

Source: Water & Light *Tal*

Agenda Item No: REP 130-12

To: City Council

From: City Manager and Staff *MM*

Council Meeting Date: Aug 20, 2012

Re: Mill Creek Substation Transmission Study - Option "B"

**EXECUTIVE SUMMARY:**

Staff has prepared for Council consideration a report on the Option "B" route study for electric transmission improvements. Option "B" addresses the need to supply power to the proposed Mill Creek substation shown in Diagram "I", and improve system reliability with an additional 161 KV connection to the existing Perche Creek substation. In the April 2011 report staff was directed to conduct an alternative line route study to the presented plan, Option "B". The results of this Option "B" study show the recommended transmission line routes for the 161KV connection to Perche Creek substation and the 69 KV connection to Millcreek Substation.

This route study considered several alternative routes for providing an additional 161 kV power source to the Perche Creek substation together with alternative line routes for providing power to the proposed Mill Creek substation from the City's existing 69 kV transmission system. These routes were analyzed through the utilization of a "decision matrix" developed by SEGA, Inc. to identify the preferred routes for making the proposed power connections. The routes selected through the matrix analysis for this alternative (Option "B") are shown in the attached Diagram "B". An open house meeting was held in October 2011 at Gentry Middle School to present the line route alternatives for Option "B" to the public. Input collected from the public at this meeting was used in developing the evaluation matrix used for determining the preferred alignments identified in this report.

The estimated costs for the preferred 161KV and the 69 Kv transmission interconnections are for comparative purposes only. The estimate are based on the approximate footage of overhead line segments, line angles, and other factors identified from the past experience with similar projects from SEGA Engineering. More refined estimates will be established after alignments have been approved by Council and detailed engineering work has been performed.

**DISCUSSION:**

The need for this project was confirmed during a 2007 electric reliability assessment required as part of Columbia Water and Light's participation in the Southeast Electric Reliability Corporation's (SERC) Long Term Study Group (LTSG). This assessment identified two contingencies that could cause cascading outages of Columbia's 69kV transmission system. The City also needs to expand its electrical power import capability. Under certain contingencies the City has reached the limits of the amount of power it can import from a transmission planning perspective. To address these issues it is necessary to provide an additional 161 kV transmission line that provides a redundant connection to the City's Perche Creek substation. Failure to address these needs could lead to outages within the City of Columbia System and fines from our Federal Reliability Regulator the North American Electrical Reliability Corporation.

The need to address load growth in southwest Columbia is why the proposed Mill Creek substation has been sited and the property acquired in July 2010 at the end of Peach Court, Diagram "I". The construction of the Mill Creek substation would allow load to be diverted away from the Hinkson Creek and Grindstone substations which are near load-serving capacity, and are essentially fully "built-out". By re-distributing the load to the proposed Mill Creek substation, additional electrical service will be available to serve the growing demand in the Lemone Industrial District and to the growing population and business centers of southwest Columbia.

In April of 2011 staff presented a report to Council showing preferred transmission line alignments developed by SEGA, Inc. for powering the proposed Mill Creek substation at the 161 kV level through a series of 161 kV interconnections with the Grindstone, McBaine, and Perche Creek substations. These 161 kV transmission line alignments are referred to as Option "A" of this study and are shown in Diagram "A". At this meeting Council directed staff to consider other options to power the proposed Mill Creek substation at the 69 kV level, while still meeting the NERC reliability requirements for electric transmission facilities. Staff has worked with SEGA, Inc. to develop the preferred transmission route alternatives that are referred to as Option "B" of this study.

The proposed Option "B" improvements include the construction of two 69 kV transmission lines from the Hinkson Creek and Grindstone substations to serve the proposed Mill Creek substation. This option would utilize the existing 69 kV transmission corridors to the maximum extent practicable between the Hinkson and Grindstone substations. Because the anticipated load growth from additional feeder circuits that will be added to the new substation, larger conductors and new structures required to support the larger conductors will be required along the entire interconnection path and may eventually be needed between the Hinkson Creek and Perche Creek substations. The preferred alignments for this 69 kV interconnection of the Mill Creek substation are shown in Diagram "B". In addition to this work, a 161 kV transmission line would be constructed from CEPC's McBaine substation to the Perche Creek substation to address reliability issues with the existing transmission system identified during the planning studies described above. The preferred alignment for this 161 kV transmission route extends around the western periphery of the City as shown in Diagram "B".

An open house meeting was held in October 2011 at Gentry Middle School to present all of the potential transmission line route alternatives for Option "B" prepared by SEGA, Inc. to the public. Input gathered from the public at this meeting was used to identify public preferences and concerns associated with the proposed line routes and to weight a "decision matrix". This matrix was utilized as a tool to rank all the presented alignment alternatives based on public input identified at the public meetings and to identify the public's preferred route of each transmission line for Option "B". The matrix is an algorithm that incorporates route "decision factors" and assigns them a score and weights them according to their importance based on public feedback. Since most decision factors are negative (meaning unfavorable), the route receiving the least negative score is determined to be the most publicly preferred route.

