Utilities helping utilities: A regional effort to address utility needs

Mallory Valley Utility District (MVUD), in partnership with **Maury County Water System, City of Mt. Pleasant Water Department, Columbia Power and Water Systems, and City of Spring Hill,** has completed its feasibility study exploring the potential of supplying Maury and Williamson County communities with water from the Cumberland River through a 30-mile MVUD water transmission line by 2033. This collaborative effort underscores our commitment to regional water solutions and informed community decisions, and we are immensely proud of the dedication of all partners.

Mallory Valley Utility District began in 1966, created by local farmers who needed access to water. We are a non-profit local government agency in Williamson County whose mission is to deliver safe, reliable, and high-quality water services to our customers while providing exceptional value to our current and future customers through service, teamwork, ownership, and initiative. MVUD strives to be a leader in addressing the evolving water needs of its communities. This feasibility study is a testament to that commitment, demonstrating the power of regional partnerships between public utilities to address shared challenges and achieve the best possible outcomes for our communities and our natural resources.

Beyond this specific study, MVUD maintains ongoing partnerships with Harpeth Valley Utilities District, Nolensville/College Grove Utility District, and Milcrofton Utility District knowing that, collectively, we can build a more secure future and better tomorrow through collaboration.

In alignment with Governor Bill Lee's Executive Order 108, which emphasizes protecting the threatened Duck River watershed and exploring alternative water sources, we initiated this study to investigate the viability of supplying Cumberland River water to these growing areas.

The Duck River, a critical water source for over 250,000 people in southern Middle Tennessee, faces increasing pressure from rapid population growth and industrial development. Based on our unique proximity between the Cumberland River and the Duck River watersheds, and in the spirit of “utilities helping utilities”, we reached out to explore the possibility of this study.

We recognize the critical importance of our leadership roles and the utilities we represent. Understanding the diverse possibilities available, we believe our actions today profoundly shape a more secure tomorrow for these communities.

Conversations surrounding this idea started in mid-2024. Those initial conversations evolved into this collaborative study, with Brasfield & Gorrie LLC, Hazen and Sawyer, and HDR Engineering Inc. leading the detailed analysis. The study assesses the high-level technical, environmental and financial aspects, and the feasibility of constructing a new finished drinking water pipeline by 2033.

We recognize there are various options for addressing future water needs. We understand that our communities and our leaders will be faced with tough decisions regarding which project is most beneficial now and in the long term. Our hope is that we provide information that empowers the community to make a well-informed choice. As we have consistently stated, we fully support whichever path forward is best suited to meet the needs of Maury County and Williamson County communities. Our ultimate goal is to foster continued community growth and success, ensuring Tennessee residents have a dependable water resource for a better today and a more secure tomorrow, supported by economically and environmentally sound decisions.

Thank you,

Mallory Valley Utility District

Jenny Clarke, General Manager

Bobby Nutt, Assistant General

Karen York, Director of Development

For questions please contact: Jenny Clarke, General Manager Jclarke@mvud.org

www.MVUD.org

Commissioners:

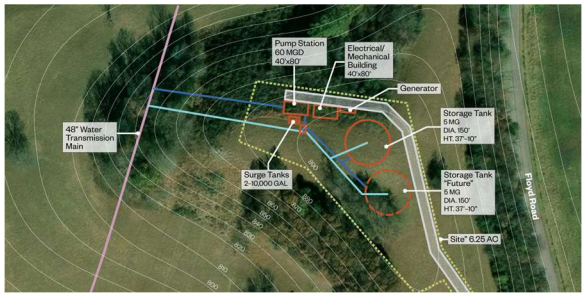
Ronald Coker, President

William Boger, Vice President

Henry Coley, Secretary

Hazen and Sawyer
545 Mainstream Drive, Suite 320
Nashville, TN 37221 • 615.783.1515









Mallory Valley Utility District Water Transmission Main Feasibility Study

Final Report
August 28, 2025

Table of Contents

Executive Summary v
1. Project Background 1-1
2. Hydraulic Modeling 2-1
2.1 Pipeline Analysis 2-1
2.2 Pumping and Storage Analysis 2-3
2.3 Water Age Analysis 2-4
2.4 Hydraulic Modeling Analysis Summary 2-4
3. Pipeline Route Analysis 3-1
3.1 Pipe Materials 3-1
3.2 Trenchless Crossings 3-2
3.3 Traffic Impact Review 3-2
3.4 Easement Identification & Acquisition 3-2
3.5 Route Analysis by Section 3-4
4. Pumping and Storage 4-1
4.1 Pump Station #1 – Beech Creek 4-1
4.2 Pump Station #2 & Storage Tank (Floyd Rd) 4-2
5. Water Quality Considerations 5-1
5.1 Utility Water Quality Assessment 5-1
5.2 Potential Corrosion and Scaling Impacts 5-4
5.3 Water Age and Chlorine Decay 5-5
5.4 Disinfection Byproduct Formation 5-7
5.5 Water Quality Next Steps 5-10
6. Identification of Future Field Information 6-1
7. Environmental, Cultural, and Historical Considerations 7-1
7.1 Waters of the U.S. and State 7-1
7.2 Protection of State Waters 7-5
7.2.1 Waters with Unavailable Parameters 7-5
7.2.2 Waters with Available Parameters 7-5
7.2.3 Exceptional Waters 7-5

7.3 Federally Protected Species 7-6
7.4 State-Listed Species 7-8
7.5 Historic and Cultural Resources 7-10
8. Permitting Requirements 8-1
8.1 Required TDEC Permits 8-2
8.2 Required Federal Permits 8-4
8.3 USACE Cumberland River Withdrawal Permit 8-4
8.4 Other Permits and Approvals 8-5
9. Raw Water Transmission Main Alternative 9-1
10. Design and Construction Schedule 10-1
10.1 Critical Success Factors 10-2
11. Opinion of Probable Construction Cost 11-1
12. Opinion of Probable Operating and Maintenance Cost 12-1
13. Cost of Service and Rate Analysis 13-1
13.1 Future Capital Costs and Allocations 13-1
13.2 Stakeholder Cost Allocations 13-4
13.3 Total Costs 13-6
14. Summary and Conclusions 14-1

List of Tables

Table 2-1: Pump Selection for Stations #1 & #2 2-4
Table 5-1: DIC Estimations from MOR Data 5-4
Table 5-2: One Day Chlorine Decay Approximation 5-6
Table 5-3: Two Day Chlorine Decay Approximation 5-7
Table 5-4: MVUD DBP Sample Site LRAAs 5-8
Table 7-1: Federally Protected Species 7-8
Table 7-2: State-Listed Species 7-9
Table 8-1: Required Permits to be Approved by TDEC 8-3
Table 8-2: Required Federal Permits 8-4
Table 8-3: Additional Permitting 8-5
Table 10-1: Project Schedule 10-3
Table 11-1: Cost Estimate Summary – 2025 Dollar Basis 11-1
Table 11-2: Cost Estimate Summary – Construction Mid-Point Basis (March 2032) 11-2
Table 12-1: Projected Operations and Maintenance Costs Assuming 35 MGD of Flow in 2033 12-2
Table 13-1: Utility Basis Annual Depreciation Expense (80-year) Allocation Under Different Project Scenarios[1] 13-3
Table 13-2: Utility Basis Annual Depreciation Expense (100-year) Allocation Under Different Project Scenarios[1] 13-3
Table 13-3: Total Estimated MVUD Expenses and Illustrative Example of HVUD Expenses in Test Year 2033 Assuming Delivery of 35 MGD of Water to Stakeholders 13-4
Table 13-4: Estimate of Annual MVUD Expense Allocations by Stakeholder, 2033 Used as Test Year 13-5

List of Figures

Figure 2-1: Recommended Pipeline Alternatives Summary 2-2
Figure 2-2: Ground Elevation & Resulting HGL w/ Recommended Pump Station Locations 2-3
Figure 3-1: Example of Easement Location adjacent to TVA ROW 3-3
Figure 3-2: HVUD Tie-In Point 3-5
Figure 3-3: West Side of Manley Lane Looking South 3-5
Figure 3-4: Wet Weather Ditch 3-6
Figure 3-6: Cartwright Close Neighborhood Entrance 3-7
Figure 3-7: View East of Hillsboro Road Crossing 3-9
Figure 3-8: View West of Hillsboro Road Crossing 3-9
Figure 3-9: Elevation Consideration at First Harpeth River Crossing 3-10
Figure 3-10: View from Old Hillsboro Road Looking Toward Wray Bluff 3-11
Figure 3-11: Harpeth River at Proposed Transmission Main Crossing 3-12
Figure 3-12: Standing on Lawrence Road Looking West 3-12
Figure 3-13: Standing at Highway 96 Looking North 3-14
Figure 3-14: Rock Ledge at Highway 96 3-14
Figure 3-15: Standing at Highway 96 Looking South 3-15
Figure 3-16: Bridge at Boyd Mill Pike Looking North 3-17

