$394 = \$5,235/\text{mile}/\text{year}$;
See: <http://dls.virginia.gov/commission/pdf/Dominion071905.pdf> (App. III-S)

Appendix II: Calculation of Property Values Along TEP’s Proposed Route

The value of property at risk along two proposed routes for the Kino-DMP project were estimated. Routes 1B, TEP’s “preferred route,” and 5A as set forth in TEP’s *August Update* mailer were examined. The map feature at Zillow.com allows the user to magnify the map until each property’s estimated value is displayed (Figure 3). This allows one to count the number of properties along the route, defined as within 1000 feet (two blocks) and to aggregate the value of those properties. In addition, the land use along route can be discerned.

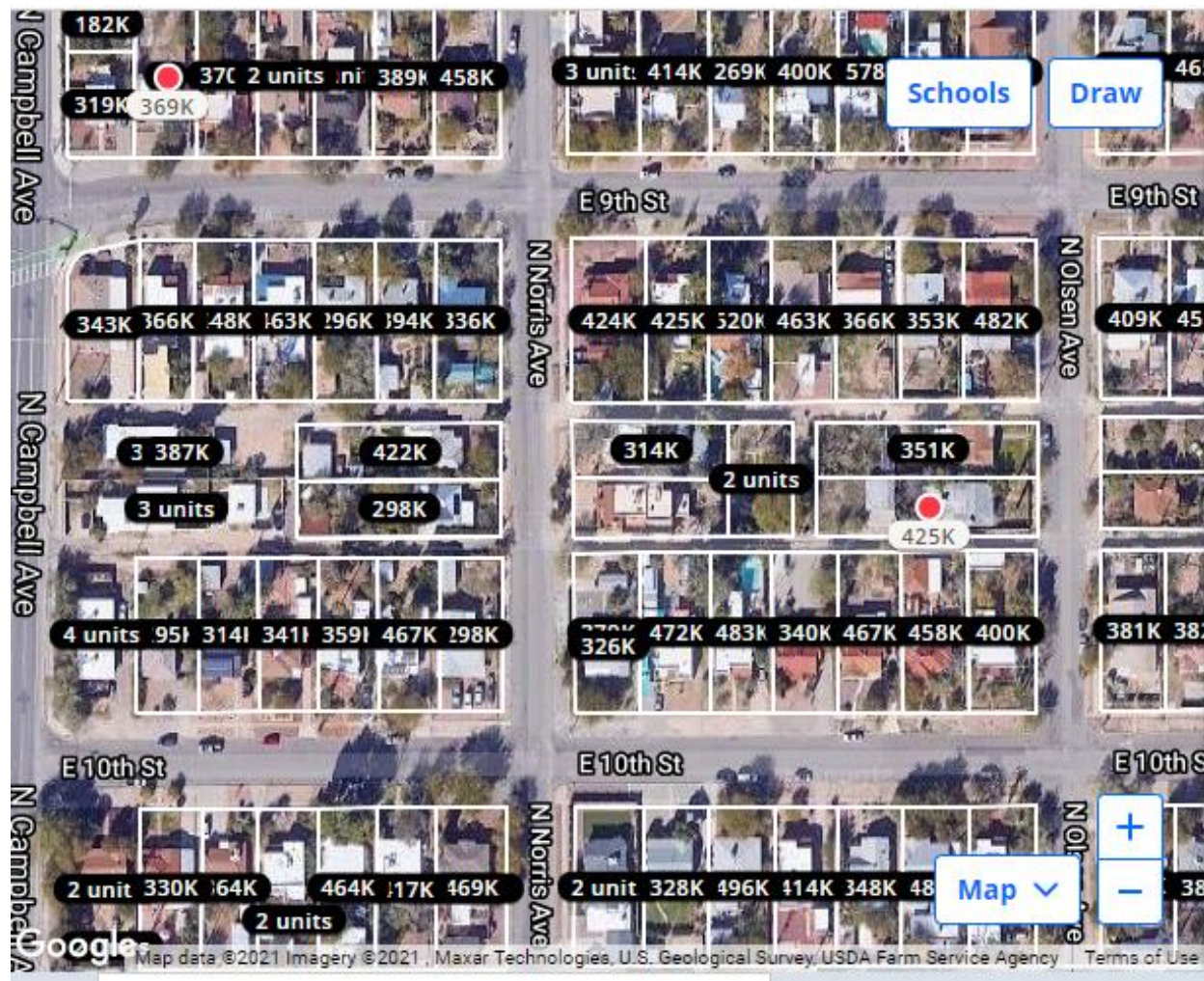


Figure 3. Screen capture from Zillow.com along Route 1B. The two blocks bounded by Campbell, Olsen, 10th, and 9th contain 37 properties with an aggregate value of approximately \$10.7M.

Route 1B and 5A were broken into segments. For each segment the total number of residential properties within 1000 ft of the route were tallied (which the study TEP cited indicates can possibly occur), one block at a time. The Zillow estimate for each property was used to provide an average home value for that block. Property values were obtained in the period 3-11 August 2021. Care was taken to avoid double counting any property. For example, where there are many turns in close

proximity, the “inside corner” can only be counted on one, not both segments of the turn. This required particular attention along route 5A north of the University.

Through examination of the map images, the land use was broken into four categories: residential, commercial, open land, public use. An estimate of the amount of land dedicated to residential and commercial use was tallied for each segment. The aggregate value of residential properties along a segment was used to estimate the value of commercial properties, which in general are not reported on Zillow. The commercial property value was estimate by assuming commercial property value per unit area is the same as residential property. Consultation with commercial real estate experts indicate this is a conservative assumption.