Based on the public feedback received at the open house meetings for the Option "B" alignments, the following public opinion rankings were assigned to the physical and material factors of the lines within the decision matrix:

Public's Importance Rank Category	(% is of total)
Proximity to residences	30%
Proximity to schools	19.3%
Costs	13.7%
Environmental concerns	13.1%
Proximity to businesses	12.4%
Proximity to recreation areas	11.5%

Proximity to residences – includes houses, multi-family houses, and nursing homes within 200 feet of a proposed line route.

Proximity to Schools - includes day cares and schools within 200 feet of a proposed line route.

Costs - include the estimated design and construction costs of each proposed route. These are preliminary numbers and should not be used as more than as a comparison reference to other lines. More detailed cost estimates will be developed once a final route has been determined.

Proximity to environmental concerns - includes wooded/forested areas crossed, streams within 200 feet of a proposed line route, conservation areas crossed, wetlands crossed, and agricultural property crossed.

Proximity to businesses - includes commercial structures, churches, and hospitals within 200 feet of a proposed line route.

Proximity to recreation areas - includes parks, trails, and other recreation areas within 200 feet of a proposed line route.

In the matrix, the total lineal feet of instances were counted for proximity to schools, cost, proximity to environmental concerns, and proximity to recreation areas. For proximity to residences and businesses, instances were counted and then multiplied by a normalizing factor. As a result, each residence would impact the decision matrix exactly the same as every other residence, and likewise for businesses. This is to prevent under-representation of a cluster of several residences with relatively small properties, and over-representation by single residences with several thousand feet of affected property. All residences, whether they are 50 or 2,000 lineal feet contribute 200 feet towards the decision matrix while businesses contribute 500 feet.

The matrix calculates line preference ratings by adding the lineal feet of instances, multiplying that number by an importance factor,<sup>(1)</sup> and then by the public feedback ranking. For example: one house 0-100 feet from a proposed route would receive 200 lineal feet of instance, and that number would be multiplied by the importance factor (-10) and then by the public feedback ranking (30%). So the total score of one house 0-100 feet is  $200 \times -10 \times 30\% = -600$ .

(1) Importance factors range from -10 to +10, with negative values indicating negative characteristics and positive values indicating positive characteristics. The same values from Option A were used for Option B for consistency.

The decision matrix used to evaluate Option "B" alignments was modified slightly from the one used in the evaluation of Option "A" alternatives based on feedback received during the open house meetings. While the importance factors remained the same, the public identified and ranked the route properties differently and the disparity between large residential and small residential properties was greater in Option "B". For this reason, it is not useful to compare the numerical results of Option "B" to the numerical results of Option "A". The full results of the matrix analysis are provided in Diagrams "C" thru "E".

All the transmission routes considered in the evaluation of Option "B" are shown in Diagrams "F" thru "H". The preferred routes for the Hinkson Creek and Grindstone substation 69 kV interconnections were selected through the matrix analysis based primarily on the fact that these options affected the least number of combined residences and businesses. The preferred alignment selected for the McBaine to Perche Creek 161kV interconnection is based on its moderate effects to residences, moderate costs, and the least impact on environmental factors. Staff has some concerns with the preferred routes for the Hinkson Creek and Grindstone substation 69 kV interconnection because they would require double circuiting the two 69 kV power sources to the proposed Mill Creek substation. Under this scenario, a single contingency event could lead to a complete power loss to the Mill Creek substation, resulting in a large outage that would affect many residences and businesses within the southwest quadrant of Columbia. For this reason, it may be necessary to reevaluate the alternatives for connecting Mill Creek, Grindstone, and the Hinkson substations to eliminate the double circuit feed in order to increase the overall system reliability.

After the Interested Parties meeting for the Option "B" routes identified by Segal, Inc., staff identified another alternative route for the McBaine to Perche Creek 161 kV line where approximately 37% of the line could be constructed on city property. This alternative route is only for the 161KV line in Option "B" it is being referred to as Option "B-2" shown in Diagram "B-2". The Option "B-2" route is approximately 22% longer than the preferred route identified in Option "B" and was not initially identified Segal Inc. because of the lack of existing rights of way and the excessive length of the route. Because this option was not considered as part of the Option "B" route study, this route alternative has not been presented at any public meetings nor has it gone through the public feedback process. For internal analysis, staff applied alternative Route "B-2" to the Option "B" matrix to develop a comparative ranking. The matrix analysis showed that the Option "B-2" scored lower than the preferred Option "B" route, with the most negative factors being cost (longer route with more angles) and proximity to recreation areas like the Katy Trail and the MKT Trail.

