

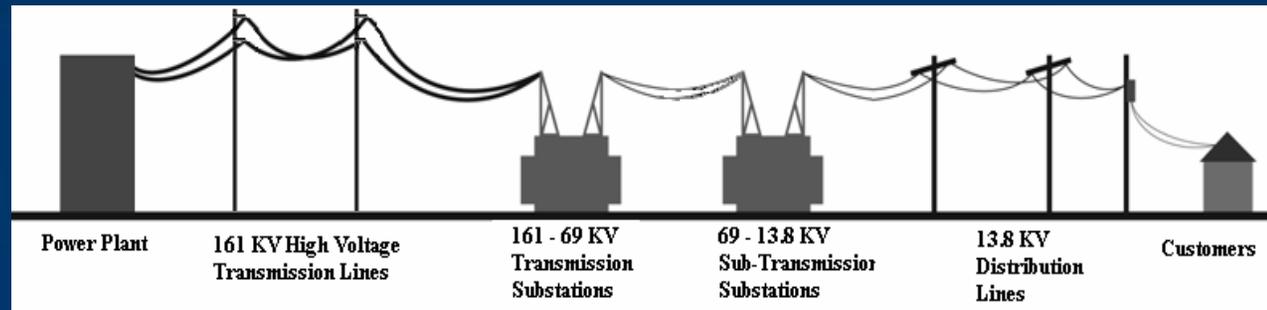


Mill Creek Substation & Transmission Lines
Council Work Session
June 13, 2013

Mill Creek Substation & Transmission Lines Council Work Session



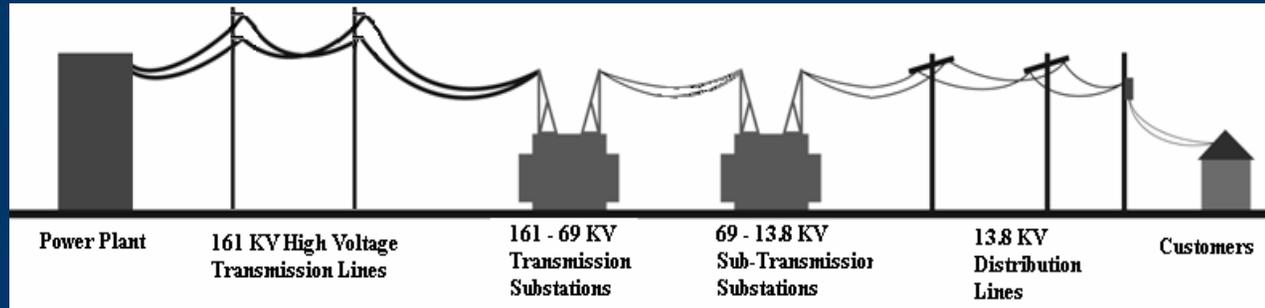
- System
- History
- Current Problem
- Solution Options/Interested Party Process
- Community Feedback
- Costs
- Staff Recommendation



System

Transmission System: 161 KV power lines

- Columbia's Power Import Lines
- Federal, NERC, Standards for Transmission:
 - The occurrence of any single transmission outage cannot cause any overloads of other transmission elements
 - The occurrence of any two transmission outages cannot cause cascading outages on the system

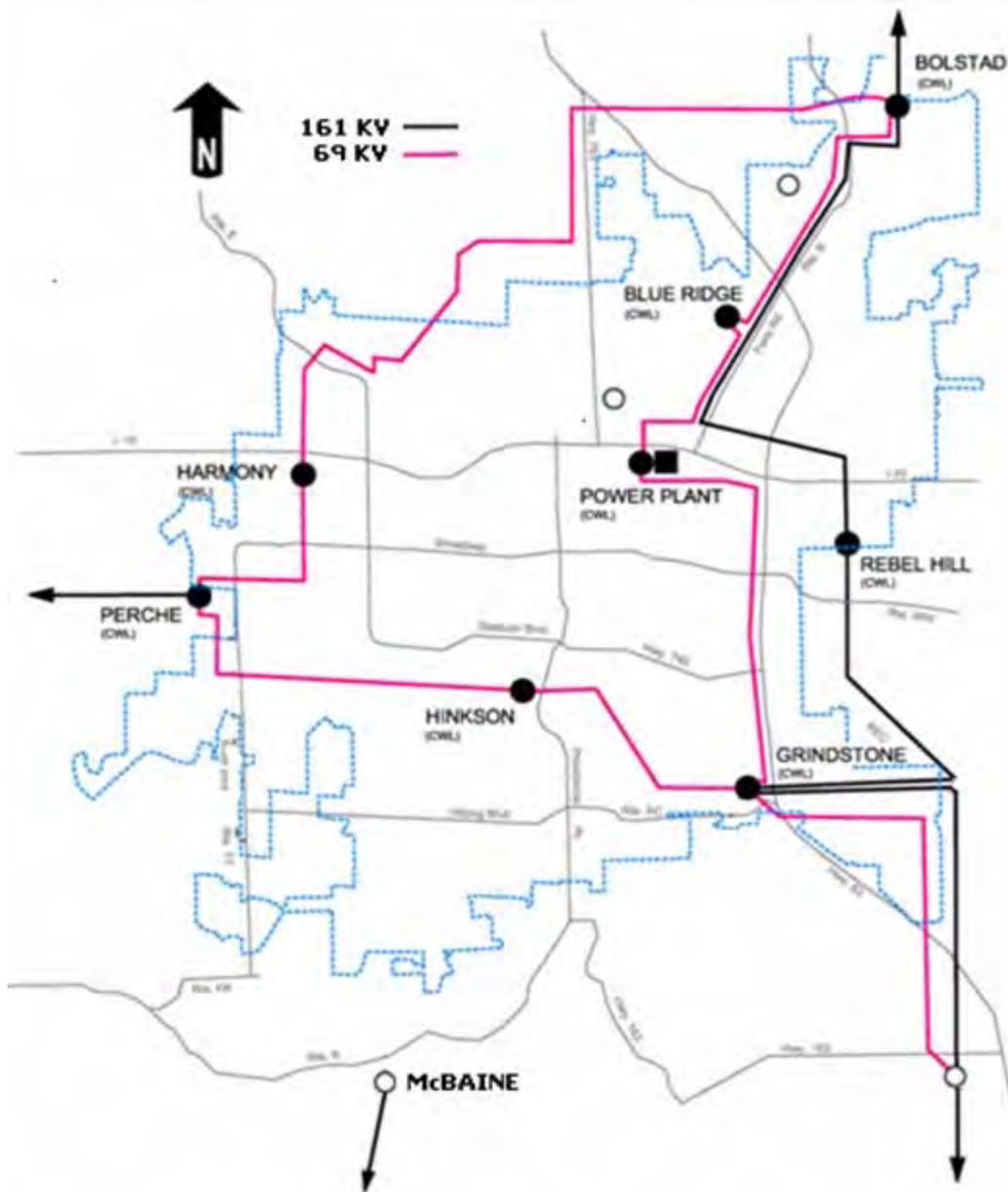


System

Sub-Transmission System: 69 KV power lines

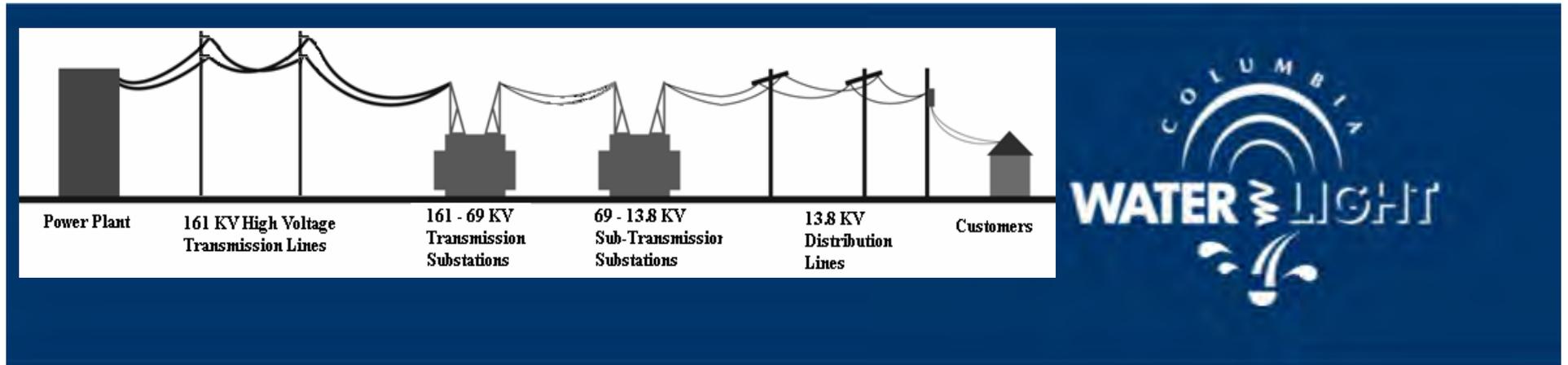
- Columbia's Internal Sub-Transmission Loop
- Operate Under Federal contingency guidelines due to Transmission Connection for Other Load Serving Utilities:
 - City of Fulton
 - University of Missouri

System



Substations

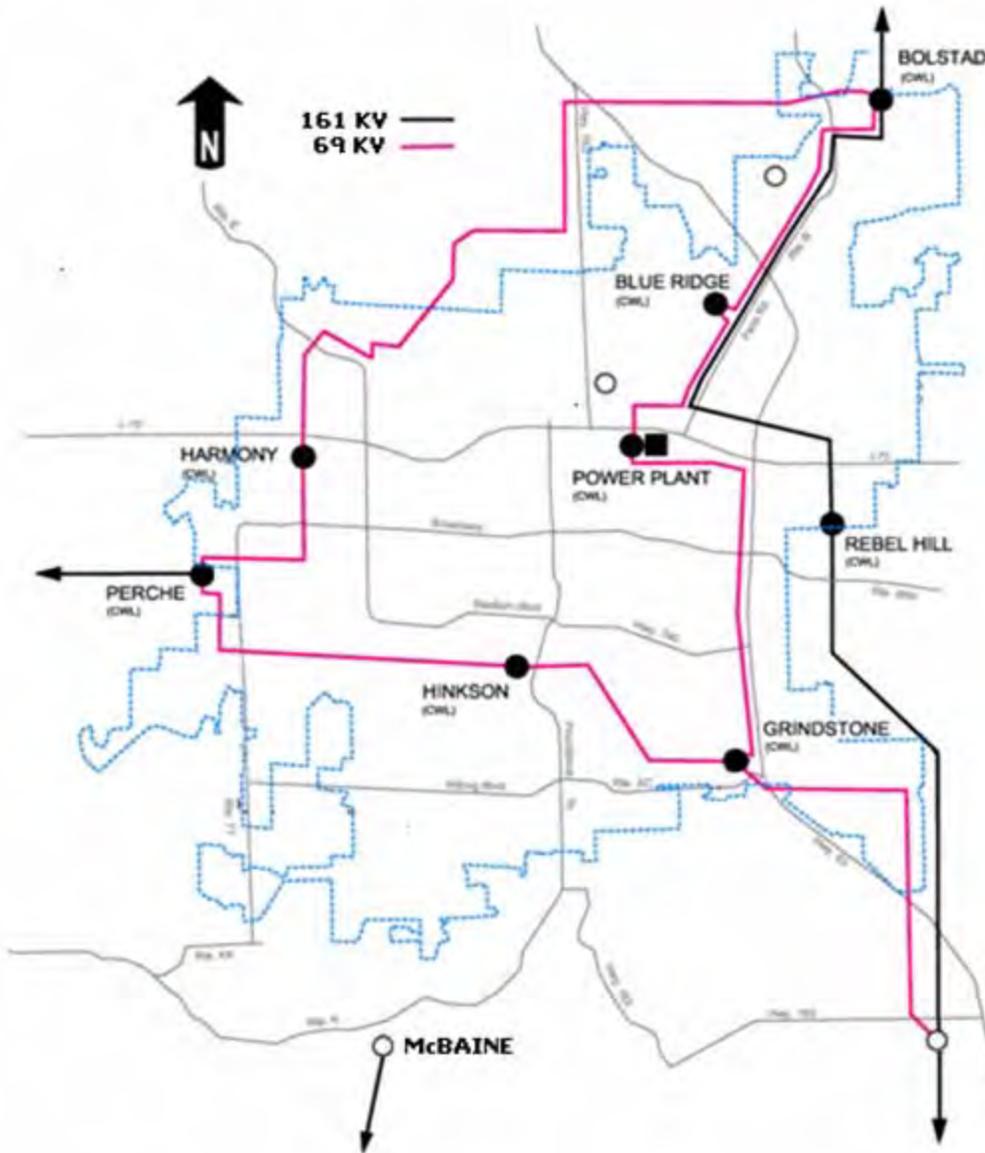
- Convert Energy from Transmission to Distribution Level
- Operate for the loss of any single element without long term loss of load



System Summary

- Columbia's Transmission System is the 161KV and 69KV Systems
 - 161KV lines
 - Tie (import/export) lines for Columbia
 - 69KV lines
 - Columbia's Internal Loop Lines
 - Tie (import/export) lines for Fulton and University of Missouri
- Columbia Distribution Systems Operates at 13.8KV

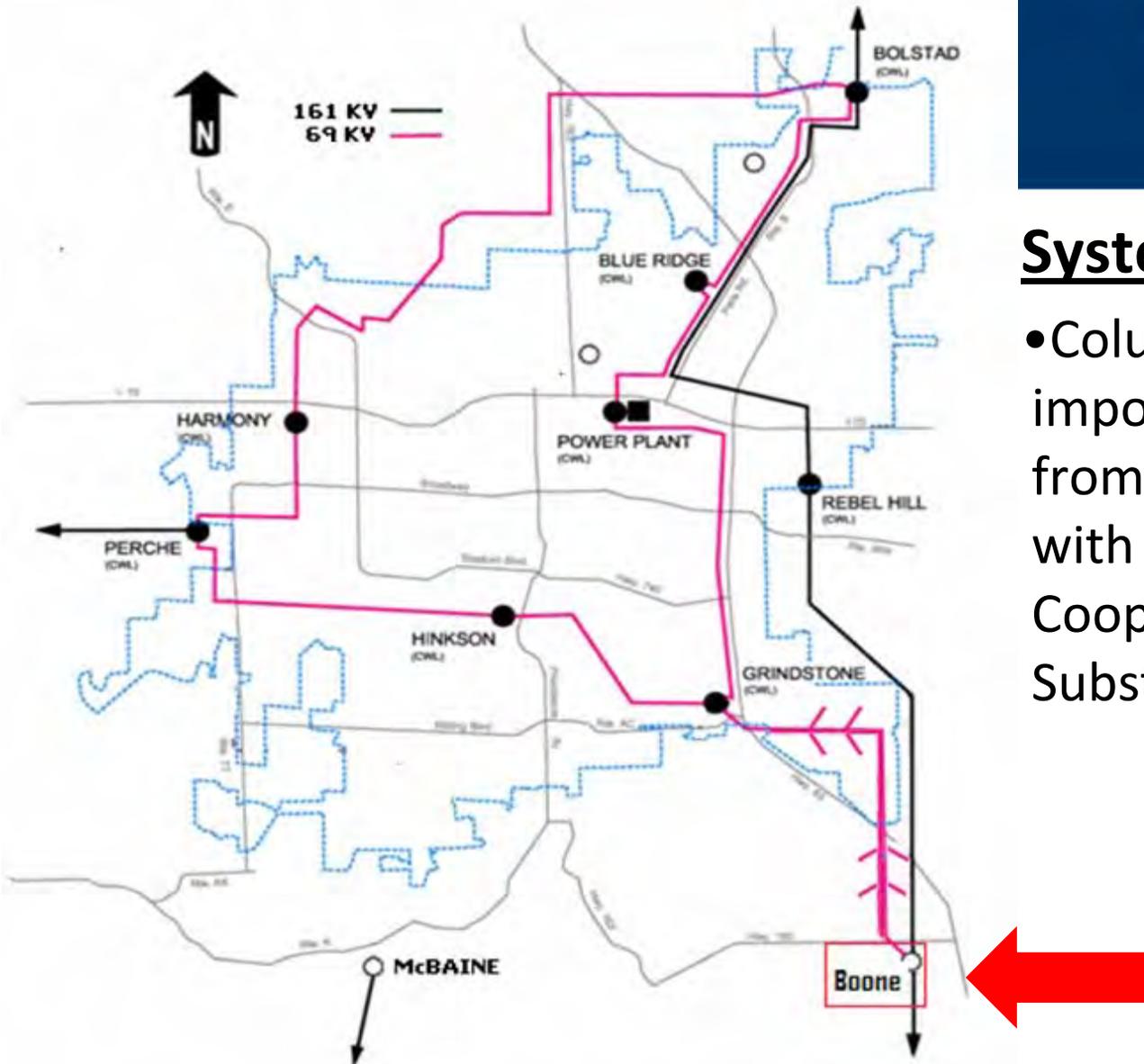
History



System

- Configuration at the start of 2000
- In 2005 loading issues started to occur on the southern side of Columbia's 69KV system.

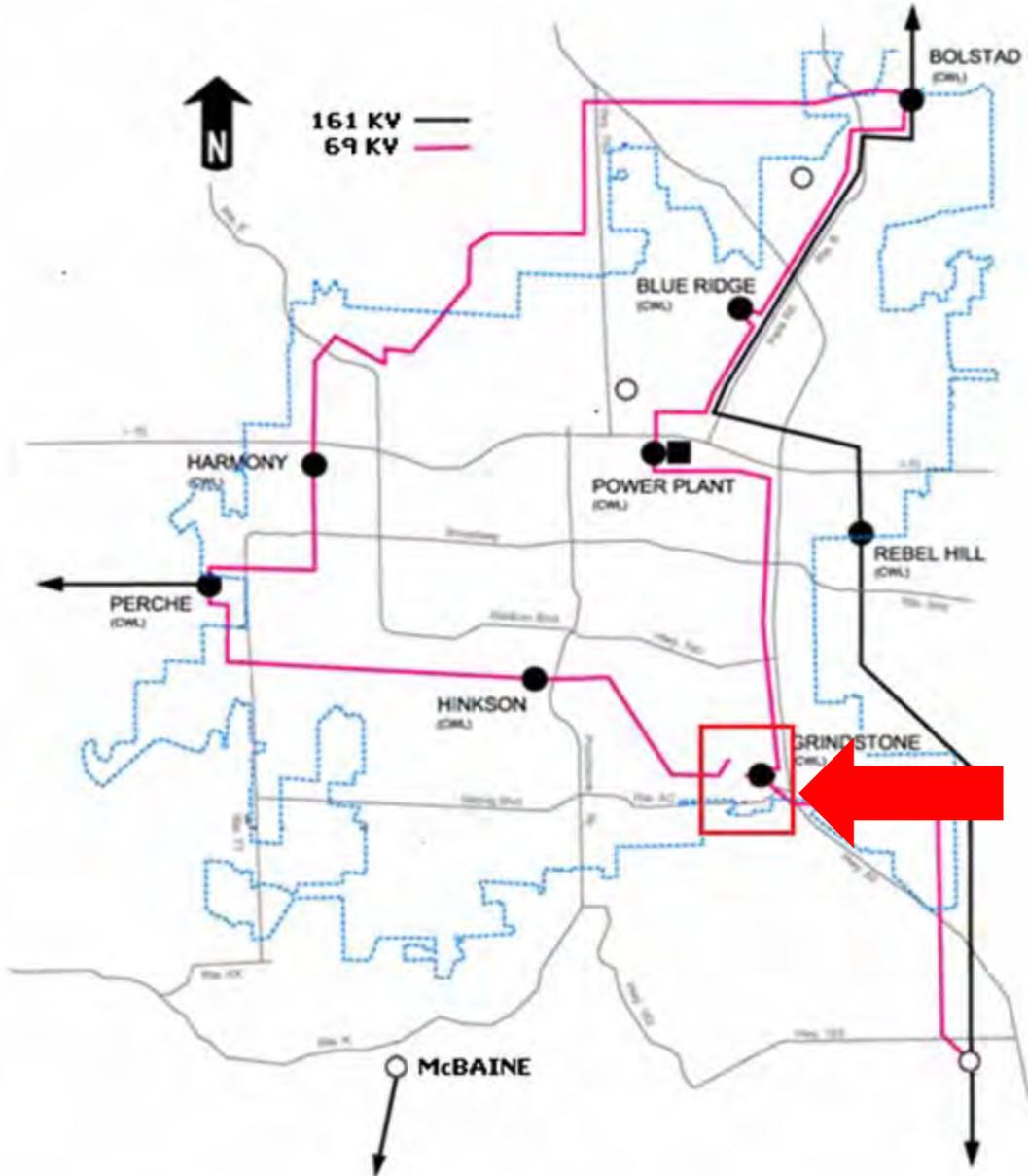
History



System

- Columbia's System started importing too much power from our 69KV Connection with Central Electric Cooperative's Boone Substation.

History



System

- Required to create and implement an operating guide to mitigate the Boone Substation loading issue.
- Result was to redirect power flow but had a reduction in reliability impact

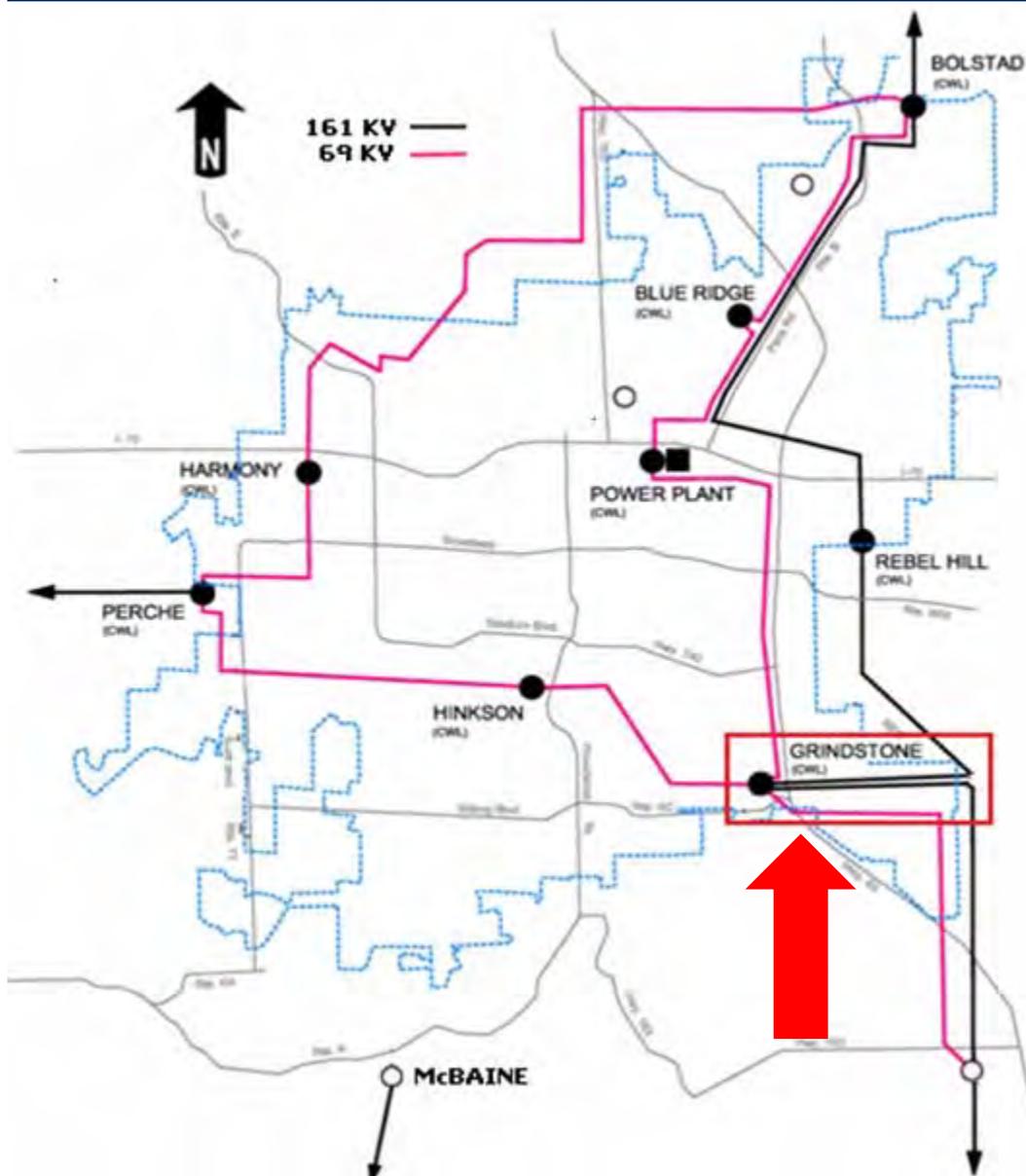
History



System Transmission Planning

- Transmission Planner identified contingencies that has and will result in the overloading of lines on the 69 kV transmission system. The following system improvement were identified:
 1. 161KV Transmission Line into Grindstone.
 2. 161 KV Transmission Line into Perche Creek
 3. Substation addition in the southern part of our services territory.

