COST ESTIMATE FOR

MILL CREEK GENERATING STATION
PIPELINE FEED STUDY

JEFFERSON COUNTY, KENTUCKY

SUBMITTED REV. D: 01/12/2021

FINAL

TABLE OF CONTENTS

SECTION 1

EXECUTIVE SUMMARY

PROJECT DESCRIPTION

This report describes the results of a preliminary cost study for LG&E's proposed Mill Creek Generating Station in Jefferson County, KY. The scope of the study consists of a ±30% cost estimate for each of the following cases:

CASE 1 – 12" Pipeline & Interconnect Facilities

- Minimum Inlet Pressure from TGT = 575 PSIG
- Mill Creek Minimum Delivery Pressure = 700 PSIG
- Total Flow Requirements = 90 MMSCFD
    - NGCC1 = 90 MMSCFD @ 700 PSIG, > 75% CF
    - NGCC2 = 90 MMSCFD @ 700 PSIG, > 75% CF*
        - *Pipeline is capable of handling two NGCC units

CASE 2 – 16" Pipeline & Interconnect Facilities

- Minimum Inlet Pressure from TGT = 575 PSIG
- Mill Creek Minimum Delivery Pressure = 700 PSIG
- Total Flow Requirements = 180 MMSCFD
    - NGCC1 = 90 MMSCFD @ 700 PSIG, > 75% CF
    - NGCC2 = 90 MMSCFD @ 700 PSIG, > 75% CF
    - NGCC3 = 90 MMSCFD @ 700 PSIG, > 75% CF*
        - *Pipeline is capable of handling three NGCC units

The approximate 0.92-mile pipeline is proposed to feed Mill Creek Generating Station's proposed combined cycle units with natural gas from the nearby Texas Gas pipeline. Both pipeline cases are specified with a design pressure of 1000 PSIG, 0.5 design factor and 0.125" corrosion allowance. The upstream tie-point is at the existing 26" Texas Gas pipeline, where a new interconnect facility would be installed.

EN Engineering (ENE) performed investigations of the proposed pipeline route and tie-in location using Google Earth. The material project costs were developed using adjusted historical pricing. Costs for installation were compiled using unit rates from similar size projects.

COST ESTIMATE RESULTS

The cost estimates were prepared using 2020 project costs. The full estimate can be found in Section 5 of this report. The cost estimates have been split up between the TGT interconnect and LG&E pipeline facilities. The total estimated cost summary is listed below for each case:

Cost Estimate Summary	
CASE 1 - 12" Pipeline & Related Facilities - LG&E	
Category	**Cost (180 MMSCFD)**
Material	$ 545,237
Construction	$ 1,997,528
Survey	$ 57,934
Land Acquisition	$ 255,819
Environmental	$ 24,100
Geotechnical	$ 37,500
Inspection	$ 285,100
Engineering	$ 196,890
AFUDC (8%)	$ 272,009
Contingency (20%)	$ 680,022
TOTAL COST	**$ 4,352,139**

CASE 2 - 16" Pipeline & Related Facilities - LG&E	
Category	**Cost (180 MMSCFD)**
Material	$ 697,501
Construction	$ 2,140,274
Survey	$ 57,934
Land Acquisition	$ 255,819
Environmental	$ 24,100
Geotechnical	$ 37,500
Inspection	$ 285,100
Engineering	$ 196,890
AFUDC (8%)	$ 295,610
Contingency (20%)	$ 739,024
TOTAL COST	**$ 4,729,752**

CASE 1 or 2 - Interconnect Facilities - TGT		
Category	**Cost (180 MMSCFD)**	*** Cost Deduct (90 MMSCFD)**
Material	$ 1,036,303	($130,811)
Construction	$ 1,170,000	($20,000)
Survey	$ 16,271	$0.00
Inspection	$ 65,600	$0.00
Engineering	$ 153,439	$0.00
AFUDC (8%)	$ 195,330	$0.00
Contingency (20%)	$ 488,323	$0.00
TOTAL COST	**$ 3,125,266**	**($150,811)**

* Material and Construction deduct if only one combined cycle unit is installed upfront. Material savings are at the interconnect facility only, including one (1) meter and one (1) control valve with associated pipe and fittings. The block valves for the meter and control valve are assumed to be installed upfront. There is no cost savings associated with the filter separator or the pipeline as they are both sized for the full flowrate of 180 MMSCFD.

PROJECT RISKS AND IMPACTS

The project has various uncertainties and risks that may impact the project costs. ENE has attempted to evaluate the impact of these risks on the project. The most significant project risks are listed below:

- Rock is assumed to be present along HDD drill path.
- Change in delivery and supply pressures and/or flow rates
- Wetlands are assumed to be open cut with Nationwide Permit 12.

LIMITATIONS OF THE REPORT

Cost estimates prepared by ENE for this project were prepared with good faith and reasonable care and are the opinion of ENE as to what the actual costs may be at the time of construction. Since there are many variables that may impact the cost of construction, materials, equipment, ROW and services for a project of this nature, the cost estimates provided in this report are ENE's best effort to determine the approximate cost of the proposed facilities.

The cost estimates contained in this report are not a guarantee of the future project costs. Lastly, the cost estimates do not include any costs internal to LGE that will be directly charged and/or allocated to the project or incidental project costs, for example: administrative costs, [unlisted] restoration costs resulting from construction, environmental permit fees, property taxes, other miscellaneous expenses, etc.

SECTION 2

PIPELINE ROUTE & LAND ACQUISITION

OVERVIEW OF PIPELINE ROUTE

For both cases, the approximate 0.92 mile pipeline will route through an existing LG&E electrical easement and then follow US 60 before routing through Mill Creek Generating Station property, see Section 6 for a route map. Both pipeline cases are specified with a design pressure of 1000 PSIG, 0.5 design factor and 0.125" corrosion allowance. The upstream tie-point is at the existing 26" Texas Gas pipeline, where a new interconnect facility would be installed. Pigging facilities will be installed on either end.

FEATURES CROSSED

The table below lists the features crossed by the pipeline route, determined by using aerial images, along with the method for crossing that feature.

Pipeline Crossings			
Description of Feature	**Case**	**Method**	**Length**
Paducah and Louisville (P&L) Railroad	1 & 2	HDD	500'
US-60	1 & 2	Bore	125'
Mill Creek Rail Loop	1 & 2	Bore	100'

PIPELINE CONSTRUCTION CONSIDERATIONS & CHALLENGES

While there are challenges to physical construction such as wetlands, railroad crossings, and a highway crossing, these are all addressed with today's pipeline construction techniques and do not present significant physical barriers. The proposed route is anticipated to cross through approximately 200' of wetland but assumed to be open cut with USACE Nationwide Permit 12.

Soil borings should be obtained to verify the subsurface conditions for the HDD and bored crossings. Five soil borings have been included in the cost estimate.

LAND ACQUISITION

While it is expected that the proposed pipeline will be located in LG&E existing electric easement and on the LG&E Mill Creek Generating Station property, additional ROW and land clearing may be required in the existing ROW to maintain 20' from the existing electrical towers. The existing electrical easement will need to be amended to include the rights to install a gas pipeline. A permanent easement will be required for a pig launcher and interconnect facilities near the Texas Gas tie-in. The total construction workspace required will be 75' (30' of permanent easement and 45' of temporary workspace), 25' on the spoil side and 50' on the working side. Other areas such as directional drill and bore sites will require additional temporary workspace as outlined below. Existing access roads appear to be available for construction use.

The easement costs are assumed to be $15,000/acre. The temporary workspace costs were calculated using 50% of the per acre cost. Easement acreages are estimated and valued separately for permanent easements and temporary workspace. The ATWS calculation includes the following:

- Two (2) 100' x 50' ATWS for the HDD crossing of P&L railroad
- Two (2) 100' x 50' ATWS for the bore crossing of US-60
- One (1) 100' x 100' permanent easement for the interconnect facilities near the Texas Gas tie-in

SECTION 3

HYDRAULIC ANALYSIS

OVERVIEW OF HYDRAULIC DESIGN PARAMETERS

The following table lists the project design parameters used for preliminary design and hydraulic analysis:

Description	Value	Unit
Single NGCC Design Flow	90	MMSCFD
Dual NGCC Design Flow	180	MMSCFD
Minimum Mill Creek Delivery Pressure	700	PSIG
Proposed Mill Creek Pipeline Design Pressure	1000	PSIG
Minimum Design Pressure at Interconnect	575	PSIG
Minimum Gas Temperature at Interconnect	40	°F
Maximum Gas Temperature at Interconnect	70	°F

The following additional conditions and assumptions were used in the hydraulic modeling of the pipeline system:

- 95% Pipeline Efficiency (good average conditions, accounting for pipe bends & imperfections, etc.)
- 0.600 SG sweet natural gas
- 60 °F ambient soil temperature
- 0.220 Btu/(hr-ft^2-°F) heat transfer coefficient for proposed lateral
- 0.92-mile-long pipeline from proposed interconnect to proposed NGCC location at Mill Creek Generating Station
- Maximum pipeline design velocity of 70 ft/s
- Potential pipeline specifications
    - NPS 10 x 0.365” WT
    - NPS 12 x 0.375” WT
    - NPS 16 x 0.500” WT
    - NPS 20 x 0.500” WT
- 0.0018” internal pipe roughness for uncoated pipe
- FM Fundamental Flow Equation with flow-dependent Colebrook-White friction factor
- Synergi 4.9.2 modelling software used for analysis

HYDRAULIC ANALYSIS RESULTS

A hydraulic assessment was performed to determine appropriate sizes of proposed facilities and resulting pressure / flowrate information. The hydraulic analysis determined that a minimum pipeline size of NPS 12 is required to meet the project design parameters. The NPS 12 pipeline would have enough capacity to supply no more than 2 NGCC units at Mill Creek. Alternatively, an NPS 16 pipeline would have enough capacity for a possible 3rd NGCC unit in the future. ENE determined that these two pipeline sizes would be the most desirable economically while still meeting the required design parameters. Installing multiple pipelines in parallel was not considered as part of this initial assessment. See Section 6 for detailed hydraulic results.

