Kino to DeMoss-Petrie 138 Kilovolt (kV) Transmission Line Project

Project Update

Posted: April 17, 2020

TEP suspended public open house meetings scheduled in March 2020 to limit unnecessary risk of exposure to the COVID-19 coronavirus. TEP prepared the following online update to:

- Provide an overview of the project
- Describe the purpose and need
- Inform the public about potential line route links
- Solicit public input

Please comment on the information in this project update by **May 22, 2020**.

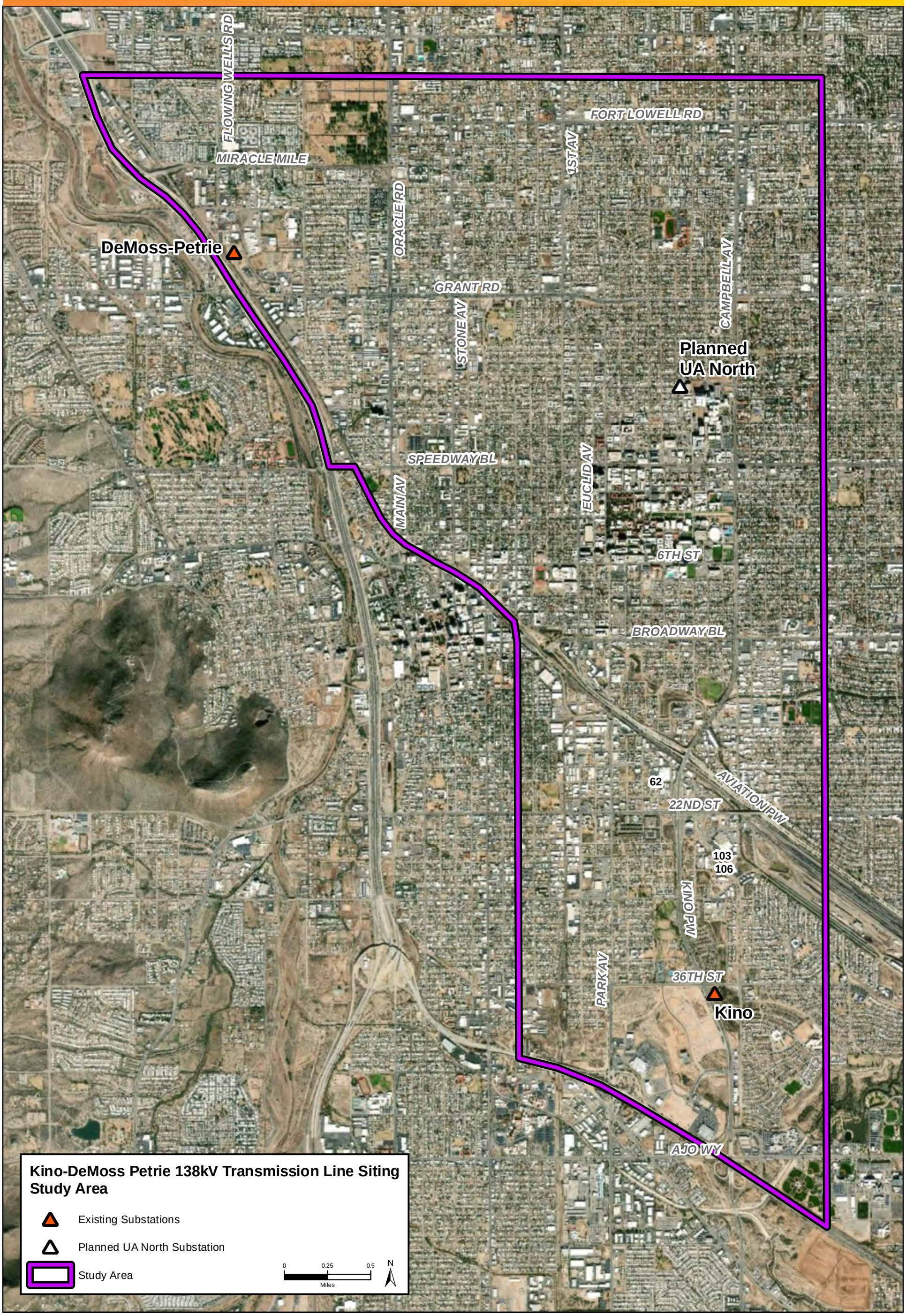
See slide 35 for how to submit comments.

Kino to DeMoss-Petrie Transmission Line Project

TEP is planning to construct a new 138 kilovolt (kV) transmission line to interconnect existing & planned substations (project). The existing substations are located at Kino Boulevard & 36th Street, and Grant Road and Interstate 10 and the planned UA North Substation will be located on Vine Ave., between Lee St. and Chauncey Lane.

TEP has identified a preliminary study area to develop alternative routes that would interconnect the three substations. See next page for Preliminary Study Area Map.

Kino to DeMoss-Petrie Transmission Line Project



Presentation Topics

- Overview
- Project Purpose & Need
- Transmission Line Siting Process
- Project Description
- Project Benefits
- Design Philosophy & Criteria
- Alternative Route Development
- Transmission Line Undergrounding
- Next Steps
- More Information/Comments

Helpful definitions may be found at the end of this update and
tep.com/wp-content/uploads/Definitions-for-CWG_final_011020.pdf

Overview

The planning process includes environmental studies as required by the Arizona Corporation Commission (ACC) and outreach to gain public input about the project, which helps to identify and compare alternative routes.

Public outreach: TEP mailed newsletters to about 40,000 residents & landowners:

- Newsletter #1 mailed October 2019 | Open House Meetings held Oct. 22-23, 2019
- Newsletter #2 mailed February 2020 | Open House Meetings scheduled for March 17-18, 2020 canceled due to COVID-19 emergency
- To continue TEP's planning process and provide public input opportunities, TEP has created this Project Update

A summary of environmental studies to be conducted can be found on page 22.

Project Purpose & Need

Why is this project needed?

In 2008, TEP determined new facilities would be needed in the project area to meet future energy demands. Existing facilities are now approaching capacity.

Contributing Factors:

1) Energy demand within the project area has increased. It is becoming increasingly difficult for existing infrastructure to support current energy demand and ensure TEP can continue providing safe, reliable energy
2) TEP's existing 46 kV system is nearing the end of its useful life, needs replacement and cannot support increasing demand

Project Purpose & Need

Contributing Factors: *continued*

3) By increasing electric capacity, TEP can avoid overload conditions that can damage equipment, causing outages or low voltage for residential and other customers. Some distribution lines in the study area have reached or are approaching their capacity limitations

Project Purpose & Need

The TEP system map on page 17 shows the existing infrastructure serving the project area:

- The Kino 138kV Substation (currently under construction) will be served from a radial line (from one direction). If the line experiences an outage, all customers served by this substation will experience an interruption in service.
- The existing 46 kV system (shown in pink on the map on page 17) serves a large portion of the project area. It serves energy demand using radial lines and has no redundancy. If a line is damaged, a more lengthy interruption of service will continue until repairs are made or service can be re-routed from another direction.