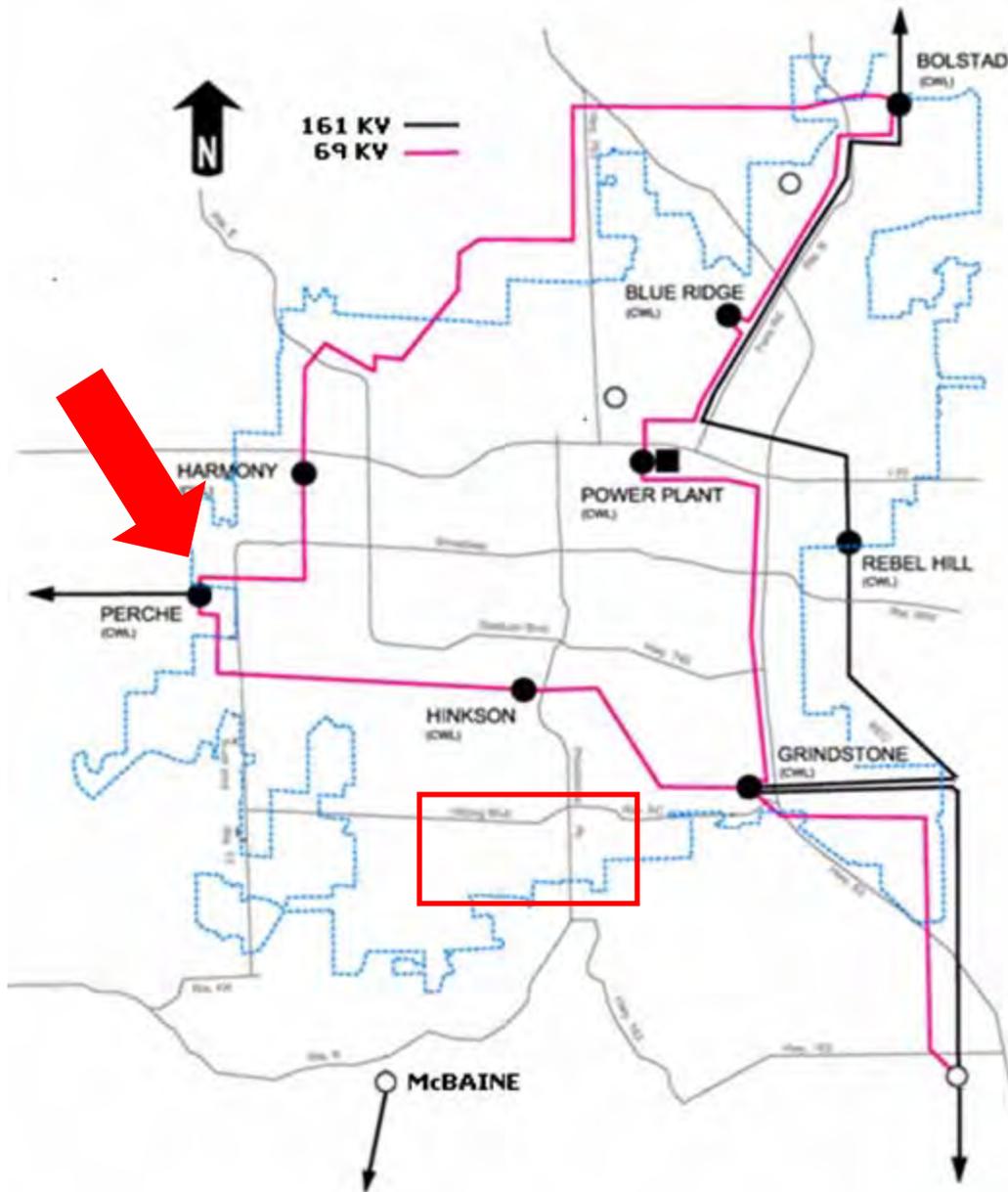
History



System Improvement #1

- 161KV Transmission Line into Grindstone.
- Sectionalization of the Rebel Hill to Boone 161KV Line
- Eliminates the impact Columbia's Transmission Problem on Neighboring Utilities.

History

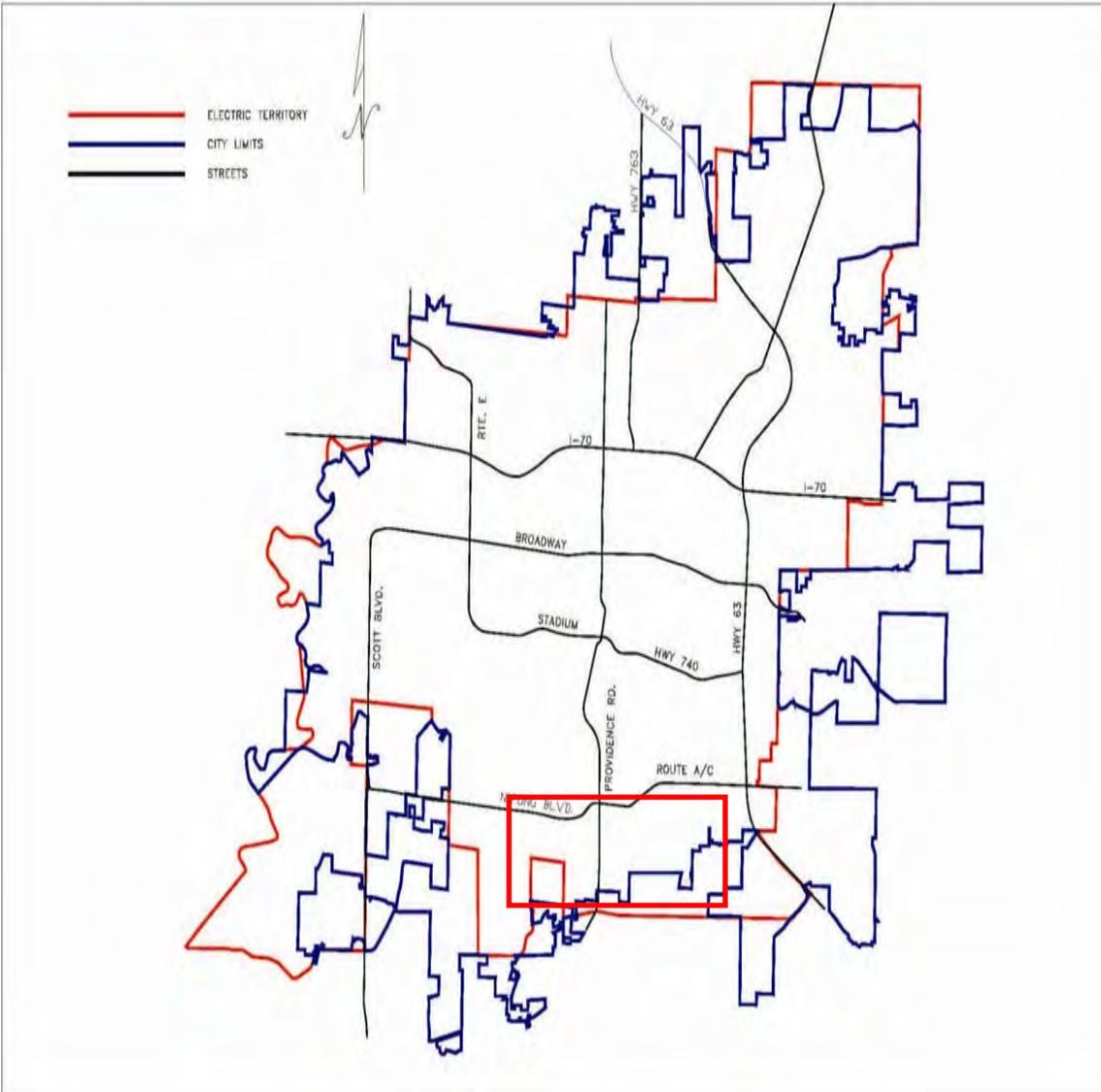


System Improvements

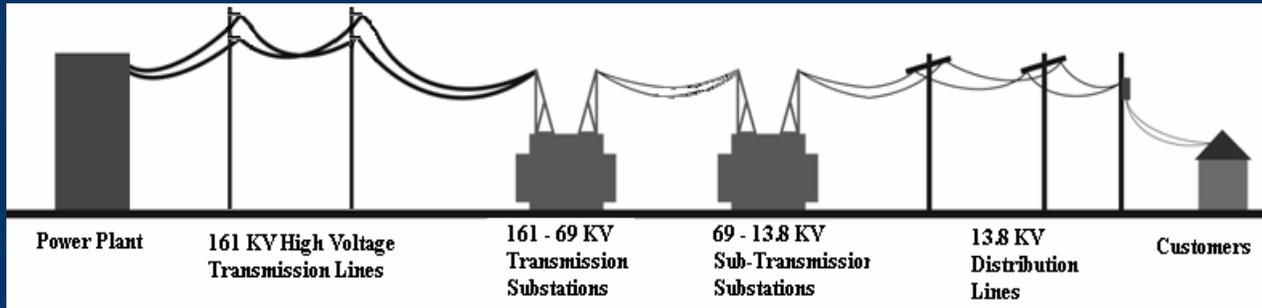
#2 & #3

2. 161KV Transmission Line into Perche Creek
3. Substation in Southern part of Electric Service Territory

History

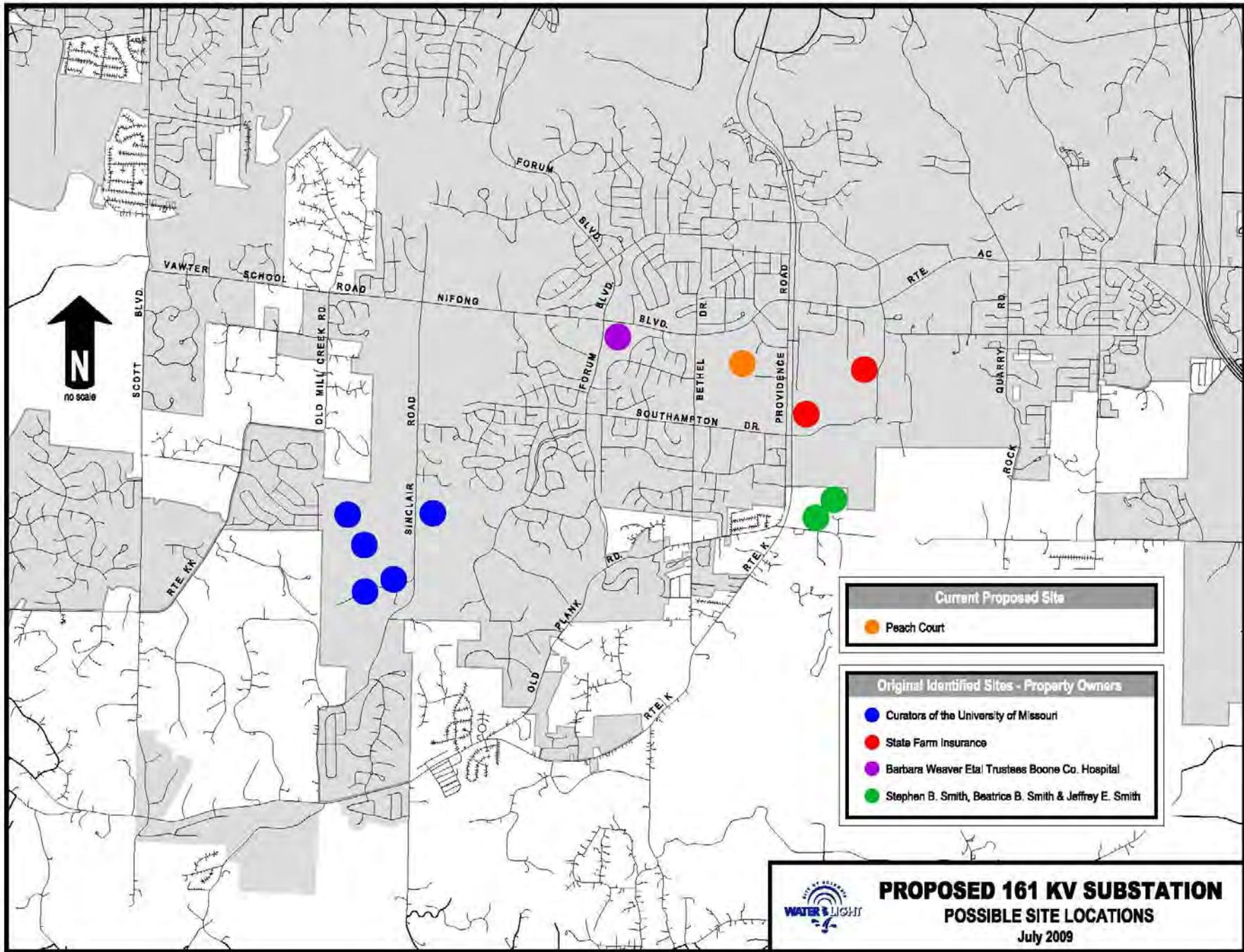


Electric Service
Territory
vs.
City Limits



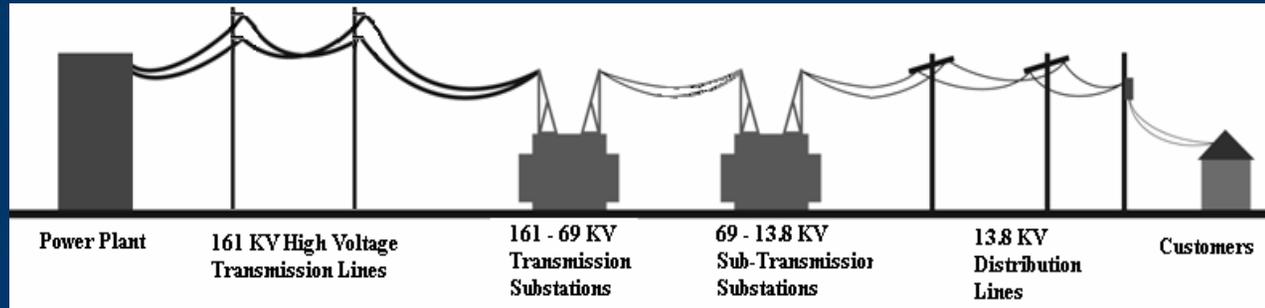
History

- In 2008 Columbia Water & Light Department contracted with Segra, Inc. for help implementing needs #2 and #3. Segra has been contracted to help identify substation locations and identity connection plans.
- January 2009 Columbia and Segra, Inc. identified ten acceptable locations for the new substation and then an “Interested Parties” meeting was held.
- Spring 2009 A willing seller approached the City.



**PROPOSED 161 KV SUBSTATION
POSSIBLE SITE LOCATIONS**

July 2009



History

- September 2009 Water & Light Advisory Board approved and recommended to the City Council that they acquire the Peach Ct. site.
- February 2010 Water & Light met with the City Council at a pre-Council work session and discussed the factors associated with building a new substation.
- March 2010 City Council approved Bill B54-10 adopting an ordinance to acquire the Peach Ct. site for a substation.

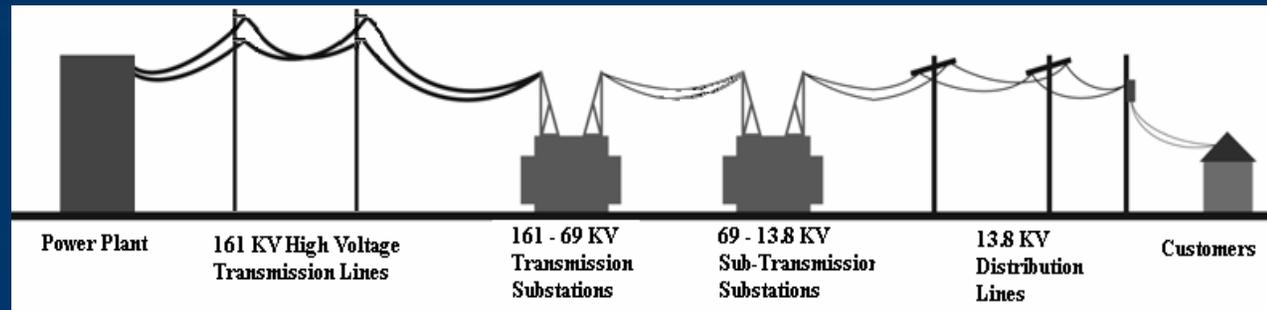


Mill Creek Substation
Location Map

DIAGRAM B



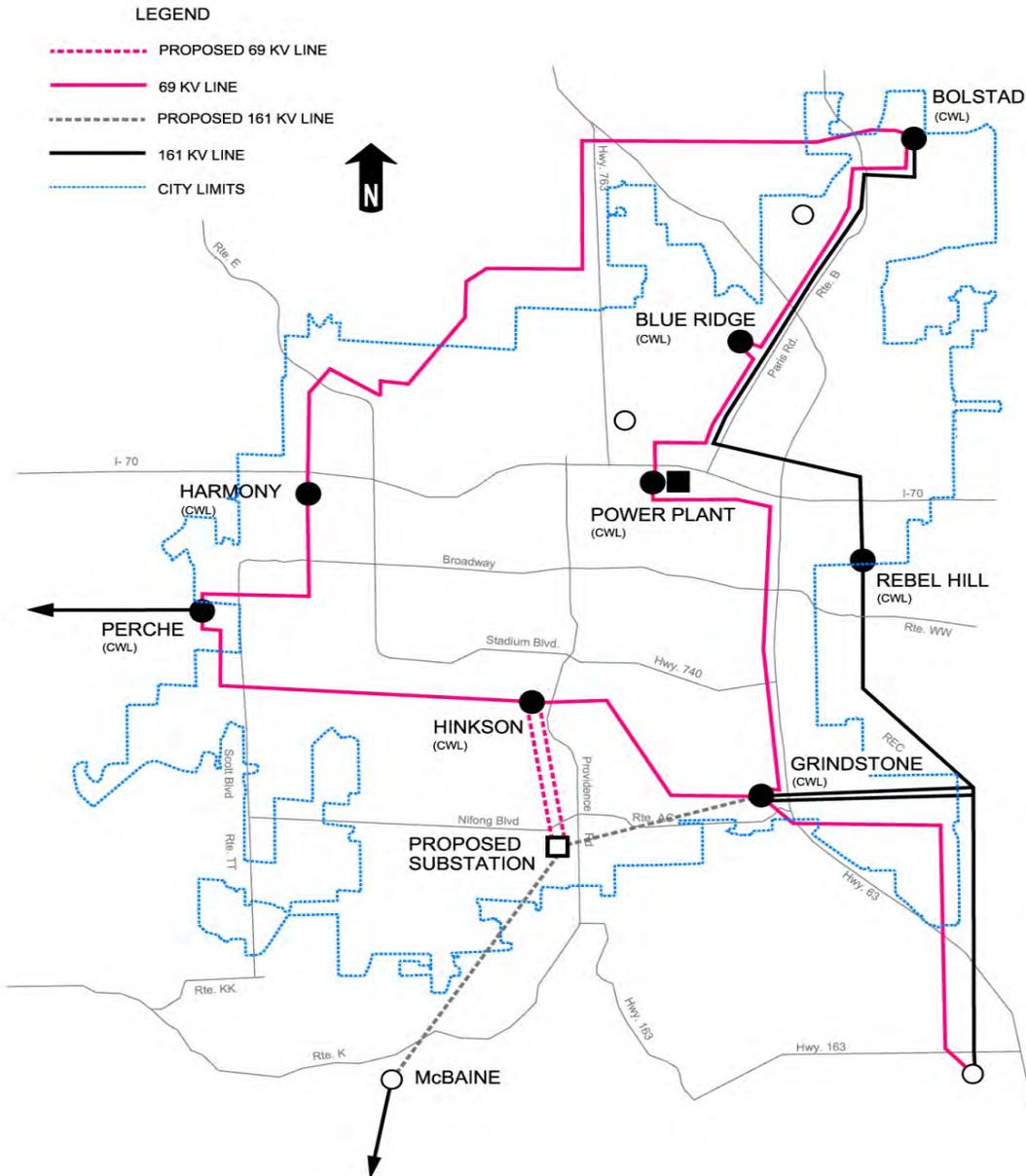
Rendering of Proposed Electric Substation



History Summary

- Transmission Planning Resulted in the Need for Three System Improvement
 1. 161KV Transmission Line into Grindstone.
 - Completed in 2007
 2. 161 KV Transmission Line into Perche Creek
 - Is the Focus of this Current Process
 3. Substation addition in the southern part of our services territory.
 - Site and Purchased in 2010
 - Connection is the Focus of this Current Process