SECTION 4

INTERCONNECT FACILITIES

OVERVIEW OF INTERCONNECT FACILITIES

Two pipeline facilities are proposed as part of this study. The upstream tie-point is at the existing 26" Texas Gas pipeline, where a new interconnect facility would be installed. The interconnect facility shall include a custody transfer ultrasonic meter, flow control, filter separator, gas chromatograph, odorizer and a pig launcher near the Texas Gas tie-in. Proposed meter and flow control designs will keep gas velocities below 70 ft/s in order to minimize pressure drops across the station. Odorization has been included due to the class location of the pipeline (Class 3) and proximity to occupied buildings/businesses (refer to PART 192 – TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS, §192.5 Class locations and §192.625 Odorization of gas).

The downstream facility, at Mill Creek Generating Station shall include a pig receiver. See Section 6 of the report for process flow diagrams.

Regulation and/or compression is assumed to be required at Mill Creek Generating Station to provide adequate pressures to the combined cycle units but is not included in this study. Mainline block valves are not required for this route.

SECTION 5
COST ESTIMATES

CASE #1
12” Pipeline & Related Facilities – LG&E

Preliminary Cost Estimate - Case 1 - 12" Pipeline & Related Facilities - LG&E

PROJECT LG&E Mill Creek Pipeline Route - Case 1
0.92 Miles, 12" Pipeline, 1000 psig Design Pressure/MAOP, 1/8" Corrosion Allowance
NGCC1 = 90 MMSCFD (@700PSIG, >75%CF), NGCC2 = 90 MMSCFD (@700PSIG, >75%CF)

LOCATION Jefferson County, KY

REV REV C - Final

DATE January 4, 2021

TYPE Budget Type Estimate, 30% Accuracy

LINE NUM.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	COMMENTS
1	**PROCUREMENT**					
2	**PIPELINE MATERIAL**					
3	12" x 0.375" 5LX52 ERW, PSL2 Pipe with FBE Coating	FOOT	4,280	$ 34.00	$ 145,520.00	Includes 3% Kicker
4	12" x 0.375" 5LX52 ERW, PSL2 Pipe with FBE Coating & Powercrete Coating	FOOT	800	$ 41.00	$ 32,800.00	HDD & Bore, Includes 5% Kicker
5	12" 3D Segmentable Weld Elbows Y52, 90 deg.	EACH	6	$ 900.00	$ 5,400.00	45°<X<90°
6	12" 3D Segmentable Weld Elbows Y52, 45 deg.	EACH	8	$ 675.00	$ 5,400.00	18°<X<45°
7	Trucking for Items 3 to 6	TRUCK	8	$ 5,000.00	$ 40,000.00	
8	16" x 12" Launcher Assembly	EACH	1	$ 100,000.00	$ 100,000.00	
9	16" x 12" Receiver Assembly	EACH	1	$ 100,000.00	$ 100,000.00	
10	Marker Sign & Post	EACH	5	$ 20.00	$ 100.00	1 Per 1000 feet
11	Rectifier and Groundbed	EACH	1	$ 30,000.00	$ 30,000.00	
12	AC Mitigation	FT	4,858	$ 7.00	$ 34,004.00	
13	Standard Test Station	EACH	8	$ 100.00	$ 800.00	
14	Coupons with RMUs	EACH	3	$ 300.00	$ 900.00	
15	Insulating Flange Kit	EACH	2	$ 300.00	$ 600.00	1 per pig trap/pipeline delination
16	**Pipeline Material Subtotal**				**$ 495,524.00**	
17	Sales Tax	%	6.0%	$ 495,524.00	$ 29,732.00	
18	**Sales Tax Subtotal**				**$ 29,732.00**	
19	**FREIGHT**					
20	Freight For All Non-Pipe Materials	%	7.5%	$ 266,404.00	$ 19,981.00	
21	**Freight Subtotal**				**$ 19,981.00**	
22	**TOTAL MATERIAL AND FREIGHT COST**				**$ 545,237.00**	
23						
24	**CONSTRUCTION**					
25	**PIPELINE CONSTRUCTION**					
26	Mob/Demob	LS	1	$ 250,000.00	$ 250,000.00	
27	Truck Off Load & Transport 12" Pipe to Storage Yard	FOOT	5,080	$ 2.25	$ 11,430.00	Load Truck, Transport, Offload Truck
28	Lay 12" x 0.375" 5LX52 Line Pipe Including Soil Sep., Coating Field Welds & All Tie-Ins	FOOT	3,933	$ 200.00	$ 786,520.00	historic pricing based on lay of similar length and size
29	12" Directional Drill of P&L Railroad, w/ 12" x 0.375" 5LX52 FBE + PC coated pipe	FOOT	500	$ 475.00	$ 237,500.00	historic pricing based on lay of similar length and size (75% rock assumed)
30	12" Conventional Bore of US-60 & Mill Creek Loop Rail, w/ 12" x 0.375" 5LX52 FBE + PC coated pipe	FOOT	225	$ 275.00	$ 61,875.00	historic pricing based on lay of similar length and size (75% rock assumed)
31	12" Wetland Open Cut Installation w/ 12" x 0.375" 5LX52 FBE	FOOT	200	$ 150.00	$ 30,000.00	Approx. 4 small stream crossings.
32	Provide X-Ray Services for Non-Destructive Inspection - 12"	MILE	0.92	$ 20,000.00	$ 20,000.00	
33	Hydrostatic Test, Dewater & Dry 12" Pipe	FOOT	4,858	$ 12.00	$ 58,292.00	Assumed water is sourced and discharged at Mill Creek Facility
34	Fabricate and Install Pig Traps	EACH	2	$ 150,000.00	$ 300,000.00	Upstream and downstream pig traps
35	Rock Removal (Per Linear Foot of Trench)	FOOT	1,033	$ 100.00	$ 103,315.00	25% of route minus HDD & Bore
36	Provide Trench Padding Machine and Pad Ditch	FOOT	1,033	$ 10.00	$ 10,332.00	25% of route minus HDD & Bore
37	Furnish and Install Sandbag/Foam Trench Breaker	EACH	5	$ 75.00	$ 375.00	
38	Supply and Install Wood Mats	EACH	90	$ 400.00	$ 36,000.00	HHD + Wetland footages
39	Removing and Chipping of Trees and Brush	ACRE	1.00	$ 30,000.00	$ 30,000.00	

40	Installing Cathodic Protection and AC Mitigation	EACH	1	$ 30,000.00	$ 30,000.00	
41	Installing Pipeline Marker Signs	EACH	5	$ 250.00	$ 1,250.00	1 Per 1000 feet
42	Supply and Installing Straw Bales	EACH	20	$ 25.00	$ 500.00	
43	Supply and Install Orange Safety Fence	FOOT	254	$ 5.00	$ 1,270.00	5% of total pipeline
44	Supply and Install Silt Fence	FOOT	254	$ 8.00	$ 2,032.00	5% of total pipeline
45	Supply and Installing Erosion Control Fabric at Facilities	SQ. YD.	200	$ 8.00	$ 1,600.00	
46	Supply and Installing Crushed Rock and Geotextile Fabric Under Rock at Facilities	SQ. YD.	200	$ 25.00	$ 5,000.00	
47	Reseeding	ACRE	8	$ 1,750.00	$ 14,637.00	
48	Installing Anchored Mulch	ACRE	2	$ 2,800.00	$ 5,600.00	
49	**TOTAL CONSTRUCTION COST**				**$ 1,997,528.00**	
50						
51	**SURVEY SERVICES**					
52	**Preliminary Survey & Cadastral Survey**					
53	Project Manager	HOUR	8	$ 115.00	$ 920.00	
54	Survey Technician	HOUR	16	$ 75.00	$ 1,200.00	
55	Professional Land Surveyor	HOUR	8	$ 115.00	$ 920.00	
56	Two Person Survey Crew	HOUR	48	$ 150.00	$ 7,200.00	
57	Project Mileage	MILE	100	$ 0.58	$ 58.00	
58	Per Diem	UNIT	8	$ 150.00	$ 1,200.00	
59	Mobilization	UNIT	4	$ 600.00	$ 2,400.00	
60	**Sub-Total Preliminary Survey**				**$ 13,898.00**	
61	**Pre-Construction Staking & Staking for Tree Clearing**					
62	Project Manager	HOUR	1	$ 115.00	$ 115.00	
63	Survey Technician	HOUR	8	$ 75.00	$ 600.00	
64	Two Person Survey Crew	HOUR	24	$ 150.00	$ 3,600.00	
65	Project Mileage	MILE	50	$ 0.58	$ 29.00	
66	Per Diem	UNIT	4	$ 150.00	$ 600.00	
67	Mobilization	UNIT	2	$ 600.00	$ 1,200.00	
68	**Sub-total Pre-Con Staking**				**$ 6,144.00**	
69	**As-built Survey**					
70	Two Person Survey Crew, Day Rate	HOUR	200	$ 150.00	$ 30,000.00	
71	Project Mileage	MILE	400	$ 0.58	$ 232.00	
72	Per Diem	UNIT	8	$ 150.00	$ 1,200.00	
73	Mobilization	UNIT	8	$ 600.00	$ 4,800.00	
74	**Sub-total As-built Survey**				**$ 36,232.00**	
75	**Other Survey**					
76	Boundary Mosaic and Landowner Plats	PLAT	4	$ 415.00	$ 1,660.00	Assume 4 plats
77	**Sub-Total Other Survey**				**$ 1,660.00**	
78	**TOTAL SURVEY SERVICES COST**				**$ 57,934.00**	
79						
80	**LAND ACQUISITION**					
81	**Easements**					
82	30-Ft Wide Permanent Easement	ACRE	3	$ 15,000.00	$ 50,182.00	Assumes full route
83	Easement Recording fees	EACH	4	$ 50.00	$ 200.00	Assumes 4 parcels
84	Cathodic Protection - Deep Well Groundbed & Rectifier	EACH	1	$ 7,500.00	$ 7,500.00	25% of per acre cost