The next step in this process is to have our final interested parties meeting. For this final interested parties meeting we are planning to review these three options.

1. Option "A", Diagram A
  - a. (3) 161 KV lines
    - i. Mill Creek to Perche
    - ii. Mill Creek to Grindstone
    - iii. Mill Creek to McBaine
2. Options "B" & "B-2", Diagram B & Diagram B-2
  - a. (2) 69 KV lines
    - i. Mill Creek to Grindstone
    - ii. Mill Creek to Hinkson Creek
  - b. (1) 161 KV line
    - i. Perche Creek to McBaine

In addition to the three route choices, we will be planning to review and present the following information at the next interested parties meeting

1. Relative Costs
2. Load Serving capability
3. Load Projections
4. Undergrounding Costs and Recommendations

Staff is planning to proceed with scheduling public interested parties meetings for presentation of the preferred transmission line alignments selected in Option "A" and the two Option "B" plans before proceeding with a formal public hearing before the City Council.

#### **FISCAL IMPACT:**

The total appropriations requested for this project, including the proposed Mill Creek substation and three 161kV interconnections is \$26,325,000. This project has been broken up into multiple projects identified within the 2012 Capital Improvement Program. The Mill Creek 161/13.8kV substation is identified as project EL0121 and currently has \$2,000,000 already appropriated. The McBaine Substation to Mill Creek substation transmission line interconnection is identified as project EL0148 and has \$1,650,000 already appropriated. The Perche Substation to Mill Creek Substation transmission line interconnection is identified as EL0150 has no funds appropriated. And, the Grindstone substation to Mill Creek substation interconnection, identified as project EL0149 also has no funds appropriated, leaving an unappropriated balance of \$22,675,000. Expected funding sources for the unappropriated portions of this project are from a future revenue bond issue.

#### **VISION IMPACT:**

<http://www.gocolumbiamo.com/Council/Meetings/visionimpact.php>

This project represents a well planned, proactive growth strategy that addressed the manner in which infrastructure is developed that provided coordination among all stakeholders as defined in section 5.1 of the Vision Goals.

**SUGGESTED COUNCIL ACTIONS:**

No Action Required, Informational Only.

FISCAL and VISION NOTES:					
City Fiscal Impact Enter all that apply		Program Impact		Mandates	
City's current net FY cost	\$0.00	New Program/ Agency?	No	Federal or State mandated?	No
Amount of funds already appropriated	\$0.00	Duplicates/Expands an existing program?	No	Vision Implementation impact	
Amount of budget amendment needed	\$0.00	Fiscal Impact on any local political subdivision?	No	Enter all that apply: Refer to Web site	
Estimated 2 year net costs:		Resources Required		Vision Impact?	No
One Time	\$0.00	Requires add'l FTE Personnel?	No	Primary Vision, Strategy and/or Goal Item #	
Operating/ Ongoing	\$0.00	Requires add'l facilities?	No	Secondary Vision, Strategy and/or Goal Item #	
		Requires add'l capital equipment?	No	Fiscal year implementation Task #	