Figure 3-17: Bridge at Boyd Mill Pike Looking South 3-17
Figure 3-18: Standing on Southall Road Looking North 3-19
Figure 3-19: Standing on Southall Road Looking South 3-19
Figure 3-20: Standing on Bailey Road Looking North 3-20
Figure 3-21: Standing on Bailey Road Looking South 3-21
Figure 3-22: Standing on Bear Creek Road Looking North 3-22
Figure 3-23: Standing on Bear Creek Road Looking South 3-22
Figure 3-24: View from Interstate 840 Looking North 3-24
Figure 3-25: View from Interstate 840 Looking South 3-24
Figure 3-26: View from Fairview Road Looking North 3-26
Figure 3-27: View from Fairview Road Looking South at Carters Creek 3-26
Figure 3-28: The Orchard Under the TVA Powerlines 3-27
Figure 3-29: The Hill After Crossing Les Robinson Road 3-28
Figure 3-30: Standing on Gravel Hill Road Looking North 3-29
Figure 3-31: View from Roy Sellers Road Looking North 3-30
Figure 3-32: View from Roy Sellers Road Looking South 3-31
Figure 3-33: View from Mahon Road Looking North 3-32
Figure 3-34: View from Mahon Road Looking South 3-32
Figure 3-35: Tie-In Point: Multiple Parallel Powerline Easements 3-33
Figure 4-1: Pump Station #1 (Beech Creek) 4-1
Figure 4-2: Pump Station #2 & Storage Tank (Concept) 4-2
Figure 5-1: Water Quality Assessment Utility pH Comparison 5-1
Figure 5-2: Water Quality Assessment Utility Finished Alkalinity Comparison 5-2
Figure 5-3: Water Quality Assessment Utility Finished Chlorine Residual Comparison 5-2
Figure 5-4: Water Quality Assessment Utility Finished Hardness Comparison 5-3
Figure 5-5: MVUD Water Age Map with Approximate Locations of DBP Monitoring Sites 5-9
Figure 7-1: National Wetlands Inventory in Proximity to Proposed Transmission Main 7-3
Figure 7-2: Watersheds and Waterways in Proximity to Proposed Transmission Main 7-4
Figure 7-3: Exceptional Tennessee Waters in Proximity to Proposed Transmission Main 7-7

List of Appendices

Appendix A: MVUD Proposed Water Transmission Main Route Map Series
Appendix B: Permitting Matrix
Appendix C: Permitting Timelines
Appendix D: Permit Flow Charts
Appendix E: USACE Statement and HVUD Letter
Appendix F: Project Schedule

Executive Summary

Mallory Valley Utility District (MVUD), in collaboration with Maury County Water System (MCWS), City of Mt. Pleasant Water Department, Columbia Power and Water Systems (CPWS), and City of Spring Hill, commissioned a feasibility study to explore the potential of supplying water from the Cumberland River to Maury and Williamson County communities. This project aims to secure a reliable, long-term water supply for these growing areas by 2033.

The Duck River, which currently provides drinking water to over 250,000 people in southern Middle Tennessee, is under pressure due to increased population growth and industrial interest. The study aligns with Executive Order 108 by Governor Bill Lee, which seeks to protect the Duck River watershed by exploring alternative water sources.

MVUD selected the Brasfield & Gorrie / Hazen and Sawyer Team, along with HDR for hydraulic water modeling, to perform this study. The goal is to determine if supplying water from the Cumberland River is viable, with projected demands ranging from 20 MGD to 60 MGD.

Key Sections of the Study:

Section 2: Hydraulic Modeling: HDR conducted hydraulic modeling, recommending either dual 42-inch pipelines or a single 54-inch pipeline. The single pipeline costs less, but dual pipelines provide redundancy. Two 60 MGD pump stations are required, one at the connection point with Harpeth Valley Utilities District (HVUD) and another at the mid-point of the 30-mile transmission main.

Section 3: Pipe Route Analysis: The project team proposed aligning the approximately 30-mile pipeline within or adjacent to the existing TVA easement. This alignment minimizes disruptions and reduces environmental and residential impacts. The proposed pipeline project is expected to impact approximately 200 properties across Williamson and Maury Counties. However, the project will require only permanent easements – 50 feet in width for a single 54-inch pipeline or 60 feet for dual 42-inch pipelines. These easements will not result in the displacement of any residents or businesses.

Section 5: Water Quality Considerations: The team assessed water quality considerations, including chlorine decay, disinfection byproducts formation, and potential pipeline corrosion. This desktop analysis revealed that, based on historical water quality data, the finished water from HVUD could be compatible with the downstream systems. Further sampling and analysis are recommended during the preliminary design process to develop specific recommendations to ensure water quality is protected long-term.

Section 7: Environmental, Cultural, and Historic Considerations: The team reviewed natural and cultural resources, identifying 21 NRHP-listed sites within a 2-mile radius of the project corridor in Williamson County. The desktop review indicates that the proposed project is feasible under applicable laws and regulations. Further coordination with appropriate jurisdictional agencies will be required should the project move forward.

Section 8: Permitting Requirements: Gaining regulatory approval will require coordination with relevant authorities, including the Tennessee Department of Environment and Conservation (TDEC) and

the U.S. Army Corps of Engineers (USACE). The study developed a regulatory matrix and permit sequencing flow charts.

Section 10: Design and Construction Schedules: The project is projected to be built and operational by 2033, with construction completion anticipated in mid-2033. The schedule depends on the completion of the USACE study in 2026, funding availability, and other critical decisions.

Section 11: Cost Estimate: The total estimated project cost is between $1.7 billion and $1.9 billion in 2025 dollars. The project includes necessary infrastructure to withdraw, treat, and convey finished water to the point of delivery for each stakeholder. Major infrastructure improvements include:

a. HVUD
    i. New/expanded Cumberland River intake and pump station
    ii. New/expanded 50MGD Water Treatment Plant (WTP)
    iii. New/expanded water transmission main/system between WTP and MVUD

b. MVUD
    i. New 30-mile dual 42-inch or single 54-inch pipeline from HVUD connection with MVUD to stakeholder connections
    ii. New 60MGD pumping station at the HVUD connection
    iii. New 60MGD pumping station at the mid-point of the pipeline
    iv. New 5MG water storage tank at the mid-point of the pipeline

Section 13: Cost of Service: A financial model was developed to determine project-level revenue requirements and allocate costs based on industry standard methodologies.

Section 14: Summary and Conclusions: The study provides a comprehensive evaluation of constructing a new transmission main to deliver high-quality drinking water to communities in southern Middle Tennessee. The proposed alignment takes advantage of an existing TVA easement, helping to minimize both construction-related disruptions and long-term environmental impacts. The project concept is envisioned to address water supply needs while ensuring reliable long-term operation. The success of the project is dependent upon USACE approval of increased Cumberland River withdrawal, coordination with project partner HVUD, and permitting approvals by TDEC and other regulatory agencies.

Based on the findings of this study, the Project Team concludes that the proposed solution is both technically feasible and well-suited to meet the region's short-term and long-term water supply needs. The water transfer benefits extend beyond initial stakeholder use, as the solution also reinforces the reliability of Duck River flows downstream of the stakeholder communities.

The feasibility of the project can be further enhanced if partner utilities actively pursue and secure local, state, and federal funding. Access to these external resources can significantly reduce the financial burden and improve overall project viability.