Project Purpose & Need

- The existing 46 kV system does not provide adequate voltage support for increasing energy demand, which could result in poor electrical service.
- The existing 46kV system cannot support any increase in energy demand within the service area.
- The planned 138 kV transmission line will provide an alternate path to serve the Kino Substation, originating at the DeMoss-Petrie Substation and continuing through the planned UA North Substation. The line will allow the Kino and planned UA North 138 kV Substations to be looped into the existing 138 kV transmission system.

Transmission Line Siting Process

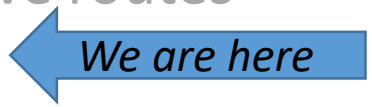
TEP's transmission line siting process includes the following steps (Grayed out items are completed):

- ✓ Identify need for the Project
- ✓ Identify need for ACC approval because Project voltage is greater than 115 kV
- ✓ Identify a preliminary study area
- ✓ Identify stakeholders and neighbors within the study area, develop mail and email contact lists
- ✓ Develop a community working group (CWG) that includes neighborhood association representatives and other interested parties
- ✓ Begin collection of baseline data (ongoing throughout process)

Cont. on next page…

Transmission Line Siting Process

- ✓ Begin public/CWG/stakeholder outreach
- ✓ Begin to identify & analyze opportunities and constraints in the Study Area (ongoing throughout process)
- ✓ Develop links that can be combined to form alternative routes
- Follow-up on public/CWG/stakeholder outreach



- Conduct preliminary impact assessment/engineering & constructability assessment/link comparison
- Identify & analyze multiple preliminary potential alternative routes
- Conduct additional public/CWG/stakeholder outreach

Cont. on next page…

Transmission Line Siting Process

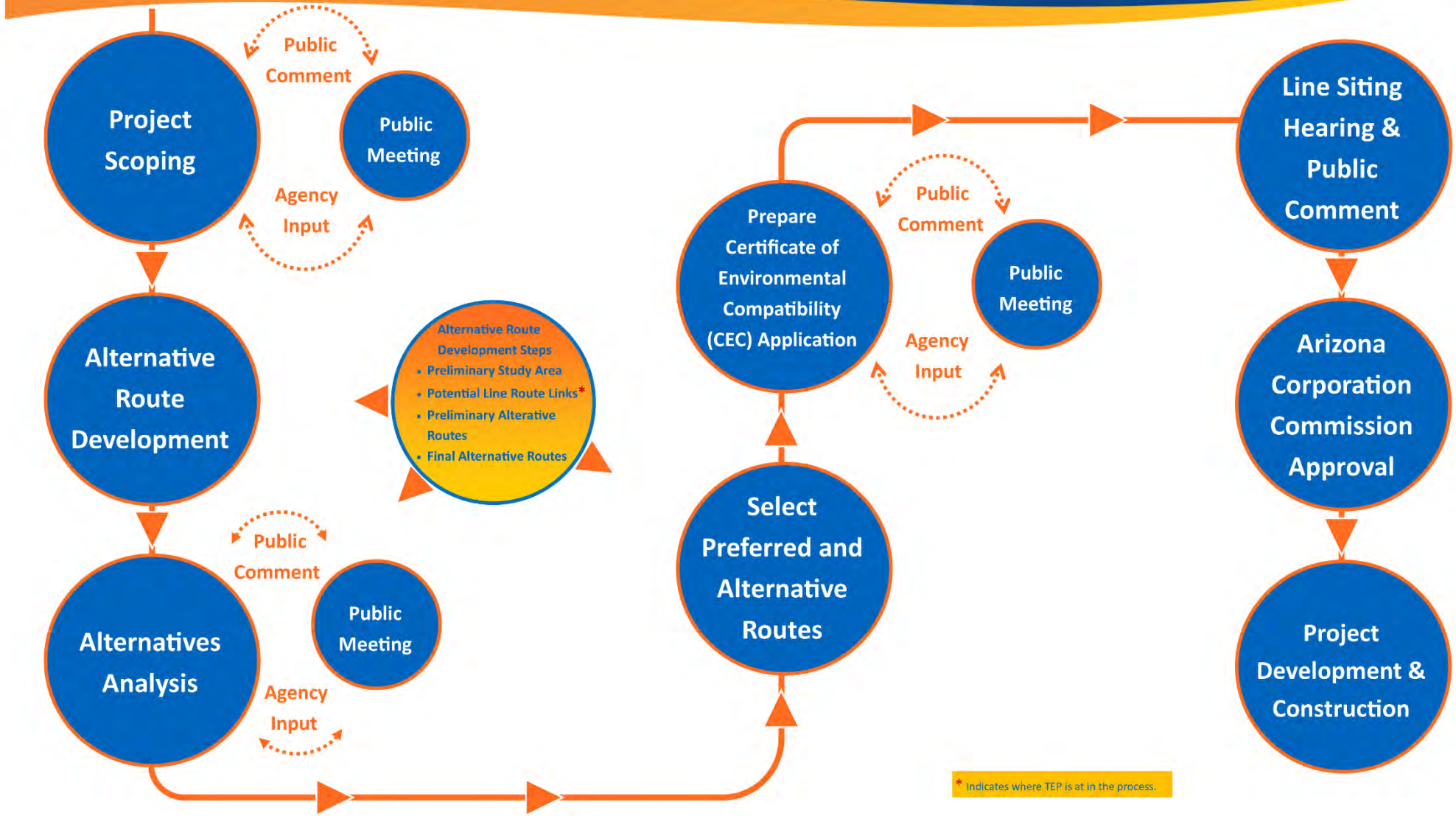
- Throughout the public & agency input process, identify & analyze multiple routes, when possible, to bring forward in the Certificate of Environmental Compatibility (CEC) application to be filed with the ACC
- File application with the ACC.

  tep.com/wp-content/uploads/Irv-to-EL-138-CEC-FINAL-11x17-20200121-1-21-20.pdf

- About 45 days after filing, the Arizona Power Plant and Transmission Line Siting Committee (LSC) will consider the application in an open hearing
- Following the hearing, the LSC makes a decision whether to grant a CEC and if granted, which route should be constructed and under what conditions
- About 60 days later, the ACC will review the application to either approve, approve with modifications, or deny the application in an open meeting

The chart on the next page depicts this process.