85	**Easement Costs Subtotal**				**$ 57,882.00**	
86	**Temporary and Construction**					
87	Temporary Workspace for Construction - Additional 45-Ft wide	ACRE	5	$ 7,500.00	$ 37,637.00	75' Wide Construction Workspace (30' perm. Easement), 50% of per acre cost
88	Additional Temporary Workspace	ACRE	1.0	$ 7,500.00	$ 7,500.00	ATWS for HDD & 4 stream crossings
89	Contractor Yard	ACRE	0	$ 7,500.00	$ -	Assumes contractor yard is within Mill Creek
90	**Temporary and Construction Subtotal**				**$ 45,137.00**	
91	**Permit Fees - Roads and Railroads**					
92	Railroad	EACH	1	$ 1,500.00	$ 1,500.00	# of RR Crossings
93	Roads	EACH	1	$ 500.00	$ 500.00	# of Road Crossings
94	Survey Permits - Miscellaneous	EACH	4	$ 200.00	$ 800.00	Assumes 4 parcels
95	**Permit Fees Subtotal**				**$ 2,800.00**	
96	**Third Party ROW Agents**	LS	1	$ 150,000.00	$ 150,000.00	
97	**TOTAL LAND ACQUISITION COST**				**$ 255,819.00**	
98						
99	**ENVIRONMENTAL SERVICES**					
100	Waters of the US Delineation	LS	1	$ 7,000.00	$ 7,000.00	
101	Threatened and Endangered Species Habitat Assessment	LS	1	$ 2,600.00	$ 2,600.00	
102	Waters of the US and other Environmental Permitting	LS	1	$ 7,400.00	$ 7,400.00	
103	Cultural Resources Services and Phase I Literature Review	LS	1	$ 1,500.00	$ 1,500.00	
104	Phase I Reconnaissance and Reports	LS	1	$ 5,600.00	$ 5,600.00	
105	**TOTAL ENVIRONMENTAL COST**				**$ 24,100.00**	
106						
107	**GEOTECHNICAL SERVICES**					
108	**Drilling, Laboratory Testing, & Engineering Services**					2 per HDD, 1 per bore, 1 per facility
109	**TOTAL GEOTECHNICAL SERVICES COST**				**$ 37,500.00**	
110						
111	**INSPECTION SERVICES**					
112	**Construction Inspection Services**					
113	Chief Inspector	MAN/WEEK	8	$ 7,700.00	$ 61,600.00	1 Construction Spread - 2 Months
114	Welding Inspector	MAN/WEEK	8	$ 7,500.00	$ 60,000.00	1 Construction Spread - 2 Months - 1 W. Inspect/Spread
115	Utility Inspector	MAN/WEEK	8	$ 7,500.00	$ 60,000.00	1 Construction Spread - 2 Months - 1 U. Inspect/Spread
116	Office Manager	MAN/WEEK	8	$ 4,500.00	$ 36,000.00	1 Construction Spread - 2 Months
117	Environmental Training	MAN/DAY	2	$ 1,250.00	$ 2,500.00	
118	Environmental Inspection	MAN/WEEK	8	$ 7,500.00	$ 60,000.00	1 Inspector - 2 Months - 4 Weeks/Mo, 6 Days/Week
119	Construction Office Expenses - Office Rental	MO	2	$ 1,500.00	$ 3,000.00	1 Construction Spread - 2 Months
120	Construction Office Expenses - Office Supplies	MO	2	$ 1,000.00	$ 2,000.00	1 Construction Spread - 2 Months
121	**TOTAL INSPECTION SERVICES COST**				**$ 285,100.00**	
122						
123	**ENGINEERING SERVICES**					
124	Project/Design Management	HR	160	$ 179.00	$ 28,640.00	
125	Project Engineering	HR	300	$ 121.00	$ 36,300.00	
126	Cathodic Protection /AC Mitigation (Includes field time and travel day rates)	HR	400	$ 134.00	$ 53,600.00	
127	Construction Drafting	HR	600	$ 103.00	$ 61,800.00	
128	As-Built Drafting	HR	50	$ 118.00	$ 5,900.00	
129	Metallurgical Consulting	HR	10	$ 235.00	$ 2,350.00	

130	Procurement	HR	20	$ 112.00	$ 2,240.00	
131	Project Controls Engineer	HR	10	$ 106.00	$ 1,060.00	
132	Misc. (Printing, FedEx, Travel etc.)	LS	1	$ 5,000.00	$ 5,000.00	
133	**TOTAL ENGINEERING SERVICES COST**				**$ 196,890.00**	
134						
135	**AFUDC**	%	8%	$ 3,400,108.00	**$ 272,009.00**	
136	**TOTAL PROJECT CONTIGENCY**	%	20%	$ 3,400,108.00	**$ 680,022.00**	
137						
138	**TOTAL PROJECT COST**				**$ 4,352,139.00**	
139						
140	**TOTAL COST PER FOOT**				**$ 896**	

CASE #2
16” Pipeline & Related Facilities – LG&E

Preliminary Cost Estimate - Case 2 - 16" Pipeline & Related Facilities - LG&E

PROJECT LG&E Mill Creek Pipeline Route - Case 2
0.92 Miles, 16" Pipeline, 1000 psig Design Pressure/MAOP, 1/8" Corrosion Allowance
NGCC1, NGCC2 & NGCC 3 each @ 90 MMSCFD (@700PSIG, >75%CF)

LOCATION Jefferson County, KY

REV REV C - Final

DATE January 4, 2021

TYPE Budget Type Estimate, 30% Accuracy

LINE NUM.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	COMMENTS
1	**PROCUREMENT**					
2	**PIPELINE MATERIAL**					
3	16" x 0.500" 5LX52 ERW, PSL2 Pipe with FBE Coating	FOOT	4,280	$ 46.00	$ 196,880.00	Includes 3% Kicker
4	16" x 0.500" 5LX52 ERW, PSL2 Pipe with FBE Coating & Powercrete Coating	FOOT	800	$ 54.00	$ 43,200.00	HDD & Bore, Includes 5% Kicker
5	16" 3D Segmentable Weld Elbows Y52, 90 deg.	EACH	6	$ 1,200.00	$ 7,200.00	45°<X<90°
6	16" 3D Segmentable Weld Elbows Y52, 45 deg.	EACH	8	$ 780.00	$ 6,240.00	18°<X<45°
7	Trucking for Items 3 to 6	TRUCK	11	$ 5,000.00	$ 55,000.00	
8	20" x 16" Launcher Assembly	EACH	1	$ 130,000.00	$ 130,000.00	
9	20" x 16" Receiver Assembly	EACH	1	$ 130,000.00	$ 130,000.00	
10	Marker Sign & Post	EACH	5	$ 20.00	$ 100.00	1 Per 1000 feet
11	Rectifier and Groundbed	EACH	1	$ 30,000.00	$ 30,000.00	
12	AC Mitigation	FT	4,858	$ 7.00	$ 34,004.00	
13	Standard Test Station	EACH	8	$ 100.00	$ 800.00	
14	Coupons with RMUs	EACH	3	$ 300.00	$ 900.00	
15	Insulating Flange Kit	EACH	2	$ 300.00	$ 600.00	1 per pig trap/pipeline delination
16	**Pipeline Material Subtotal**				**$ 634,924.00**	
17	Sales Tax	%	6.0%	$ 634,924.00	$ 38,096.00	
18	**Sales Tax Subtotal**				**$ 38,096.00**	
19	**FREIGHT**					
20	Freight For All Non-Pipe Materials	%	7.5%	$ 326,404.00	$ 24,481.00	
21	**Freight Subtotal**				**$ 24,481.00**	
22	**TOTAL MATERIAL AND FREIGHT COST**				**$ 697,501.00**	
23						
24	**CONSTRUCTION**					
25	**PIPELINE CONSTRUCTION**					
26	Mob/Demob	LS	1	$ 250,000.00	$ 250,000.00	
27	Truck Off Load & Transport 16" Pipe to Storage Yard	FOOT	5,080	$ 2.50	$ 12,700.00	Load Truck, Transport, Offload Truck
28	Lay 16" x 0.500" 5LX52 Line Pipe Including Soil Sep., Coating Field Welds & All Tie-Ins	FOOT	3,933	$ 210.00	$ 825,846.00	historic pricing based on lay of similar length and size
29	16" Directional Drill of P&L Railroad, w/ 16" x 0.500" 5LX52 FBE + PC coated pipe	FOOT	500	$ 550.00	$ 275,000.00	historic pricing based on lay of similar length and size (75% rock assumed)
30	16" Conventional Bore of US-60 & Mill Creek Loop Rail, w/ 16" x 0.500" 5LX52 FBE + PC coated pipe	FOOT	225	$ 325.00	$ 73,125.00	historic pricing based on lay of similar length and size (75% rock assumed)
31	16" Wetland Open Cut Installation w/ 16" x 0.500" 5LX52 FBE	FOOT	200	$ 175.00	$ 35,000.00	Approx. 4 small stream crossings.
32	Provide X-Ray Services for Non-Destructive Inspection - 16"	MILE	0.92	$ 20,000.00	$ 18,400.00	
33	Hydrostatic Test, Dewater & Dry 16" Pipe	FOOT	4,858	$ 12.00	$ 58,292.00	Assumed water is sourced and discharged at Mill Creek Facility
34	Fabricate and Install Pig Traps	EACH	2	$ 175,000.00	$ 350,000.00	Upstream and downstream pig traps
35	Rock Removal (Per Linear Foot of Trench)	FOOT	1,033	$ 100.00	$ 103,315.00	25% of route minus HDD & Bore
36	Provide Trench Padding Machine and Pad Ditch	FOOT	1,033	$ 10.00	$ 10,332.00	25% of route minus HDD & Bore
37	Furnish and Install Sandbag/Foam Trench Breaker	EACH	5	$ 75.00	$ 375.00	
38	Supply and Install Wood Mats	EACH	90	$ 400.00	$ 36,000.00	HHD + Wetland footages
39	Removing and Chipping of Trees and Brush	ACRE	1.00	$ 30,000.00	$ 30,000.00	