## OPTION A - IDENTIFIED ROUTES



### Legend

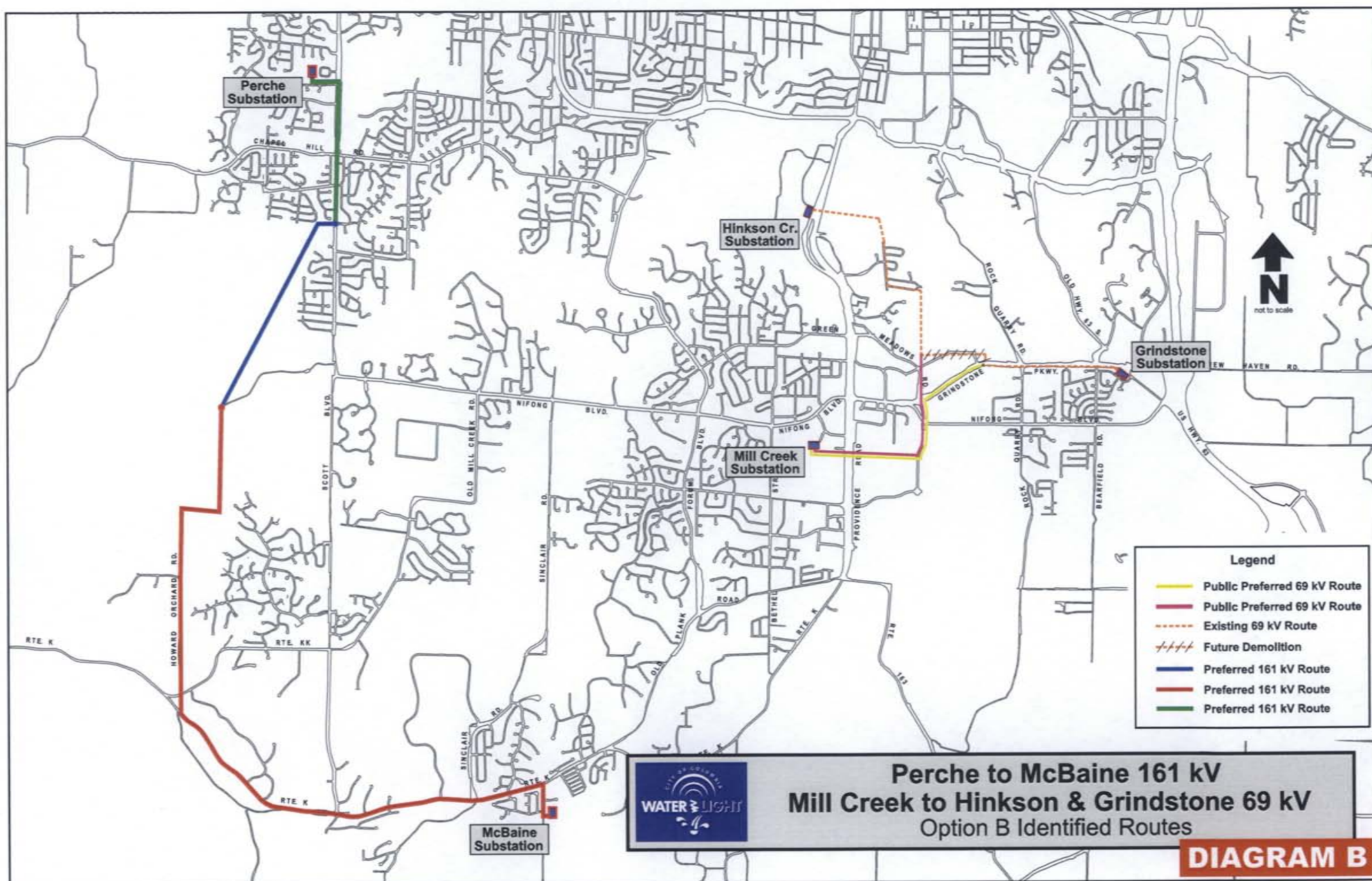
#### Option A - Identified Routes

- Mill Creek to Perche
- Mill Creek to Grindstone
- Mill Creek to McBaine
- Existing 69kV
- Trails
- Parks
- Substation