Transmission Line Siting Process



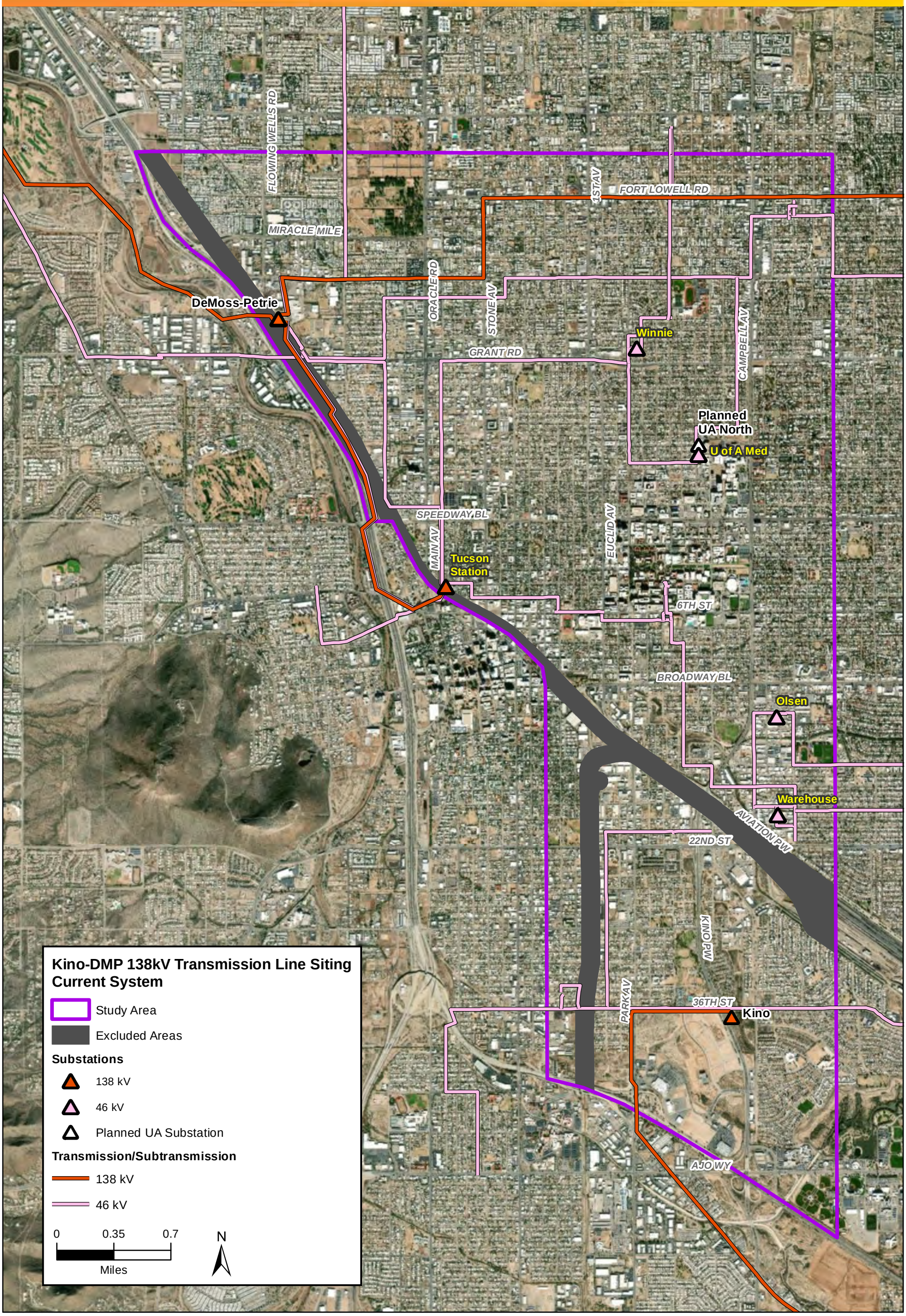
Project Description

A new single circuit, 138 kV transmission line interconnecting:

- Kino 138 kV Substation (currently under construction) located at the southeast corner of Kino Boulevard & 36th Street
- Planned UA North 138 kV Substation to be located on the east side of Vine Avenue between Lee Street & Chauncey Lane
- Existing DeMoss-Petrie (DMP) 138 kV Substation, located east of Interstate 10 and north of Grant Road on the west side of Flowing Wells Road

- The TEP system map on the next page shows the following existing and planned infrastructure:
  - 138 kV DMP, Tucson, and Kino Substations
  - The existing 46 kV substations in the area
  - The existing 138 kV transmission and 46 kV sub-transmission lines within the project area
  - The planned UA North Substation

Kino to DeMoss-Petrie Transmission Line Project



Project Benefits

- Prevention of power outages and inadequate voltage: By increasing electric capacity, TEP can avoid overload conditions that can damage equipment, causing outages or low voltage for residential and other customers. Some lower-voltage feeder lines in the study area have reached or are approaching their capacity limitations
- Service for growing energy needs. Increased electrical capacity would allow TEP to better serve customers throughout the study area, even during summer months when customers' need for power is highest. Peak energy demands throughout TEP's service territory have increased by about 9 percent since mid-2015. New infrastructure would help meet customers' current and future energy needs.

Project Benefits

- Improved electric reliability. New energy infrastructure will strengthen reliability for homes and businesses in the study area by adding redundancy, allowing TEP to deliver energy from more than one direction
- Replacement of aging infrastructure. A large transformer, electric switchgear and other substation equipment currently providing service to some area customers are nearing the end of their useful lives and must be replaced within the next five years.
- Support for the University of Arizona and the Banner – University Medical Center Tucson campus and emergency room. The new line will tie into TEP's 138 kV transmission system to accommodate increased energy demands.

Project Benefits

- The project will create a “looped” 138 kV transmission system that will interconnect both the Kino and UA North 138 kV Substations to TEP’s existing infrastructure. This looped system adds redundancy by serving both UA North and Kino from two directions
- UA North Substation will alleviate demand placed on existing 46 kV circuits, providing contingency support in and around the study area, allowing TEP greater flexibility to respond to outages
- UA North Substation will interconnect with TEP's 138 kV system, which provides greater service reliability and additional capacity to serve future energy needs.

Philosophy & Criteria

When developing a project TEP makes every effort to:

- Design routes that will utilize existing road rights-of-way and utility corridors in an effort to minimize disturbance to surrounding areas. This also gives TEP the flexibility to improve aesthetics by undergrounding or retiring existing distribution facilities
- Work with neighbors and other stakeholders to identify concerns and develop alternatives that are in the best interest of the community