40	Installing Cathodic Protection and AC Mitigation	EACH	1	$ 30,000.00	$ 30,000.00	
41	Installing Pipeline Marker Signs	EACH	5	$ 250.00	$ 1,250.00	1 Per 1000 feet
42	Supply and Installing Straw Bales	EACH	20	$ 25.00	$ 500.00	
43	Supply and Install Orange Safety Fence	FOOT	254	$ 5.00	$ 1,270.00	5% of total pipeline
44	Supply and Install Silt Fence	FOOT	254	$ 8.00	$ 2,032.00	5% of total pipeline
45	Supply and Installing Erosion Control Fabric at Facilities	SQ. YD.	200	$ 8.00	$ 1,600.00	
46	Supply and Installing Crushed Rock and Geotextile Fabric Under Rock at Facilities	SQ. YD.	200	$ 25.00	$ 5,000.00	
47	Reseeding	ACRE	8	$ 1,750.00	$ 14,637.00	
48	Installing Anchored Mulch	ACRE	2	$ 2,800.00	$ 5,600.00	
49	**TOTAL CONSTRUCTION COST**				**$ 2,140,274.00**	
50						
51	**SURVEY SERVICES**					
52	**Preliminary Survey & Cadastral Survey**					
53	Project Manager	HOUR	8	$ 115.00	$ 920.00	
54	Survey Technician	HOUR	16	$ 75.00	$ 1,200.00	
55	Professional Land Surveyor	HOUR	8	$ 115.00	$ 920.00	
56	Two Person Survey Crew	HOUR	48	$ 150.00	$ 7,200.00	
57	Project Mileage	MILE	100	$ 0.58	$ 58.00	
58	Per Diem	UNIT	8	$ 150.00	$ 1,200.00	
59	Mobilization	UNIT	4	$ 600.00	$ 2,400.00	
60	**Sub-Total Preliminary Survey**				**$ 13,898.00**	
61	**Pre-Construction Staking & Staking for Tree Clearing**					
62	Project Manager	HOUR	1	$ 115.00	$ 115.00	
63	Survey Technician	HOUR	8	$ 75.00	$ 600.00	
64	Two Person Survey Crew	HOUR	24	$ 150.00	$ 3,600.00	
65	Project Mileage	MILE	50	$ 0.58	$ 29.00	
66	Per Diem	UNIT	4	$ 150.00	$ 600.00	
67	Mobilization	UNIT	2	$ 600.00	$ 1,200.00	
68	**Sub-total Pre-Con Staking**				**$ 6,144.00**	
69	**As-built Survey**					
70	Two Person Survey Crew, Day Rate	HOUR	200	$ 150.00	$ 30,000.00	Includes mileage and per diem
71	Project Mileage	MILE	400	$ 0.58	$ 232.00	
72	Per Diem	UNIT	8	$ 150.00	$ 1,200.00	
73	Mobilization	UNIT	8	$ 600.00	$ 4,800.00	
74	**Sub-total As-built Survey**				**$ 36,232.00**	
75	**Other Survey**					
76	Boundary Mosaic and Landowner Plats	PLAT	4	$ 415.00	$ 1,660.00	Assume 4 plats
77	**Sub-Total Other Survey**				**$ 1,660.00**	
78	**TOTAL SURVEY SERVICES COST**				**$ 57,934.00**	
79						
80	**LAND ACQUISITION**					
81	**Easements**					
82	30-Ft Wide Permanent Easement	ACRE	3	$ 15,000.00	$ 50,182.00	Assumes full route
83	Easement Recording fees	EACH	4	$ 50.00	$ 200.00	Assumes 4 parcels
84	Cathodic Protection - Deep Well Groundbed & Rectifier	EACH	1	$ 7,500.00	$ 7,500.00	25% of per acre cost

85	**Easement Costs Subtotal**				**$ 57,882.00**	
86	**Temporary and Construction**					
87	Temporary Workspace for Construction - Additional 45-Ft wide	ACRE	5	$ 7,500.00	$ 37,637.00	75' Wide Construction Workspace (30' perm. Easement), 50% of per acre cost
88	Additional Temporary Workspace	ACRE	1.0	$ 7,500.00	$ 7,500.00	ATWS for HDD & 4 stream crossings
89	Contractor Yard	ACRE	0	$ 7,500.00	$ -	Assumes contractor yard is within Mill Creek
90	**Temporary and Construction Subtotal**				**$ 45,137.00**	
91	**Permit Fees - Roads and Railroads**					
92	Railroad	EACH	1	$ 1,500.00	$ 1,500.00	# of RR Crossings
93	Roads	EACH	1	$ 500.00	$ 500.00	# of Road Crossings
94	Survey Permits - Miscellaneous	EACH	4	$ 200.00	$ 800.00	Assumes 4 parcels
95	**Permit Fees Subtotal**				**$ 2,800.00**	
96	**Third Party ROW Agents**	LS	1	$ 150,000.00	$ 150,000.00	
97	**TOTAL LAND ACQUISITION COST**				**$ 255,819.00**	
98						
99	**ENVIRONMENTAL SERVICES**					
100	Waters of the US Delineation	LS	1	$ 7,000.00	$ 7,000.00	
101	Threatened and Endangered Species Habitat Assessment	LS	1	$ 2,600.00	$ 2,600.00	
102	Waters of the US and other Environmental Permitting	LS	1	$ 7,400.00	$ 7,400.00	
103	Cultural Resources Services and Phase I Literature Review	LS	1	$ 1,500.00	$ 1,500.00	
104	Phase I Reconnaissance and Reports	LS	1	$ 5,600.00	$ 5,600.00	
105	**TOTAL ENVIRONMENTAL COST**				**$ 24,100.00**	
106						
107	**GEOTECHNICAL SERVICES**					
108	**Drilling, Laboratory Testing, & Engineering Services**					2 per HDD, 1 per bore, 1 per facility
109	**TOTAL GEOTECHNICAL SERVICES COST**				**$ 37,500.00**	
110						
111	**INSPECTION SERVICES**					
112	**Construction Inspection Services**					
113	Chief Inspector	MAN/WEEK	8	$ 7,700.00	$ 61,600.00	1 Construction Spread - 2 Months
114	Welding Inspector	MAN/WEEK	8	$ 7,500.00	$ 60,000.00	1 Construction Spread - 2 Months - 1 W. Inspect/Spread
115	Utility Inspector	MAN/WEEK	8	$ 7,500.00	$ 60,000.00	1 Construction Spread - 2 Months - 1 U. Inspect/Spread
116	Office Manager	MAN/WEEK	8	$ 4,500.00	$ 36,000.00	1 Construction Spread - 2 Months
117	Environmental Training	MAN/DAY	2	$ 1,250.00	$ 2,500.00	
118	Environmental Inspection	MAN/WEEK	8	$ 7,500.00	$ 60,000.00	1 Inspector - 2 Months - 4 Weeks/Mo, 6 Days/Week
119	Construction Office Expenses - Office Rental	MO	2	$ 1,500.00	$ 3,000.00	1 Construction Spread - 2 Months
120	Construction Office Expenses - Office Supplies	MO	2	$ 1,000.00	$ 2,000.00	1 Construction Spread - 2 Months
121	**TOTAL INSPECTION SERVICES COST**				**$ 285,100.00**	
122						
123	**ENGINEERING SERVICES**					
124	Project/Design Management	HR	160	$ 179.00	$ 28,640.00	
125	Project Engineering	HR	300	$ 121.00	$ 36,300.00	
126	Cathodic Protection /AC Mitigation (Includes field time and travel day rates)	HR	400	$ 134.00	$ 53,600.00	
127	Construction Drafting	HR	600	$ 103.00	$ 61,800.00	
128	As-Built Drafting	HR	50	$ 118.00	$ 5,900.00	
129	Metallurgical Consulting	HR	10	$ 235.00	$ 2,350.00	

