Goshen & Elberta Rural Expansion Analysis

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Purpose

As part of the state rural expansion provision, natural gas service is proposed for the towns of Goshen and Elberta. The High Pressure (HP) Feeder Line (FL) route would likely tap off of the currently planned 6-inch FL along US Highway 6 and head eastward as shown in Figure 1. The first segment would run approximately 1.7 miles to Elberta and then an additional 2.7 miles to Goshen. This analysis considers whether a 4-inch, 6-inch, or 8-inch diameter size FL should be installed for the given route operating under a 354 psig Maximum Allowable Operating Pressure (MAOP).

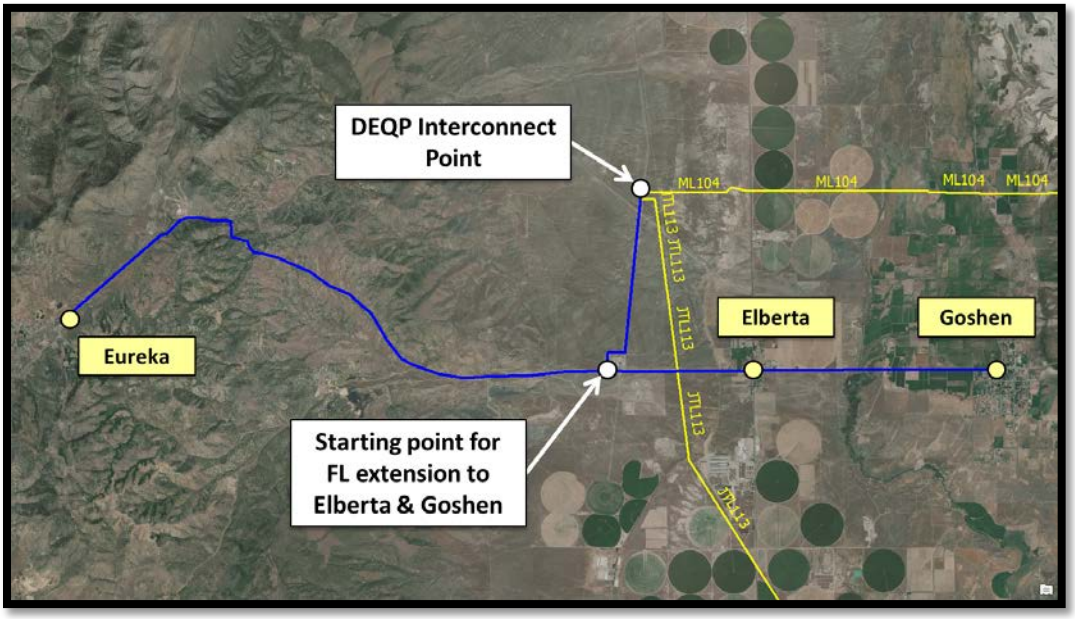

Figure 1: Overview of the HP FL route to Elberta and Goshen

Analysis

An unsteady-state model was used to analyze minimum pressures at the end of the HP FL options to Goshen for diameter sizes of 4-inch, 6-inch, and 8-inch under varying daily demands at Goshen and operating at a 354 psig MAOP. It should be noted that demand at Goshen and Elberta combined was assumed to be twice as large as the demand at Eureka based on estimated structure count and population size for each given town. Goshen and Elberta were also profiled to match typical residential demand behavior on an hourly basis as well. Results for these scenarios are shown in Figure 2.

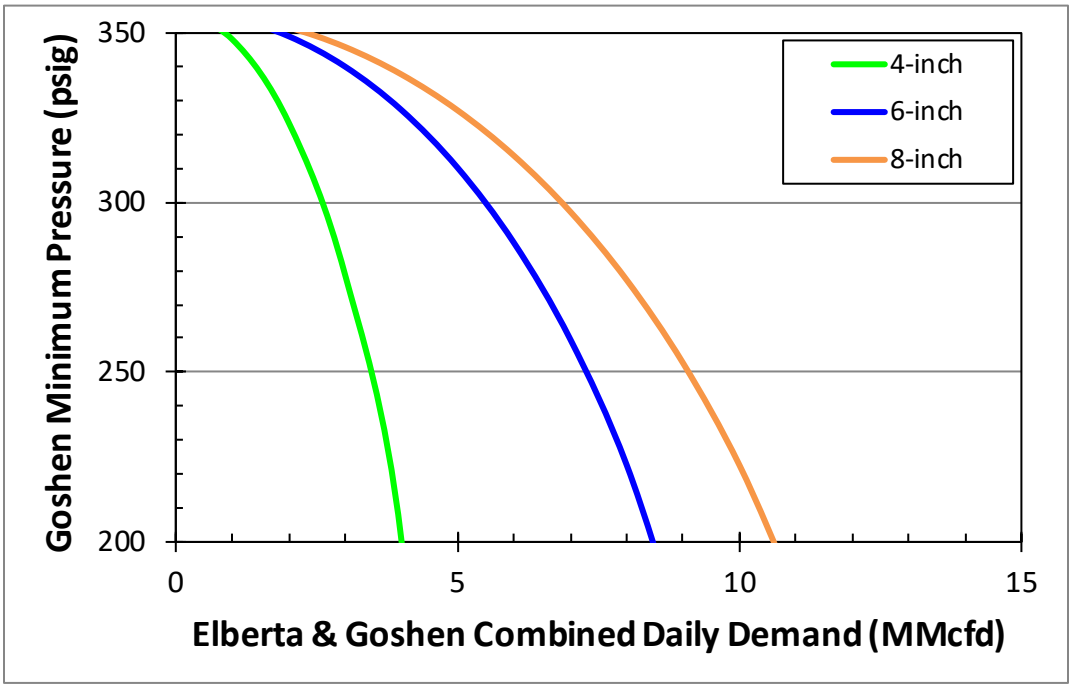

Figure 2: Minimum pressures at Goshen for different FL diameter sizes

The maximum daily and corresponding peak hour demands that can be provided via the proposed FL diameter sizes before the minimum pressure at Goshen drops below 200 psig is also shown in Table 1.

Table 1: Demand limits for different FL diameter sizes

	Daily Demand (MMcfd)	Peak Hour Demand (MMcfd)
4-inch	4.0	5.4
6-inch	8.4	11.4
8-inch	10.6	14.3

Analysis shows that increasing diameter size from 4-inch to 6-inch, more than doubles the daily and hourly capacity of the line to accommodate future growth in the area. Increasing the design size further from 6-inch to 8-inch diameter provides diminishing returns in capacity. [redacted] The potential peak hour residential demand of Elberta and Goshen is currently estimated at 1.25 MMcfd. While that demand wouldn't presently require a 6-inch line, rural expansion to this area will likely encourage firm growth per the original intent of the provision. Having the additional capacity available will be necessary and ensure DEUWI will not need to incur additional costs to upsize from a minimum diameter size of 4-inch in the future.

Conclusion

The appropriate diameter size for extending service to Elberta and Goshen under the rural expansion provision is 6-inch. This size can be installed for approximately the same costs as the 4-inch minimum diameter but gives the Company more flexibility in serving potential future growth around Elberta and Goshen. The line could also be extended in the future to serve the town of Genola.