Current Problem



New Substation Supply Options

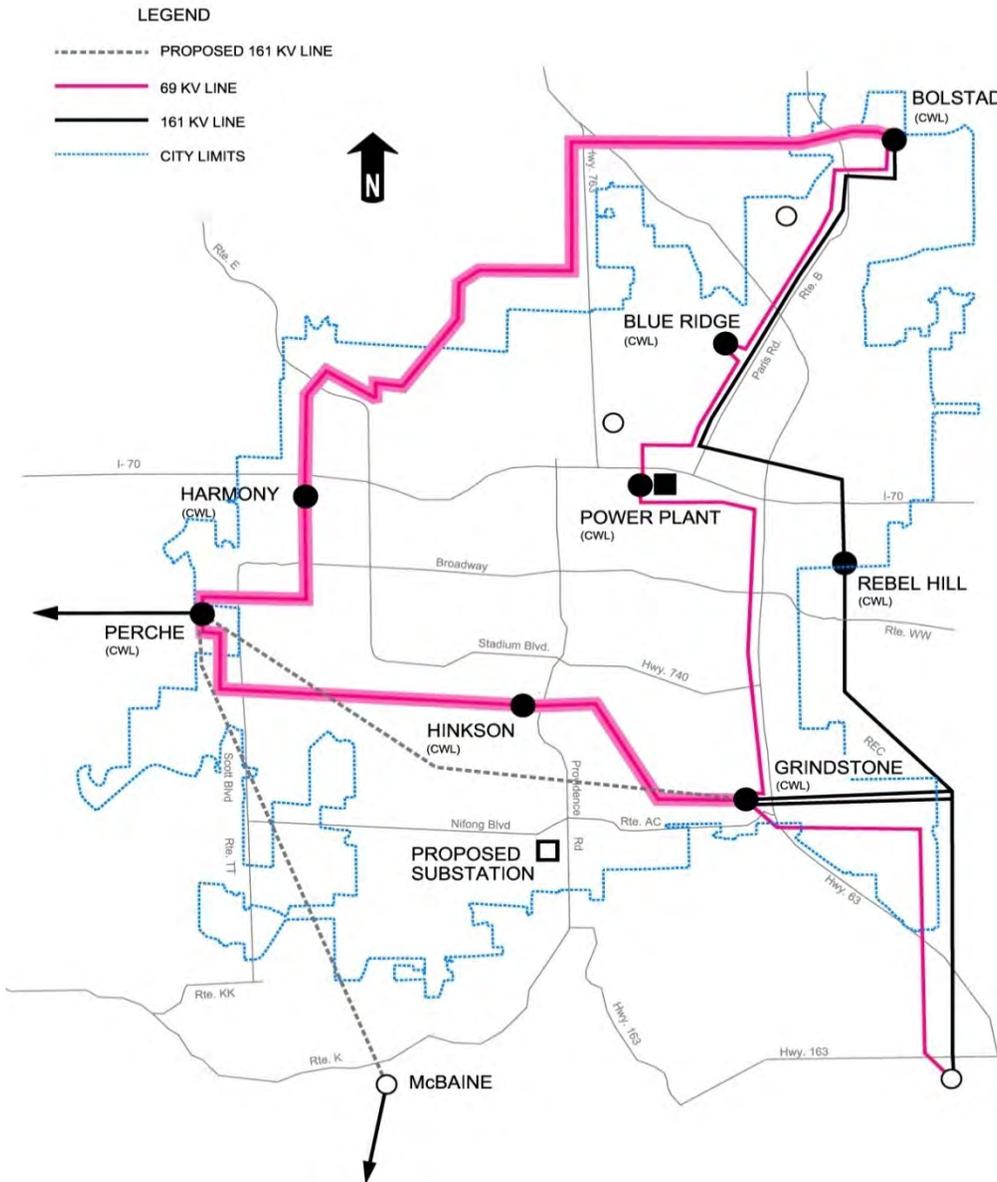
Add to 69 kV System

- Double circuit line from Hinkson Creek to New Substation

Add to 161 kV system

- Insert on a line from McBaine to Grindstone

Current Problem



Second Source Perche Creek Source

Add Generation at Perche

- Fuel supply issues
- Permitting issues

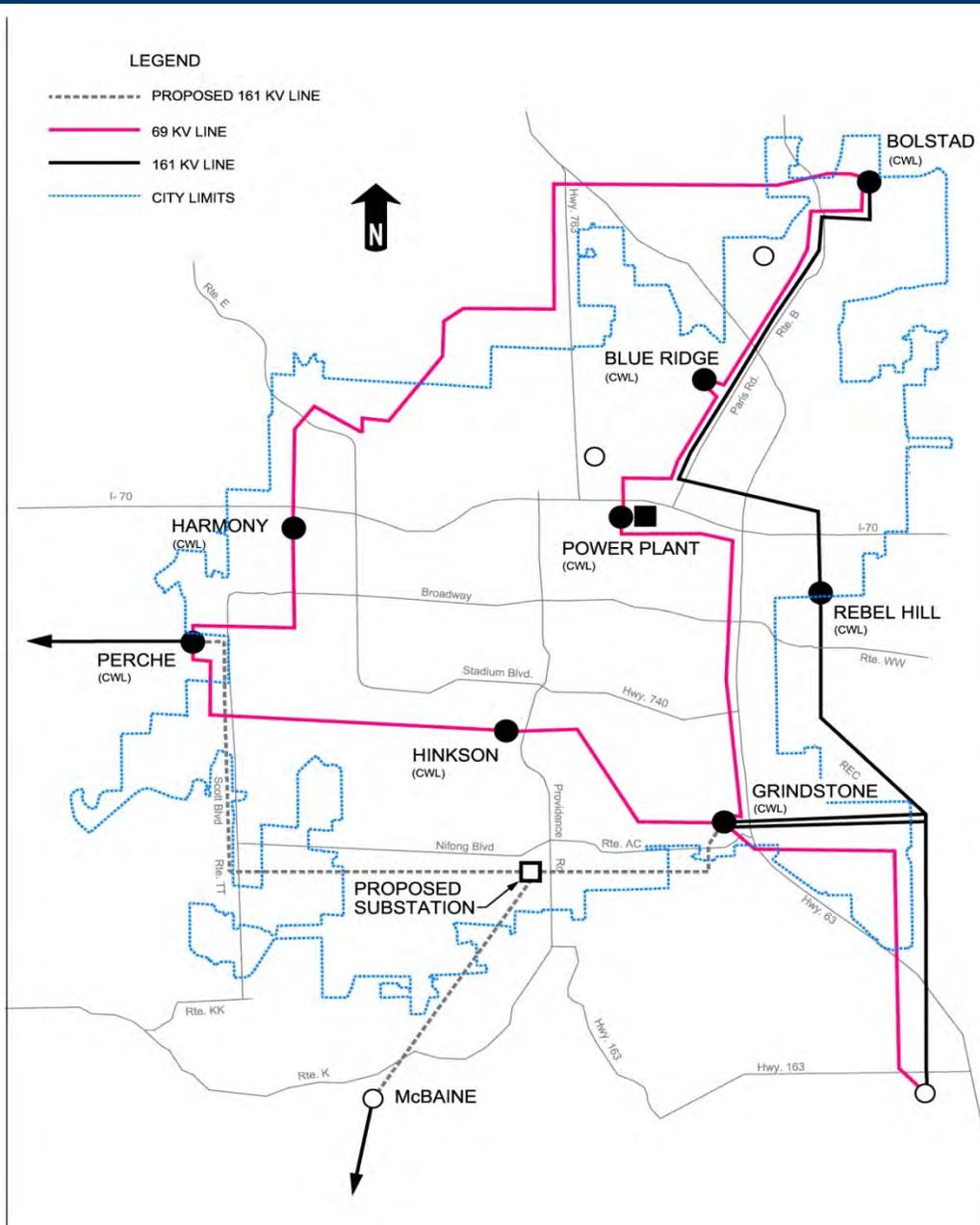
Re-conductor Grindstone to Bolstad
through Perche

- New line
- 21 Miles

Additional 161 kV line to Perche Creek

- From McBaine
- From Grindstone

Current Problem

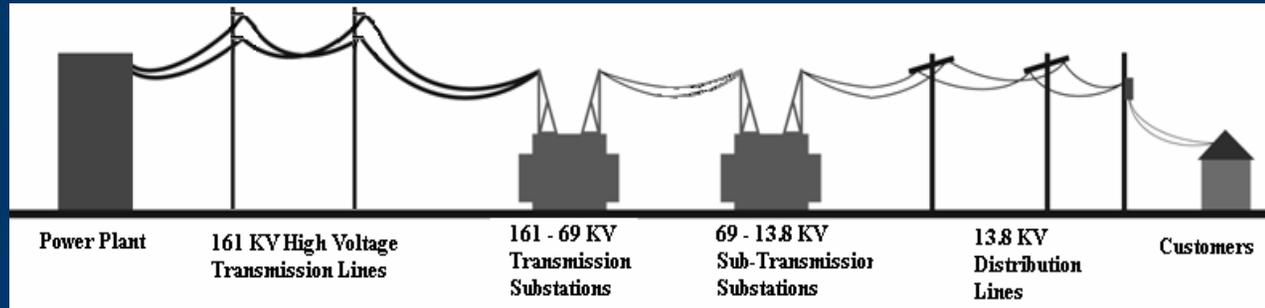


Combined Solution

Supply New Substation with 161 kV Feed

- From Grindstone
- From Perche Creek
- From McBaine

Three possible New Line Segments



Current Problem

Current Problem Summary

- Second 161KV Transmission Source to Perche Creek integrated with New Substation Connections is best solution
- November 2010 Council Work Session to review problems and the proposed combined substation and transmission solutions.
- The Interested Parties Process and Resulting Option A, B and alternate B-2

Selection Process

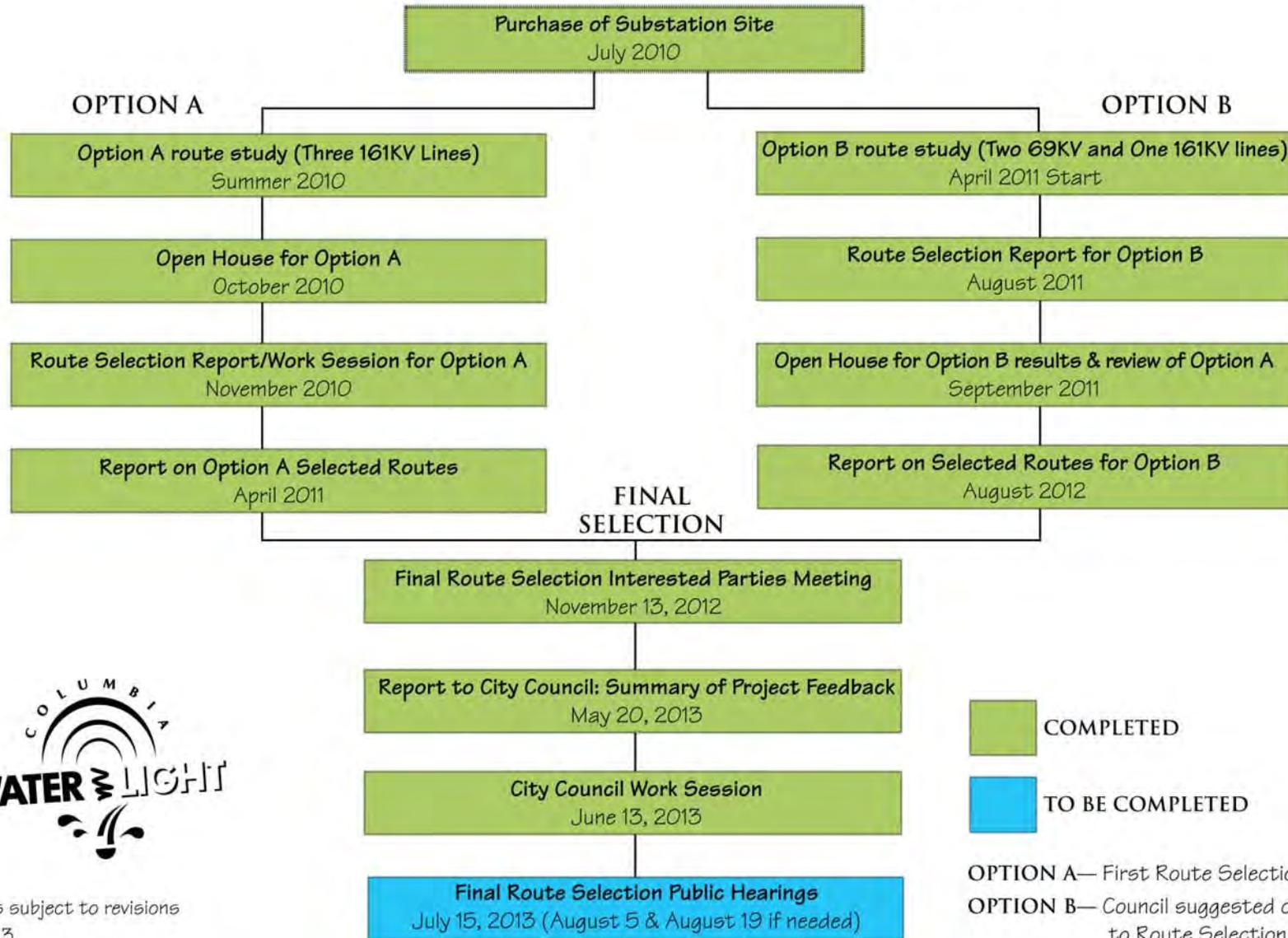


Option A

- Interested Parties process to select route
- Routes Considered
- Review Results.
- Most Publically Acceptable Route

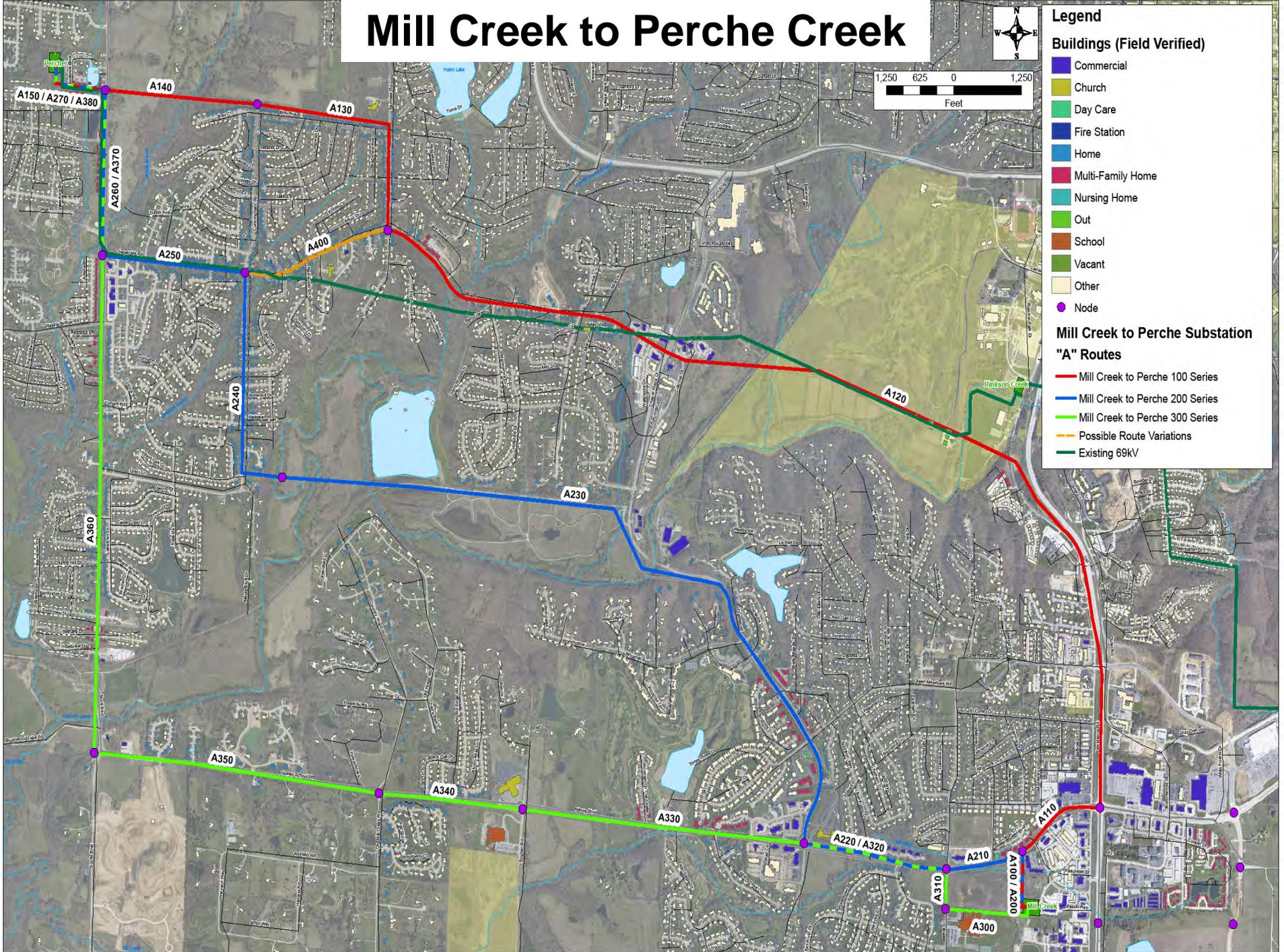
COLUMBIA WATER & LIGHT

Mill Creek substation and electric transmission line project time line

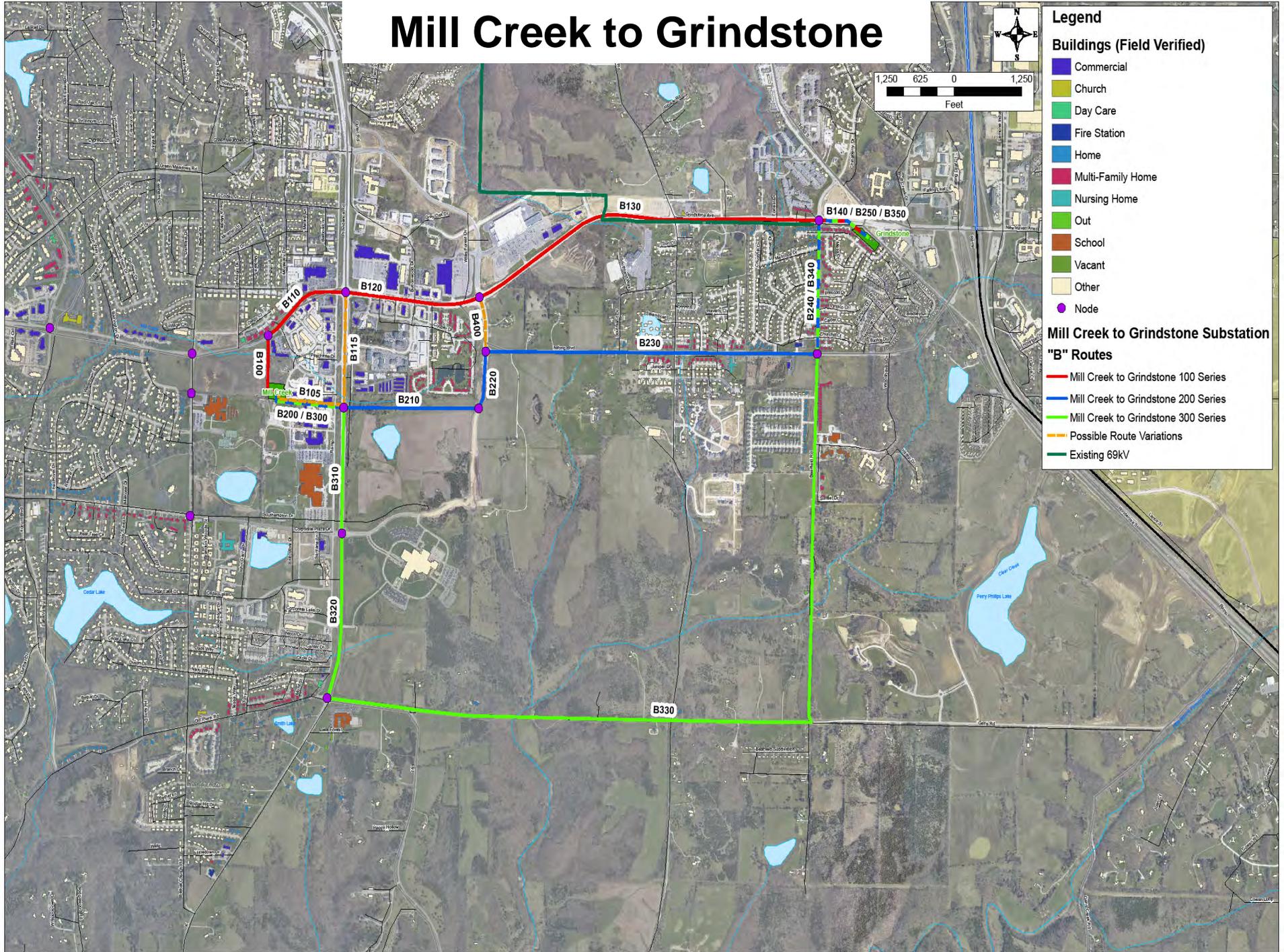


Timeline is subject to revisions
JUNE 2013

Mill Creek to Perche Creek



Mill Creek to Grindstone



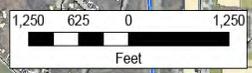
Legend

Buildings (Field Verified)

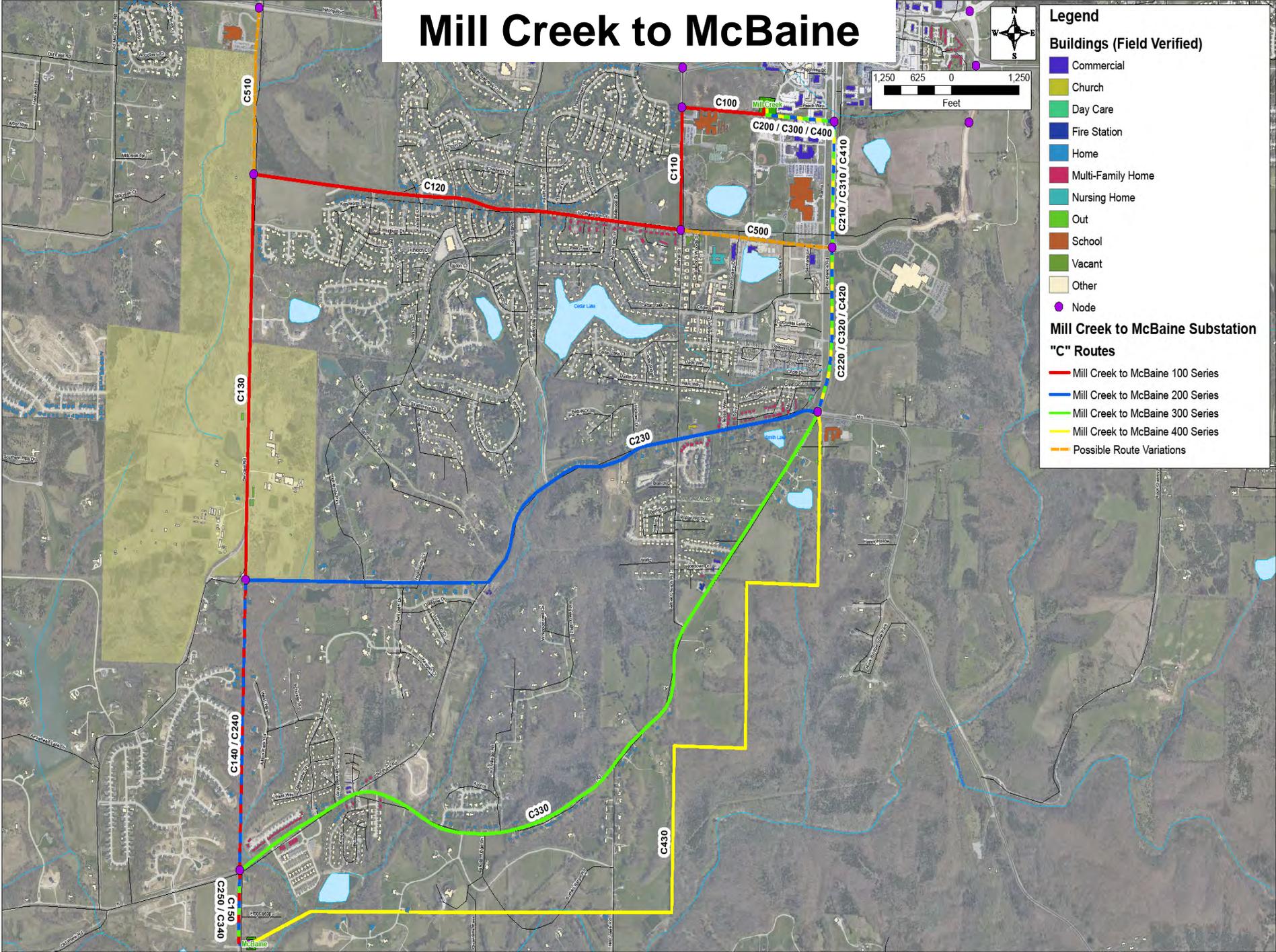
- Commercial
- Church
- Day Care
- Fire Station
- Home
- Multi-Family Home
- Nursing Home
- Out
- School
- Vacant
- Other
- Node

Mill Creek to Grindstone Substation "B" Routes

- Mill Creek to Grindstone 100 Series
- Mill Creek to Grindstone 200 Series
- Mill Creek to Grindstone 300 Series
- Possible Route Variations
- Existing 69kV