130	Procurement	HR	20	$ 112.00	$ 2,240.00
131	Project Controls Engineer	HR	10	$ 106.00	$ 1,060.00
132	Misc. (Printing, FedEx, Travel etc.)	LS	1	$ 5,000.00	$ 5,000.00
133	**TOTAL ENGINEERING SERVICES COST**				**$ 196,890.00**
134					
135	**AFUDC**	%	8%	$ 3,695,118.00	**$ 295,610.00**
136	**TOTAL PROJECT CONTIGENCY**	%	20%	$ 3,695,118.00	**$ 739,024.00**
137					
138	**TOTAL PROJECT COST**				**$ 4,729,752.00**
139					
140	**TOTAL COST PER FOOT**				**$ 974**

CASE #1 or 2
Interconnect Facilities - TGT

Preliminary Cost Estimate - Case 1 or Case 2 Interconnect Facilities - TGT

PROJECT LG&E Mill Creek Pipeline Route - Case 1 or Case 2
1000 psig Design Pressure/MAOP, 1/8" Corrosion Allowance
TGT Interconnect Facilities

LOCATION Jefferson County, KY

REV REV B - Final

DATE December 22, 2020

TYPE Budget Type Estimate, 30% Accuracy

LINE NUM.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	COMMENTS
1	**MATERIAL**					
2	**INTERCONNECT MATERIAL**					
3	Filter Separator	EACH	1	$ 150,000.00	$ 150,000.00	
4	8" Ultrasonic Meter	EACH	2	$ 89,721.00	$ 179,442.00	
5	8" Flow Control Vavle, VRG, Sized for 90 MMSCFD, 600-1200 PSIG	EACH	2	$ 31,090.00	$ 62,180.00	
5	Gas Chromatograph	EACH	1	$ 30,000.00	$ 30,000.00	
6	Odorizer	EACH	1	$ 50,785.00	$ 50,785.00	
7	Balance of Pipe, Valves, and Fittings	LS	1	$ 357,630.00	$ 357,630.00	
8	**M&R Material Subtotal**				**$ 830,037.00**	
9	Miscellaneous Small Diameter Pipe, Fittings, Equipment, and Instrumentation	%	10.0%	$ 830,037.00	$ 83,004.00	
10	**Misc. Material Subtotal**				**$ 83,004.00**	
11	Sales Tax	%	6.0%	$ 913,041.00	$ 54,783.00	
12	**Sales Tax Subtotal**				**$ 54,783.00**	
13	**FREIGHT**					
14	Freight For All Materials	LOT	7.5%	$ 913,041.00	$ 68,479.00	
15	**Freight Subtotal**				**$ 68,479.00**	
16	**TOTAL MATERIAL AND FREIGHT COST**				**$ 1,036,303.00**	
17						
18	**CONSTRUCTION**					
19	Hot tap TGT mainlines	EACH	2	$ 85,000.00	$ 170,000.00	Per recent TDW quotes
20	Fabricate and Install M&R Facilities	EACH	1	$ 1,000,000.00	$ 1,000,000.00	All Mech., Civil, E&I & NDE
21	**TOTAL CONSTRUCTION COST**				**$ 1,170,000.00**	
22						
23	**SURVEY SERVICES**					
24	**Preliminary Survey**					
25	Project Manager	HOUR	1	$ 95.00	$ 95.00	0.5 Hr/Crew Day
26	RLS	HOUR	1	$ 85.00	$ 85.00	0.5 Hr/Crew Day
27	Two Person Crew with GPS	DAY	2	$ 850.00	$ 1,700.00	One Crew - 2 Person Crew - 2 Day
28	Data Processor	HOUR	3	$ 75.00	$ 225.00	1.5 Hr/Crew Day
29	Sundays no work, per diem only	DAY	0	$ 142.00	$ -	
30	Mileage, additional over 100 per day	MILE	200	$ 0.54	$ 108.00	1 Vehicles-2 Day-100 Miles/D
31	Survey Supplies	EACH	1	$ 310.00	$ 310.00	One - 2 Person Survey Crew
32	Per Diem	DAY	4	$ 142.00	$ 568.00	2 Field Employees - 2 Day
33	Mob/Demob	EACH	4	$ 600.00	$ 2,400.00	One - 2 Person Survey Crew
34	**Sub-Total Preliminary Survey**				**$ 5,491.00**	
35	**Pre-Construction Staking**					
36	Project Manager	HOUR	1	$ 95.00	$ 47.50	0.5 Hr/Crew Day
37	Survey Supervisor	DAY	1	$ 85.00	$ 42.50	0.5 Hr/Crew Day
38	Two Person Crew with GPS	DAY	1	$ 850.00	$ 850.00	One Crew - 2 Person Crew - 1 Day

LINE NUM.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	COMMENTS
39	Data Processing	HOUR	0	$ 75.00	$ -	
40	Sundays no work, per diem only	DAY	0	$ 142.00	$ -	
41	Mileage, additional over 100 per day	MILE	100	$ 0.54	$ 54.00	1 Vehicles-1 Day-100 Miles/D
42	Survey Supplies	EACH	1	$ 310.00	$ 310.00	One - 2 Person Survey Crew
43	Per Diem	DAY	2	$ 142.00	$ 284.00	2 Field Employees - 1 Day
44	Mob/Demob	EACH	4	$ 600.00	$ 2,400.00	One - 2 Person Survey Crew
45	**Sub-total Pre-Con Staking**				**$ 3,988.00**	
46	**As-built Survey**					
47	Project Manager	HOUR	1	$ 95.00	$ 95.00	0.5 Hr/Crew Day
48	Survey Supervisor	HOUR	1	$ 85.00	$ 85.00	0.5 Hr/Crew Day
49	Two Person Crew with GPS	DAY	3	$ 850.00	$ 2,550.00	1 Crew - 2 Person Crew - 3 Day
50	Data Processing	HOUR	5	$ 75.00	$ 338.00	1.5 Hr/Crew Day
51	Sundays no work, per diem only	DAY	0	$ 142.00	$ -	
52	Mileage, additional over 100 per day	MILE	300	$ 0.54	$ 162.00	1 Vehicles-3 Day-100 Miles/D
53	Survey Supplies	EACH	1	$ 310.00	$ 310.00	One - 2 Person Survey Crew
54	Per Diem	DAY	6	$ 142.00	$ 852.00	2 Field Employees - 3 Day
55	Mob/Demob	EACH	4	$ 600.00	$ 2,400.00	One - 2 Person Survey Crew
56	**Sub-total As-built Survey**				**$ 6,792.00**	
57	**TOTAL SURVEY SERVICES COST**				**$ 16,271.00**	
58						
59	**INSPECTION SERVICES**					
60	**Material Inspection Services**					
61	Valves, Fittings, Etc.	MAN/WEEK	1	$ 6,500.00	$ 6,500.00	
62	**Material Inspection Services Subtotal**				**$ 6,500.00**	
63	**Construction Inspection Services**					
64	Chief Inspector	MAN/WEEK	3	$ 7,700.00	$ 23,100.00	1 Construction Spread-3 Weeks Each
65	Welding Inspector	MAN/WEEK	3	$ 7,500.00	$ 22,500.00	1 Construction Spreads-3 Weeks Each-1 W. Inspect/Spread
66	Office Manager	MAN/WEEK	3	$ 4,500.00	$ 13,500.00	1 Construction Spreads-3 Weeks Each
67	**Construction Inspection Services Subtotal**				**$ 59,100.00**	
68	**TOTAL INSPECTION SERVICES COST**				**$ 65,600.00**	
69						
70	**ENGINEERING SERVICES**					
71	Project/Design Management	HR	80	$ 179.00	$ 14,320.00	
72	Project Engineering	HR	350	$ 121.00	$ 42,350.00	
73	Construction Drafting w/ CADD Equipment	HR	750	$ 103.00	$ 77,250.00	
74	As-Built Drafting w/ CADD Equipment	HR	100	$ 118.00	$ 11,800.00	
75	Metallurgical Consulting	HR	5	$ 235.00	$ 1,175.00	
76	Procurement	HR	10	$ 112.00	$ 1,120.00	
77	Project Controls Engineer	HR	4	$ 106.00	$ 424.00	
78	Misc. (Printing, FedEx, Travel etc.)	LS	1	$ 5,000.00	$ 5,000.00	
79	**Engineering Subtotal**				**$ 153,439.00**	
80	**TOTAL ENGINEERING SERVICES COST**				**$ 153,439.00**	
81						
82	**AFUDC**		8.0%	$ 2,441,613.00	**$ 195,330.00**	