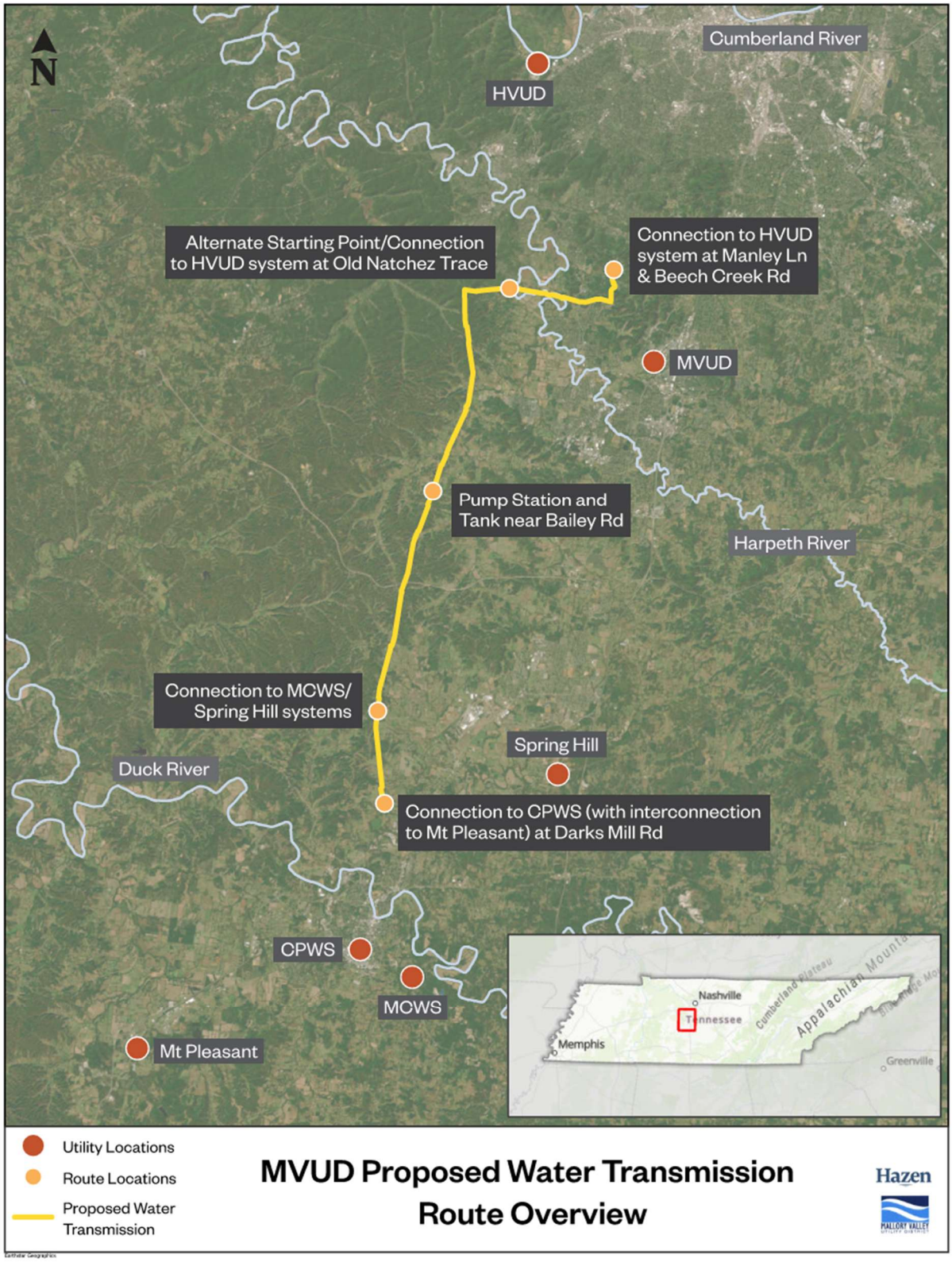


Figure ES-1: Recommended MVUD Water Transmission Main Route Overview & Stakeholder Locations

1. Project Background

Mallory Valley Utility District (MVUD), in partnership with Maury County Water System (MCWS), City of Mt. Pleasant Water Department, Columbia Power and Water Systems (CPWS), and City of Spring Hill, commissioned this Feasibility Study for a Regional Water Solution. This crucial study explores the potential of supplying Maury and Williamson County communities with water from the Cumberland River. The project envisions a 30-mile MVUD water transmission line by 2033, aiming to secure a reliable, long-term water supply for these growing areas.

The Duck River provides drinking water to more than 250,000 people in southern Middle Tennessee. In recent years, these areas have experienced increased population growth and interest by industry in locating new facilities within the watershed. Mallory Valley Utility District (MVUD) observed the need for feasible alternatives to address long term water needs in the Duck River watershed. Based on MVUD's unique proximity between the Cumberland River and the Duck River watersheds, MVUD reached out to several utilities to explore the possibility of a study. The study explores the idea of supplying Maury County and Williamson County communities with Cumberland River water through MVUD's connection to Harpeth Valley Utilities District (HVUD).

The project aligns with Executive Order 108 by Governor Bill Lee that outlines actions to protect the Duck River watershed, a bio-diverse ecosystem that is threatened by overuse by rapidly growing communities that rely on it for water. The Executive Order includes the exploration of alternative water sources for communities currently dependent upon the Duck River.

The goal of this study is to determine if supplying water from the Cumberland River via MVUD infrastructure (and HVUD's infrastructure as the supplier) is a viable option with projected demands ranging from 20 MGD to 60 MGD over a 20-year planning horizon. To achieve this goal, the following parameters were established.

- Meet stakeholder near-term and long-term drinking water demands ranging from 20 to 60 MGD
- Develop a preliminary pipeline route and required infrastructure to convey drinking water from a connection with HVUD to the north and stakeholder utilities to the south
    - Maximize consideration of the existing Tennessee Valley Authority (TVA) easement for pipeline routing
    - Assume the northern connection point with HVUD will be located at the intersection of Manley Lane East and Beech Creek Road South in northern Williamson County
    - Assume the southernmost stakeholder connection point will be located at Darks Mill Road east of Carters Creek Pike in northern Maury County

Based on the project parameters, the following criteria were considered in the evaluation.

- Evaluate pipeline route alternatives, pipe size, and pipe material
- Evaluate pumping and storage requirements
- Evaluate water quality, environmental, permitting, easements, traffic, and constructability considerations

- Develop capital and operating cost estimates
- Define a schedule for design and construction should the project be deemed feasible

Figure ES-1 in the Executive Summary shows the preliminary pipeline corridor, location of HVUD and MVUD, and location of these stakeholder utilities.

Demand scenarios were developed based on possible initial and ultimate build-out water needs within each stakeholder service area. Flow projections range between 20 and 60 MGD. The following scenarios were developed and evaluated.

Table 1-1: Demand Scenarios

Demand Scenario	Minimum Demand	Maximum Demand	Pipeline Capacity	Pump Station Minimum	Pump Station Maximum
1	20	50	50	35	50
2	35	50	50	50	50
3	50	60	60	60	60

MVUD developed an initial route for the possible transmission main that primarily follows the existing TVA easement. The project team began with the MVUD route and refined it based on the detailed evaluation performed as part of this study. The remaining sections of this report provide details of each project task.

2. Hydraulic Modeling

HDR was contracted by MVUD to conduct hydraulic modeling for the study. The project team coordinated with HDR throughout the study and referenced their work in this section of the report. An InfoWater Pro model was developed and utilized to evaluate alternatives. Supply-side boundary conditions were included for HVUD. The boundary conditions for the stakeholder systems were provided by each stakeholder utility for the delivery side of the pipeline. The model was utilized to identify optimum pipeline diameters, pumping requirements, and storage facility requirements. The model was also utilized to characterize water age to support evaluation of water quality concerns.

Tennessee Department of Environment and Conservation (TDEC) and drinking water industry standards were utilized to define the design criteria for development and evaluation of the transmission main alternatives modeled. These criteria included acceptable pressures, pipe material, velocities, and tank turnover. Although 140 is a widely accepted and realistic "C" value for the pipe roughness factor of newly installed ductile iron pipe (DIP), Hazen recommended using a "C" value of 120 for both DIP and steel pipe as the basis for all modeling scenarios and minor losses were estimated based on the anticipated number of fittings required along the reach of the pipeline.

2.1 Pipeline Analysis

Pipeline alternatives were ultimately narrowed to six different combinations. Two parallel pipeline options and four single pipeline options. These included parallel 36-inch, parallel 42-inch, single 36-inch, single 42-inch, single 48-inch, and single 54-inch lines. The single 36- and 42-inch options were considered as options for 'ramping up' to the ultimate demand and were primarily considered as the first phase of the parallel alternatives.

Modeling suggests the parallel 36-inch and single 48-inch pipelines would function well at demands as low as 20 MGD. As demand increases larger diameter alternatives offer better performance. Among all alternatives, the parallel 42-inch and single 54-inch pipeline alternatives provide the best performance across the full range of demands including and up to 60 MGD. Therefore, the parallel 42-inch and single 54-inch alternatives are recommended.

Each option was evaluated to determine operational conditions delivering flow under two operating scenarios. One included delivering all flow to the southernmost stakeholder connection at CPWS. The second assumed 40% of the flow would be delivered at the Spring Hill / MCWS connection point. The analysis demonstrated the best and recommended operating conditions fit one of two alternatives – either dual 42-inch pipelines or a single 54-inch pipeline.

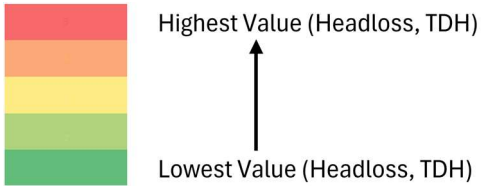
Figure 2-1 summarizes the hydraulic analysis conducted to evaluate recommended pipeline alternatives. It illustrates velocity and head loss conditions for each scenario considered in the study, highlighting the critical factors that influenced the selection of optimal options. The color gradient—from green to red—indicates performance quality, with green representing favorable conditions and red indicating unfavorable. Notably, the two recommended alternatives – a parallel 42-inch pipeline and a single 54-inch pipeline – maintain acceptable velocity and head loss across the full range of anticipated operating flows, from 20 to 60 MGD.