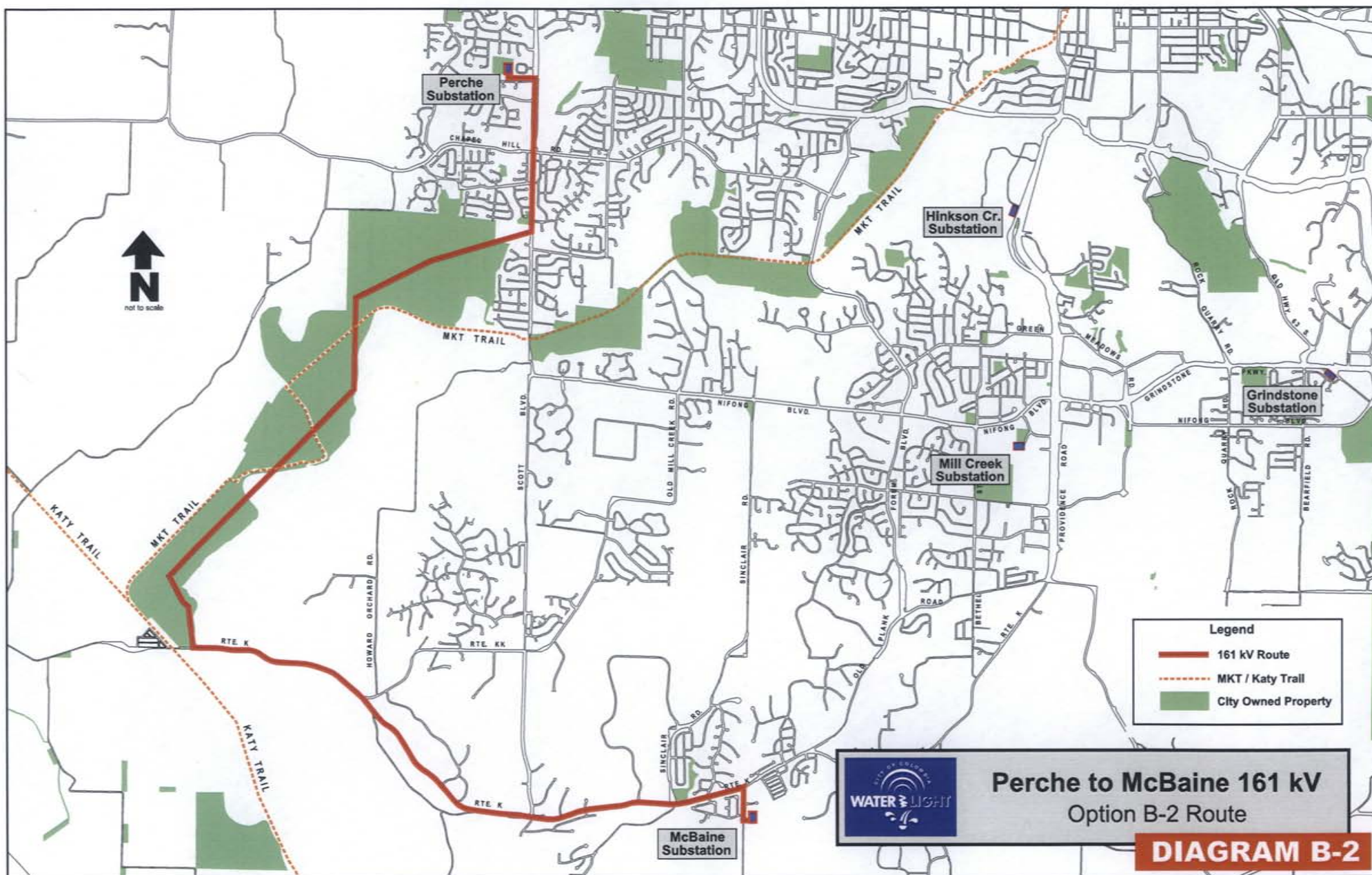
**DIAGRAM A**













City of Columbia Water and Light  
Perche Creek - McBaine 161-kV Transmssion Line (Option B)  
Route Selection Matrix

	Public Feedback Ranking	Importance Factor (See Note)	GREEN LINE			RED LINE			RED-ORANGE-GREEN LINE			RED-BLUE-GREEN LINE		
			Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact
Proximity to Residences	30.0%													
Houses 0-100		-10	15	200	-9,000	5	200	-3,000	15	200	-9,000	16	200	-9,600
Houses 100-200		-5	94	200	-28,200	44	200	-13,200	81	200	-24,300	54	200	-16,200
Multi-Family 0-100		-10	24	200	-14,400	42	200	-25,200	40	200	-24,000	40	200	-24,000
Multi-Family 100-200		-5	43	200	-12,900	16	200	-4,800	22	200	-6,600	21	200	-6,300
Nursing homes 0-100		-10	0	200	0	0	200	0	0	200	0	0	200	0
Nursing homes 100-200		-5	0	200	0	0	200	0	0	200	0	0	200	0
Proximity to Residences TOTALS					-64,500			-46,200			-63,900			-56,100
Proximity to Schools	19.3%		Lineal feet of instance		Total impact	Lineal feet of instance		Total impact	Lineal feet of instance		Total impact	Lineal feet of instance		Total impact
Day care 0-100		-10	0		0	0		0	0		0	0		0
Day Care 100-200		-5	0		0	0		0	0		0	0		0
Schools 0-100		-10	0		0	0		0	0		0	0		0
Schools 100-200		-5	0		0	0		0	0		0	0		0
Proximity to Schools TOTALS					0			0			0			0
Proximity to Environmental Concerns	13.1%		Lineal feet of instance		Total impact	Lineal feet of instance		Total impact	Lineal feet of instance		Total impact	Lineal feet of instance		Total impact
Wooded/forested crossed		-10	2336		-3,060	11054		-14,481	0		0	0		0
Streams 0-200		-10	200		-262	600		-786	1100		-1,441	1100		-1,441
Conservation areas crossed		-10	0		0	0		0	0		0	0		0
Wetlands crossed		-10	156		-204	2446		-3,204	691		-905	196		-257
Agricultural property crossed		3	0		0	0		0	0		0	0		0
Proximity to Environmental Concerns TOTALS					-3,527			-18,471			-2,346			-1,698
Proximity to Recreation Areas	11.5%		Lineal feet of instance		Total impact	Lineal feet of instance		Total impact	Lineal feet of instance		Total impact	Lineal feet of instance		Total impact
Parks 0-100		-10	1050		-1,208	424		-488	424		-488	424		-488
Parks 100-200		-5	1347		-775	424		-244	1058		-608	424		-244
Trails 0-100		-10	12		-14	12		-14	12		-14	12		-14
Trails 100-200		-5	0		0	0		0	0		0	0		0
Other recreation areas 0-100		-10	0		0	0		0	0		0	0		0
Other recreation areas 100-200		-5	0		0	541		-311	541		-311	541		-311
Proximity to Recreation Areas TOTALS					-1,996			-1,056			-1,421			-1,056
Proximity to Businesses	12.4%		Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact
Commercial structures 0-100		-5	0	500	0	0	500	0	1	500	-310	1	500	-310
Commercial structures 100-200		-2	7	500	-868	1	500	-124	4	500	-496	4	500	-496
Churches 0-100		-5	0	500	0	0	500	0	0	500	0	0	500	0
Churches 100-200		-2	0	500	0	0	500	0	0	500	0	0	500	0
Hospitals 0-100		-10	0	500	0	0	500	0	0	500	0	0	500	0
Hospitals 100-200		-5	0	500	0	0	500	0	0	500	0	0	500	0
Proximity to Businesses TOTALS					-868			-124			-806			-806
TOTAL LINEAL FEET PUBLIC FEEDBACK IMPACT					-70,890			-65,851			-68,473			-59,660
AVERAGE LINEAL FEET FEEDBACK IMPACT	-68370.81													
COST	13.7%				\$6,526,142			\$8,343,663			\$7,767,692			\$7,084,854
COST COMPARISON ADJUSTMENT (Highest cost is 1)				0.78			1.00			0.93				0.85
COST COMPARISON ADJUSTED APPLIED TO PUBLIC FEEDBACK				0.11			0.14			0.13				0.12
COST AS A NEGATIVE PERCENT IMPACT OF TOTAL LINE FEEDBACK.				-7,326			-9,367			-8,720				-7,954
TOTAL LINE SCORE INCLUDING ADJUSTED COST COMPARISON					-78,217			-75,218			-77,193			-67,614