LINE NUM.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	COMMENTS
83	**TOTAL PROJECT CONTINGENCY**		20.0%	$ 2,441,613.00	**$ 488,323.00**	
84						
85	**TOTAL PROJECT COST**				**$ 3,125,266.00**	

SECTION 6
ATTACHMENTS

ATTACHMENT #1
Pipeline Route Map

Mile Posts
Launcher/Receiver
Bore
HDD
Mill Creek Route
Texas Gas Pipeline

Wetlands
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Riverine

USA Flood Hazard Areas
Base Floodplain
0.2% Annual Chance Flood Hazard
1% Annual Chance Flood Hazard
Parcels
Facility

5 Ft Contours
Railroad

0 225 450 900 Feet

REV NUM	DATE			
A	12/4/2020	JW	FEED - ISSUED FOR REVIEW	

REVISION TABLE

ABSOLUTE SCALE: 1:3,600
REFERENCE SCALE: 1 IN = 300 feet
Page 1 of 1

DRAWN BY:	JW
CHECKED BY:	TE
APPROVED BY:	BA
PROJECT:	2036023.01
DATE:	12/4/2020
REV:	A

LG&E

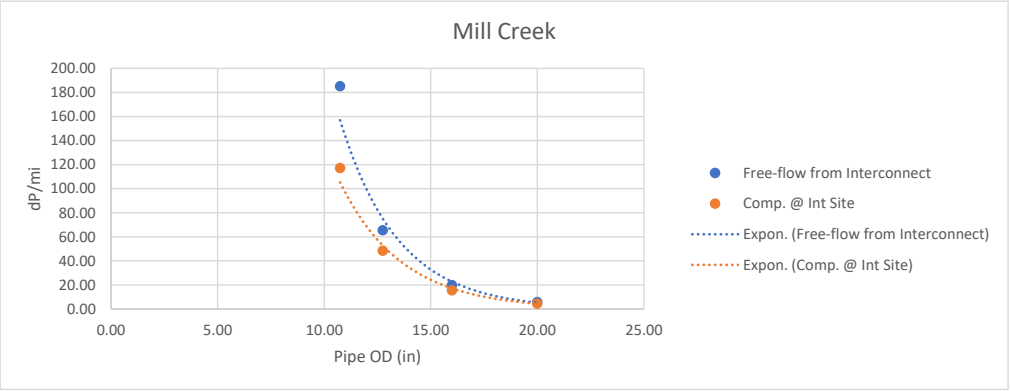
LG&E Mill Creek FEED Study

ENGineering

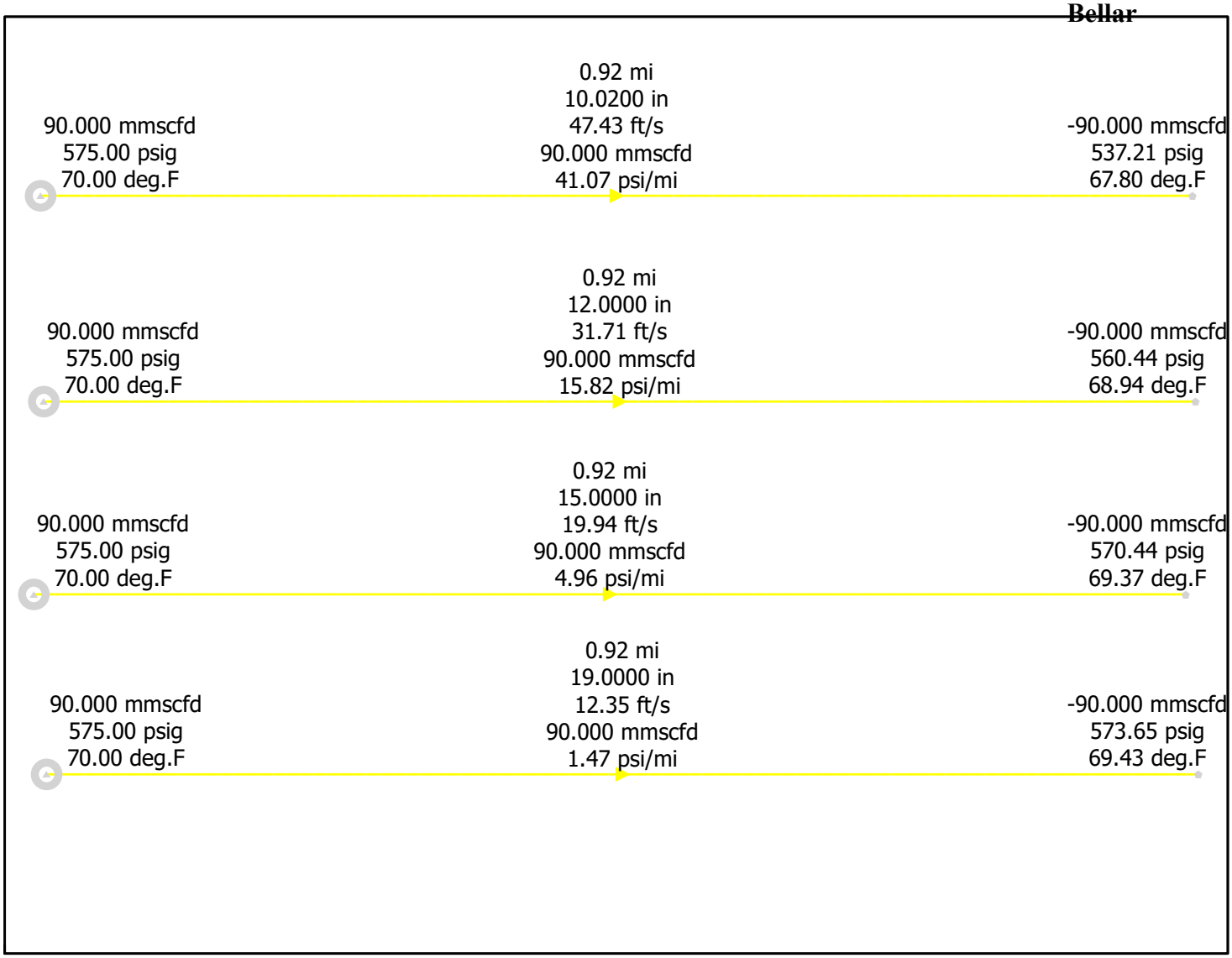
Document Path: I:\DI\Projects\GIS\Projects\Oil and Gas\L G&E\2020 Pipeline FEED Study - 2036023.00\LGE Mill Creek FEED Study Exhibit.mxd

ATTACHMENT #2
Hydraulic Analysis

Site	Comp. Location	Flowrate	Supply Gas Temperature	Inlet Pressure	Pipe OD	Pipe WT	Pipe ID	Pipeline Length	Downstream Velocity	Pressure Drop per Mile	Delivery Pressure
		MMSCFD	°F	psig	in	in	in	mi	ft/s	psid/mi	psig
Mill Creek	Free-flow from Interconnect	90	70	575.0	10.75	0.365	10.02	0.92	47.43	41.07	537.2
		90	70	575.0	12.75	0.375	12.00	0.92	31.71	15.82	560.4
		90	70	575.0	16.00	0.5	15.00	0.92	19.93	4.96	570.4
		90	70	575.0	20.00	0.5	19.00	0.92	12.35	1.47	573.7
		180	70	575.0	10.75	0.365	10.02	0.92	125.34	185.17	404.6
		180	70	575.0	12.75	0.375	12.00	0.92	68.99	65.47	514.8
		180	70	575.0	16.00	0.5	15.00	0.92	40.87	19.86	556.7
		180	70	575.0	20.00	0.5	19.00	0.92	24.89	5.79	569.7
	Comp. @ Int Site	90	70	728.9	10.75	0.365	10.02	0.92	35.77	31.41	700.0
		90	70	711.5	12.75	0.375	12.00	0.92	24.99	12.53	700.0
		90	70	703.7	16.00	0.5	15.00	0.92	16.01	3.98	700.0
		90	70	701.1	20.00	0.5	19.00	0.92	9.98	1.18	700.0
		180	70	807.9	10.75	0.365	10.02	0.92	70.81	117.27	700.0
		180	70	744.6	12.75	0.375	12.00	0.92	49.79	48.44	700.0
		180	70	714.4	16.00	0.5	15.00	0.92	31.99	15.64	700.0
		180	70	704.3	20.00	0.5	19.00	0.92	19.96	4.65	700.0



LG&E Mill Creek



Legend

Facilities Symbols
Default Pipe
Nodes Symbols
Default Known Node
Default Unknown Node
Default Supply Node
Polygons Symbols