Mill Creek to McBaine

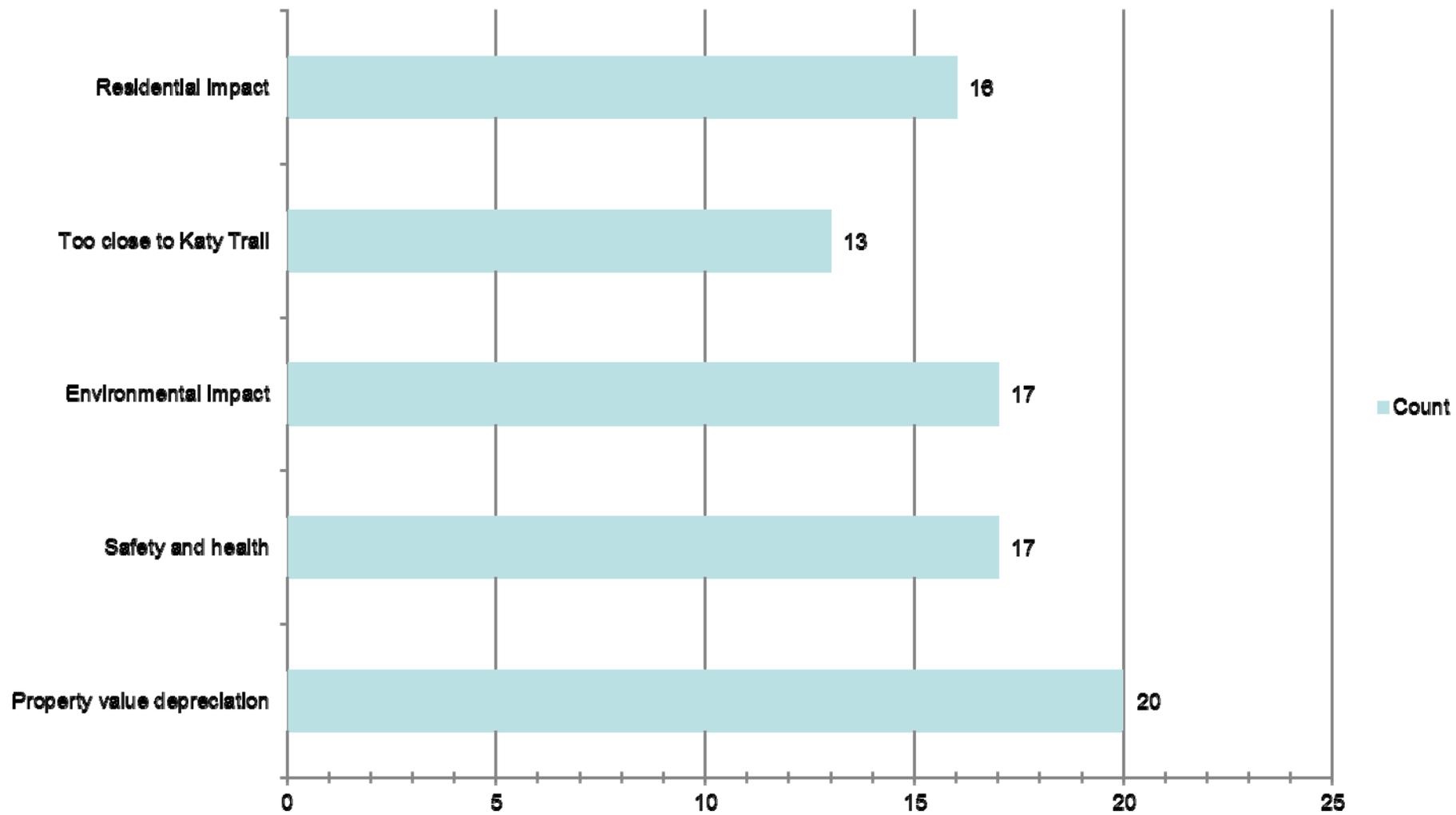


Option A Results



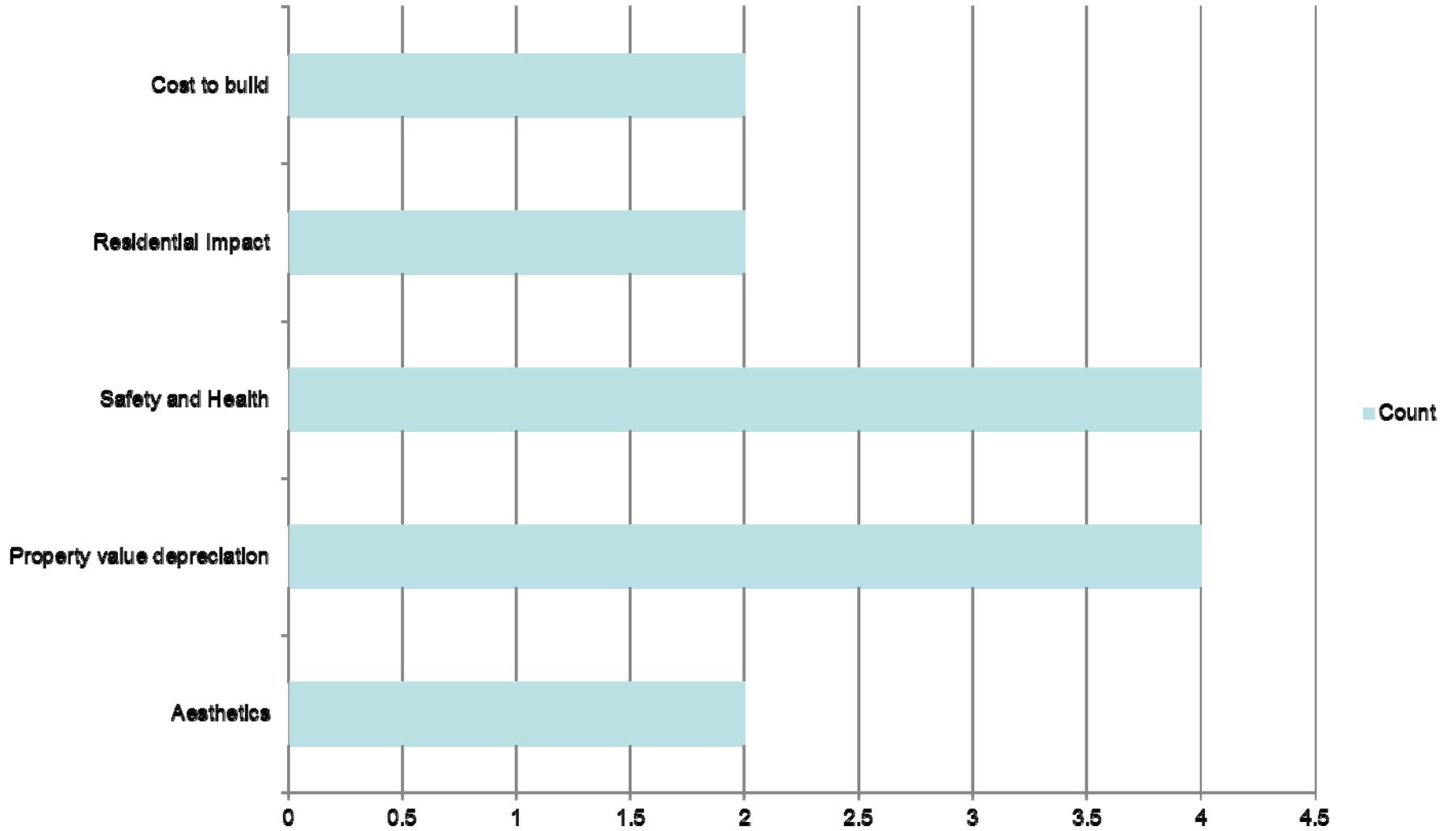
- Over 350 responses
- Most frequently asked questions
 - Funding source? Future bond issue.
 - Underground? More costly.
 - Cost estimates at that time?
 - Overhead: \$7.5 to \$11.5 million
 - Underground: \$37.5 to \$56 million

Top Five Perche Line Concerns



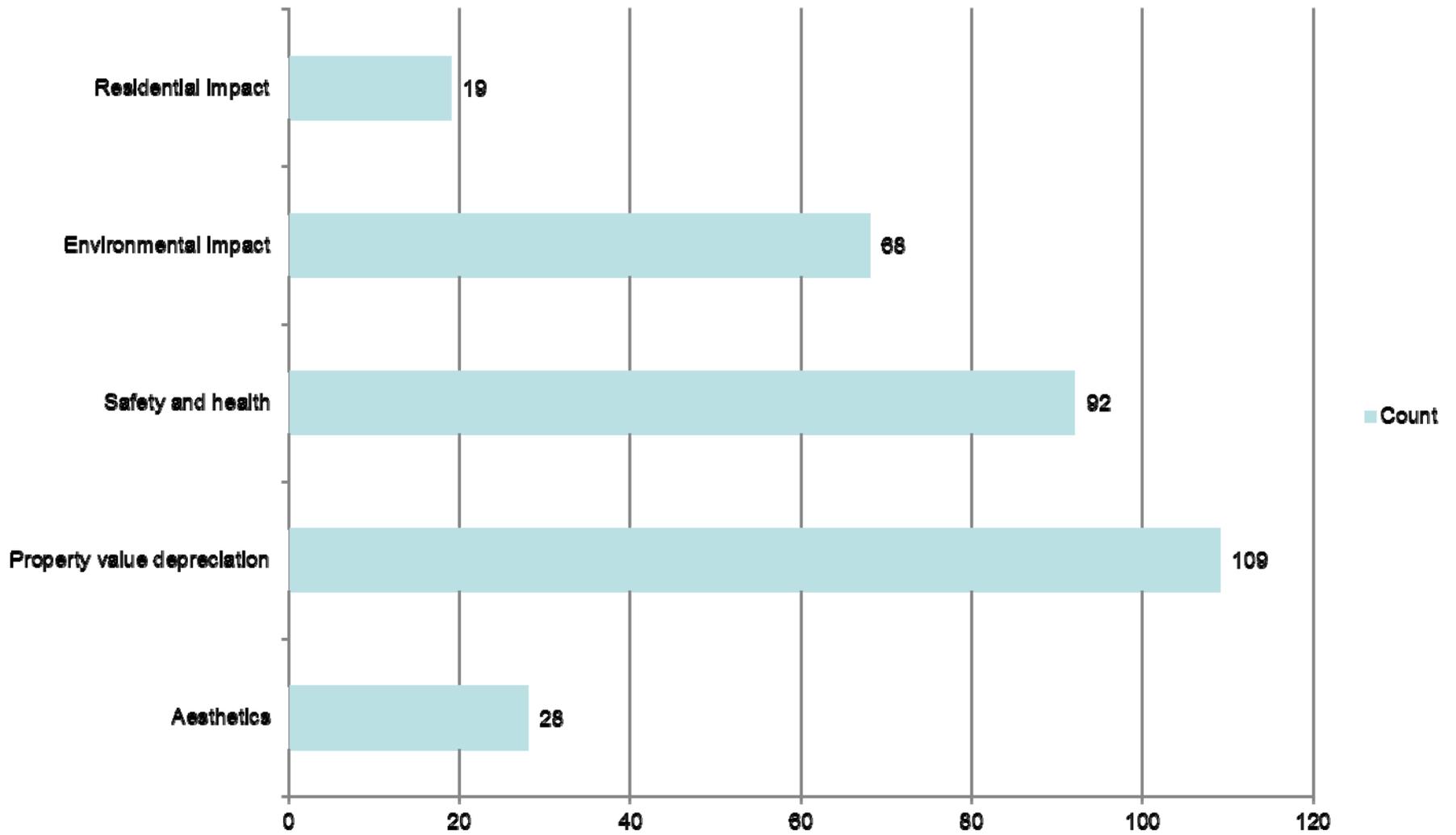
Based on 70 respondents

Top Five Grindstone Line Concerns



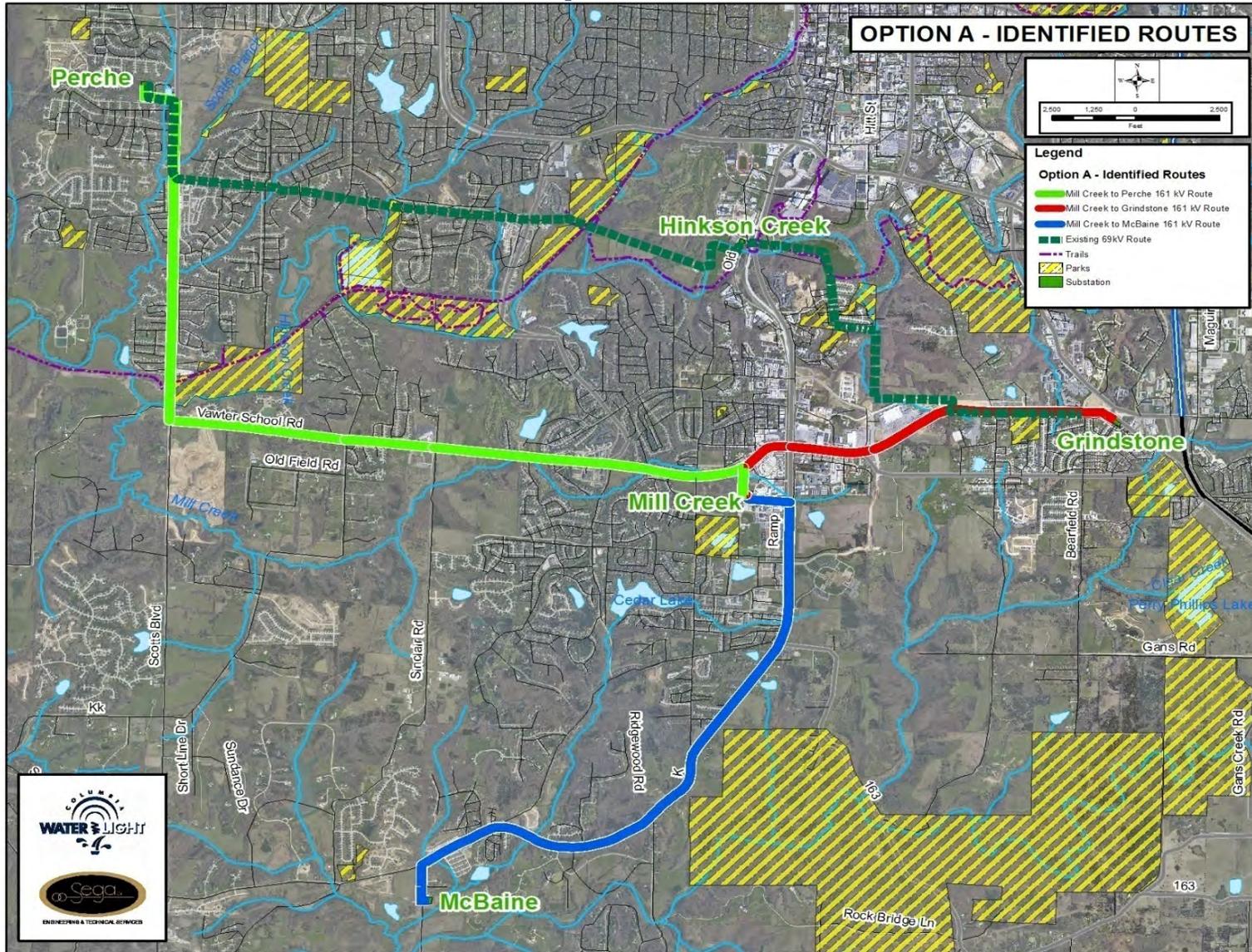
Based on 12 respondents

Top Five McBaine Line Concerns



Based on 141 respondents

Option A



Selection Process



Option B

- Interested Parties process to select route
- Routes Considered
- Review Results.
- Most Publically Acceptable Route

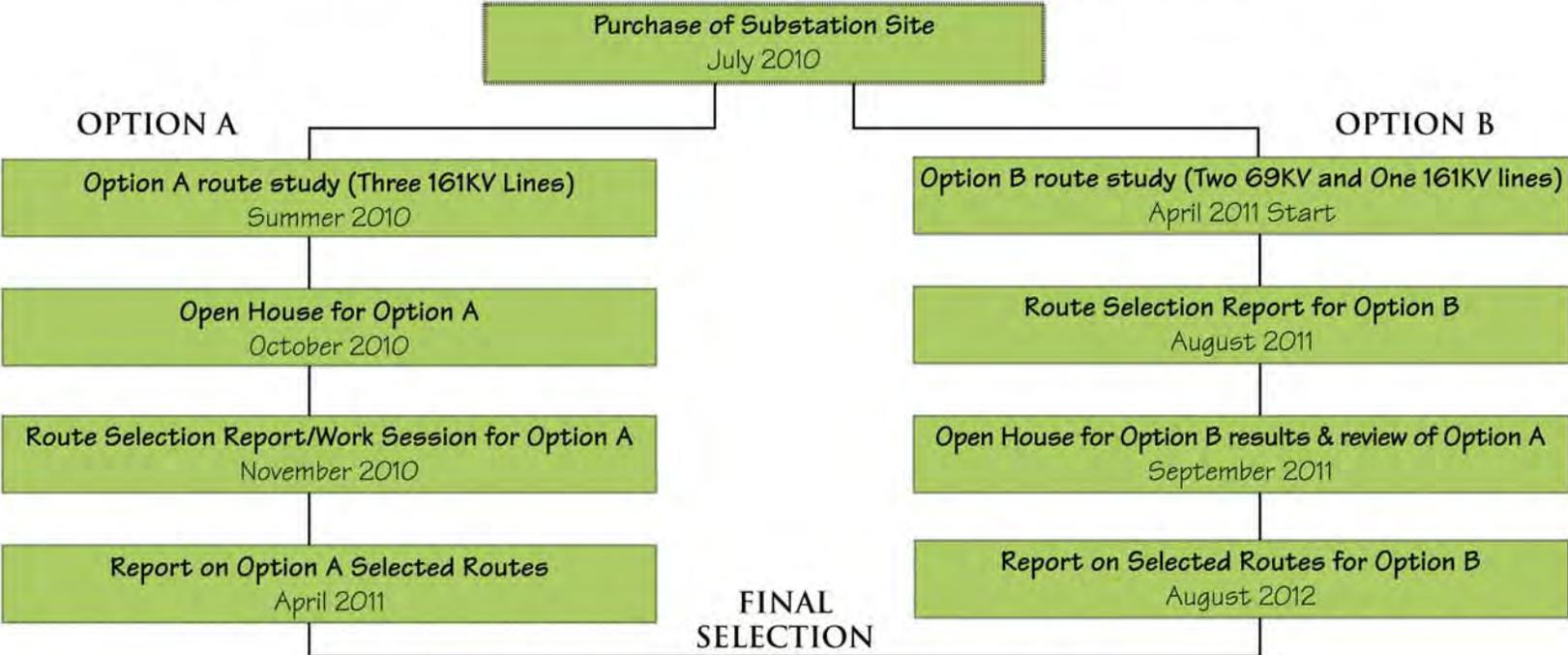
Option B



- The 69 kV transmission line for Option B utilizes an *existing* transmission line path that currently runs from Grindstone Substation to Hinkson Creek Substation.
- New 69 kV transmission lines will be needed from the Mill Creek Substation and the existing Grindstone-Hinkson Creek 69 kV transmission line.
- Portions of the existing 69 kV system will have to be reconstructed.
- The 161 kV transmission line for Option B runs along the perimeter of the Water & Light service territory.

COLUMBIA WATER & LIGHT

Mill Creek substation and electric transmission line project time line



FINAL SELECTION

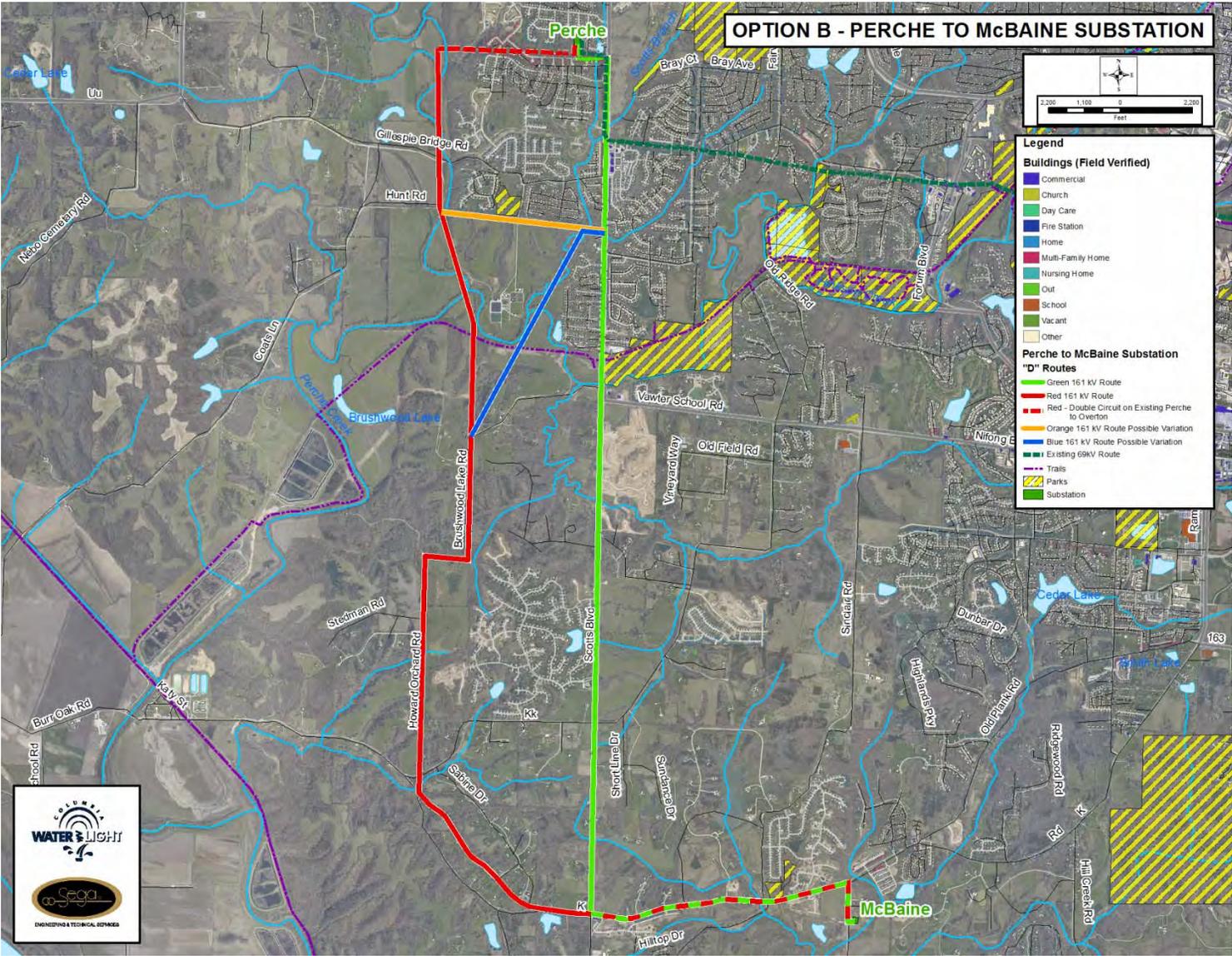


COMPLETED
 TO BE COMPLETED

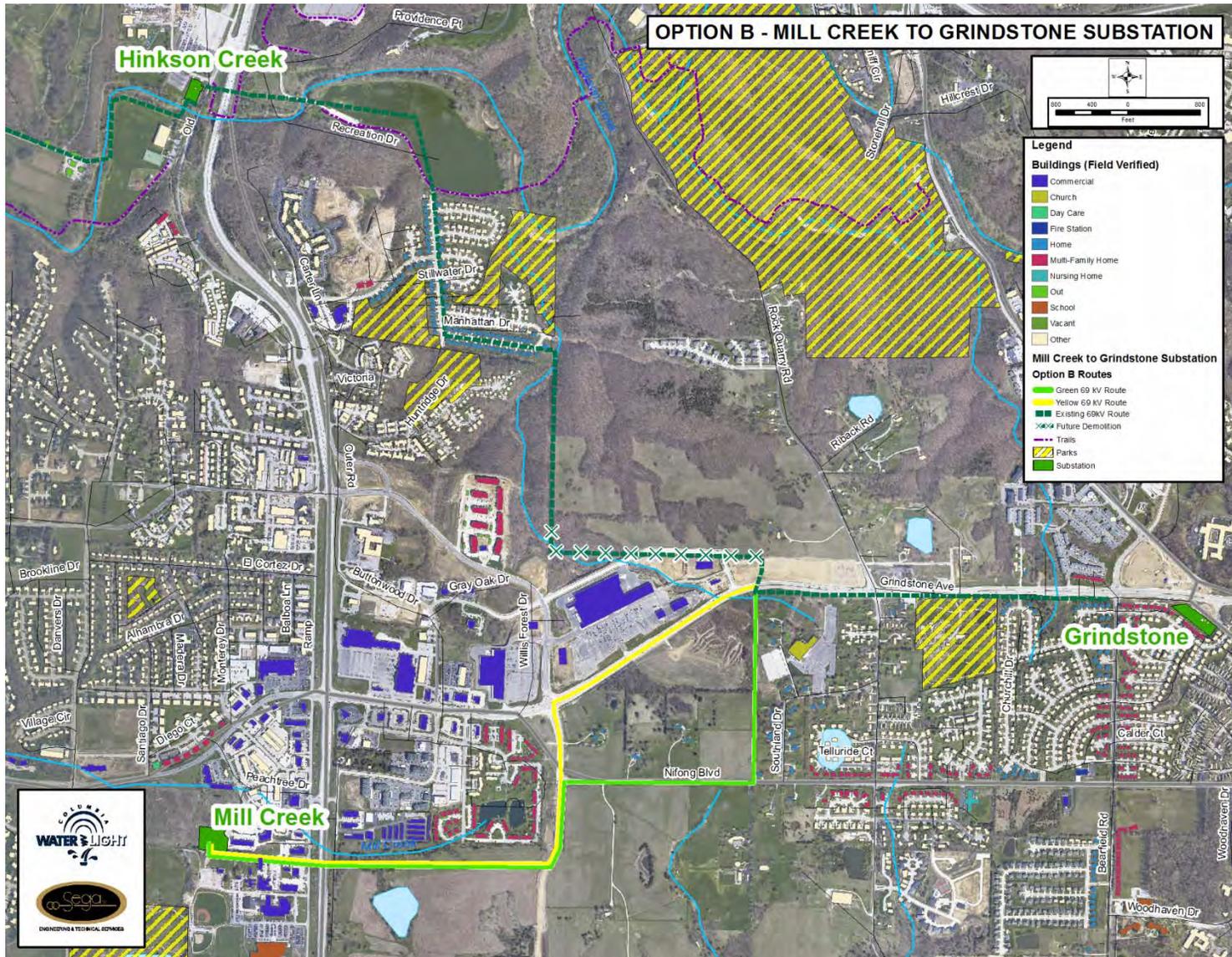
OPTION A— First Route Selection Study
 OPTION B— Council suggested changes to Route Selection Study