Philosophy & Criteria

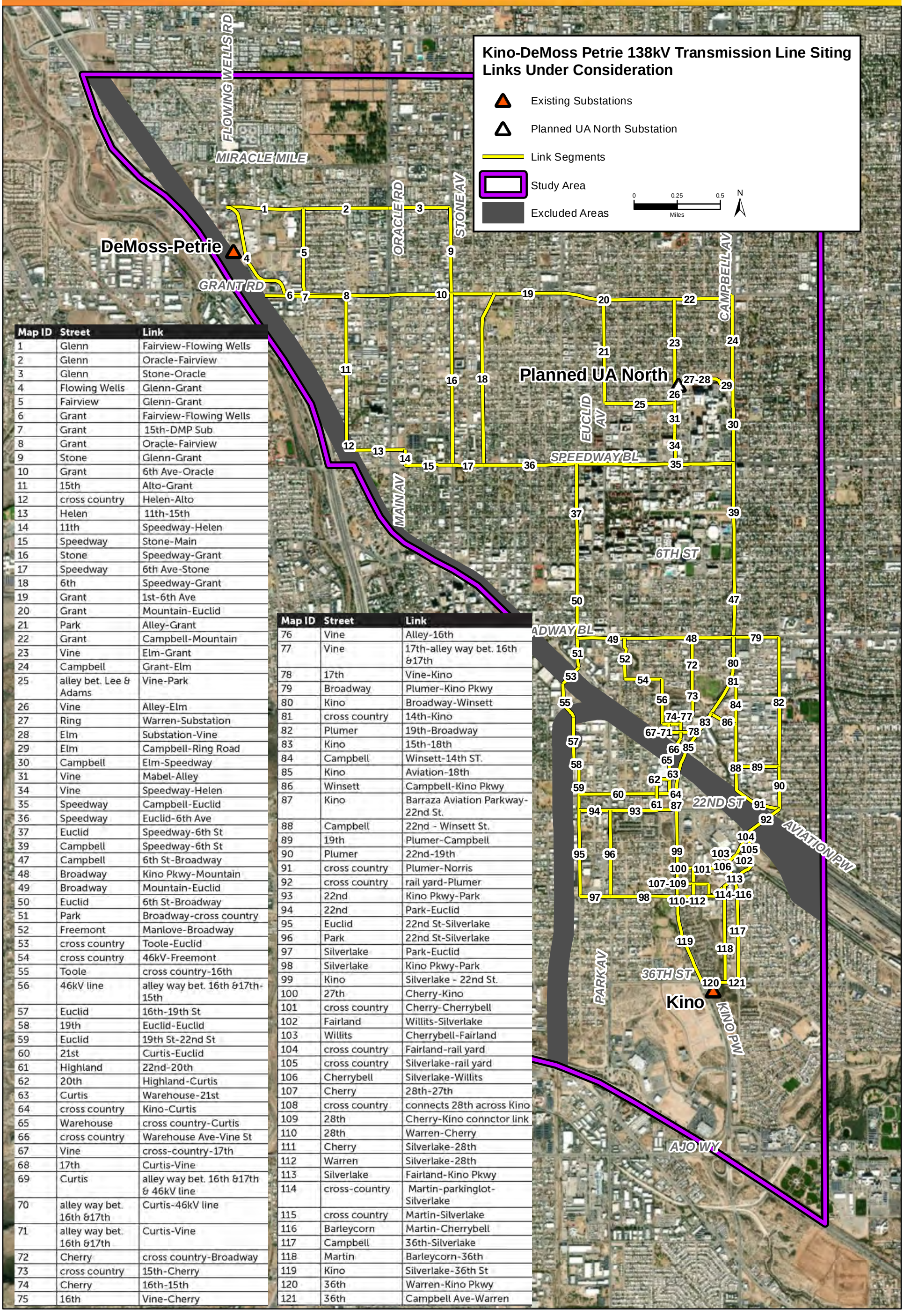
In addition to the design considerations on the previous slide, TEP also analyzes specific criteria in developing and selecting alternative routes. These criteria include:

- Total environment (fish, wildlife, plants)
- Existing state, local government, and private development plans including residential use
- Noise
- Recreational impacts
- Scenic areas, historic sites & structures, archaeological sites
- Interference with communication facilities
- Technical aspects
- Cost
- Other applicable federal and state laws

Alternative Route Development

- TEP has developed multiple potential line route links that could be combined in various ways to form route alternatives, and eventually a final route
- Residents and other stakeholders are encouraged to use the identifying numbers in the maps on the following pages to share thoughts or concerns about specific line route links.
- Note that excluded areas shown on the maps are areas where TEP is not allowed to build, such as railroad and highway rights of way

Kino to DeMoss-Petrie Transmission Line Project – Potential Route Links



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2	Glenn	Oracle-Fairview
3	Glenn	Stone-Oracle
4	Flowing Wells	Glenn-Grant
5	Fairview	Glenn-Grant
6	Grant	Fairview-Flowing Wells
7	Grant	15th-DMP Sub
8	Grant	Oracle-Fairview
9	Stone	Glenn-Grant
10	Grant	6th Ave-Oracle
11	15th	Alto-Grant
12	cross country	Helen-Alto
13	Helen	11th-15th
14	11th	Speedway-Helen
15	Speedway	Stone-Main
16	Stone	Speedway-Grant
17	Speedway	6th Ave-Stone
18	6th	Speedway-Grant
19	Grant	1st-6th Ave
20	Grant	Mountain-Euclid
21	Park	Alley-Grant
22	Grant	Campbell-Mountain
23	Vine	Elm-Grant
24	Campbell	Grant-Elm
25	alley bet. Lee & Adams	Vine-Park
26	Vine	Alley-Elm
27	Ring	Warren-Substation
28	Elm	Substation-Vine
29	Elm	Campbell-Ring Road
30	Campbell	Elm-Speedway
31	Vine	Mabel-Alley
34	Vine	Speedway-Helen
35	Speedway	Campbell-Euclid
36	Speedway	Euclid-6th Ave
37	Euclid	Speedway-6th St
39	Campbell	Speedway-6th St
47	Campbell	6th St-Broadway
48	Broadway	Kino Pkwy-Mountain
49	Broadway	Mountain-Euclid
50	Euclid	6th St-Broadway
51	Park	Broadway-cross country
52	Freemont	Manlove-Broadway
53	cross country	Toole-Euclid
54	cross country	46kV-Freemont
55	Toole	cross country-16th
56	46kV line	alley way bet. 16th &17th-15th
57	Euclid	16th-19th St
58	19th	Euclid-Euclid
59	Euclid	19th St-22nd St
60	21st	Curtis-Euclid
61	Highland	22nd-20th
62	20th	Highland-Curtis
63	Curtis	Warehouse-21st
64	cross country	Kino-Curtis
65	Warehouse	cross country-Curtis
66	cross country	Warehouse Ave-Vine St
67	Vine	cross-country-17th
68	17th	Curtis-Vine
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72	Cherry	cross country-Broadway
73	cross country	15th-Cherry
74	Cherry	16th-15th
75	16th	Vine-Cherry

Map ID	Street	Link
76	Vine	Alley-16th
77	Vine	17th-alley way bet. 16th &17th
78	17th	Vine-Kino
79	Broadway	Plumer-Kino Pkwy
80	Kino	Broadway-Winsett
81	cross country	14th-Kino
82	Plumer	19th-Broadway
83	Kino	15th-18th
84	Campbell	Winsett-14th ST.
85	Kino	Aviation-18th
86	Winsett	Campbell-Kino Pkwy
87	Kino	Barraza Aviation Parkway-22nd St.
88	Campbell	22nd - Winsett St.
89	19th	Plumer-Campbell
90	Plumer	22nd-19th
91	cross country	Plumer-Norris
92	cross country	rail yard-Plumer
93	22nd	Kino Pkwy-Park
94	22nd	Park-Euclid
95	Euclid	22nd St-Silverlake
96	Park	22nd St-Silverlake
97	Silverlake	Park-Euclid
98	Silverlake	Kino Pkwy-Park
99	Kino	Silverlake - 22nd St.
100	27th	Cherry-Kino
101	cross country	Cherry-Cherrybell
102	Fairland	Willits-Silverlake
103	Willits	Cherrybell-Fairland
104	cross country	Fairland-rail yard
105	cross country	Silverlake-rail yard
106	Cherrybell	Silverlake-Willits
107	Cherry	28th-27th
108	cross country	connects 28th across Kino
109	28th	Cherry-Kino connctor link
110	28th	Warren-Cherry
111	Cherry	Silverlake-28th
112	Warren	Silverlake-28th
113	Silverlake	Fairland-Kino Pkwy
114	cross-country	Martin-parkinglot-Silverlake
115	cross country	Martin-Silverlake
116	Barleycorn	Martin-Cherrybell
117	Campbell	36th-Silverlake
118	Martin	Barleycorn-36th
119	Kino	Silverlake-36th St
120	36th	Warren-Kino Pkwy
121	36th	Campbell Ave-Warren