Full Demand to CPWS																	
Pipeline	Volume (MG)	Velocity (ft/s)					Total Headloss				PS #1 TDH Max (ft)				PS #2 TDH Max (ft)			
		20 MGD	30 MGD	35 MGD	50 MGD	60 MGD	20 MGD	35 MGD	50 MGD	60 MGD	20 MGD	35 MGD	50 MGD	60 MGD	20 MGD	35 MGD	50 MGD	60 MGD
Parallel 36"	17.6	2.07	3.10	3.62	5.17	6.21	84.1	240.5	470.0	662.1	192	241	358	461	109	139	184	267
***Parallel 42"**	**23.9**	**1.53**	**2.29**	**2.67**	**3.82**	**4.58**	**41.1**	**117.7**	**230.3**	**324.6**	**179**	**203**	**238**	**280**	**100**	**115**	**137**	**156**
Single 36"	8.8	4.14	6.21	7.24	10.34	12.41	309.0	884.7	1730.4	2438.8	271	581	1035	1415	153	370	762	1089
Single 42"	11.9	3.05	4.58	5.34	7.63	9.16	151.3	434.0	849.9	1198.6	213	338	562	749	122	177	354	515
Single 48"	15.6	2.34	3.51	4.09	5.84	7.01	81.0	232.7	456.3	643.9	191	239	350	451	108	138	182	259
***Single 54"**	**20.1**	**1.82**	**2.73**	**3.18**	**4.54**	**5.45**	**45.1**	**129.8**	**254.7**	**359.6**	**180**	**207**	**245**	**298**	**101**	**117**	**142**	**163**

40% Demand to Spring Hill, 60% to CPWS																	
Pipeline	Volume (MG)	Velocity (ft/s)					Total Headloss				PS #1 TDH Max (ft)				PS #2 TDH Max (ft)			
		20 MGD	30 MGD	35 MGD	50 MGD	60 MGD	20 MGD	35 MGD	50 MGD	60 MGD	20 MGD	35 MGD	50 MGD	60 MGD	20 MGD	35 MGD	50 MGD	60 MGD
Parallel 36"	17.6	2.07	3.10	3.62	5.17	6.21	75.9	216.9	423.8	597.0	192	241	358	461	109	139	184	222
***Parallel 42"**	**23.9**	**1.53**	**2.29**	**2.67**	**3.82**	**4.58**	**37.1**	**106.1**	**207.7**	**292.7**	**179**	**203**	**238**	**280**	**100**	**115**	**137**	**156**
Single 36"	8.8	4.14	6.21	7.24	10.34	12.41	278.7	797.7	1560	2199	271	581	1035	1415	153	283	591	850
Single 42"	11.9	3.05	4.58	5.34	7.63	9.16	136.5	391.3	766.3	1080.6	213	338	562	749	122	177	270	397
Single 48"	15.6	2.34	3.51	4.09	5.84	7.01	73.0	209.8	411.4	580.4	191	239	350	451	108	138	182	218
***Single 54"**	**20.1**	**1.82**	**2.73**	**3.18**	**4.54**	**5.45**	**40.7**	**117.0**	**229.6**	**324.1**	**180**	**207**	**245**	**298**	**101**	**117**	**142**	**163**

*Recommended sizes
*From HDR 7/1/25 Maury County Transmission Main Feasibility Study Modeling Report

Figure 2-1: Recommended Pipeline Alternatives Summary

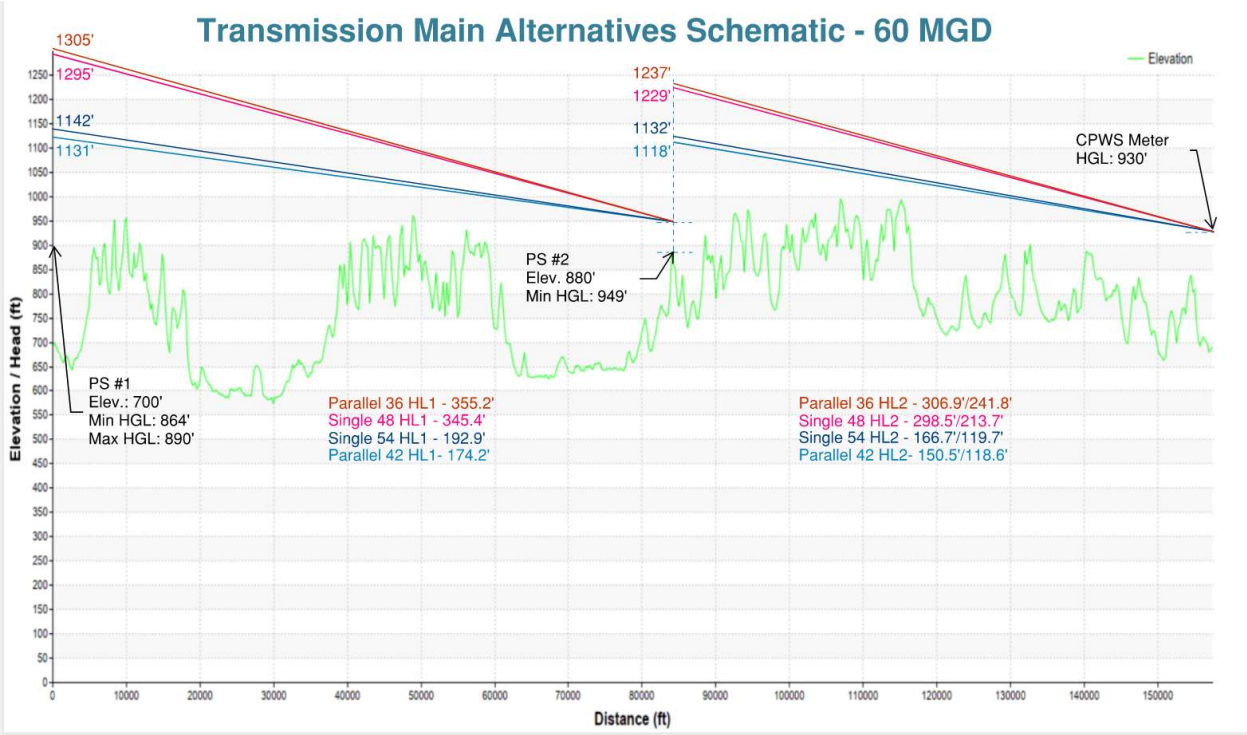


2.2 Pumping and Storage Analysis

The hydraulic modeling results determined the most hydraulically effective scenario includes two pump stations and a single mid-trunk storage tank. The first pump station (PS #1 Beech Creek) boosts the HGL enough to move flow through the first half of the alignment, maintaining 30 psi over the peak elevations. The second pump station also includes a storage tank for operation and is located just after the low 'valley' towards the middle of the alignment. This site is near Floyd Road and Bailey Road in Williamson County.

Storage is a critical component of operating water systems. For this project, storage is needed primarily for operational purposes and is limited as much as possible due to water age and quality concerns. For the scenarios studied in the model, the recommended storage is 5 MG for the initial 35 MGD operating condition with an ultimate storage need of 10 MG.

The project team performed a site visit during the evaluation period to confirm the location has ample space for a pump station and abuts a slight hill that would be a good location for a water storage tank. **Figure 2-2** presents the ground elevation along the route and the resulting HGL produced by the recommended pump station locations.



*From HDR 7/1/25 Maury County Transmission Main Feasibility Study Modeling Report

Figure 2-2: Ground Elevation & Resulting HGL w/ Recommended Pump Station Locations

2.3 Water Age Analysis

Water age was calculated within the proposed transmission main using the age of the water at the point of connection with the HVUD distribution system at Beech Creek (determined by the HVUD distribution system model) as the baseline water age from the HVUD water treatment plant. The water age from Beech Creek to the end of the proposed transmission main was then modeled for each of the pipeline alternatives. The resulting water age ranged from 48 to 77 hours depending on demand. This information was utilized as part of the water quality analysis presented in a subsequent section of the report.

2.4 Hydraulic Modeling Analysis Summary

The modeling analysis provided clear recommendations for pipe size; number, size, and location of pumping; and storage requirements. The recommended pipe diameter is either dual 42-inch pipelines or a single 54-inch pipeline to meet the full range of projected demand between 20 and 60 MGD. A 5 or 10 MG storage tank is recommended for hydraulic operational purposes. Table 2-1 summarizes the pump selection for each scenario. Each scenario utilizes three pumps to provide a firm pumping capacity of 60 MGD with one pump out of service.

Table 2-1: Pump Selection for Stations #1 & #2

Pump Station #1 at Beech Creek				Pump Station #2 at Floyd Road			
Alternative	Pump Flow	TDH	HP	Alternative	Pump Flow	TDH	HP
Dual 42-inch	30 MGD	267	1,682	Dual 42-inch	30 MGD	171	1,123
Single 54-inch	30 MGD	283	1,799	Single 54-inch	30 MGD	178	1,185

*From HDR 7/1/25 Maury County Transmission Main Feasibility Study Modeling Report

3. Pipeline Route Analysis

Hazen completed an initial screening of finished water transmission main route alternatives via desktop analysis of available GIS data including features such as existing streams and wetlands, contours, roadways, utilities, easements, parcel information, cultural/historical areas, and hazardous sites readily available from public sources. Data was also collected from other sources (private utility owners, property owners, developers, and municipal departments).