Timeline is subject to revisions
 JUNE 2013

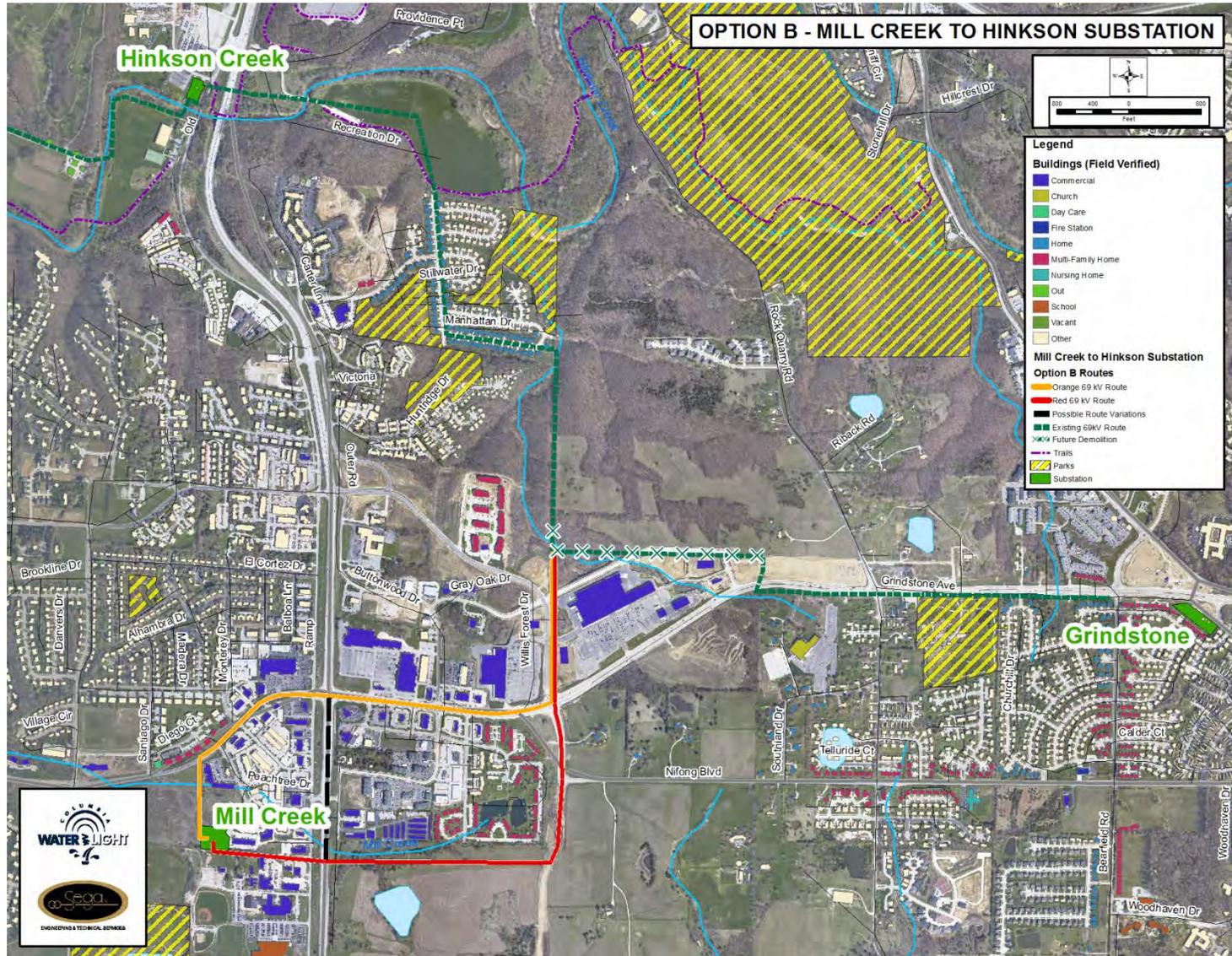
Option B Routes McBaine to Perche Creek



Option B Routes Mill Creek to Grindstone



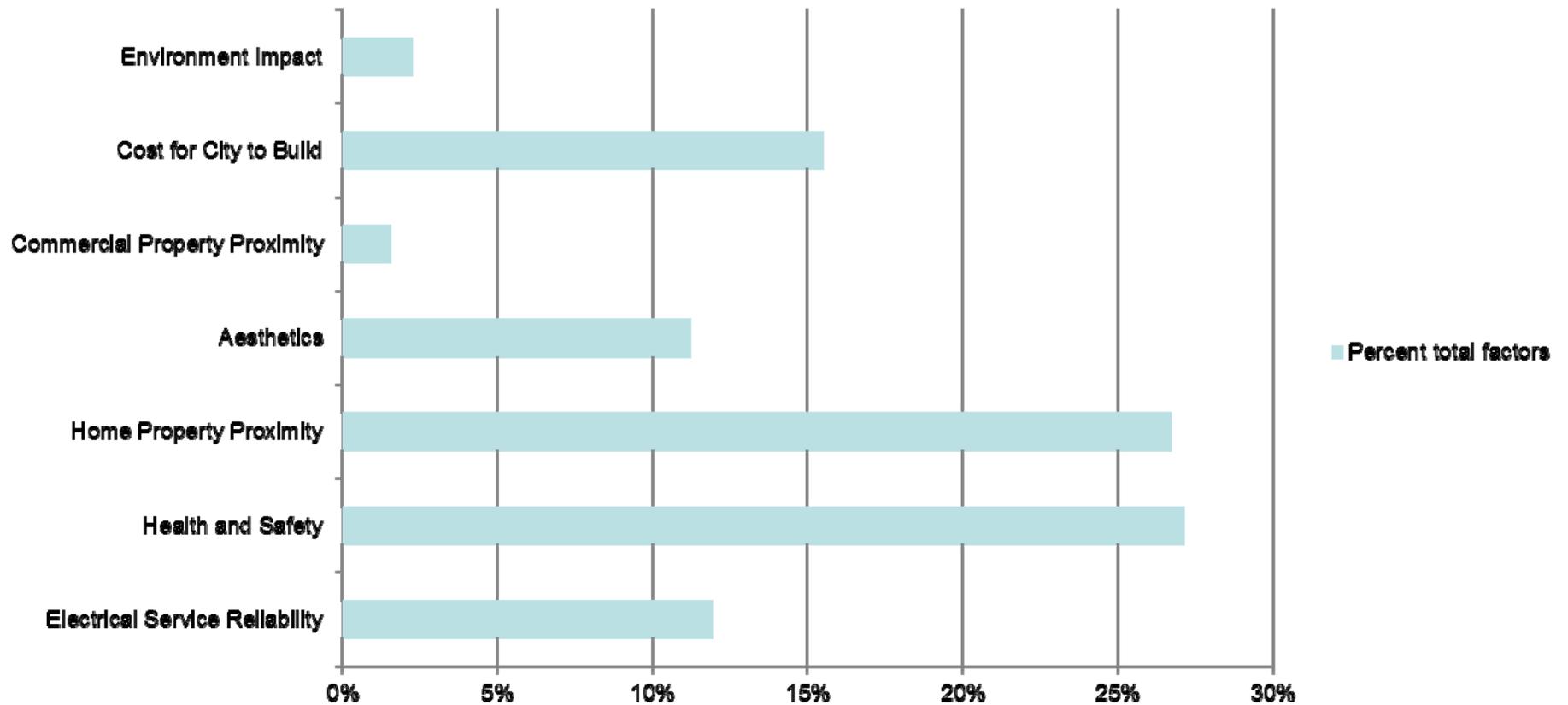
Option B Routes Mill Creek to Hinkson Creek



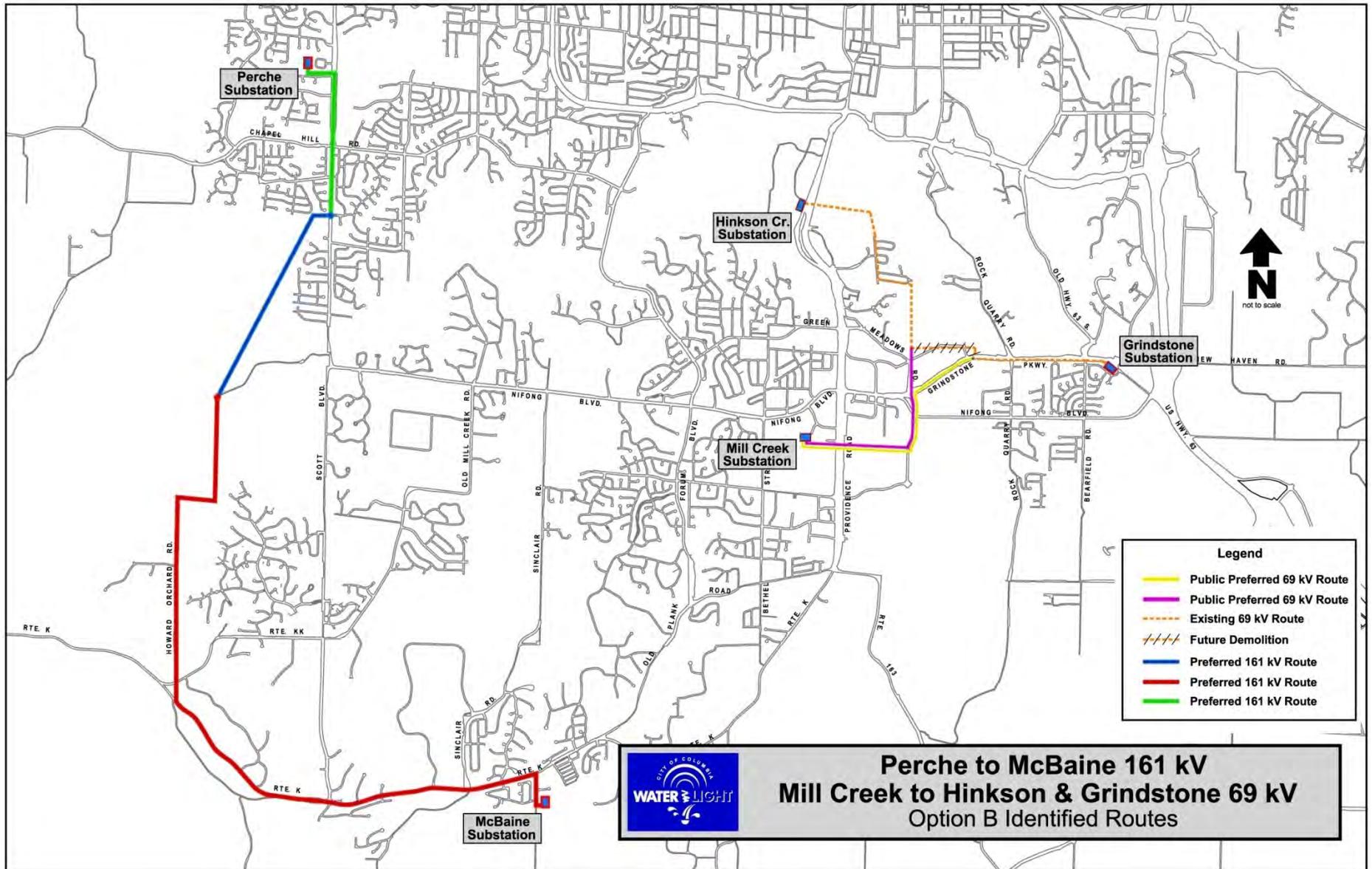
Summary of Public Values Factors



Results only include those affected by Option B



Option B



Perche to McBaine 161 kV
Mill Creek to Hinkson & Grindstone 69 kV
 Option B Identified Routes

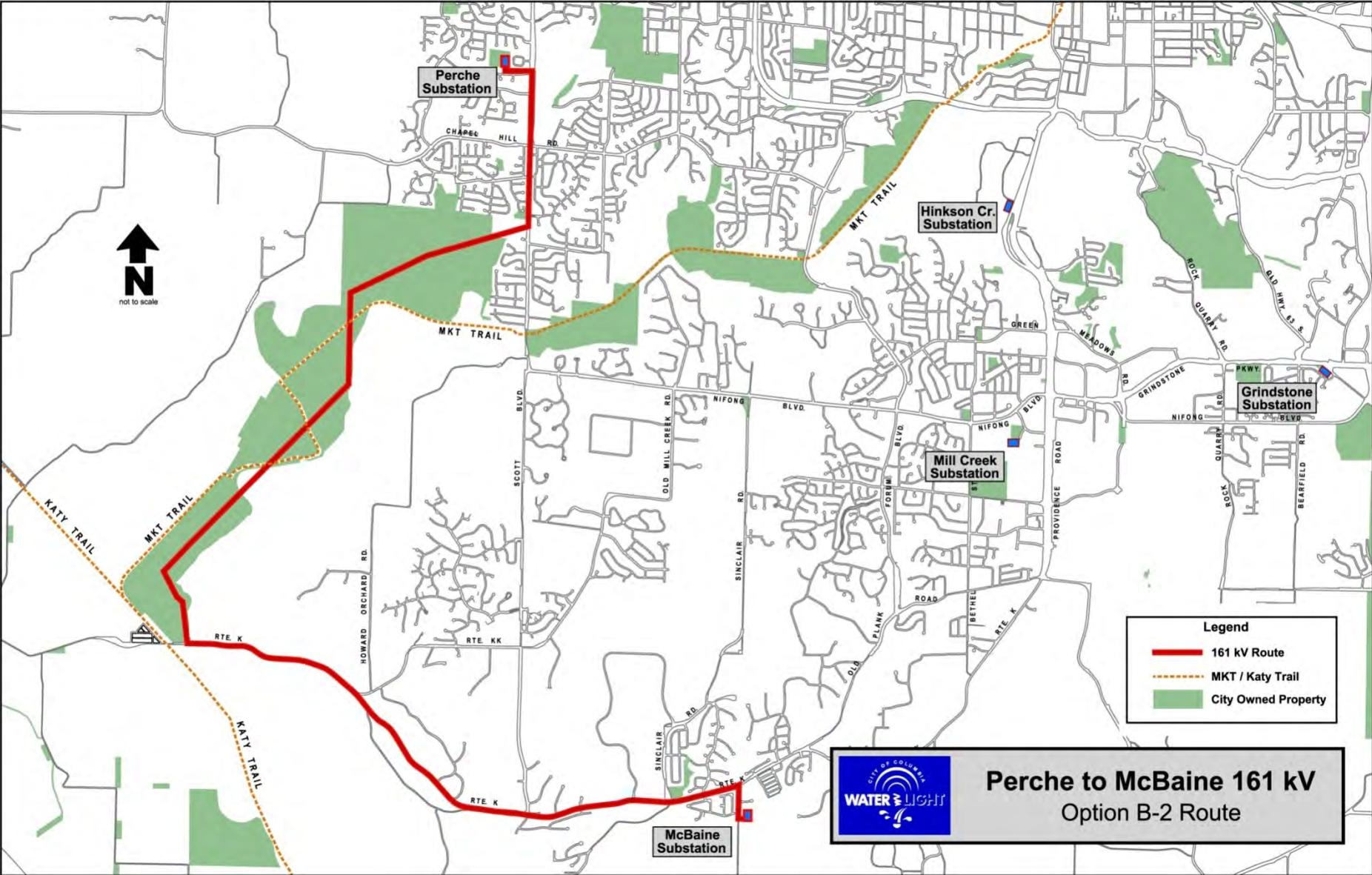
161 kV Alternate



- B-2

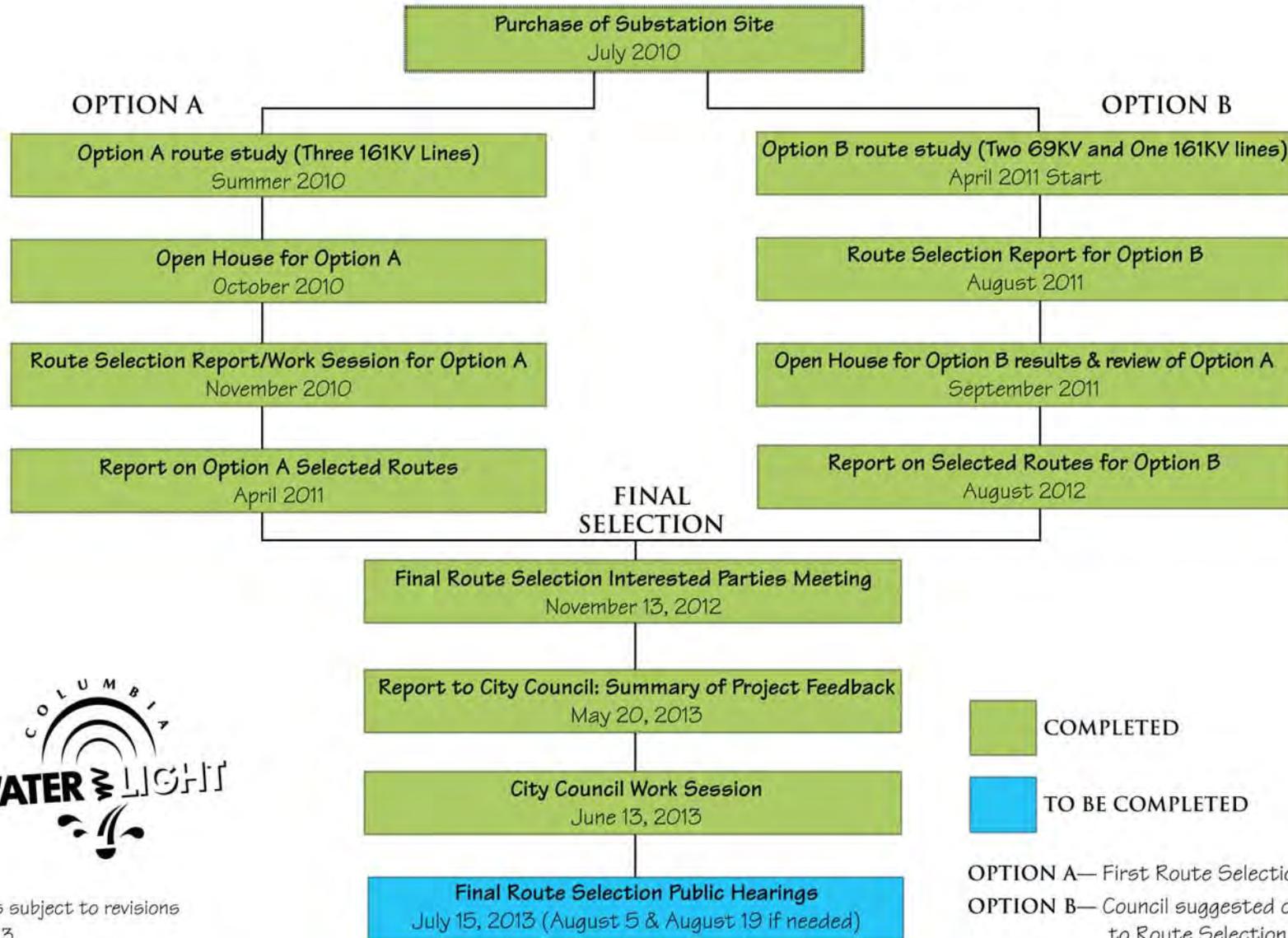
- Constructed on land currently owned by the City. 34% of the length of the line is City owned property.
- Not originally identified by SEGA due to excessive length. 22% longer than current 161 kV route in Option B

Option B-2



COLUMBIA WATER & LIGHT

Mill Creek substation and electric transmission line project time line



Timeline is subject to revisions
JUNE 2013

Interested Parties Meeting #3



- Focus
 - Review need and history
 - Highlight Option A & B results
 - Introduce Option B-2
 - Highlight advantages and disadvantages
- Information Presented
 - Map of current system w/ service territory
 - Maps Option A, B & B-2
 - Cost breakdown

Survey

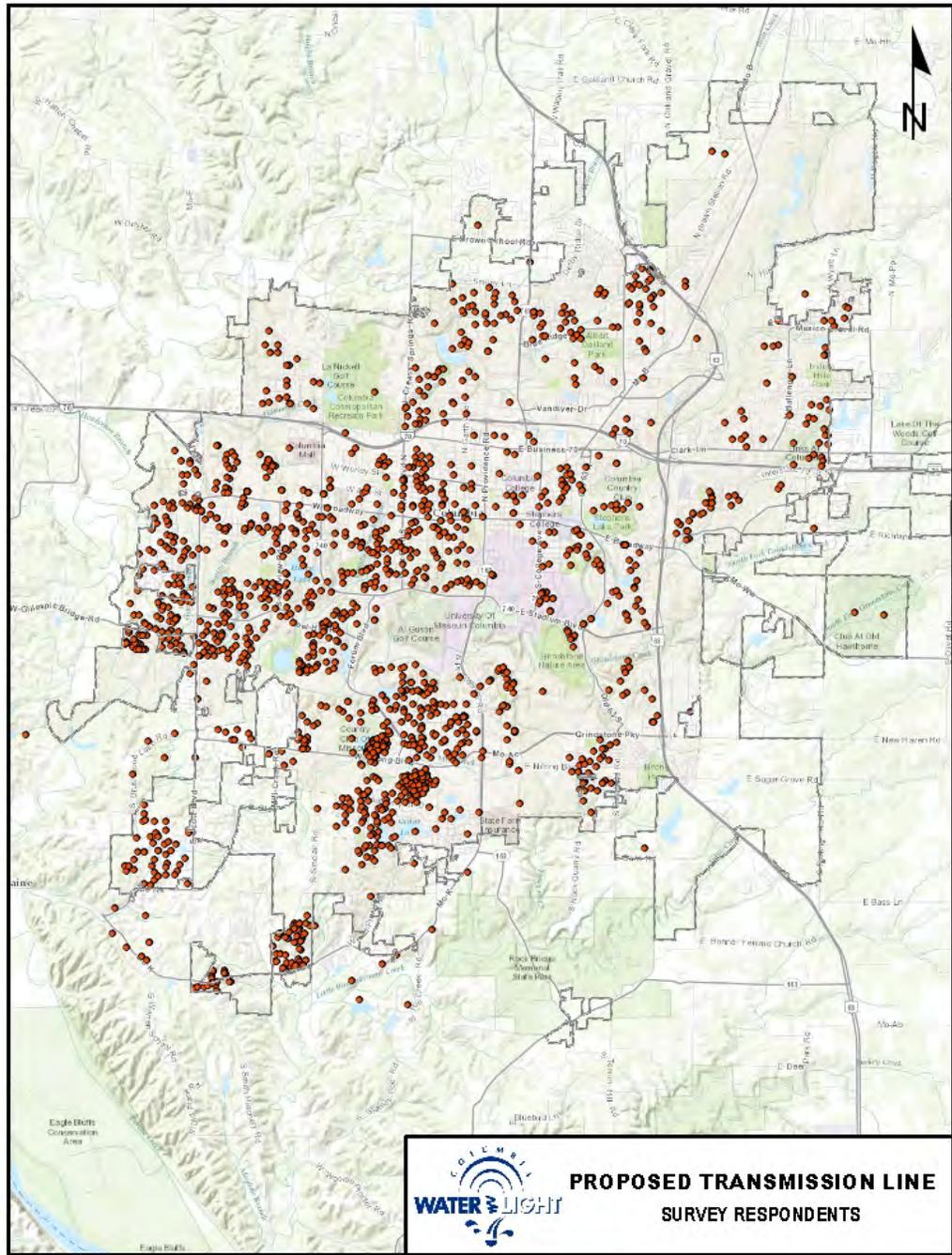


- Low turnout @ IP #3
 - Least attended IP meeting
 - Few questionnaires returned
- One Page Survey
 - Mailed to all CW&L customers
 - All previously identified interested parties

A Summary of Public Feedback on
the Option A vs. B vs. B-2 Survey,
and a Brief Overview of the Public
Impact Matrices

The Survey

- At the Open House held in November 2012 (the open house whose purpose was to determine the public's preferences regarding Option A, Option B, and Option B-2) the attendants were advised to fill out an online survey.
- This survey was open to the public at large to complete online or on paper.
- Water & Light sent out a letter to every ratepayer advising them of the available online survey.
- Though originally expecting to collect responses until 12/31/12, Water & Light extended this deadline to 2/1/2013
- Water & Light received over 1,500 responses.