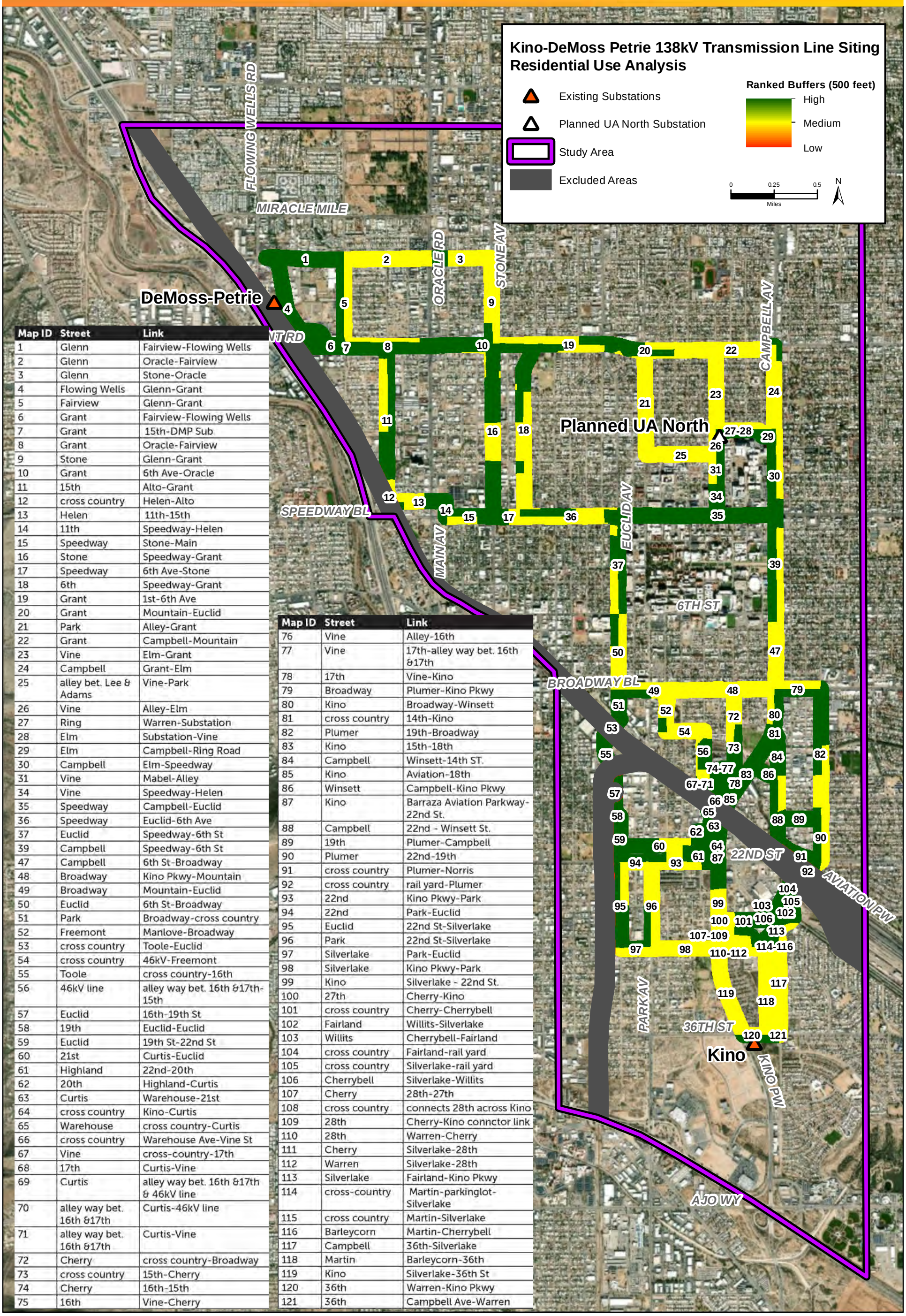
Alternative Route Development

- TEP uses geospatial analysis and input from neighbors and other stakeholders to develop and analyze potential line route links
- An initial analysis of the potential impacts these line route links could have on the criteria of residential use, listed historic properties, and sensitive receptors, as well as a composite analysis of these three criteria has been completed

Alternative Route Development

- Using this analysis, each potential line route link was provided a score. The higher the link scores, the closer it is to meeting TEP's design criteria. Higher scoring links are in green, lower scoring links are in yellow or orange
- Existing infrastructure, such as a road right-of-way or existing 46 kV sub-transmission will raise the "score" of a link.