Facilities Color By
Nodes Color By

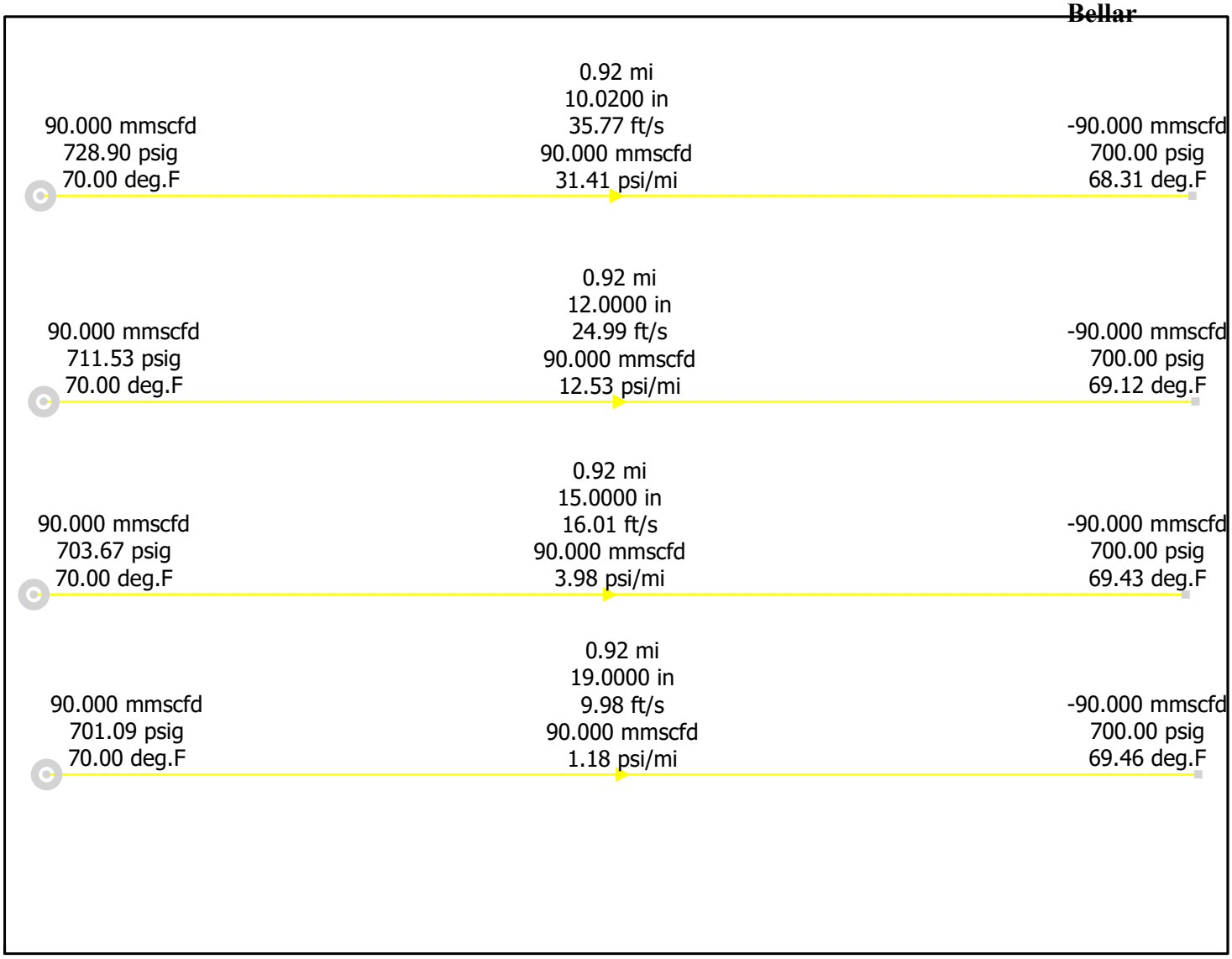
Simulation Data:
State: Solved Feasible
Date: 11/19/2020
Time: 0.00

Model Description:

Model Name: LGE Mill Creek

Model Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

LG&E Mill Creek



Legend

Facilities Symbols
Default Pipe

Facilities Color By
Nodes Color By

Nodes Symbols
Default Known Flow Node
Default Known Pressure Node
Default Supply Node

Polygons Symbols

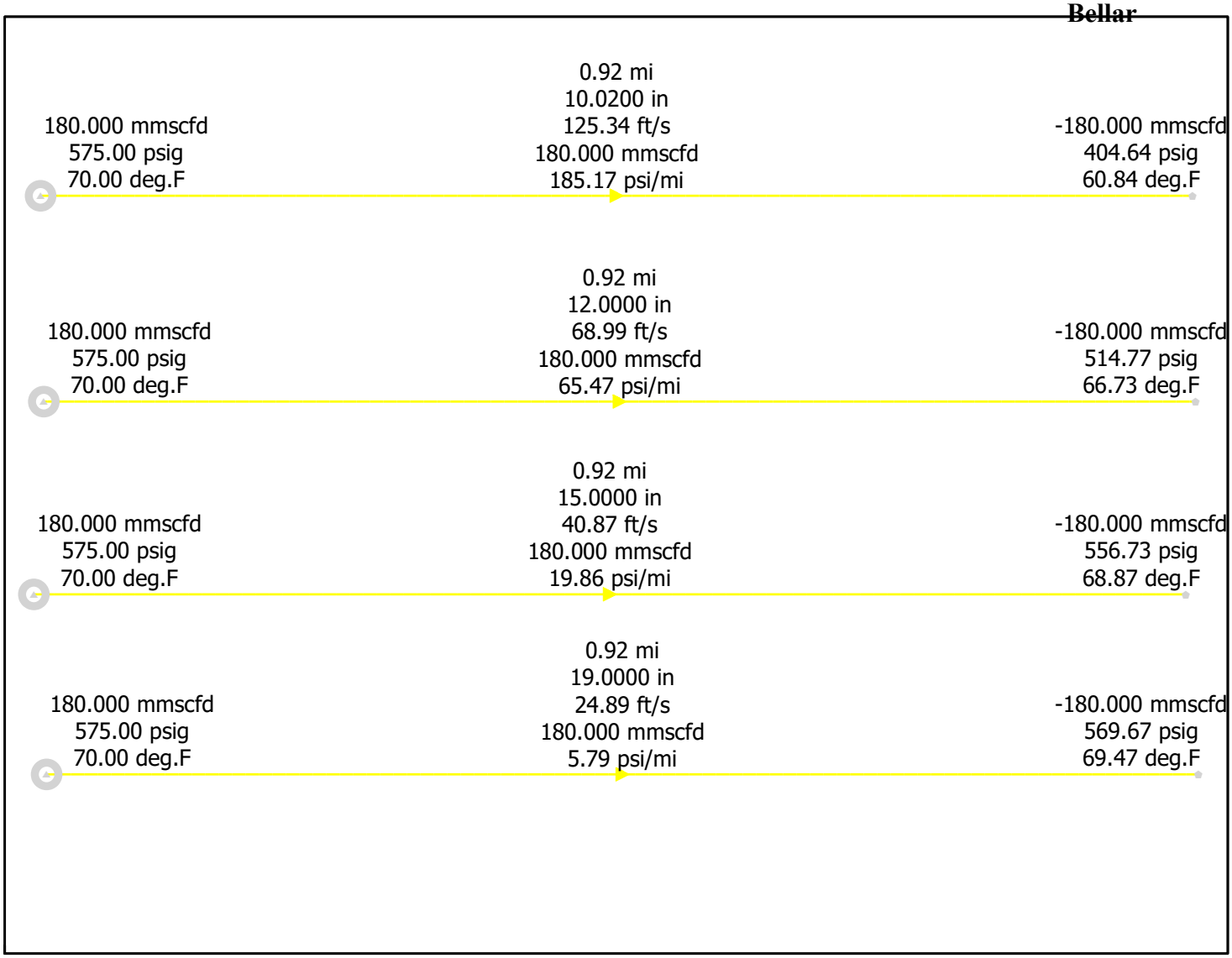
Simulation Data:
State: Solved Feasible
Date: 11/19/2020
Time: 0.00

Model Description:

Model Name: LGE Mill Creek

Model Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

LG&E Mill Creek



Legend

Facilities Symbols
Default Pipe
Facilities Color By
Nodes Color By
Nodes Symbols
Default Known Node
Default Unknown Node
Default Supply Node
Polygons Symbols