This Was the Content of the Survey

Columbia Water & Light Proposed Transmission Line Project Questionnaire

Thank you for commenting on the proposed transmission line routes for the southern part of Columbia. Input for the final route selection will be collected through December 31, 2012. The public's feedback will be forwarded to the Columbia City Council before they make the decision on the final route.



If you have access to a computer, we urge you to fill out the online questionnaire at (<http://tinyurl.com/columbiaelectric>) so feedback can be more easily tabulated.

Completed forms can be mailed to or dropped off at Columbia Water & Light, Attn: Adam Schuttler, P.O. Box 6015, 701 E. Broadway, Columbia, MO. 65205
Please submit only ONE questionnaire per household or business.



Name Prefix: (Mr., Mrs., Ms.) _____ First _____ Middle _____
 Last Name _____ Name Suffix _____
 Street Number _____ Street Name _____
 Street Type (St., Cir., Ct., Ave., Blvd., Rte., etc.) _____
 Apt. Number _____ Zip Code _____ Email _____

Given the necessity for this project, if you must choose, which option would you prefer to see implemented (circle one) Option A Option B Option B-2

Is your home or business **along** (within 150 feet) one of the **final** routes presented for either Option A, Option B, or Option B-2? (choose one) Yes No

Is your home or business **near** (between 150 and 500 feet) one of the **final** routes presented for either Option A, Option B, or Option B-2? (choose one) Yes No

Proposed Transmission Line Project Questionnaire

Please rank these factors in determining which option is most preferable to you in order of importance (8=most important, 1=least important, no repeated numbers, all blanks must be filled out)

	Rank
1. Reliable electric service	_____
2. Least cost to build/minimize rate impact	_____
3. Option provides longest-term solution	_____
4. Furthest away from residential homes (this includes apartments).....	_____
5. Furthest away from commercial businesses.....	_____
6. Furthest away from schools, day cares, churches, hospitals, and/or nursing homes.....	_____
7. Negative aesthetic impact on city, neighborhood, or recreational areas	_____
8. Environmental impact (trees cleared, wetlands disturbed, etc.)	_____

Please choose one statement: (choose one)

- I understand why this project is necessary for the long-term reliability and load-serving capabilities of the Columbia Water & Light.
- I do not understand why this project is necessary for the long-term reliability and load-serving capabilities of the Columbia Water & Light.

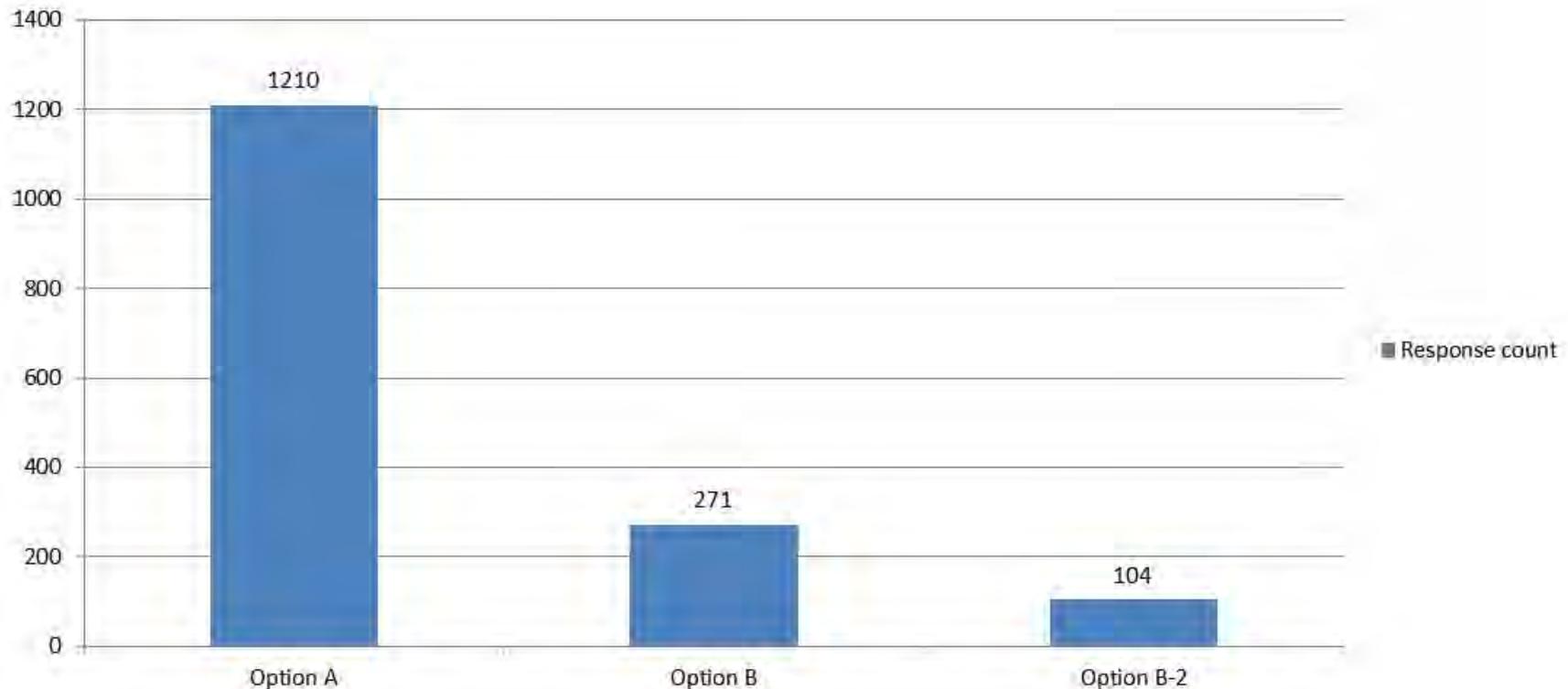
For comparative purposes, consider an average household monthly electric use of 720 kWh with a charge of \$76.42. A Columbia Water & Light customer would pay an estimated additional \$8.26 (10.8%) per month for the next 20 years to construct these lines underground. Under the same usage, a Columbia Water & Light customer would pay an estimated additional \$1.18 (1.5%) per month for the next 20 years to construct these lines overhead. Please choose one of the following responses.

- I would rather have Columbia Water & Light rates increased to the price necessary to construct the lines underground.
- I would rather have Columbia Water & Light rates increased to the price necessary to construct the lines overhead.

Comments? Thank you! _____

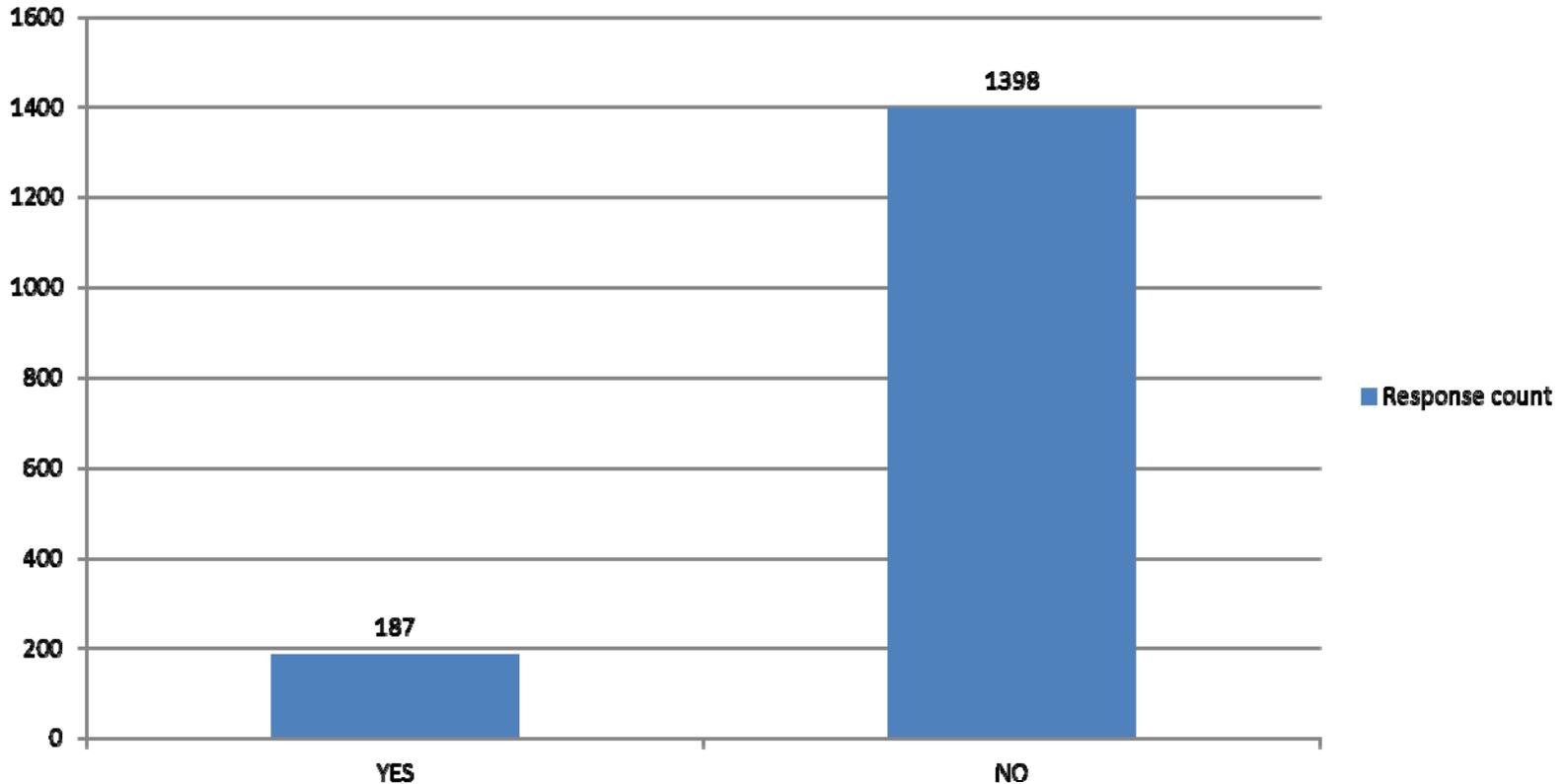
Question 1

- Given the necessity for this project, if you must choose, which option would you prefer to see implemented?



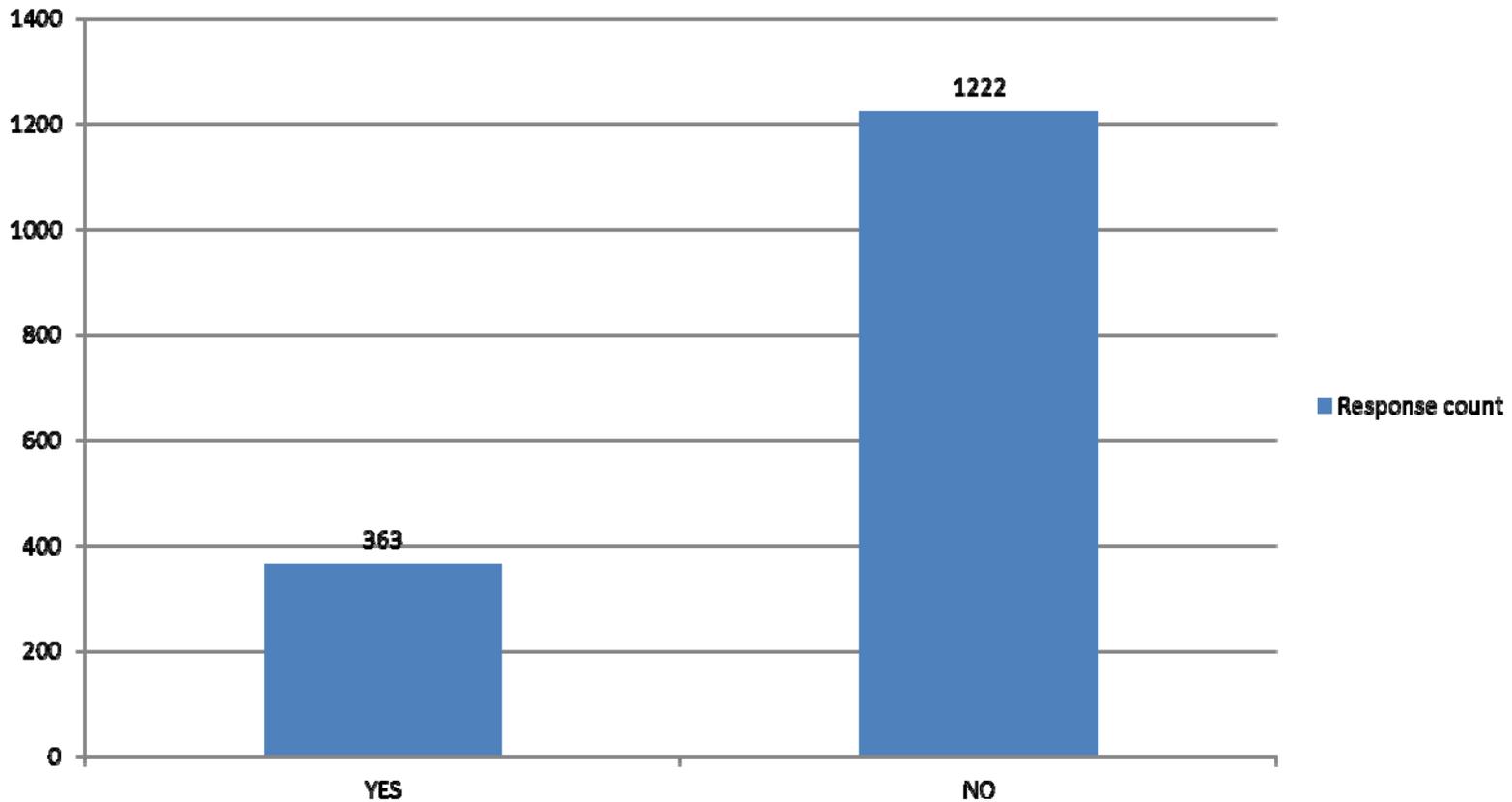
Question 2

- Is your home or business along (within 150 feet) one of the final routes presented for either Option A, Option B, or Option B-2?



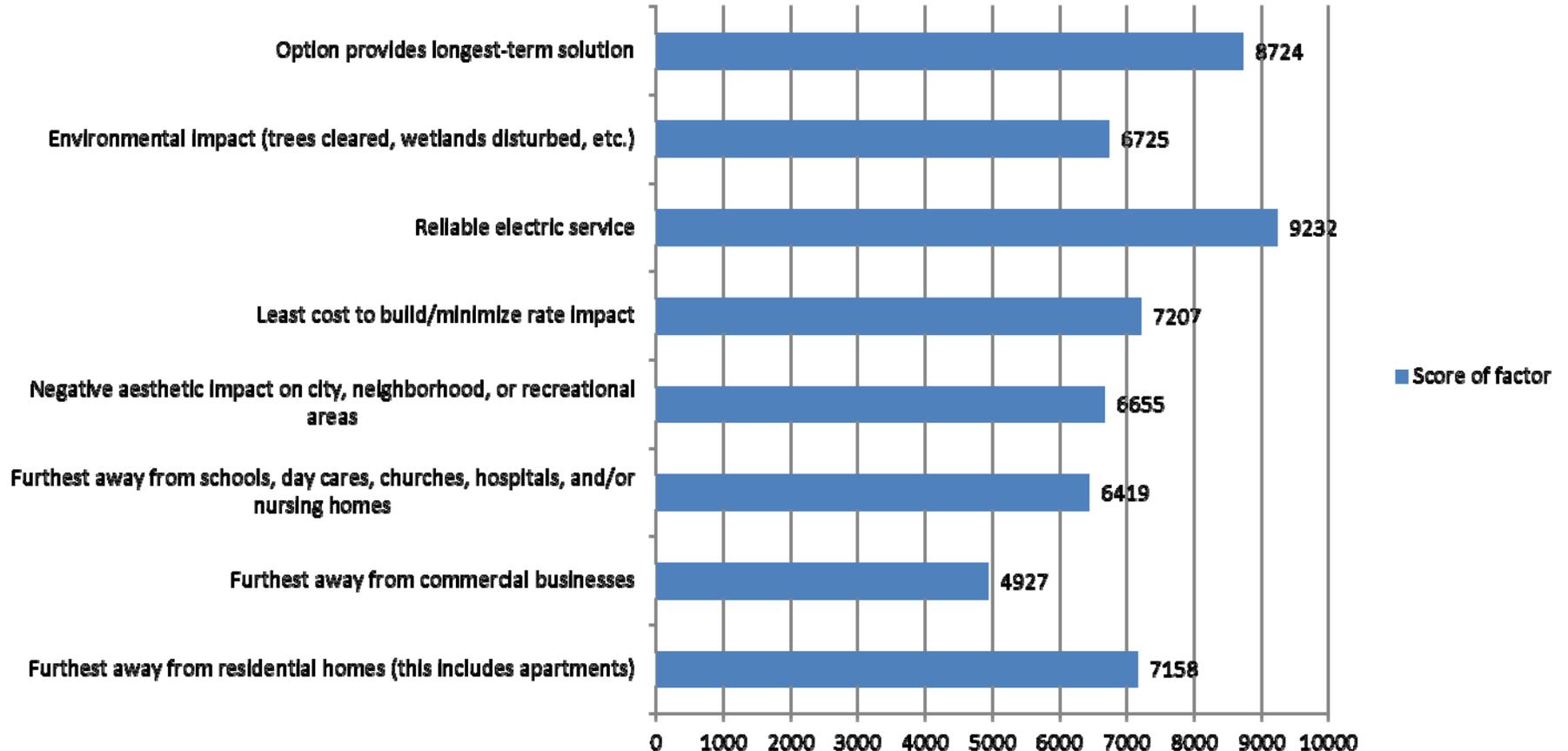
Question 3

- Is your home or business near (between 150 and 500 feet) one of the final routes presented for either Option A, Option B, or Option B-2?



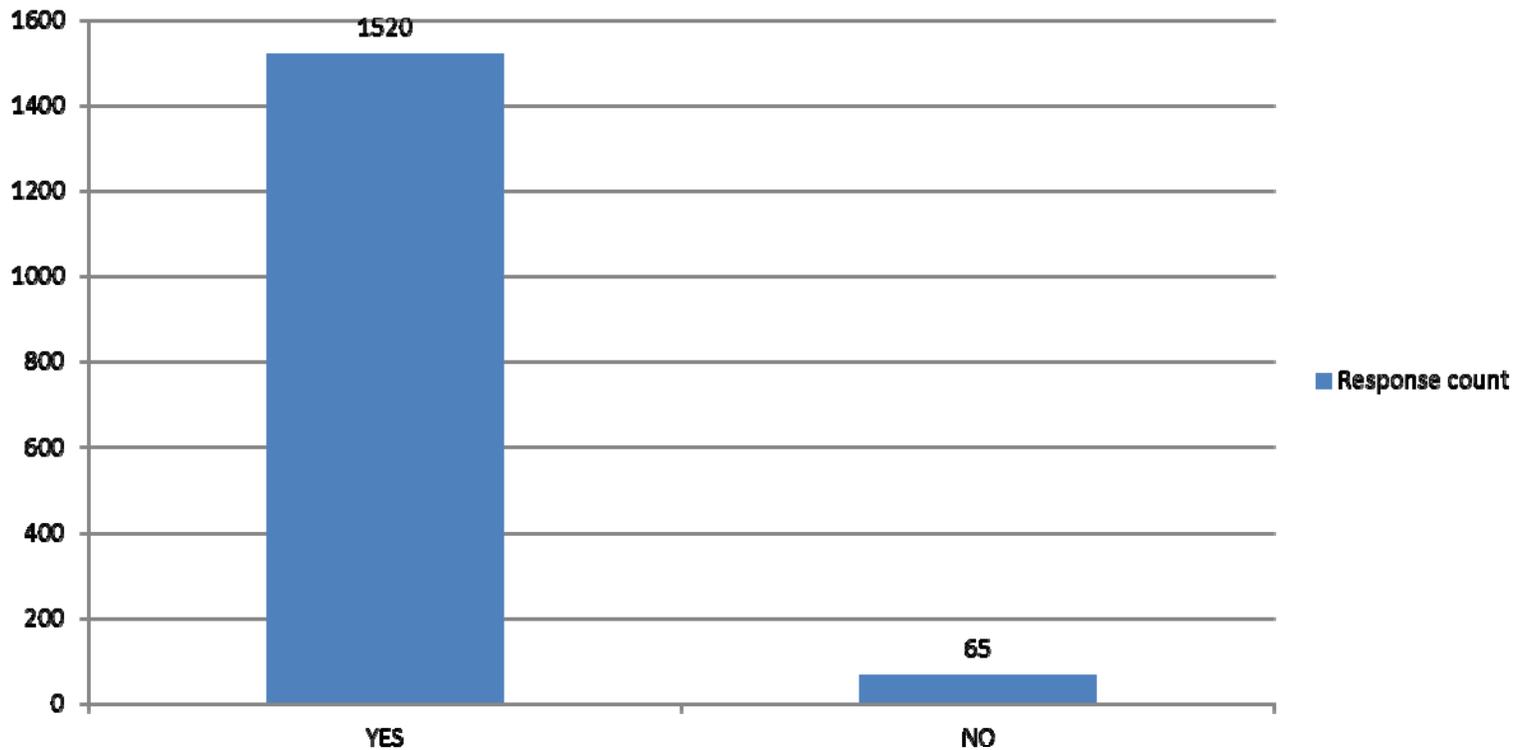
Question 4

- Please rank these factors in determining which option is most preferable to you in order of importance (8=most important, 1=least important, no repeated numbers, all blanks must be filled out)