Kino to DeMoss-Petrie Transmission Line Project



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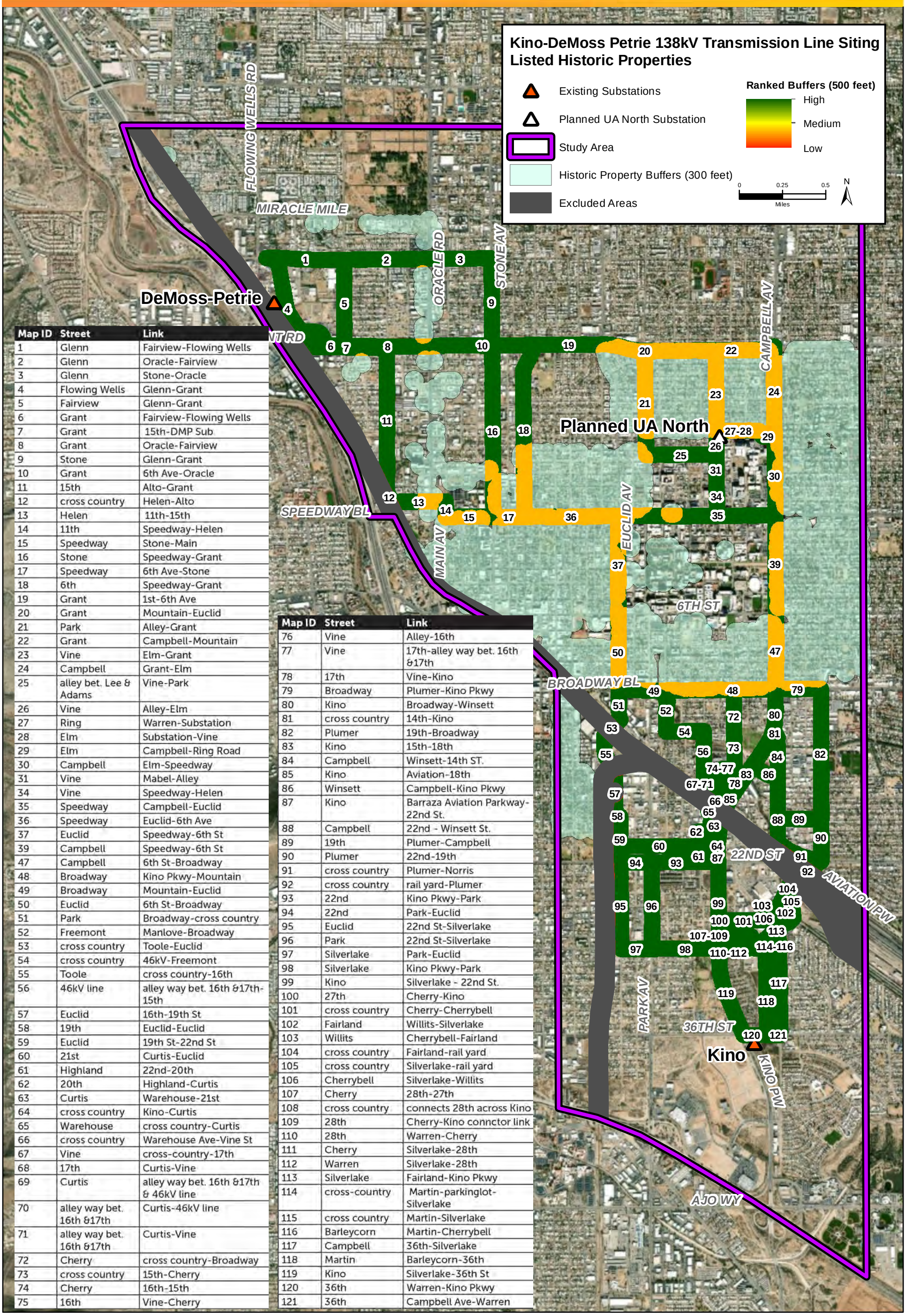

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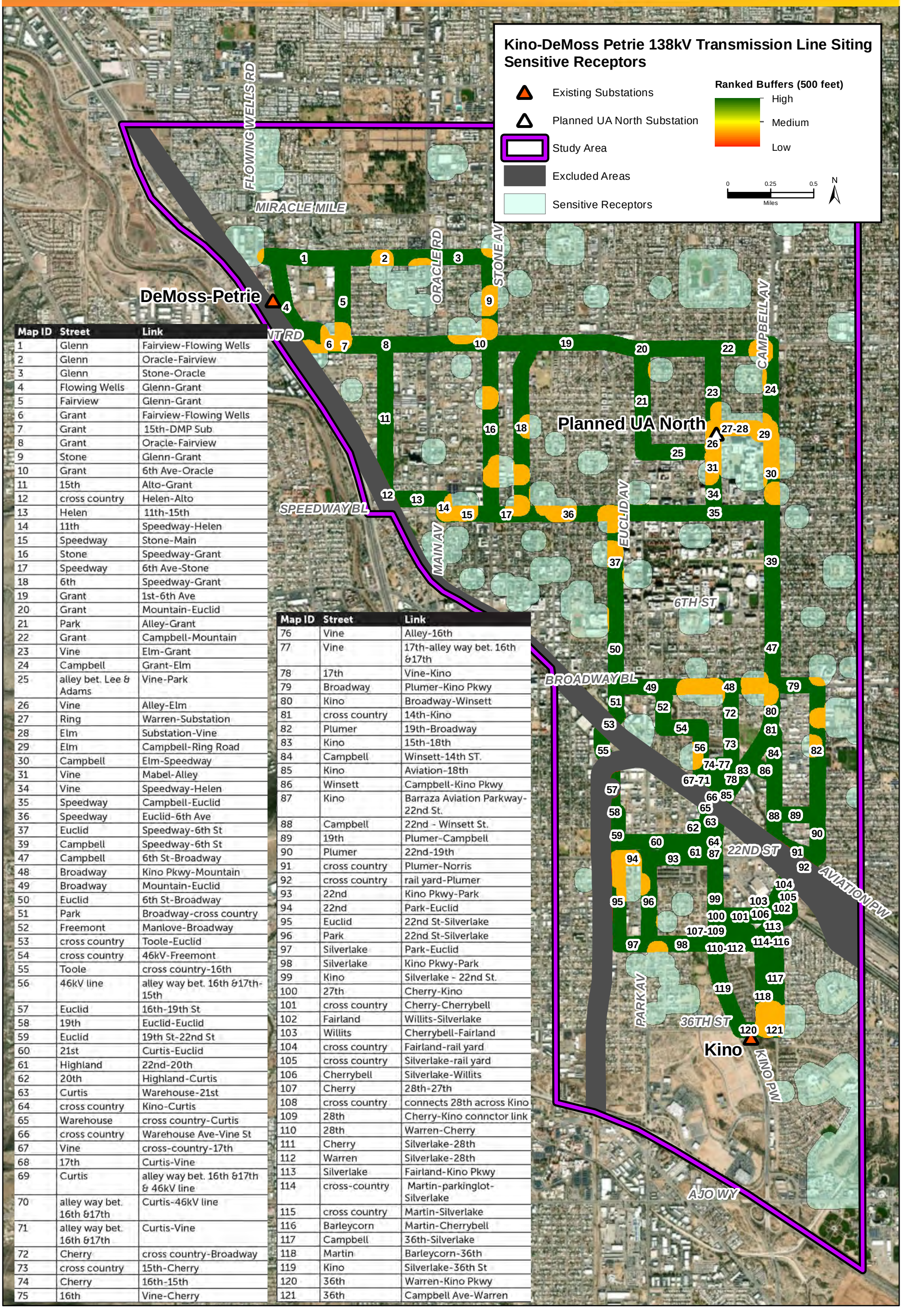
Kino to DeMoss-Petrie Transmission Line Project