Multiple visual site surveys were performed to define the limits of the study area and potential transmission main routes within the study area. The routing analysis focused on utilization of the TVA easement with consideration variations along the route to accommodate field conditions, existing utilities and infrastructure, and constructability concerns. The TVA easement is bisected many times by public roads which would provide multiple access points to aid in construction. Following a workshop with MVUD to review the potential routes, a single preferred route was selected (as shown in Figure ES-1) and is described in more detail in the sections below.

3.1 Pipe Materials

Long-term reliability of the selected pipe material is critical to the success of this project. Based on the anticipated service life, and other factors such as size, length, and lay conditions of the pipeline route, ductile iron pipe (DIP) and steel pipe are the two pipe materials recommended. Ductile iron provides high impact resistance, superior strength, various interior coating options, joint restraint, proven long life and is available in 20-foot lengths. It has been in production since the mid-1950s. Steel provides similar characteristics as DIP and is available in segment lengths up to 50 feet. Steel pipe joints can be lap-welded together for restraint. Additional evaluation of soil conditions is recommended during design to determine if corrosive conditions exist that require special pipe treatments, including cathodic protection. If so, protective measures can be taken to protect the pipe from corrosion concerns.

Ductile iron and steel pipes offer exceptional long-term durability due to their high tensile strength, resistance to impact, and ability to withstand internal and external pressures. Their corrosion-resistant coatings and linings, such as cement mortar or epoxy, further enhance their longevity including in harsh environments. These pipe materials provide superior structural integrity and longevity for critical infrastructure projects such as this one. According to the *American Society of Civil Engineers Manual of Practice No. 134 (ASCE MOP 134)*, ductile iron and steel pipelines, when properly installed and maintained, are estimated to have a service life ranging from **80 to 100 years or more**.

The cost for steel is approximately 35% to 40% less than ductile iron. In addition to cost savings, steel is also available in longer segment lengths, which can further contribute to schedule reduction and additional cost savings due to the shorter schedule. Thus, the steel pipe is recommended and is used to develop the cost estimate.

3.2 Trenchless Crossings

The proposed route includes an estimated 53 trenchless crossings. The estimate is based on a GIS desktop analysis that included the review of terrain, utilities, streams and wetlands, and roadway and right-of-way data. An estimated 28 roadway crossings, 24 stream / water body crossings, and 1 gas pipeline crossing were identified for a total of approximately 6,900 linear feet of trenchless pipe installation.

Trenchless crossings would be accomplished by either the jack and bore method or micro tunneling. Each of these construction methods is common for pipeline installation projects. The length of each crossing and terrain and subsurface conditions at each location will determine which process is best. The trenchless approach allows for installation of the water transmission main under roadways without disrupting traffic. Where employed, trenchless methods also eliminate the need to enter rivers and streams for pipeline installation. This reduces the possible impact on surrounding ecosystems and aquatic habitats and reduces the potential for erosion and sedimentation.

3.3 Traffic Impact Review

A total of 28 roadway crossings were identified during the feasibility study. To avoid road closures and minimize impact to traffic, it is recommended that the trenchless jack and bore method be typically utilized for roadway crossings. This study assumes this method will be utilized for all roadway crossings for cost estimating purposes.

Although trenchless crossings will greatly reduce the need for road closures, some may be required during certain phases of construction. Traffic control will be required for ingress and egress to and from the pipeline construction easement from adjacent roadways. It will be imperative to properly plan these activities and will require coordination, permits, and traffic control measures.

3.4 Easement Identification & Acquisition

A major advantage of this project alignment is the more than 90 percent of the alignment is proposed to be within or adjacent to the existing TVA easement. The project team has coordinated extensively during the performance of the study and verified TVA's willingness to continue collaboration should the project move forward. This study assumes the full width of the easement will be required outside of, but adjacent to, the existing TVA easement.

TVA shared their easement location for our use during the study, which greatly enhanced our ability to develop a successful pipeline route. They also provided review of our preliminary route and provided feedback which allowed us to modify our preliminary route to address their initial concerns related to proximity to TVA towers and our approach to crossing their easement along the full route length.

The only land acquisition anticipated for this project involves less than 10 acres combined for the two proposed pump station sites. No land purchase is expected along the pipeline route, as property access will be secured through easements, allowing landowners to retain ownership. The Project Partners do not wish for residents or business owners to be displaced or required to relocate because of this project.

Permanent and temporary construction easements will be obtained for the pipeline. Recommended permanent easement width will vary depending on whether a single 54-inch or dual 42-inch pipelines are selected. For the single 54-inch pipeline, a 50-foot permanent easement will be desired. For the dual 42-inch pipeline, a 60-foot permanent easement will be desired. Temporary construction easements will also be necessary and are expected to be up to 120 feet in width.

Sharing easement width within the existing TVA easement is desired, if possible, to minimize impact on property owners and the cost of the project. However, this cannot be determined until the design phase.

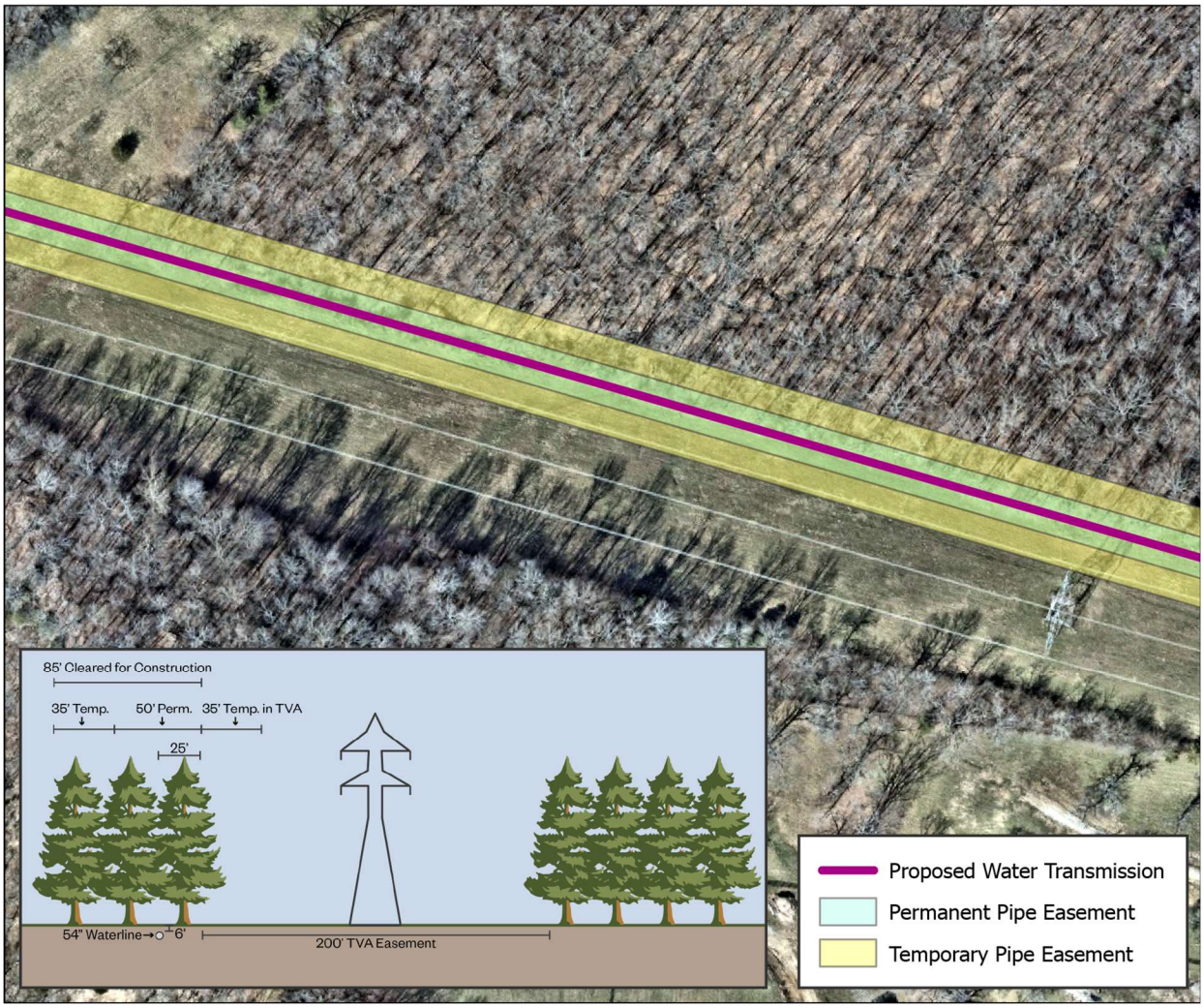


Figure 3-1: Example of Easement Location adjacent to TVA ROW

The pipeline project will impact approximately 200 properties across Williamson and Maury Counties. These properties are primarily rural and/or agricultural land with some residential parcels also included along the route. This effort will be governed by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (49 CFR Part 24). In accordance with these federal regulations, the project team will develop and implement a comprehensive, process-driven plan for acquiring the necessary Right-of-Way (ROW) and Temporary Construction Easements (TCE).