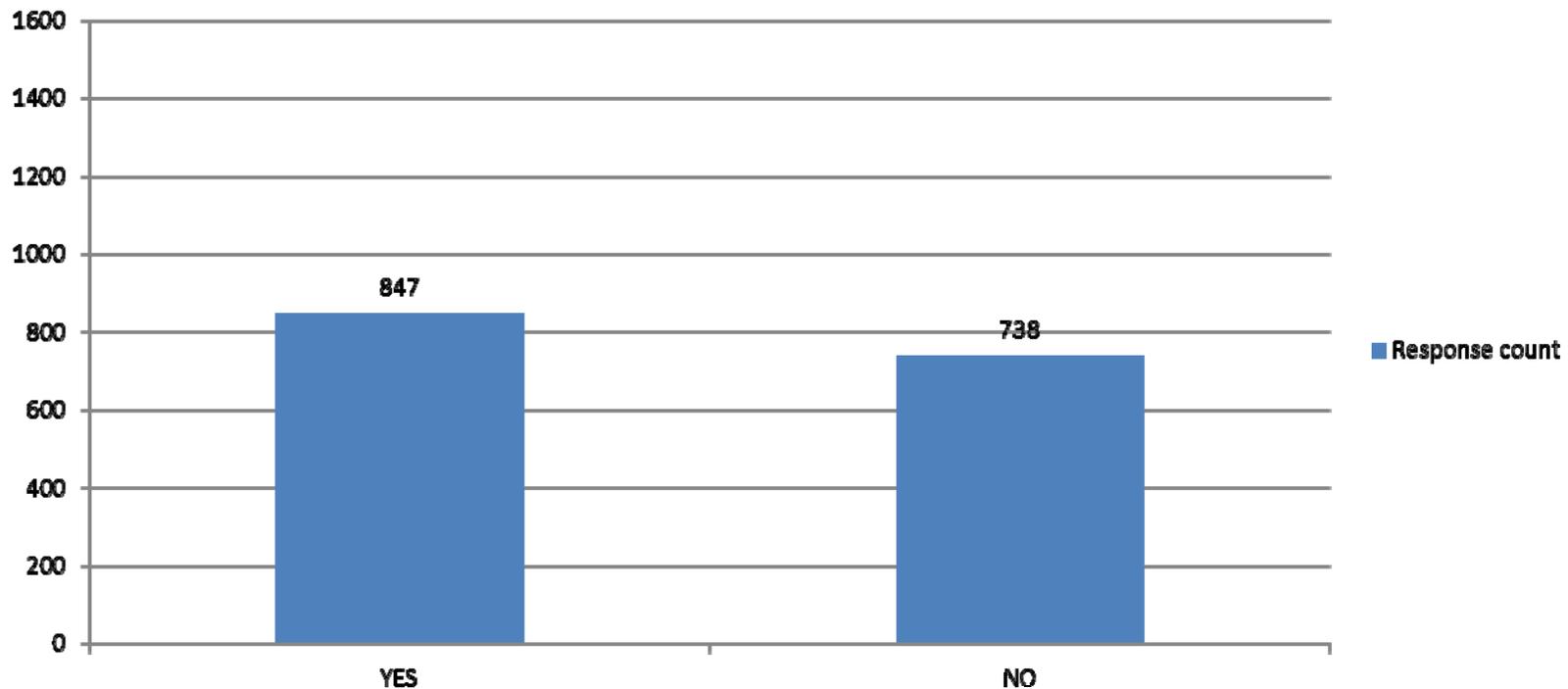
Question 5

- I understand why this project is necessary for the long-term reliability and load-serving capabilities of the City of Columbia Water & Light utility



Question 6

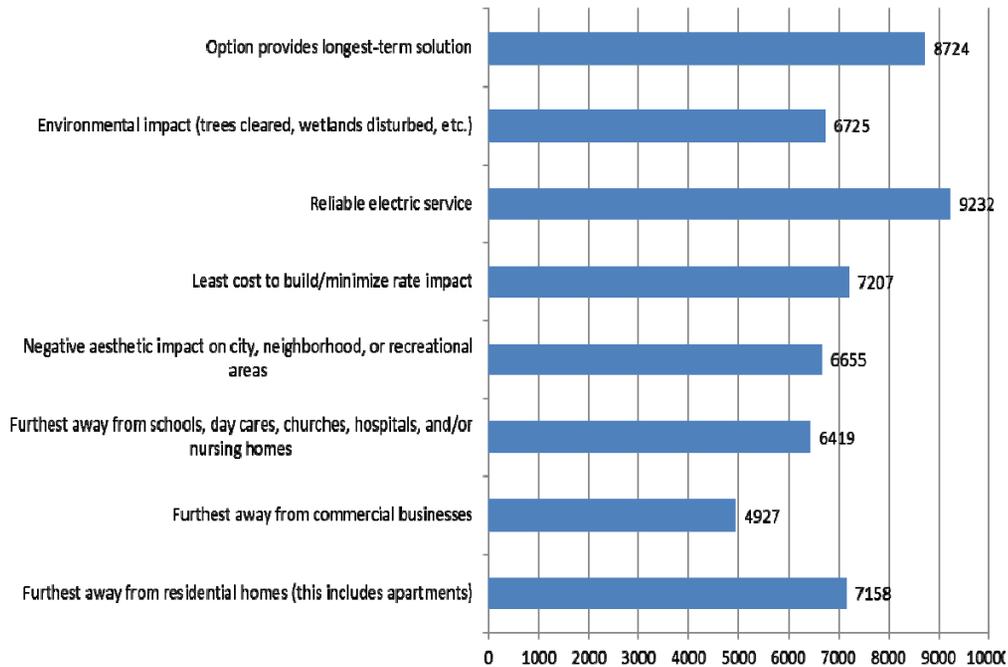
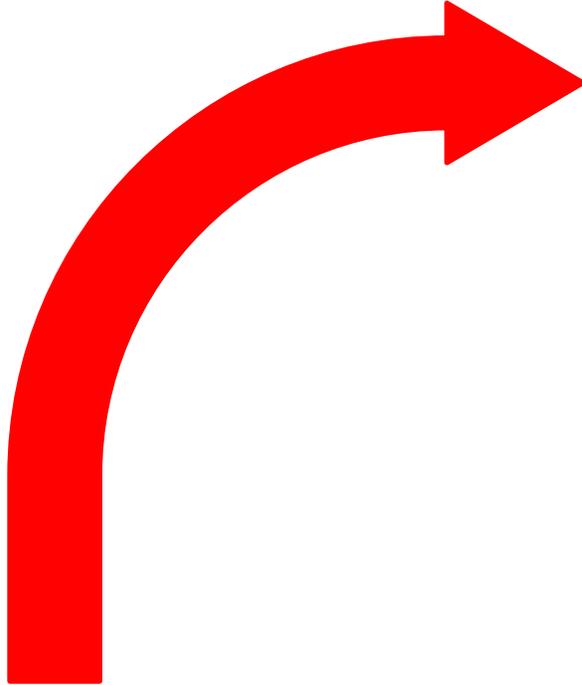
- I would rather have Columbia Water and Light rates increased to the price necessary to construct the lines underground.



The Matrix

- In addition to directly asking the public which option they would prefer to see implemented, Water & Light worked with Sega, Inc. to develop a criteria for ranking each route according to the factors outlined in Question 4.
- This ranking criteria is commonly referred to as the “DECISION MATRIX”, or just “the matrix”, as it is a complex algorithm of publically-ranked factors and incidences of occurrence applied to each option objectively.
- For consistency, the matrix used to rank the options was the same matrix used to rank the individual routes of each option in previous studies.

Survey Results



Decision Matrix

	Public Feedback Ranking	Importance Factor (See Note)
Proximity to Residences	12.5%	
Houses 0-100		-10
Houses 100-200		-5
Multi-Family 0-100		-10
Multi-Family 100-200		-5
Proximity to Residences TOTALS		
Proximity to Day Cares, Schools, Churches, Hospitals, Nursing Homes	11.3%	
Day care 0-100		-10
Day Care 100-200		-5
Schools 0-100		-10
Schools 100-200		-5
Churches 0-100		-5
Churches 100-200		-2
Hospitals 0-100		-10
Hospitals 100-200		-5
Nursing homes 0-100		-10
Nursing homes 100-200		-5
Proximity to Day Cares, Schools, Churches, Hospitals, Nursing Homes TOTALS		
Proximity to Environmental Concerns	11.8%	
Wooded/forested crossed		-10
Streams 0-200		-10
Conservation areas crossed		-10
Wetlands crossed		-10
Agricultural property crossed		3
Proximity to Environmental Concerns TOTALS		
Proximity to Recreation Areas	11.7%	
Parks 0-100		-10
Parks 100-200		-5
Trails 0-100		-10
Trails 100-200		-5
Other recreation areas 0-100		-10
Other recreation areas 100-200		-5
Proximity to Recreation Areas TOTALS		
Proximity to Businesses	8.6%	
Commercial structures 0-100		-5
Commercial structures 100-200		-2
Proximity to Businesses TOTALS		
Reliable Electric Service TOTALS	16.2%	10
Longest Term Solution TOTALS	15.3%	10

How the matrix works

This is for a single line in Option A

Factor

Sub-factors

	Public Feedback Ranking	Importance Factor (See Note)	Mill Creek - Grindstone (Option A)		
			RED LINE		
Proximity to Residences	12.5%		Count of Instance	Normalizing Factor	Total impact
Houses 0-100		-10	0	200	0
Houses 100-200		-5	14	200	-1,750
Multi-Family 0-100		-10	2	200	-500
Multi-Family 100-200		-5	19	200	-2,375
Proximity to Residences TOTALS					-4,625
Proximity to Day Cares, Schools, Churches, Hospitals, Nursing Homes	11.3%		Lineal feet of instance		Total impact
Day care 0-100		-10	0		0
Day Care 100-200		-5	0		0
Schools 0-100		-10	0		0
Schools 100-200		-5	0		0
Churches 0-100		-5	400		-236
Churches 100-200		-2	0		0
Hospitals 0-100		-10	0		0
Hospitals 100-200		-5	0		0
Nursing homes 0-100		-10	0		0
Nursing homes 100-200		-5	0		0
Proximity to Schools TOTALS					-236

Total impact = [Feedback Ranking] X [Importance Factor] X [Count] X [Normalizing]

Each sub-factor within a factor is then summed to arrive at a total for that factor

	Public Feedback Ranking	Importance Factor (See Note)	Summary (Option B-2)	Summary (Option B)	Summary (Option A)
			Combined Total	Combined Total	Combined Total
Proximity to Residences	12.5%				
Houses 0-100		-10	-5,500	-4,000	-16,250
Houses 100-200		-5	-7,875	-6,750	-16,250
Multi-Family 0-100		-10	-5,000	-10,000	-7,500
Multi-Family 100-200		-5	-4,375	-2,625	-11,750
Proximity to Residences TOTALS			-22,750	-23,375	-51,750
Proximity to Day Cares, Schools, Churches,	11.3%				
Day care 0-100		-10	0	0	0
Day Care 100-200		-5	0	0	-236
Schools 0-100		-10	-1,416	-1,416	-708
Schools 100-200		-5	0	0	0
Churches 0-100		-5	0	0	-236
Churches 100-200		-2	0	0	-189
Hospitals 0-100		-10	0	0	0
Hospitals 100-200		-5	0	0	0
Nursing homes 0-100		-10	0	0	0
Nursing homes 100-200		-5	0	0	0
Proximity to Schools TOTALS			-1,416	-1,416	-1,369
Proximity to Environmental Concerns	11.8%				
Wooded/forested crossed		-10	-2,008	0	0
Streams 0-200		-10	-2,006	-1,416	-826
Conservation areas crossed		-10	0	0	0
Wetlands crossed		-10	-2,310	-467	-186
Agricultural property crossed		3	5,228	0	0
Proximity to Environmental Concerns TOTALS			-1,097	-1,883	-1,012
Proximity to Recreation Areas	11.7%				
Parks 0-100		-10	-496	-496	-23
Parks 100-200		-5	-248	-248	0
Trails 0-100		-10	-42	-14	0
Trails 100-200		-5	0	0	0
Other recreation areas 0-100		-10	-468	0	0
Other recreation areas 100-200		-5	-234	-316	0
Proximity to Recreation Areas TOTALS			-1,488	-1,075	-23
Proximity to Businesses	8.6%				
Commercial structures 0-100		-5	-2,150	-2,150	-4,300
Commercial structures 100-200		-2	-1,720	-1,548	-3,612
Proximity to Businesses TOTALS			-3,870	-3,698	-7,912
TOTAL LINEAL FEET PUBLIC FEEDBACK IMPACT			-30,621	-31,447	-62,067
AVERAGE LINEAL FEET FEEDBACK IMPACT		-29,011			
COST	12.6%		\$ 11,267,446.00	\$ 9,854,921.00	\$ 11,970,936.00
COST COMPARISON ADJUSTMENT (Highest cost is			0.94	0.82	1
COST COMPARISON ADJUSTED APPLIED TO PUBLIC			0.119	0.104	0.126
LINE FEEDBACK.			-4,907	-4,292	-5,214
COMPARISON			-35,528	-35,739	-67,280
Reliable Electric Service	16.2%		0	0	15,912
Longest-Term Solution	15.3%		0	0	15,028
TOTAL SCORE INCLUDING RELIABILITY AND LONG-TE	100.0%		-35,528	-35,739	-36,341

Costs of Undergrounding



- Estimated Cost Overhead Construction:
 - \$1.1 Million per mile
 - \$210 per foot
- Estimated Cost Underground Construction:
 - \$7.6 Million per mile
 - \$1450 per foot
- Estimated Cost Per Riser Pole: \$150,000.
 - Riser pole is the transition from underground to overhead.

EMF



•EMF?

- EMF are electric and magnetic fields which are generated by the flow of electrons
- Generated by many common household items such as light bulbs, hair dryers, cell phones, vacuum cleaners, etc. as well as electric utility lines

According to the Environmental Protection Agency:

- “Much of the research about power lines and potential health effects is inconclusive.”
- “Despite more than two decades of research to determine whether elevated EMF exposure, principally to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer.”
- The general scientific consensus is that, thus far, the evidence available is weak and is not sufficient to establish a definitive cause-effect relationship.”

Easements



- When overhanging existing road right of way new easements may not be required unless line blowout or pole placement needs to be considered.
- For line sections that would not be routed within the road right of way, typically a 50 foot width for overhead lines is required.
- CW&L Cross country H- Frame construction utilizes 100 foot easements.
- Underground construction would require a 20 foot easement outside of the road right of way with the exception of where manholes are required where a wider width would be required.

Example of 161 kV Overhead Construction w/ Underbuild



NOTE: proposing to bury any distribution lines running under transmission lines.



Artist Rendering 161 kV along Scott Blvd



Underground Maintenance



- CW&L does not currently have any transmission underground
- Both Ameren and Associated Electric Cooperative, Inc do not currently own/operate underground high voltage transmission lines.
- The City of Springfield, Illinois referenced tests on underground cable including resistance measurements, insulation tests, shield continuity, DC over-potential testing, VLF (very low frequency) AC testing and Partial Discharge testing but do not have any formal maintenance programs.
- No long term history with underground transmission.
- Shorter life expectancy than overhead conductors.





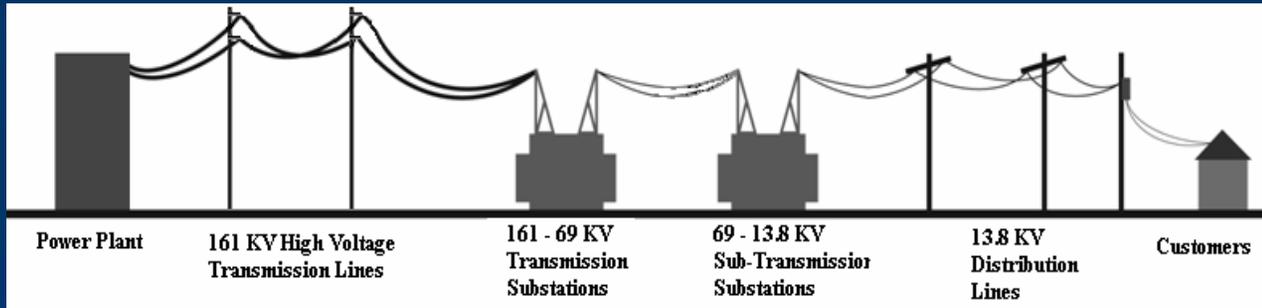








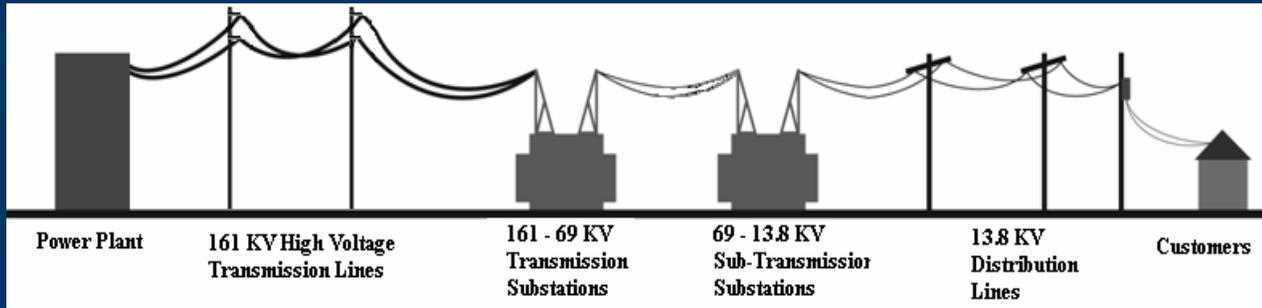




Staff Recommendation

Factors of Importance for Formulation of Staff Recommendation

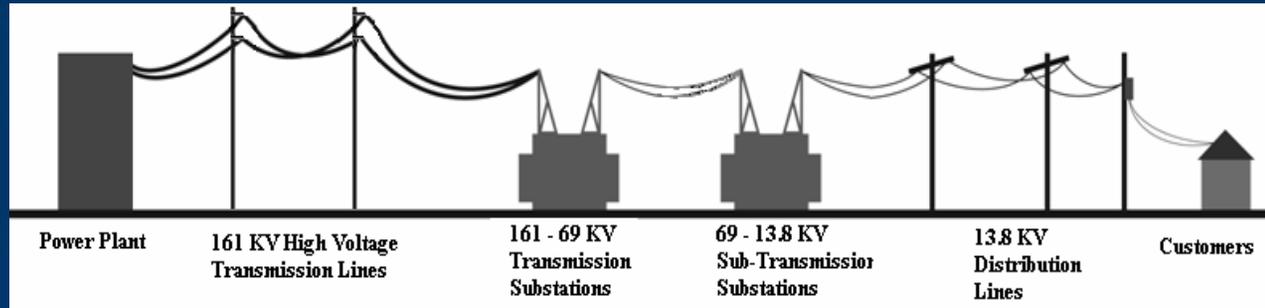
- Public Rank of Importance Survey
- Community Impact Matrix
- Public's Preferred Option & Undergrounding Cost Acceptance



Staff Recommendation

Public's Rank of Importance Survey

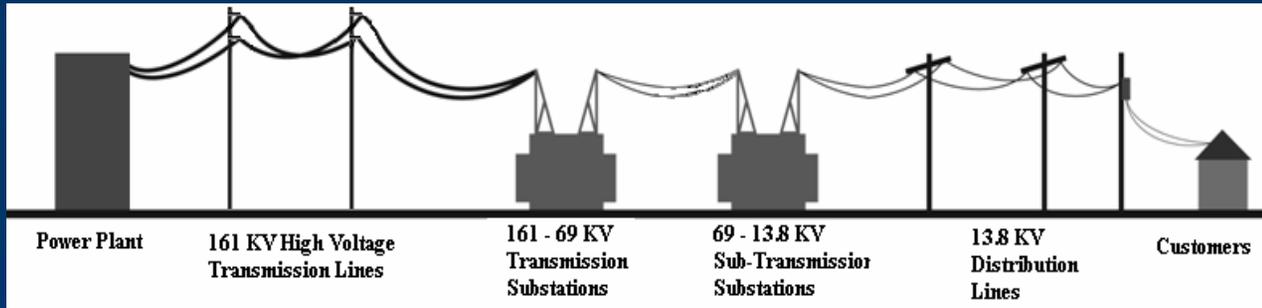
1) Reliable electric service	16.2%
2) Option provides longest-term solution	15.3%
3) Least cost to build/minimize rate impact	12.6%
4) Proximity to residential homes (this includes apartments)	12.5%
5) Environmental impact	11.8%
6) Negative aesthetic impacts	11.7%
7) Proximity to schools, day cares, churches, hospitals, nursing homes	11.3%
8) Proximity to commercial businesses	8.6%



Staff Recommendation

Results of the Decision Matrix Analyzing Community Impacts vs. Benefits

- Option A: -36,341
- Option B: -35,739
- Option B-2: -35,528



Staff Recommendation

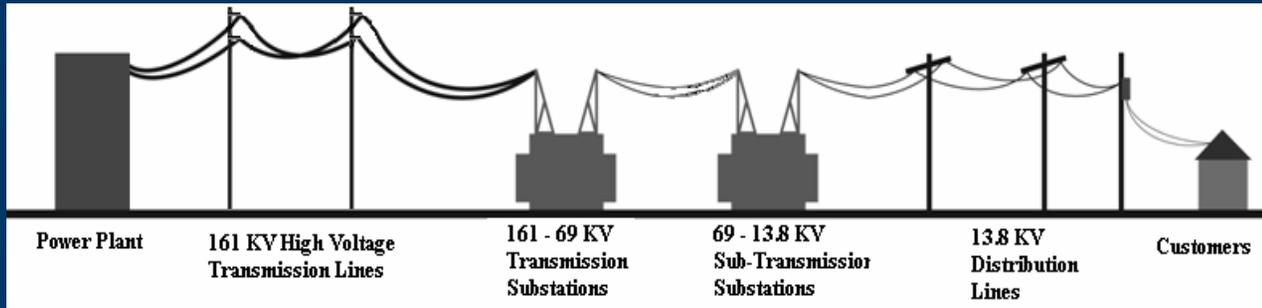
Survey for Public Opinion

“Given the necessity for this project, if you must choose, which option would you prefer to see implemented?”

- Option A: 76%
- Option B: 17%
- Option B-2: 7%

“OK to raise rates for undergrounding lines?”