Note: (Importance factors range from -10 to +10, with negative values indicating negative characteristics and positive values indicating positive characteristics.

**DIAGRAM C**

**City of Columbia Water and Light  
Mill Creek - Hinkson Creek 69-kV Transmssion Line (Option B)  
Route Selection Matrix**

	Public Feedback Ranking	Importance Factor (See Note)	ORANGE LINE			RED LINE		
			Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact
<b>Proximity to Residences</b>	30.0%							
Houses 0-100		-10	0	200	0	0	200	0
Houses 100-200		-5	0	200	0	0	200	0
Multi-Family 0-100		-10	3	200	-1800	0	200	0
Multi-Family 100-200		-5	5	200	-1500	0	200	0
Nursing homes 0-100		-10	0	200	0	0	200	0
Nursing homes 100-200		-5	0	200	0	0	200	0
<b>Proximity to Residences TOTALS</b>					<b>-3300</b>			<b>0</b>
<b>Proximity to Schools</b>	19.3%		<b>Lineal feet of instance</b>		<b>Total impact</b>	<b>Lineal feet of instance</b>		<b>Total impact</b>
Day care 0-100		-10	0		0	0		0
Day Care 100-200		-5	0		0	0		0
Schools 0-100		-10	0		0	600		-1158
Schools 100-200		-5	0		0	0		0
<b>Proximity to Schools TOTALS</b>					<b>0</b>			<b>-1158</b>
<b>Proximity to Environmental Concerns</b>	13.1%		<b>Lineal feet of instance</b>		<b>Total impact</b>	<b>Lineal feet of instance</b>		<b>Total impact</b>
Wooded/forested crossed		-10	449		-588.19	0		0
Streams 0-200		-10	100		-131	0		0
Conservation areas crossed		-10	0		0	0		0
Wetlands crossed		-10	0		0	100		-131
Agricultural property crossed		3	0		0	0		0
<b>Proximity to Environmental Concerns TOTALS</b>					<b>-719.19</b>			<b>-131</b>
<b>Proximity to Recreation Areas</b>	11.5%		<b>Lineal feet of instance</b>		<b>Total impact</b>	<b>Lineal feet of instance</b>		<b>Total impact</b>
Parks 0-100		-10	0		0	0		0
Parks 100-200		-5	0		0	0		0
Trails 0-100		-10	0		0	0		0
Trails 100-200		-5	0		0	0		0
Other recreation areas 0-100		-10	0		0	0		0
Other recreation areas 100-200		-5	0		0	0		0
<b>Proximity to Recreation Areas TOTALS</b>					<b>0</b>			<b>0</b>
<b>Proximity to Businesses</b>	12.4%		<b>Count of Instance</b>	<b>Normalizing Factor</b>	<b>Total impact</b>	<b>Count of Instance</b>	<b>Normalizing Factor</b>	<b>Total impact</b>
Commercial structures 0-100		-5	9	500	-2790	5	500	-1550
Commercial structures 100-200		-2	16	500	-1984	6	500	-744
Churches 0-100		-5	0	500	0	0	500	0
Churches 100-200		-2	0	500	0	0	500	0
Hospitals 0-100		-10	0	500	0	0	500	0
Hospitals 100-200		-5	0	500	0	0	500	0
<b>Proximity to Businesses TOTALS</b>					<b>-4774</b>			<b>-2294</b>
<b>TOTAL LINEAL FEET PUBLIC FEEDBACK IMPACT</b>					<b>-8793.19</b>			<b>-3583</b>
<b>AVERAGE LINEAL FEET FEEDBACK IMPACT</b>	-6188.095							
<b>COST</b>	13.7%				\$1,652,173			\$1,493,798
<b>COST COMPARISON ADJUSTMENT (HIGHEST cost is 1)</b>				1.00				0.90
<b>COST COMPARISON ADJUSTED APPLIED TO PUBLIC FEEDBACK</b>				0.14				0.12
<b>COST AS A NEGATIVE PERCENT IMPACT OF TOTAL LINE FEEDBACK.</b>					<b>-848</b>			<b>-767</b>
<b>TOTAL LINE SCORE INCLUDING ADJUSTED COST COMPARISON</b>					<b>-9641</b>			<b>-4350</b>