The acquisition plan will ensure that all property owners are treated fairly, consistently, and in compliance with applicable federal and state requirements. The plan must:

1. **Ensure Equal Consideration**: Each impacted property will receive equal and consistent attention throughout the acquisition process.
2. **Determine Market Value**: Adequate time will be allocated to determine the fair market value of each property through qualified appraisals and independent reviews.
3. **Facilitate Owner Engagement**: Property owners will be provided the opportunity to review the appraisal and will receive a written offer.
4. **Adhere to Federal Guidelines**: All steps will be taken in compliance with 49 CFR Part 24 to ensure that owners are offered just compensation and that their rights are fully respected.
5. **Document and Record Agreements**: Once agreements are reached, transactions will be documented and registered with the appropriate county assessor's office.

A total of 18 months has been allocated for the complete easement acquisition process with more details related to the schedule included in **Section 10**.

3.5 Route Analysis by Section

This section provides detailed observations and assessments of the 30-mile pipeline route. Each sub-section details visual site survey observations, challenges, likely construction methods, and field information pertinent to the proposed transmission main route. At a high level, the route has been divided into the following three segments:

- Segment 1: HVUD Tie-in at Beech Creek Road South to Natchez Trace (0+000 to 41+000)
- Segment 2: Natchez Trace to Pump Station #2 and Tank Site (41+000 to 91+000)
- Segment 3: Pump Station #2 and Tank Site to CPWS Tie-in at Darks Mill Road (91+000 to 159+000)

Furthermore, stationing has been subdivided based on physical route features. A detailed representation of the 30-mile route is provided in Appendix A. The map series provides visual information related to the detailed route analysis presented in this section.

Segment 1 - HVUD Tie-in at Beech Creek Road South to Natchez Trace (0+000 to 41+000)

0+000 to 1+000

Route Analysis: Transmission main to tie into existing 48" DIP and run parallel to Beech Creek Road. The alignment crosses Beech Creek Road north of Manley Lane and then crosses Manley Lane to the east. Then it runs parallel to the east of Manley down the field edge. This route avoids private fences and mailboxes at 637 Beech Creek Rd.

Trenchless Crossings: Jack and bore will likely be utilized to cross both roads to minimize traffic impact.

Field Information: Will have to cross a drainage ditch (not a blue line stream) before crossing Beech Creek Road. Some tree clearing will be necessary.

Easement Identification: The proposed easement will run parallel to Manley Lane along the field edge.

Traffic Impact: Utilizing a jack and bore will mitigate impact to thru traffic.



Figure 3-2: HVUD Tie-In Point



Figure 3-3: West Side of Manley Lane Looking South

1+000 to 3+000

Route Analysis: The proposed alignment crosses Hidden Valley Road at the field edge to avoid the wooded area. The transmission main will then cross back across Cartwright Close Drive just south of the Hidden Valley intersection and run parallel to Cartwright Close Drive.

Trenchless Crossings: Jack and bore will likely be utilized to cross both Hidden Valley Road and Cartwright Close Drive.

Field Information: Most of this section will be in open fields. A wet weather ditch, shown in the **Figure 3-4** below, will have to be crossed on the west side of Hidden Valley Road. There are also powerlines running along the road that will need to be avoided.

Easement Identification: The proposed easement will run parallel to Manley Lane and Hidden Valley Road.

Traffic Impact: Jack and bore under the roads will mitigate any impact to through traffic.

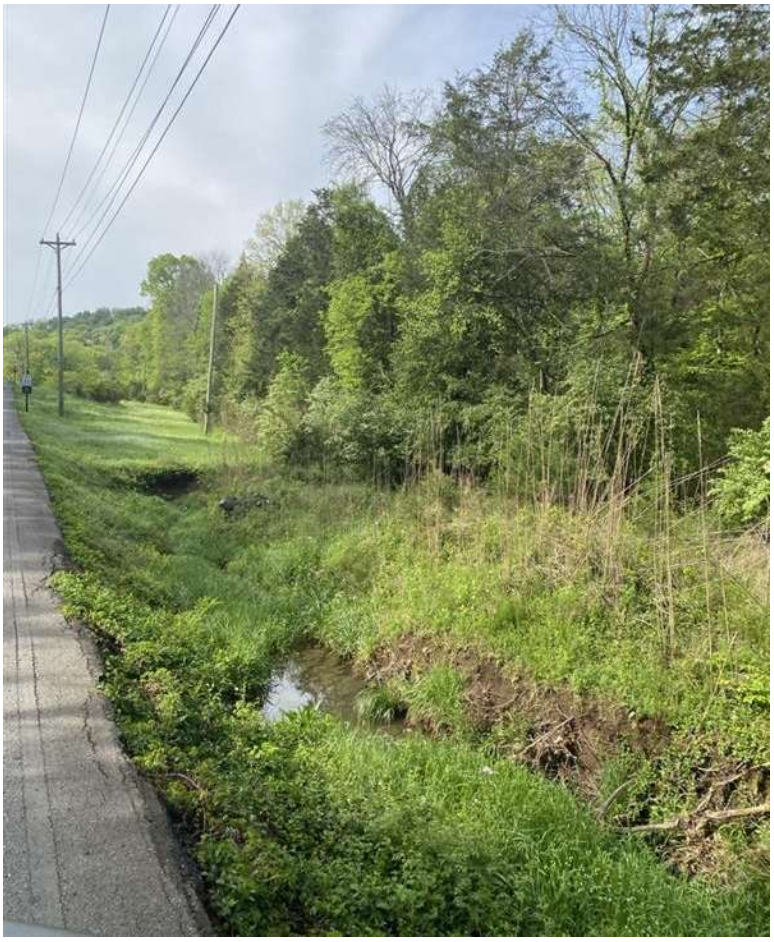


Figure 3-4: Wet Weather Ditch

3+000 to 4+000

Route Analysis: The proposed alignment runs behind the detention pond for the neighborhood, minimizing impact to the gate and entrance landscaping. The proposed alignment crosses Cartwright Close Drive just south of the detention pond.

Trenchless Crossings: Jack and bore will likely be utilized to cross Cartwright Close Drive.

Field Information: The goal would be to minimize the impact to residents' yards, neighborhood landscaping, and maintain the functionality of the detention pond.

Easement Identification: Easement will run parallel to Cartwright Close, and easements will be needed through four private parcels in the neighborhood, including a parcel owned by the neighborhood association.

Traffic Impact: Jack and bore under Cartwright Close Drive will mitigate any impact to thru traffic. There could be one lane shut down in the neighborhood for the stretch that is paralleling the road.



Figure 3-5: Cartwright Close Neighborhood Entrance

4+000 to 8+000

Route Analysis: The proposed alignment runs parallel to the west side of Cartwright Close Drive, travelling to the south. After the road ends, there will be a good amount of tree clearing required. The only alternative is the heavily wooded private parcels to the west of the neighborhood.

Trenchless Crossings: N/A

Field Information: There are some landscaped trees to the west of Cartwright Close Drive that may need to be replaced but should be avoidable. There will be significant tree clearing required once leaving Cartwright Close Drive on the southern side of this section before tying into the existing TVA easement.

Easement Identification: The easement would run to the south of the detention pond and parallel to the first private parcel in the neighborhood. After that it would run parallel to road ROW and continue south until reaching the TVA easement. Some portions of private property would be needed for easement acquisition.

Traffic Impact: It is possible that one lane of Cartwright Close Drive would need to be closed during construction.

8+000 to 10+000

Route Analysis: The proposed alignment will parallel the existing TVA easement. Staying on the north side of the TVA easement should help avoid the cul-de-sac on Hartland Road. Some steep terrain challenges will be encountered.

Trenchless Crossings: N/A

Field Information: Heavily wooded area with terrain that could present challenges. Following the TVA maintained easement will mitigate clearing efforts and cost, but it appears there will still be some clearing required.

Easement Identification: The proposed easement will run parallel to the TVA easement on the north side.

Traffic Impact: N/A

10+000 to 15+000

Route Analysis: The proposed alignment will follow the TVA easement. There is a private driveway around station 12+000, but the contractor should be able to avoid damage to the driveway by staying on the north side of the TVA easement.

Trenchless Crossings: N/A

Field Information: There will be some rough terrain and a moderate amount of tree clearing required.

Easement Identification: The proposed easement will run parallel to the TVA easement on the north side.

Traffic Impact: N/A

15+000 to 17+000

Route Analysis: This section traverses well-maintained powerline easement, and a gravel drive off Hillsboro Road allows easy equipment access.

Trenchless Crossings: Jack and bore will likely be utilized to cross Hillsboro Road.

Field Information: A steep hill, approximating 200 vertical feet, will be descended toward Hillsboro Road, and then another 100-foot hill will be traversed on the other side of Hillsboro Road. Private fences as well as roadside power poles will need to be avoided during construction.

Easement Identification: The proposed easement will run parallel to the TVA easement.

Traffic Impact: Utilizing a jack and bore would mitigate traffic impact on Hillsboro Road.