- Yes - 53%
- No - 47%

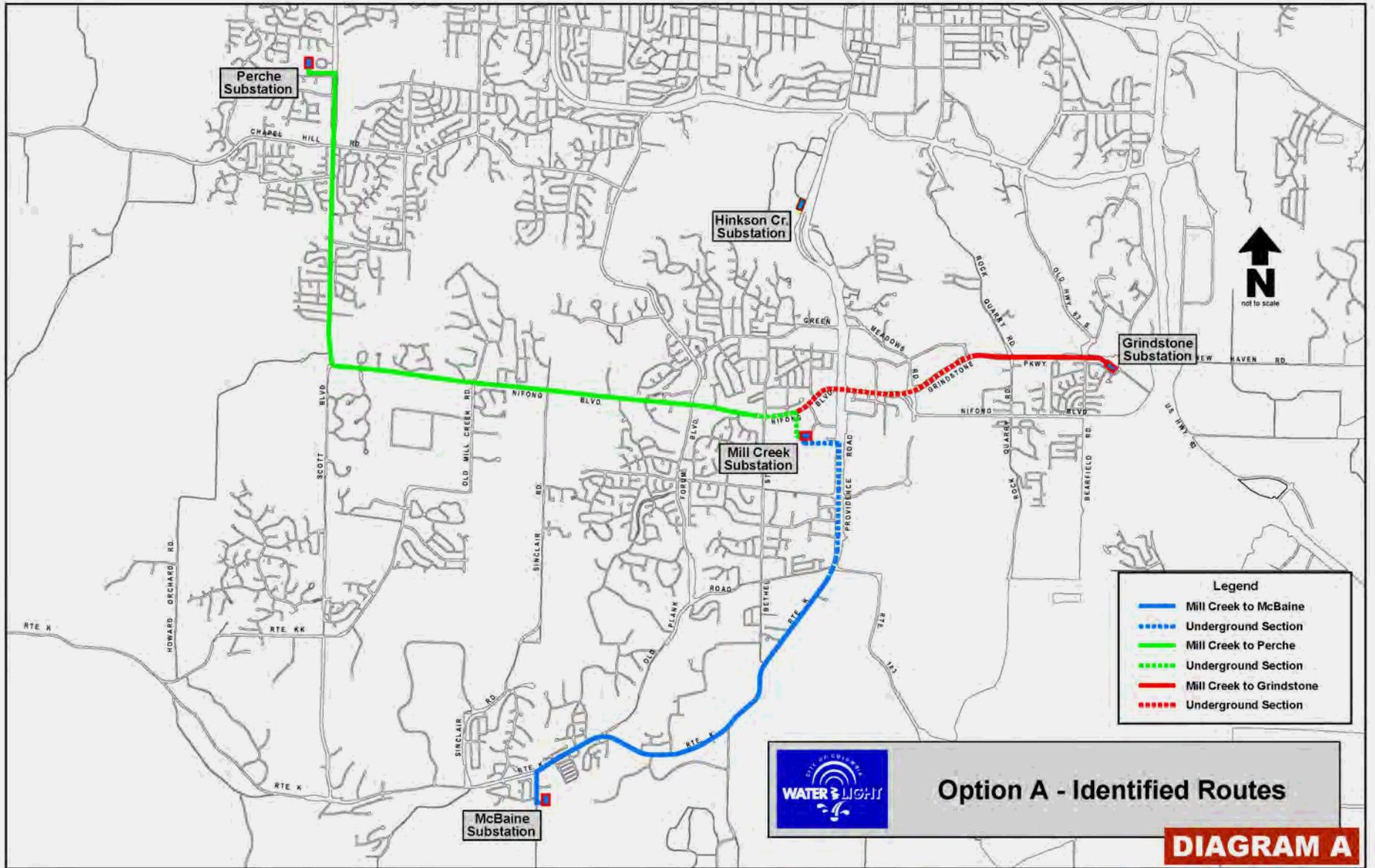


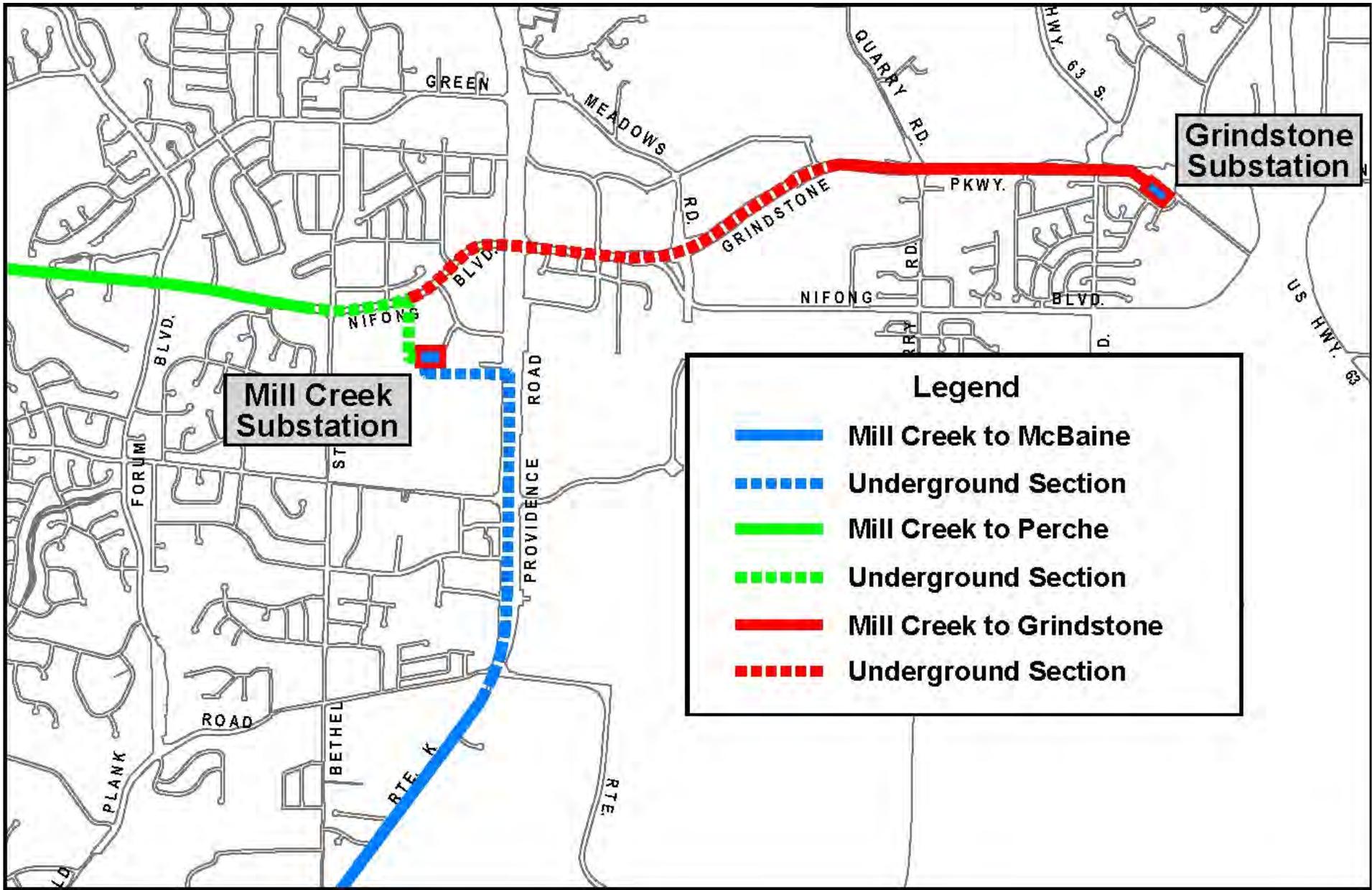
Staff Recommendation

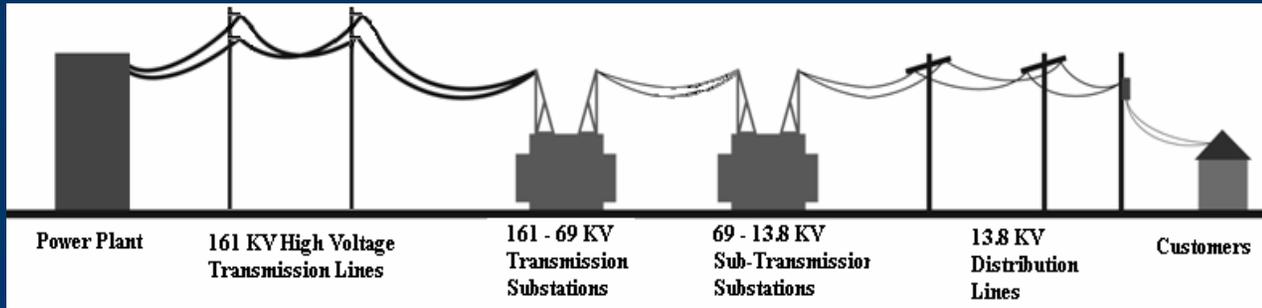
Using this Feedback Staff is Recommending Option A.

Undergrounding Options to Consider.

- All Transmission Lines to Exit the New Substation Underground and Make One Transition to Overhead on Each of the Three Segments
- Distribution Lines along the Transmission Route will be underground



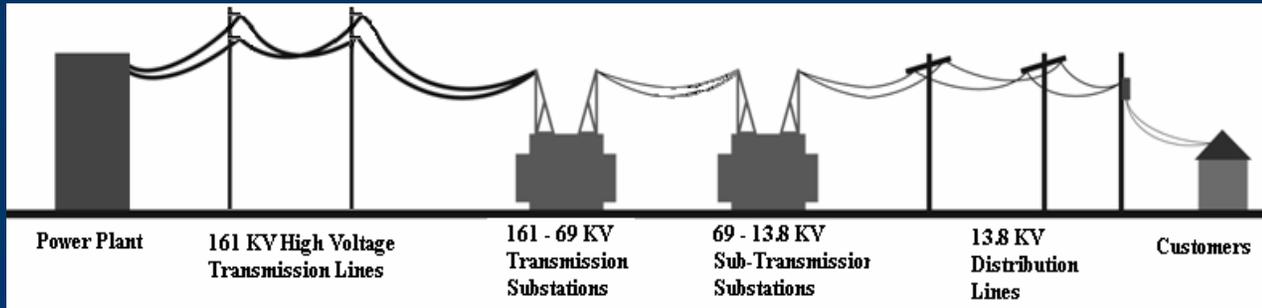




Staff Recommendation

Public's Rank of Importance

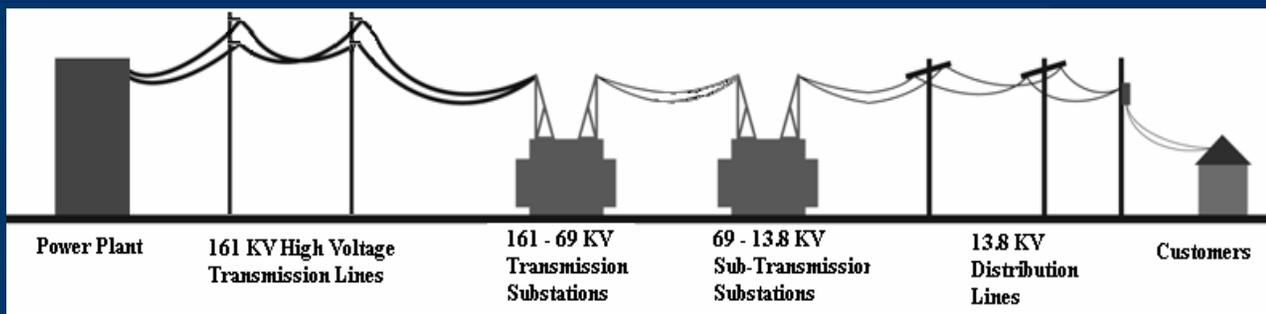
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Staff Recommendation

Results of the Decision Matrix Analyzing Community Impacts vs. Benefits

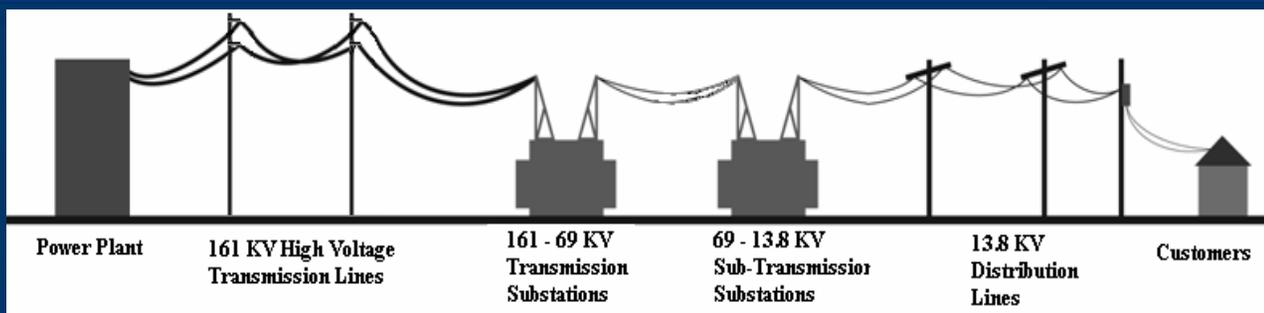
- Option A: -36,341
- Option B: -35,739
- Option B-2: -35,528
- **Option A SRU: -31,608**



Cost of Staff Recommendation

Cost of Options

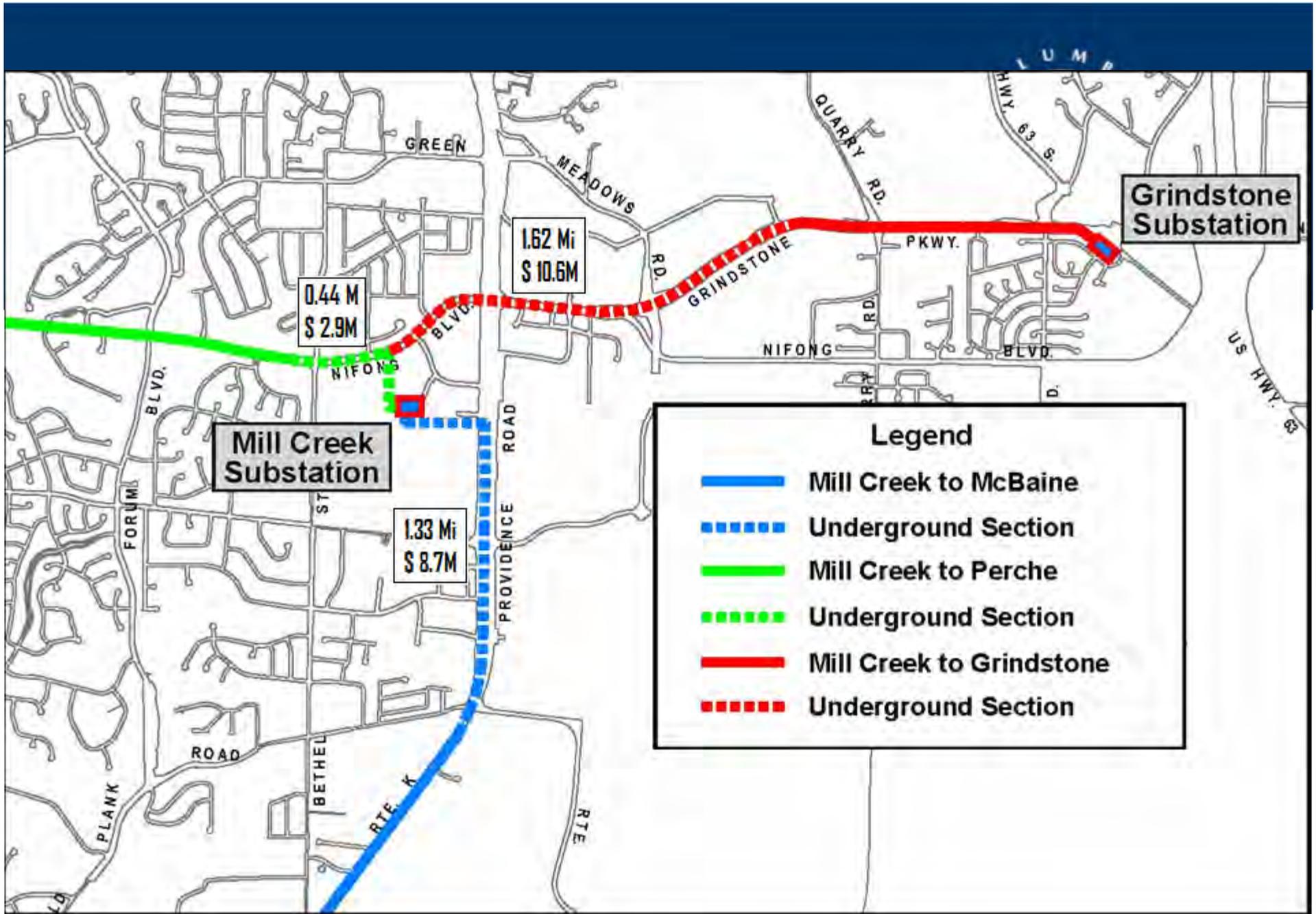
	Option A OH	Option A UG	Option B OH	Option B UG	Option B2 OH	Option B2 UG	Option A SRU
Estimated Solution Duration (Years)	20+	20+	10 to 20	10 to 20	10 to 20	10 to 20	20+
Total Miles of Transmission Line	12.07	12.07	9.96	9.96	12.81	12.81	12.07
Construction Cost/Mile Overhead	\$1,088,245	\$0	\$1,019,189	\$0	\$953,926	\$0	\$1,088,245
Construction Cost/Mile Underground	\$0	\$7,613,800	\$0	\$7,613,800	\$0	\$7,613,800	\$7,613,800
Overhead Cost	\$13,135,117	\$0	\$10,151,122	\$0	\$12,219,788	\$0	\$9,445,967
Underground Cost	\$0	\$91,898,566	\$0	\$75,833,448	\$0	\$97,532,778	\$25,810,782
Total	\$13,135,117	\$91,898,566	\$10,151,122	\$75,833,448	\$12,21,788	\$97,532,778	\$35,256,749



Cost of Staff Recommendation

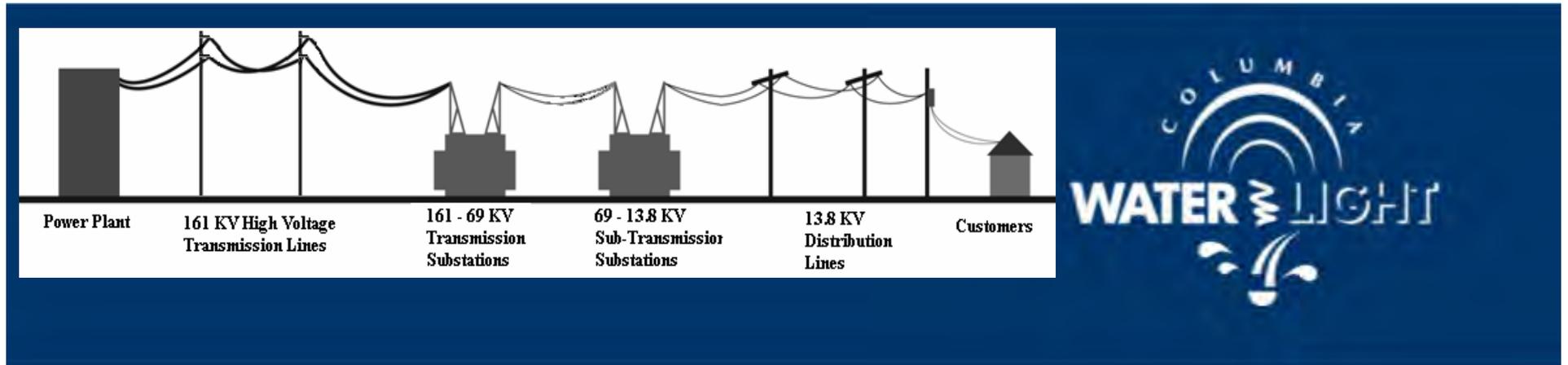
Rate Impact of Options

	Option A OH	Option A UG	Option B OH	Option B UG	Option B2 OH	Option B2 UG	Option A SRU
Construction Cost/Customer OH	\$283	\$0	\$219	\$0	\$264	\$0	\$204
Construction Cost/Customer UG	\$0	\$1,983	\$0	\$1,636	\$0	\$2,105	\$557
Total	\$283.43	\$1,982.97	\$219.04	\$1,636.32	\$263.68	\$2,104.54	\$760.76
Cost/Customer/Month over 20 Years OH	\$1.18	\$0.00	\$0.91	\$0.00	\$1.10	\$0.00	\$0.85
Cost/Customer/Month over 20 Years UG	\$0.00	\$8.26	\$0.00	\$6.82	\$0.00	\$8.77	\$2.32
Total	\$1.18	\$8.26	\$0.91	\$6.82	\$1.10	\$8.77	\$3.17
Construction Rate Increase OH	1.54%	0.00%	1.19%	0.00%	1.44%	0.00%	1.11%
Construction Rate Increase UG	0.00%	10.81%	0.00%	8.92%	0.00%	11.48%	3.04%
Total	1.54%	10.81%	1.19%	8.92%	1.44%	11.48%	4.15%



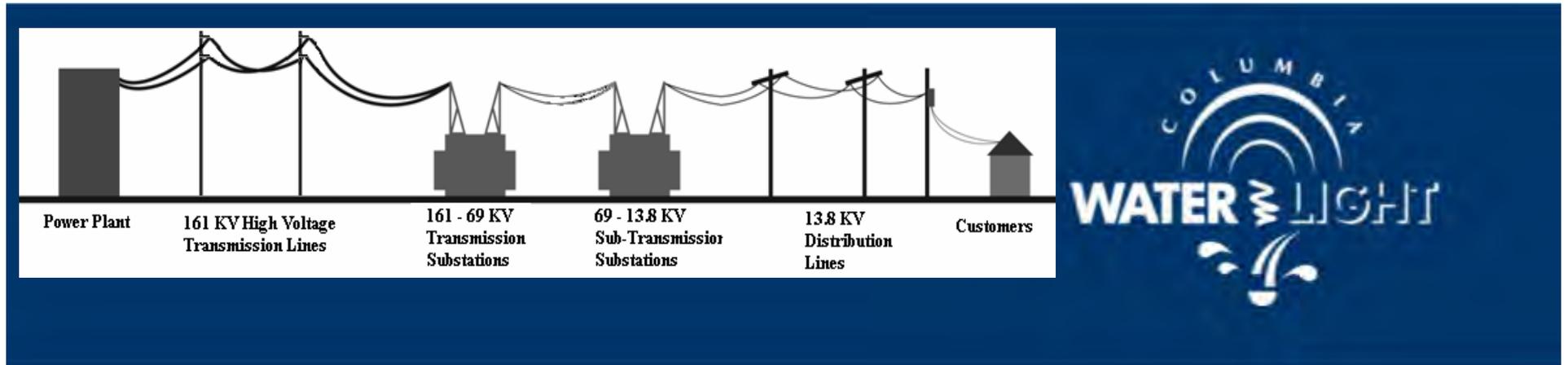
Legend

- Mill Creek to McBaine
- - - Underground Section
- Mill Creek to Perche
- - - Underground Section
- Mill Creek to Grindstone
- - - Underground Section



Staff Recommendation Summary

- Staff Recommendation of Option A with Some Undergrounding
 - Addresses 5 of the 8 public rank of importance issues with the top 2 included
 - 13% Better Public Impact Score
 - Solution increases the project costs by 270% above the Overhead only option



Staff Recommendation Summary Continued

- Transfers load to the 161 kV system and preserves current 69 kV capacity
- 161 kV option more than double the power transmission capacity
- Provides most economical, reliable & long term option
- At their June 12 meeting, the Water & Light Advisory Board Endorsed Option A without undergrounding options.



Columbia Water & Light - Transmission Powerline Timeline

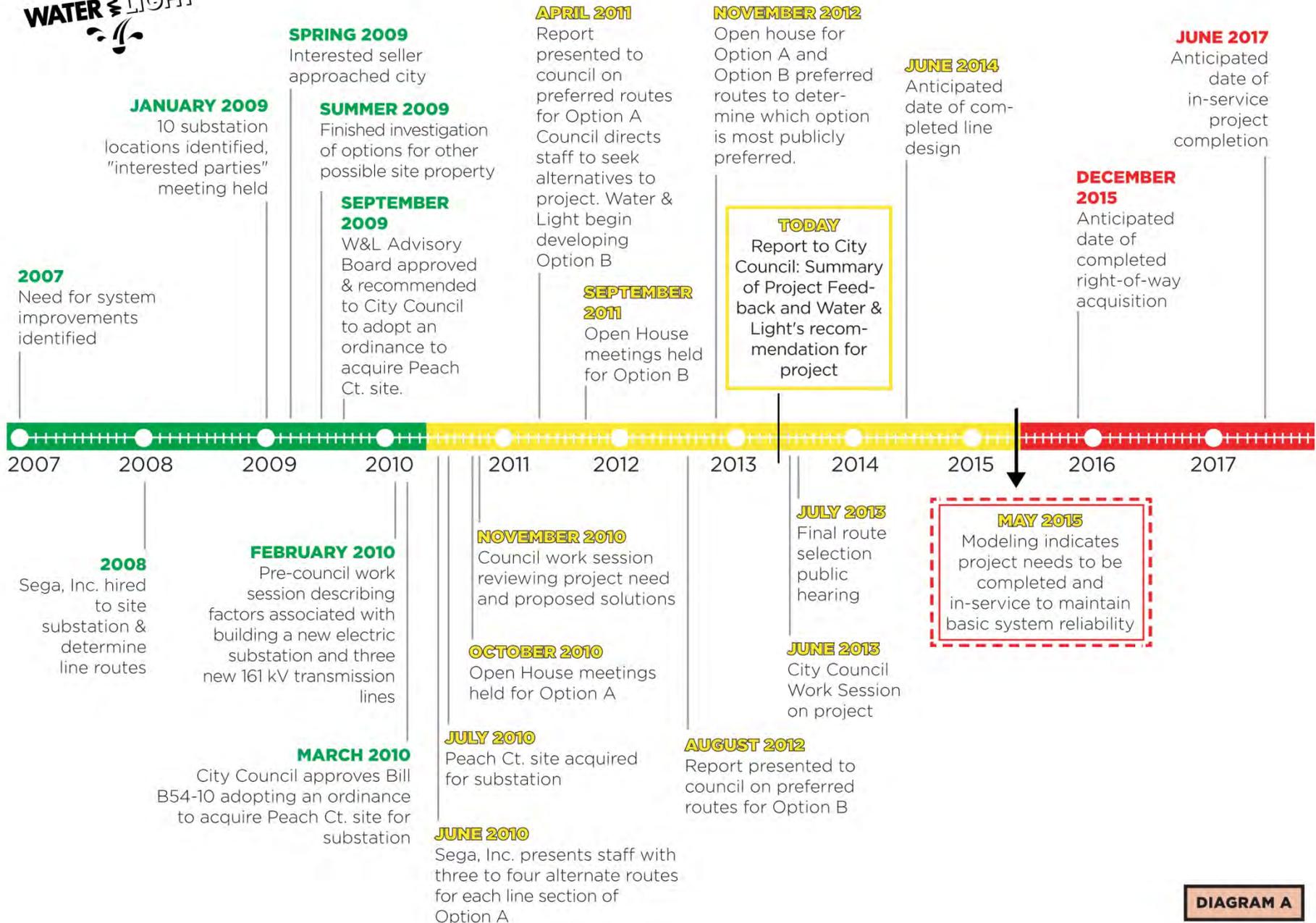


DIAGRAM A