Note: (Importance factors range from -10 to +10, with negative values indicating negative characteristics and positive values indicting positive characteristics.

**DIAGRAM D**

**City of Columbia Water and Light**  
**Mill Creek - Grindstone 69-kV Transmssion Line (Option B)**  
**Route Selection Matrix**

	Public Feedback Ranking	Importance Factor (See Note)	GREEN LINE			YELLOW LINE		
			Count of Instance	Normalizing Factor	Total impact	Count of Instance	Normalizing Factor	Total impact
<b>Proximity to Residences</b>	30.0%							
Houses 0-100		-10	1	200	-600	0	200	0
Houses 100-200		-5	4	200	-1200	0	200	0
Multi-Family 0-100		-10	0	200	0	0	200	0
Multi-Family 100-200		-5	0	200	0	0	200	0
Nursing homes 0-100		-10	0	200	0	0	200	0
Nursing homes 100-200		-5	0	200	0	0	200	0
<b>Proximity to Residences TOTALS</b>					<b>-1800</b>			<b>0</b>
<b>Proximity to Schools</b>	19.3%		<b>Lineal feet of instance</b>		<b>Total impact</b>	<b>Lineal feet of instance</b>		<b>Total impact</b>
Day care 0-100		-10	0		0	0		0
Day Care 100-200		-5	0		0	0		0
Schools 0-100		-10	600		-1158	600		-1158
Schools 100-200		-5	0		0	0		0
<b>Proximity to Schools TOTALS</b>					<b>-1158</b>			<b>-1158</b>
<b>Proximity to Environmental Concerns</b>	13.1%		<b>Lineal feet of instance</b>		<b>Total impact</b>	<b>Lineal feet of instance</b>		<b>Total impact</b>
Wooded/forested crossed		-10	0		0	0		0
Streams 0-200		-10	100		-131	100		-131
Conservation areas crossed		-10	0		0	0		0
Wetlands crossed		-10	100		-131	100		-131
Agricultural property crossed		3	0		0	0		0
<b>Proximity to Environmental Concerns TOTALS</b>					<b>-262</b>			<b>-262</b>
<b>Proximity to Recreation Areas</b>	11.5%		<b>Lineal feet of instance</b>		<b>Total impact</b>	<b>Lineal feet of instance</b>		<b>Total impact</b>
Parks 0-100		-10	0		0	0		0
Parks 100-200		-5	0		0	0		0
Trails 0-100		-10	0		0	0		0
Trails 100-200		-5	0		0	0		0
Other recreation areas 0-100		-10	0		0	0		0
Other recreation areas 100-200		-5	0		0	0		0
<b>Proximity to Recreation Areas TOTALS</b>					<b>0</b>			<b>0</b>
<b>Proximity to Businesses</b>	12.4%		<b>Count of Instance</b>	<b>Normalizing Factor</b>	<b>Total impact</b>	<b>Count of Instance</b>	<b>Normalizing Factor</b>	<b>Total impact</b>
Commercial structures 0-100		-5	4	500	-1240	4	500	-1240
Commercial structures 100-200		-2	4	500	-496	8	500	-992
Churches 0-100		-5	0	500	0	0	500	0
Churches 100-200		-2	0	500	0	0	500	0
Hospitals 0-100		-10	0	500	0	0	500	0
Hospitals 100-200		-5	0	500	0	0	500	0
<b>Proximity to Businesses TOTALS</b>					<b>-1736</b>			<b>-2232</b>
<b>TOTAL LINEAL FEET PUBLIC FEEDBACK IMPACT</b>					<b>-4956</b>			<b>-3652</b>
<b>AVERAGE LINEAL FEET FEEDBACK IMPACT</b>	-4304							
<b>COST</b>	13.7%				\$1,652,173			\$1,493,798
<b>COST COMPARISON ADJUSTMENT (HIGHEST cost is 1)</b>					1.00			0.90
<b>COST COMPARISON ADJUSTED APPLIED TO PUBLIC FEEDBACK</b>					0.14			0.12
<b>COST AS A NEGATIVE PERCENT IMPACT OF TOTAL LINE FEEDBACK.</b>					<b>-590</b>			<b>-533</b>
<b>TOTAL LINE SCORE INCLUDING ADJUSTED COST COMPARISON</b>					<b>-5546</b>			<b>-4185</b>

Note: (Importance factors range from -10 to +10, with negative values indicating negative characteristics and positive values indicting positive characteristics.