Figure 3-6: View East of Hillsboro Road Crossing



Figure 3-7: View West of Hillsboro Road Crossing

17+000 to 25+000

Route Analysis: Crossing the Harpeth River, Wray Bluff presents a drop-off of approximately 230 vertical feet. It is likely that multiple micro tunnels will be utilized in this section. To maintain adequate pipe deflections, this vertical change could push the tunneling entrance to the east. The proposed alignment hugs the south bank of the Harpeth River after crossing and will require easement through

some private properties. A second crossing of the Harpeth River will be necessary around station 24+700, but the terrain is much flatter at this crossing. Old Hillsboro Road, south of the Harpeth River, will also be crossed.

Trenchless Crossings: The Wray Bluff and Harpeth River crossing will require trenchless techniques. Micro tunneling is proposed for both river crossings due to the size of the Harpeth River although the 2nd river crossing should present fewer problems considering flatter terrain. Jack and bore will likely be utilized to cross Old Hillsboro Road.

Field Information: A moderate amount of tree clearing could be required, but between the two river crossings, it is mostly open fields. Terrain at Wray Bluff will need to be accounted for. See **Figure 3-8** and **Figure 3-9** below for elevation considerations and a view of Wray Bluff from Old Hillsboro.

Easement Identification: This route will require easement acquisition outside of the TVA easement on approximately four private properties to the south of the Harpeth River.

Traffic Impact: The contractors will likely bore under Old Hillsboro Road to minimize traffic impact. There is also potential for micro tunneling under the road considering the proximity to the Wray Bluff and Harpeth River crossing.

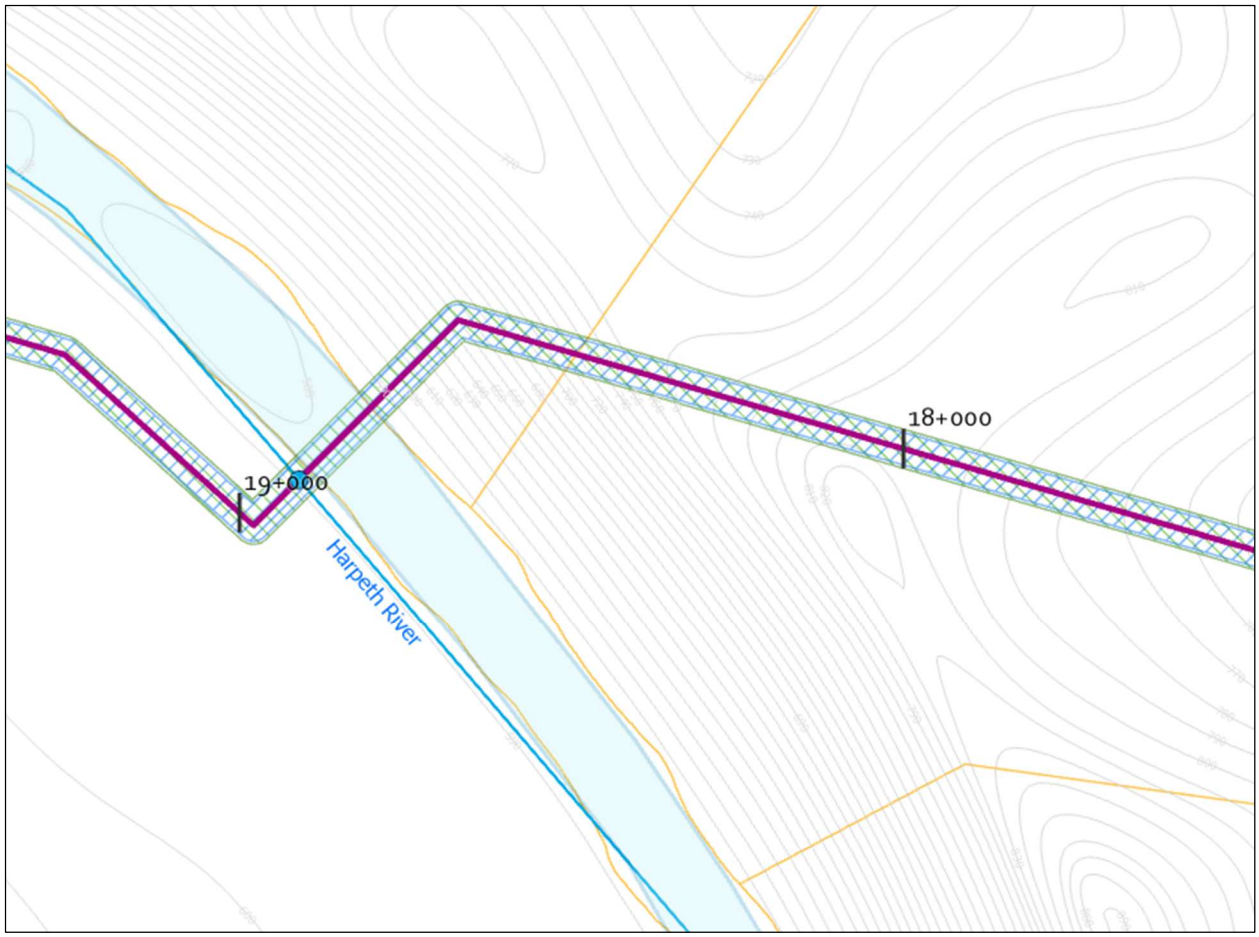


Figure 3-8: Elevation Consideration at First Harpeth River Crossing



Figure 3-9: View from Old Hillsboro Road Looking Toward Wray Bluff

25+000 to 29+000

Route Analysis: This section is relatively flat terrain through open fields.

Trenchless Crossings: N/A

Field Information: Mostly open fields with a minimal amount of tree clearing necessary. There will likely be some fences that will require repair post construction activity.

Easement Identification: The proposed easement will follow the existing TVA Easement on the north side.

Traffic Impact: N/A

29+000 to 31+000

Route Analysis: This route requires crossing the Harpeth River as well as Lawrence Road and Old Natchez Trace. The terrain is relatively flat in this area except for the riverbank. The riverbank is steep down to the water surface, but utilizing trenchless techniques will mitigate impact to the banks of the river.

Trenchless Crossings: Trenchless crossings are recommended for the Harpeth River, Old Natchez Trace Road, and Lawrence Road. Although the river is relatively shallow in this area, trenchless techniques would mitigate impact to traffic as well as the existing conditions of the river. Micro tunneling is again proposed for this river crossing due to the size of the Harpeth River.

Field Information: Some tree clearing will be necessary on the banks of the river but is mostly open field. The riverbanks are relatively steep on either side, so a trenchless crossing could be beneficial.

Easement Identification: The proposed easement will follow along the existing TVA easement.

Traffic Impact: The intersection of Lawrence Road and Old Natchez Road could be impacted. It is likely tunneling under the roads will be used, therefore mitigating impact to through traffic.



Figure 3-10: Harpeth River at Proposed Transmission Main Crossing



Figure 3-11: Standing on Lawrence Road Looking West

31+000 to 36+000

Route Analysis: The alignment could alternate from the north side of the TVA easement to the south side to minimize impact to existing roads, ponds, property, etc. This stretch will provide some flexibility considering the relatively flat terrain and minimal obstructions.

Trenchless Crossings: N/A

Field Information: There are a few fences and drainage ditches that would need to be crossed. Two farm ponds would need to be avoided, but there is ample room to get around them in clear areas. Much of this stretch will be through open fields. There could be a minor amount of tree clearing required.

Easement Identification: The proposed easement will follow the existing TVA easement. This area could be utilized as a laydown area which could require additional easement outside of TVA.

Traffic Impact: Several private driveways will need to have temporary entrances around the work area, but the impact will be minimal. Lawrence Road comes close to the proposed alignment around station 33+800 but should be able to be avoided.

36+000 to 41+000

Route Analysis: This section has some rough terrain and will require tree clearing along with several unnamed stream crossings. The proposed alignment turns to the south side of the TVA easement around station 40+800 to allow ample separation from the Natchez Trace Parkway property.

Trenchless Crossings: It could be beneficial to utilize trenchless construction when crossing Brown Creek, a TDEC Impaired Stream, at station 36+700 and station 40+100. Terrain challenges will likely dictate which trenchless method is appropriate for this crossing.

Field Information: Mountainous terrain, tree clearing, and stream crossings will need to be contended with. There are four elevated hilltops, all covered in trees, which need to be traversed.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: N/A

Segment 2: Natchez Trace to Pump Station #2 and Tank Site (41+000 to 91+000)

41+000 to 52+000

Route Analysis: Much like the previous section, terrain, tree clearing, and stream crossings. There will be a couple private driveways impacted toward the southern end of this stretch.

Trenchless Crossings: N/A

Field Information: The Little East Fork Creek will need to be crossed at station 46+500. Little East Fork is listed by TDEC as “Not Assessed”. There are several gardens and hunting food plots along the alignment that would be impacted as well.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: Multiple private driveways will need to have temporary entrances around the work area, but the impact will be minimal.