The Zillow-based census (Table 1 and Table 2) shows that there are 2083 homes within 1,000 feet along Route 1B with an aggregate value of \$693 million and 2253 homes along Route 5A with an aggregate value of \$673 million. Total residential and commercial property value along each route is approximately \$1.2 – 1.3 billion.

Table 1. Summary of properties values along Route 1B.

Segment Route 1B	Homes (#)	Value (\$k)	Notes	Residential	Comm-Ind	Total \$k (Comm=Res)	Average Home Price (\$k)
Kino, 36th to 29th	225	54,000	Silverlake Park	50%	0%	54,000	240
Kino, 29th to 22nd	190	29,125		75%	25%	38,833	153
Kino, 22nd to Broadway	50	13,500		10%	90%	135,000	270
Campbell, Broadway to Elm	580	285,000	UA	65%	10%	328,846	491
Elm, Campbell to Park	356	131,660	UMC	80%	20%	164,575	370
Park, Elm to Grant	212	62,600	Apt blocks	80%	10%	70,425	295
Grant, Park to I-10	470	117,000		25%	75%	468,000	249
Total	2,083	692,885				1,259,679	333

Table 2. Summary of property values along Route 5A.

Segment Route 5A	Homes (#)	Value (\$k)	Notes	Residential	Comm-Ind	Total \$k (Comm = Res)	Average Home Price (\$k)
36th, Kino-Campbell	40	9,600		25%	0%	9,600	240
Campbell, 36th to Kino	272	47,350		50%	50%	94,700	174
Kino, 22nd to 17th	40	12,000		40%	40%	24,000	300
17, Campbell to Highland	16	4,000	I-10	20%	10%	6,000	250
Highland, 17th to Manlove	30	7,500	Arroyo Chico	50%	0%	7,500	250
Manlove, Highland to Fremont	30	7,500	Arroyo Chico	30%	30%	15,000	250
Fremont, Manlove to Broadway	36	11,600	Arroyo Chico	30%	30%	23,200	322
Broadway, Fremont To Euclid	14	3,500		10%	90%	35,000	250
Euclid, Broadway to Helen	500	175,000		60%	20%	233,333	350
Helen, Euclid to Park	0	0	Included	50%	50%	0	NA
Park, Helen To Lester	190	58,000		100%	0%	58,000	305
Lester, Park to Vine	150	56,000		100%	0%	56,000	373
Vine, Lester to Grant	365	132,350		100%	0%	132,350	363
Grant, Vine to I-10	570	148,875		30%	70%	496,250	261
Total	2253	673,275				1,190,933	299

If we assume that the power lines will affect residential property values for 750 feet (well within the bounds of research cited by TEP), not 1,000 feet as in the two tables, the total value of potentially affected property along Route 1B is \$944 million and along Route 5B is \$893 million. For the calculations cited in the text, we further assume that commercial values (totaling \$424 million along Route 1B and \$389 million along Route 5A) will decline by half as much as residential property (totaling \$520 million along Route 1B and \$504 million along Route 5A). With these figures, we then calculate potential damage using estimates of 5% and 10% for residential property found in the study that TEP cites and half of that for commercial property. The resulting figures for reduced property value are, in the case of Route 1B, \$36.6 million and \$73.2 million respectively, with \$35.0 million and \$70.0 million respectively in the case of Route 5A.

Appendix III

Exhibit	Description of Document	Date
A	138 Kilovolt Transmission Line Underground Cost Analysis Report	February 2, 2021
B	TEP's Form 10-K 2019	February 12, 2020
C	TEP's Form 8-K	August 10, 2020
D	David Winchner, <i>Tucson Electric Power's 99.5 M rate increase proposal hits residential customer hard</i> , ARIZONA DAILY STAR, https://tucson.com/business/tucson-electric-powers-99-5m-rate-increase-proposal-hits-residential-customers-hardest/article_4897bcfc-83ed-51ee-9c86-e6c1f6cedd01.html	February 22, 2020
E	Underground Utility Facilities Improvement District for City of Scottsdale	
F	APS Power Line Construction	May 19, 2017
G	City Council Report (City of Scottsdale)	December 2, 2016
H	City Council Report (City of Scottsdale)	March 20, 2018
I	Underground Electric Transmission Lines	May 2011
J	Appendix D: Property Values effects from High Voltage Overhead Transmission Line: Study Methodology, Analysis, and Conclusions	
K	Community Working Group Meeting #4 Slides	August 6, 2020
L	Power Lines and Property Values: The Good, the Bad, and the Ugly 1993 By David R. Bolton, MAI and Kent A. Sick	1993
M	Tucson Unified Development Code Section 5.5.4 B1a	
N	University Area Plan (Resolution No. 14889)	May 8, 1989
O	Tucson Electric Power, Investing in Our Community, WWW.TEP.COM, https://www.tep.com/investing-in-our-community/	Last visited August 27, 2021
P	Tucson Electric Power, New Rates for a Cleaner, Greener Grid, WWW.TEP.COM, https://www.tep.com/new-rates/	Last visited August 27, 2021
Q	138 Kilovolt Transmission Line Underground Cost Analysis Report	February 2, 2020
R	Development Agreement and Financing Contract between The City of Scottsdale and Arizona Public Service Company	March 15, 2017
S	Transmission Line Cost Analysis: Joint Commission on Technology and Science	July 19, 2005