**DIAGRAM E**



# OPTION B - MILL CREEK TO HINKSON SUBSTATION



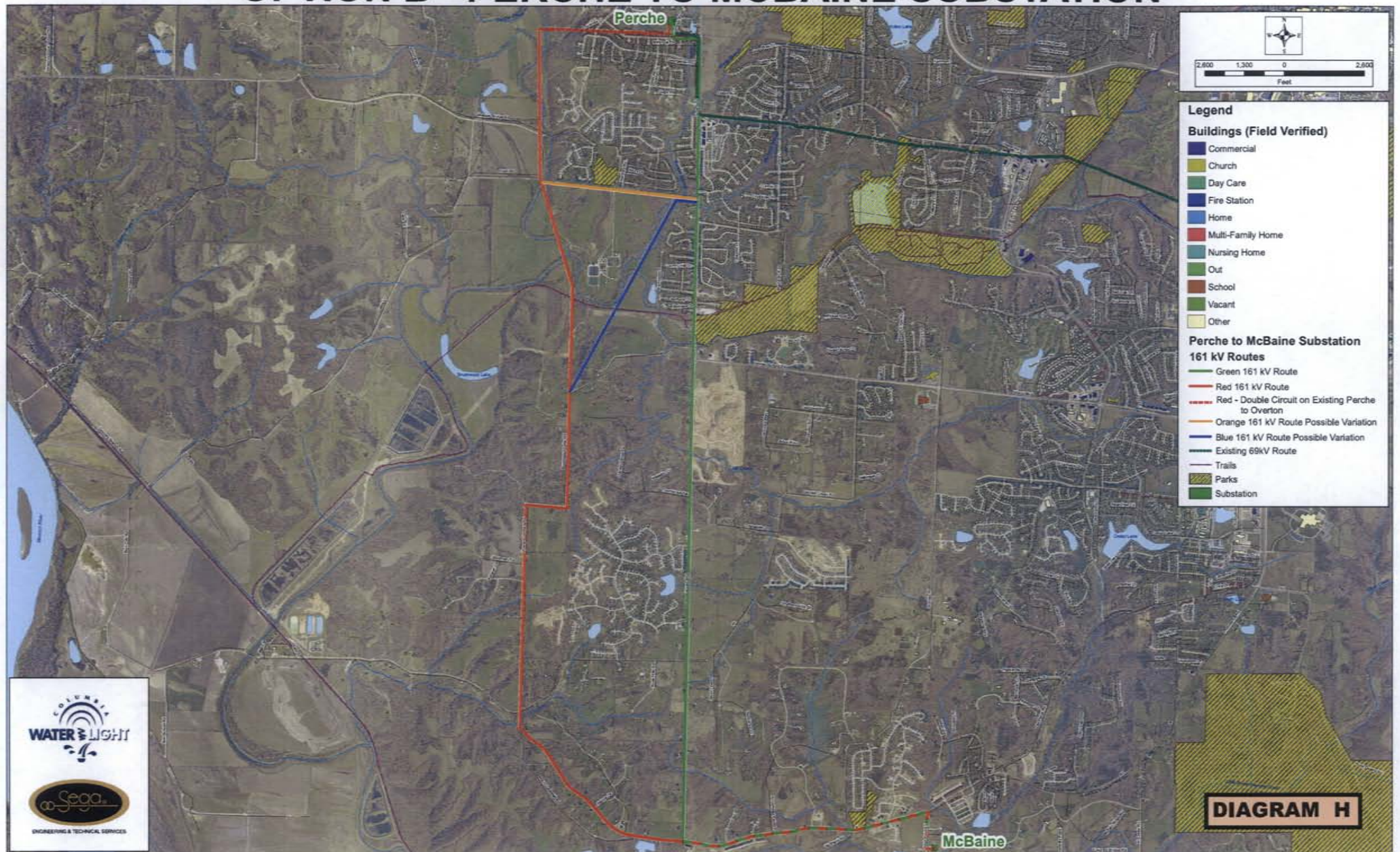


# OPTION B - MILL CREEK TO GRINDSTONE SUBSTATION





# OPTION B - PERCHE TO MCBAIN SUBSTATION







**Mill Creek Substation**  
Location Map

**DIAGRAM I**