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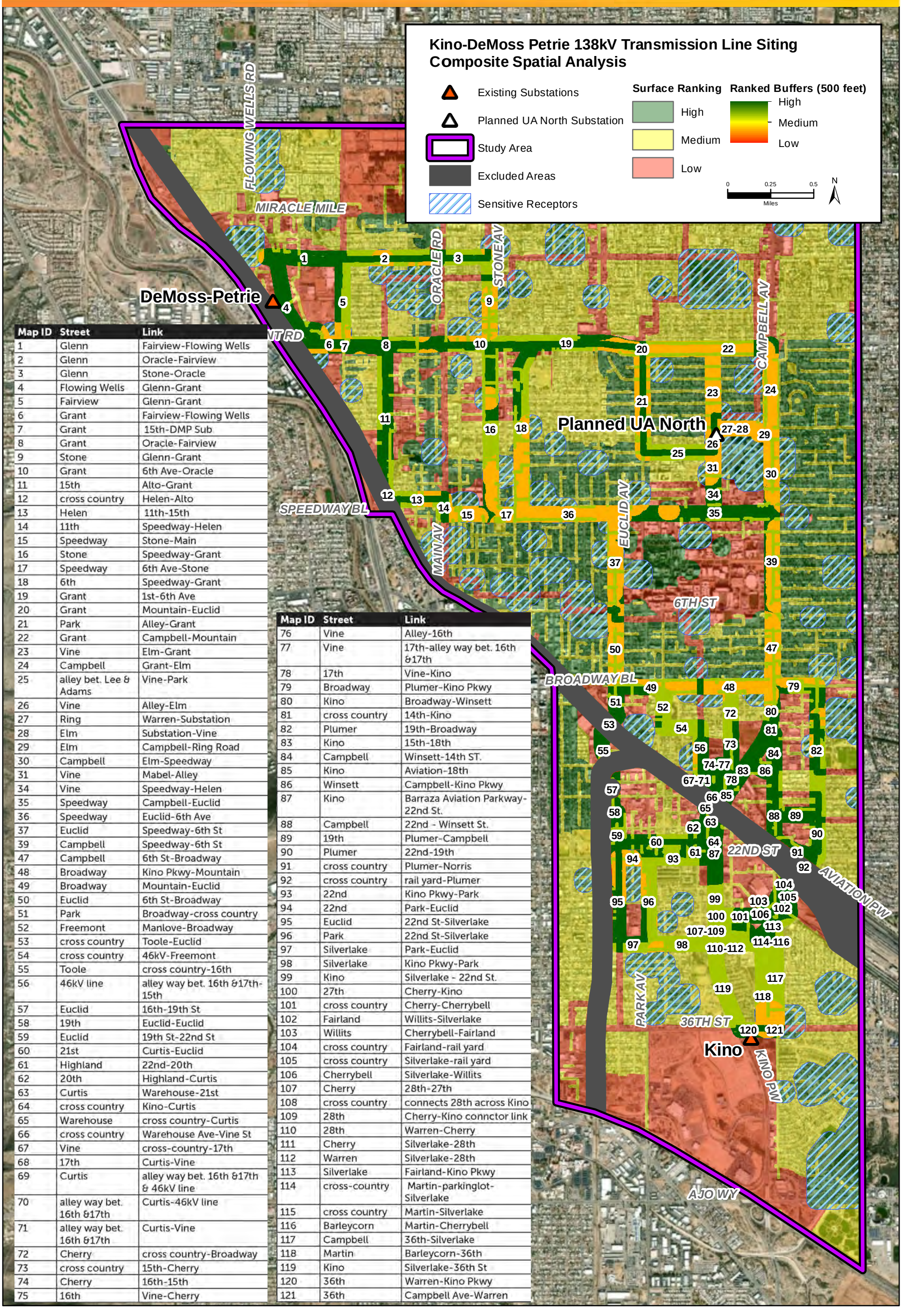
13	Helen	11th-15th
14	11th	Speedway-Helen
15	Speedway	Stone-Main
16	Stone	Speedway-Grant
17	Speedway	6th Ave-Stone
18	6th	Speedway-Grant
19	Grant	1st-6th Ave
20	Grant	Mountain-Euclid
21	Park	Alley-Grant
22	Grant	Campbell-Mountain
23	Vine	Elm-Grant
24	Campbell	Grant-Elm
25	alley bet. Lee & Adams	Vine-Park
26	Vine	Alley-Elm
27	Ring	Warren-Substation
28	Elm	Substation-Vine
29	Elm	Campbell-Ring Road
30	Campbell	Elm-Speedway
31	Vine	Mabel-Alley
34	Vine	Speedway-Helen
35	Speedway	Campbell-Euclid
36	Speedway	Euclid-6th Ave
37	Euclid	Speedway-6th St
39	Campbell	Speedway-6th St
47	Campbell	6th St-Broadway
48	Broadway	Kino Pkwy-Mountain
49	Broadway	Mountain-Euclid
50	Euclid	6th St-Broadway
51	Park	Broadway-cross country
52	Freemont	Manlove-Broadway
53	cross country	Toole-Euclid
54	cross country	46kV-Freemont
55	Toole	cross country-16th
56	46kV line	alley way bet. 16th &17th-15th
57	Euclid	16th-19th St
58	19th	Euclid-Euclid
59	Euclid	19th St-22nd St
60	21st	Curtis-Euclid
61	Highland	22nd-20th
62	20th	Highland-Curtis
63	Curtis	Warehouse-21st
64	cross country	Kino-Curtis
65	Warehouse	cross country-Curtis
66	cross country	Warehouse Ave-Vine St
67	Vine	cross-country-17th
68	17th	Curtis-Vine
69	Curtis	alley way bet. 16th &17th & 46kV line
70	alley way bet. 16th &17th	Curtis-46kV line
71	alley way bet. 16th &17th	Curtis-Vine
72	Cherry	cross country-Broadway
73	cross country	15th-Cherry
74	Cherry	16th-15th
75	16th	Vine-Cherry

Map ID	Street	Link
76	Vine	Alley-16th
77	Vine	17th-alley way bet. 16th &17th
78	17th	Vine-Kino
79	Broadway	Plumer-Kino Pkwy
80	Kino	Broadway-Winsett
81	cross country	14th-Kino
82	Plumer	19th-Broadway
83	Kino	15th-18th
84	Campbell	Winsett-14th ST.
85	Kino	Aviation-18th
86	Winsett	Campbell-Kino Pkwy
87	Kino	Barraza Aviation Parkway-22nd St.
88	Campbell	22nd - Winsett St.
89	19th	Plumer-Campbell
90	Plumer	22nd-19th
91	cross country	Plumer-Norris
92	cross country	rail yard-Plumer
93	22nd	Kino Pkwy-Park
94	22nd	Park-Euclid
95	Euclid	22nd St-Silverlake
96	Park	22nd St-Silverlake
97	Silverlake	Park-Euclid
98	Silverlake	Kino Pkwy-Park
99	Kino	Silverlake - 22nd St.
100	27th	Cherry-Kino
101	cross country	Cherry-Cherrybell
102	Fairland	Willits-Silverlake
103	Willits	Cherrybell-Fairland
104	cross country	Fairland-rail yard
105	cross country	Silverlake-rail yard
106	Cherrybell	Silverlake-Willits
107	Cherry	28th-27th
108	cross country	connects 28th across Kino
109	28th	Cherry-Kino connctor link
110	28th	Warren-Cherry
111	Cherry	Silverlake-28th
112	Warren	Silverlake-28th
113	Silverlake	Fairland-Kino Pkwy
114	cross-country	Martin-parkinglot-Silverlake
115	cross country	Martin-Silverlake
116	Barleycorn	Martin-Cherrybell
117	Campbell	36th-Silverlake
118	Martin	Barleycorn-36th
119	Kino	Silverlake-36th St
120	36th	Warren-Kino Pkwy
121	36th	Campbell Ave-Warren