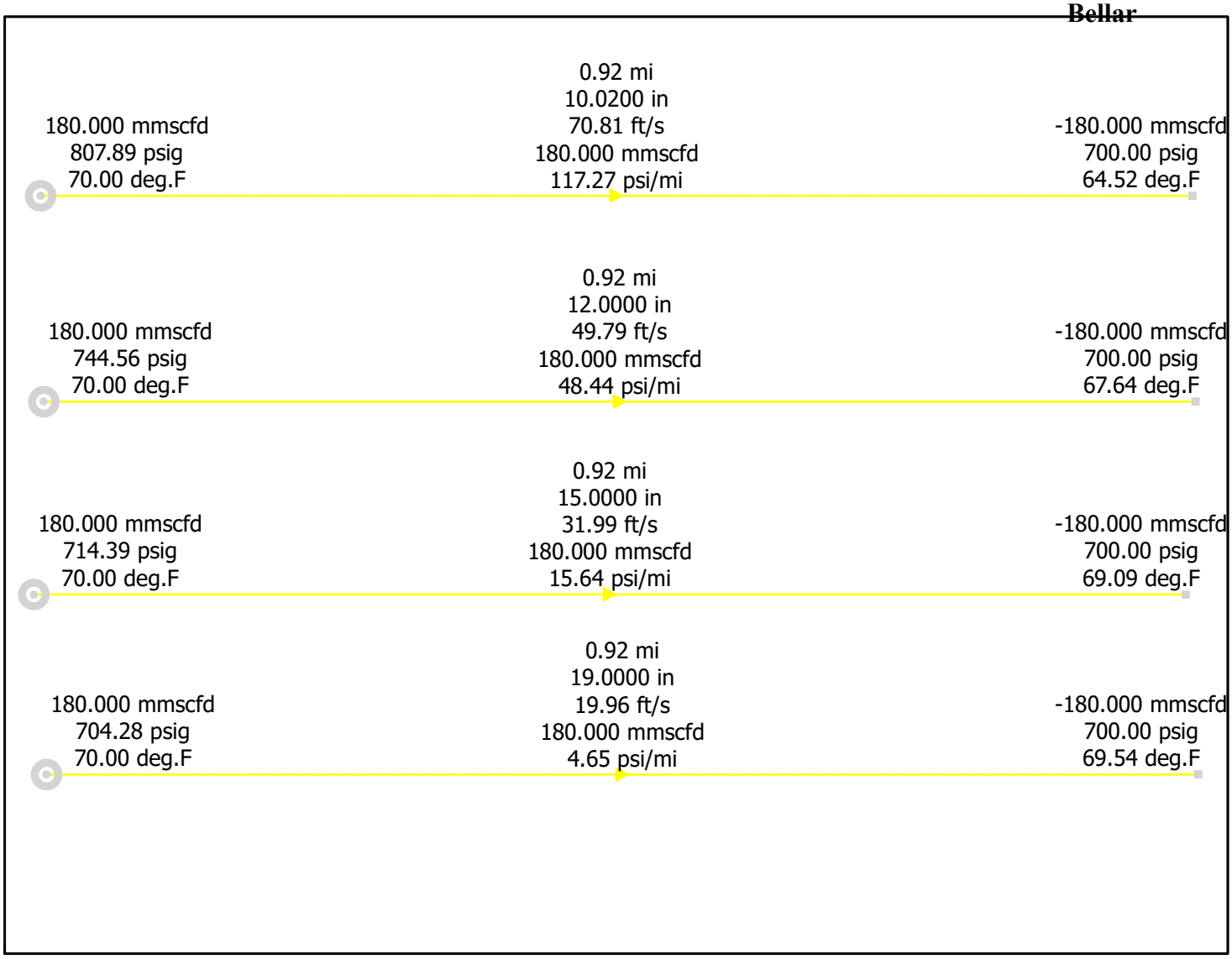
Simulation Data:
State: Solved Feasible
Date: 11/19/2020
Time: 0.00

Model Description:

Model Name: LGE Mill Creek

Model Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

LG&E Mill Creek



Legend

Facilities Symbols
Default Pipe

Facilities Color By
Nodes Color By

Nodes Symbols
Default Known Flow Node
Default Known Pressure Node
Default Supply Node

Polygons Symbols

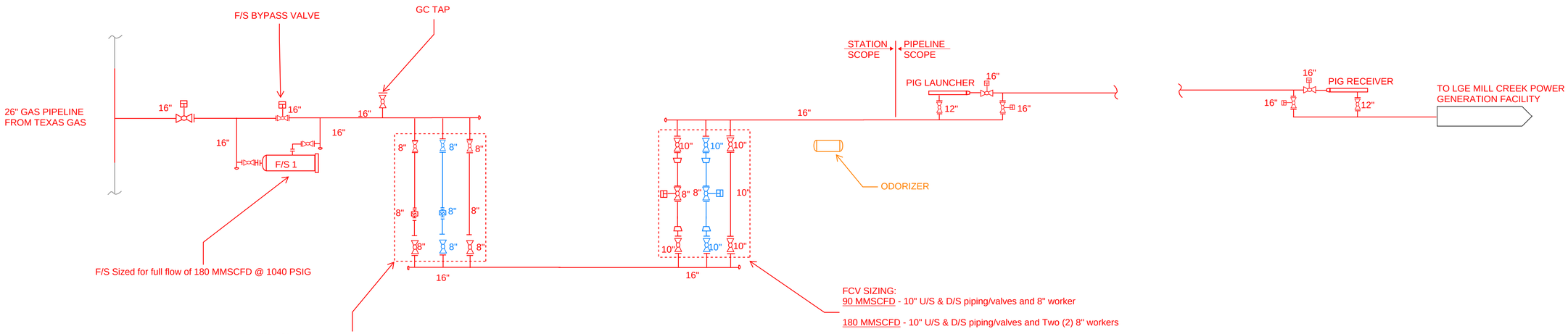
Simulation Data:
State: Solved Feasible
Date: 11/19/2020
Time: 0.00

Model Description:

Model Name: LGE Mill Creek

Model Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

ATTACHMENT #3
Process Flow Diagrams



NOTES:
1. MATERIAL LISTED IN BLUE APPLIES TO SPECIFICALLY THE ADDITIONAL CAPACITY REQUIRED MOVING FROM 90 MMSCFD TO 180 MMSCFD. THIS MATERIAL WILL BE BLIND FLANGED FOR THE LOWER FLOW CASE.

DESIGNED IN ACCORDANCE WITH TITLE 49–PART 192 OF MINIMUM FEDERAL SAFETY STANDARDS AND GPTC GUIDE FOR GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS, LATEST EDITION.

NO.	DATE ISSUED	BY	DATE AS BUILT	BY	DESCRIPTION	ENGR.	DATE APPROVED	BY
0	12/21/20	TD			2020 FEED STUDY			

REVISIONS

ENengineering
28100 TORCH PARKWAY
WARRENVILLE, IL 60555
TEL. 630.353.4000
FAX 630.353.7777
WWW.ENENGINEERING.COM

DWG NUMBER	TITLE

REFERENCE DRAWINGS

LG&E
a PPL company

	ISSUED FOR BID		PROJECT I.D.
	ISSUED FOR CONSTRUCTION		DRAWING SIZE D

2020 MILL CREEK FEED STUDY
TEXAS GAS INTERCONNECT
PROCESS FLOW DIAGRAM

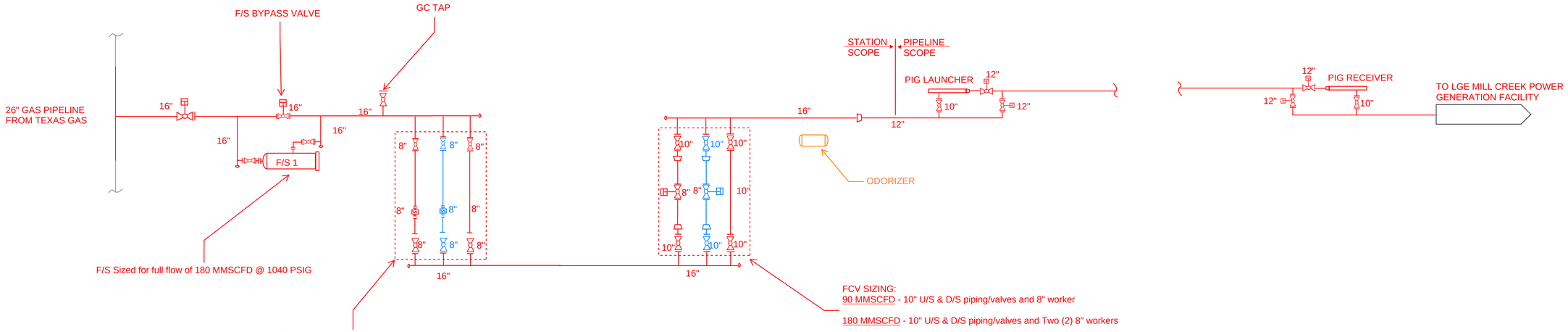
MUHLENBERG COUNTY KY

DRAWN	CHK. BY.	SCALE	DATE
		NONE	

PROJECT ENGR. / PROJECT MGR.: MDW

FILE NO.: LGE-MC-E1

FILE: \\ENE.ENENGINEERING.COM\DFS\FILESHARE\PROJECTS\LGE\2036023.00\01.0000\DRAWINGS\6-WORKING_DRAWINGS\LGE-MC-R4-E1.DWG



NOTES:
1. MATERIAL LISTED IN BLUE APPLIES TO SPECIFICALLY THE ADDITIONAL CAPACITY REQUIRED MOVING FROM 90 MMSCFD TO 180 MMSCFD. THIS MATERIAL WILL BE BLIND FLANGED FOR THE LOWER FLOW CASE.

DESIGNED IN ACCORDANCE WITH TITLE 49–PART 192 OF MINIMUM FEDERAL SAFETY STANDARDS AND GPTC GUIDE FOR GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS, LATEST EDITION.

NO.	DATE	BY	DATE	BY	DESCRIPTION	ENGR.	DATE	BY
	ISSUED		AS BUILT			APPROVED		
0	12/21/20	TD			2020 FEED STUDY			

REVISIONS

ENEngineering
28100 TORCH PARKWAY
WARRENVILLE, IL 60555
TEL. 630.353.4000
FAX 630.353.7777
WWW.ENENGINEERING.COM

DWG NUMBER	TITLE

REFERENCE DRAWINGS

LG&E a PPL company

	ISSUED FOR BID		PROJECT I.D.
	ISSUED FOR CONSTRUCTION		DRAWING SIZE D

2020 MILL CREEK FEED STUDY
TEXAS GAS INTERCONNECT
PROCESS FLOW DIAGRAM

MUHLENBERG COUNTY KY

DRAWN	CHK. BY.	SCALE NONE	DATE
PROJECT ENGR. / PROJECT MGR. MDW		FILE NO. LGE-MC-E2	

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