Kino to DeMoss-Petrie Transmission Line Project



Map ID	Street	Link
1	Glenn	Fairview-Flowing Wells
2	Glenn	Oracle-Fairview
3	Glenn	Stone-Oracle
4	Flowing Wells	Glenn-Grant
5	Fairview	Glenn-Grant
6	Grant	Fairview-Flowing Wells
7	Grant	15th-DMP Sub
8	Grant	Oracle-Fairview
9	Stone	Glenn-Grant
10	Grant	6th Ave-Oracle
11	15th	Alto-Grant
12	cross country	Helen-Alto
13	Helen	11th-15th
14	11th	Speedway-Helen
15	Speedway	Stone-Main
16	Stone	Speedway-Grant
17	Speedway	6th Ave-Stone
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Map ID	Street	Link
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77	Vine	17th-alley way bet. 16th &17th
78	17th	Vine-Kino
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117	Campbell	36th-Silverlake
118	Martin	Barleycorn-36th
119	Kino	Silverlake-36th St
120	36th	Warren-Kino Pkwy
121	36th	Campbell Ave-Warren

Transmission Line Undergrounding

- Residents and stakeholders have indicated a preference for some or all of the project to be installed underground. As a result, TEP conducted a third-party study to determine the feasibility and cost of undergrounding the line
- TEP does not install underground transmission facilities because the significant additional costs would be borne by all TEP customers
- To accommodate underground installation, an underground district would have to be formed and managed by the City of Tucson to assess the extra undergrounding costs to property owners who would benefit. More information about this process can be found here:

  https://www.azleg.gov/ars/48/00620.htm

Transmission Line Undergrounding

The underground study determined that the cost to underground is approximately 11 times greater than overhead construction:

- Overhead construction: $1.5 million/1.5miles
- Underground construction: **$16.4 million**/1.5 miles

A copy of the underground study can be found at:

tep.com/wp-content/uploads/TEP-138-UG-Report-Rev.-0-signed.pdf

Next Steps

- Continue to incorporate public, Community Working Group, & stakeholder comments/data
- Score preliminary links based on geospatial analysis and input from public/CWG/stakeholders and develop multiple preliminary alternative routes prior to next outreach
- Conduct CWG Meeting # 4 – June 2020
- Conduct Pubic Open House Meetings July 2020
- Complete analysis and select *up to* three routes for incorporation into the CEC application
- File CEC application – September 2020
- ACC LSC Hearing – November 2020
- ACC Open Meeting – est. January 2020

*** Note: All future dates are subject to change due to COVID-19 pandemic response**

More Information

For more project information please visit the project webpage:

www.tep.com/kino-to-demoss-petrie/

Here, you can:

- Find past newsletters, public meeting communications and community working group materials
- Read commonly asked questions & answers
- Read comments and responses from the community working group

Comments

We want your feedback, please comment on the information in this project update by May 22, 2020

Fill out an online comment form at the project webpage:

www.tep.com/kino-to-demoss-petrie/

There will be future opportunities to comment on this project as TEP develops preliminary alternative routes.

Definitions

Kino to DeMoss-Petrie Transmission Line Project

Line Siting Vocabulary

Electrical System Definitions:

Conductor: A substance or body that allows an electric current to pass continuously along it.

Distribution Line: A low voltage power line designed to deliver power from convenient points on transmission lines or from substations to the final power consumer. TEP's distribution line voltages are 13.8 kV or 4.16 kV.

Insulator: Supports that attach the conductor to power poles while isolating the pole from current that passes through the conductor, usually made of materials that do a poor job of conducting electricity.

Interconnect: A connection between two electric circuits permitting the transfer of electric energy in either direction.

kV: Abbreviation of kilovolt, a measurement of voltage. A 138 kV line has 138,000 volts going through it.

Load Center: A point at which the load (customers' electric demand) of a given area is assumed to be concentrated. The load center is determined through an area study.

Pull boxes and junction boxes: Access boxes that allow for installation or removal of cables in conduit connected to the box. Pull boxes allow lengths of wire to be installed in shorter intervals.

Redundancy: Having more than one cable or electric source carrying power supplying a given area.

Self-Weathering steel monopole: A transmission line structure constructed with a single steel pole to support cable spans that weathers over time. TEP now primarily uses monopoles in place of larger lattice structures.

Substation: A set of equipment used for switching, changing and regulating the voltage of electricity to suitable levels for supply to consumers or for long distance transport. Acts as a hub, supplying power to nearby consumers or transmission facilities, and allowing TEP to cut off power in case of an emergency.

Sub-transmission Line: A medium voltage power line designed to carry electric energy in bulk from a source or sources of supply to the distribution system and in certain cases to ultimate customers. TEP maintains sub-transmission lines with voltages of 46 kV.

Switchgear: Electrical disconnect switches, fuses, or circuit breakers used to control, protect, and isolate electrical equipment. Switchgear allows the utility to turn on and turn off service to an area dependent on need.

Transformer: An electromagnetic device for changing the voltage of alternating-current electricity.

Transmission Line: A high voltage power line designed to carry electricity in bulk, for long distances, and with minimum losses from power sources to other principal parts of the electric system or other utilities. The ACC considers power lines with voltages of 115 kilovolts (kV) or more as transmission lines. TEP maintains transmission lines with voltages of 138 kV, 345 kV, and 500 kV.

Voltage: The 'push' (difference in electrical potential) that causes charges to move in a conductor.

Kino to DeMoss-Petrie Transmission Line Project

Line Siting Vocabulary

Regulations, Organizations, and Legal Definitions:

Arizona Corporation Commission (ACC): A state regulatory agency that regulates corporations and utilities within the state of Arizona. The ACC is responsible for final approval of CEC. Website: https://azcc.gov/

Arizona Power Plant and Transmission Line Siting Committee: Also known as the 'Line Siting Committee,' this ACC committee serves as a single, independent forum to evaluate applications to build power plants or transmission projects in the state. Website: https://azcc.gov/arizona-power-plant/line-siting-committee

Certificate of Environmental Compatibility (CEC): A certificate provided by the Arizona Corporation Commission (ACC) that allows for the construction of transmission line and generation 115 kV or greater.

Community Working Group (CWG): An important link to the community. Includes neighborhood representatives and constituents within a project study area. Neighborhood representatives provide a unified perspective on behalf of their neighborhood to share with the rest of the CWG. Members can present a range of opinions in a forum small enough to allow for education of participants, detailed discussion of issues, and informal dialogue. Member input is crucial in planning for a project by bringing forth issues, ideas and concerns held by the members and their constituency.

Easement: A right of way giving persons other than the owner access to or over a property through an agreement between both parties.

Right of Way (ROW): The right to use a particular path for access or passage over another's property, typically linear in nature. ROWs can be a type of easement.

Stakeholder Group: Technical experts representing other utilities and federal, state and local jurisdictions that can provide information related to how the project may directly impact their facilities.

Study Area: The area considered for line siting. Identification is based on natural geographic features or man-made boundaries, project needs, existing infrastructure and considerations of potential routes.