Figure 3-12: Standing at Highway 96 Looking North

52+000 to 53+000

Route Analysis: The proposed alignment will run on the east side of the TVA easement until Highway 96 forces the road crossing. Staying on the north side of Highway 96 for as long as possible will mitigate issues with the rock ledge on the west side of Highway 96 (See **Figure 3-13**). Highway 96 crosses the TVA easement in a parallel fashion, so the work area will be near the road for several hundred feet.



Figure 3-13: Rock Ledge at Highway 96

Trenchless Crossings: Jack and bore under Highway 96.

Field Information: This is a relatively flat and open area alongside Highway 96, however outside of the road ROW, there is a decent drop-off. After crossing Highway 96, there is steep rocky terrain.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: A single private driveway will need temporary entrance around the work area. Depending on construction methods, there could also be an impact on Highway 96. The highway crosses the TVA easement in a parallel fashion, so to ensure worker safety, additional provisions will be required.



Figure 3-14: Standing at Highway 96 Looking South

53+000 to 63+000

Route Analysis: Traversing up and down hills, some as tall as 200 vertical feet, could present equipment accessibility issues.

Trenchless Crossings: N/A

Field Information: Some tree clearing may be necessary. There are sections of open field and privately maintained yards to traverse as well as heavily wooded areas along the existing TVA easement.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: There are two private driveways that would be need be crossed. The most prominent is named Pishon Trail at station 55+100.

63+000 to 65+000

Route Analysis: The proposed alignment will cross multiple tributaries to the West Harpeth River as well as Waddell Hollow Road and Old Hillsboro Road. It will also cross a private driveway.

Trenchless Crossings: Jack and bore will be utilized at Waddell Hollow Road and Old Hillsboro Road. Jack and bore will likely be used to cross the "Not Assessed" tributary that runs beside Waddell Hollow Road as well.

Field Information: The route is mostly open fields with a moderate amount of tree and brush clearing necessary.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: Utilizing a jack and bore method would mitigate impact to the public roads, but a single private driveway off Old Hillsboro would need a temporary entrance around the construction zone.

65+000 to 69+000

Route Analysis: The proposed alignment will cross multiple tributaries to the West Harpeth River as well as Boyd Mill Pike. The route follows the TVA easement until the easement intersects the West Harpeth River. At that point, the proposed alignment bends around the river on the west side, to avoid crossing the river. Avoiding the horse corral area at station 68+000 and the tributary to the West Harpeth River could prove challenging.

Trenchless Crossings: Jack and bore will be utilized at Boyd Mill Pike. In order to avoid a horse corral, jack and bore could be utilized at station 68+000 to cross a TDEC qualified stream as well.

Field Information: The route is mostly open fields with a moderate amount of tree clearing needed. The majority of tree clearing could occur as the alignment bends around the West Harpeth River.

Easement Identification: The proposed easement will follow the existing TVA easement except for the bend around the river. Easement will need to be acquired from approximately three private properties.

Traffic Impact: Utilizing a jack and bore method would mitigate impact to Boyd Mill Pike. After crossing the river, two private driveways will need alternate routes around the construction area.



Figure 3-15: Bridge at Boyd Mill Pike Looking North



Figure 3-16: Bridge at Boyd Mill Pike Looking South

69+000 to 77+000

Route Analysis: This section will be crossing private driveways as well as livestock fields. There are multiple driveways and livestock fields that would require provisions during construction. Temporary fences blocking off the construction area and re-routes of private driveways would be necessary. There are also multiple "Not Assessed" tributaries to cross as well as the "Fully Supporting" Leipers Fork.

Trenchless Crossings: Jack and bore method could be used to cross Leipers Fork. Using jack and bore to cross some of these streams would largely depend on TDEC permitting requirements. TDEC might allow open-cut construction on some of the tributaries but might require trenchless techniques to be used on others.

Field Information: The alignment follows a flat section of mostly farmland. The main impact would be to livestock fields and horse farms. Temporary fences blocking off the construction area would require close coordination with the landowners.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: Multiple private driveways will need temporary entrances around the work area.

77+000 to 79+000

Route Analysis: Crossing Leipers Fork in what appears to be a low area will require keeping water out of the excavated trench. However, jack and bore would mitigate this risk. Southall Road will also have to be crossed.

Trenchless Crossings: Jack and bore will be utilized to cross Southall Road and could also be an option to get across Leipers Fork.

Field Information: Based on aerial imagery, it appears that the crossing area at Leipers Fork could be a low and wet area. There are also some moderate terrain challenges in this area.

Easement Identification: The proposed easement will follow the existing TVA easement. It might make sense to cross Leipers on the east side of the TVA easement to avoid a parallel section of the stream. **Figure 3-17** shows the parallel section of Leipers Fork on the left side of the image.

Traffic Impact: Utilizing a jack and bore method would mitigate impact to Southall Road.



Figure 3-17: Standing on Southall Road Looking North



Figure 3-18: Standing on Southall Road Looking South

79+000 to 91+000

Route Analysis: There are two road crossings at Floyd Road and Bailey Road. The two stream crossings are classified as “Fully Supporting” tributaries to Leipers Fork.

At approximately station 86+000, a connection to the water transmission main is proposed for the 2nd pump station (60 MGD) and a 5 MG gallon tank. This approximate mid-point in the water transmission main is a practical location for a storage tank to be built on the hill. More details on the Pump Station #2 and Tank Site is provided in **Section 4.2**.

Trenchless Crossings: Jack and bore across Floyd Road and Bailey Road. There is a stream a few feet off Bailey Road that could be crossed during the road crossing. Jack and bore could also be utilized on Mauldin Woods Trail, which appears to be a private drive serving a small subdivision.

Field Information: This section is a mix of open fields and TVA maintained ROWs. The terrain gets steep toward the end of this stretch with multiple hills eclipsing 100 vertical feet. Cattle and livestock fields along the route will need to be traversed as well. After crossing Bailey Road, there are two streams classified as “Fully Supporting” portions of Leipers Fork to cross. However, these appear to be small drainage ways at the beginning of the stream headwaters.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: There are two private driveways around station 81+000 that would be impacted, but utilizing a jack and bore will allow the public roads to remain open.



Figure 3-19: Standing on Bailey Road Looking North



Figure 3-20: Standing on Bailey Road Looking South

Segment 3: Pump Station #2 & Tank Site to CPWS Tie-in at Darks Mill Road (91+000 to 159+000)

91+000 to 99+000

Route Analysis: There is also a road crossing at Bear Creek Road. There is a tributary to Bear Creek that will need to be crossed at station 98+500.

Trenchless Crossings: Utilizing the jack and bore method at Bear Creek Road would mitigate impacts to traffic. (see **Figure 3-21** and **Figure 3-22)**

Field Information: There is a farm pond at station 91+500, but staying on the east side of the easement will mitigate the construction impact. Depending on the condition of the TVA easement, some tree and brush clearing may be necessary in this area.

Easement Identification: The proposed easement will follow the existing TVA easement. Before crossing Bear Creek Road, the proposed route switches from the east side of the TVA easement to the west.

Traffic Impact: Utilizing a jack and bore method would mitigate impact to Bear Creek Road.



Figure 3-21: Standing on Bear Creek Road Looking North



Figure 3-22: Standing on Bear Creek Road Looking South

99+000 to 108+000

Route Analysis: Steep terrain and small ponds are present in this area. There is a single private driveway and a single road crossing as well.

Trenchless Crossings: Utilizing the jack and bore method at Sycamore Road would mitigate impact to traffic.

Field Information: This section mostly contains wooded hills with a few open areas. Depending on the condition of the TVA maintained easement, there could be a significant amount of tree and brush clearing required in this area. The ponds are not easily accessible as they are surrounded by hills on each side.

Easement Identification: The proposed easement follows the existing TVA easement. However, if it is desired to avoid the ponds along this route, an easement would need to be obtained outside of the TVA limits.

Traffic Impact: Utilizing a jack and bore method would mitigate impact to Sycamore Road. There is also a private driveway off Sycamore Road that would require temporary detour.

108+000 to 109+000

Route Analysis: The route hugs the west side of the TVA easement and must cross under US Interstate 840. The interstate ROW distance is approximately 480’ wide at the point of crossing.

Trenchless Crossings: Jack and bore under US Interstate 840.

Field Information: There could be some terrain challenges, but the slope is relatively gentle. The south side of the interstate provides a steeper slope than the north side.

Easement Identification: The proposed easement would follow the existing TVA easement and run perpendicular to the interstate ROW.

Traffic Impact: Boring under the interstate would mitigate impact to through traffic.



Figure 3-23: View from Interstate 840 Looking North



Figure 3-24: View from Interstate 840 Looking South

109+000 to 116+000

Route Analysis: Terrain, a public road, and a stream crossing need to be considered in this section. The alignment will switch from the west side of the TVA easement to the east side after crossing Johnson Hollow Road.

Trenchless Crossings: Jack and bore could be utilized under Johnson Hollow Road, but the terrain might eliminate this option. Further investigation is needed to determine the feasibility of jack and bore at this spot.

Field Information: There is a decent portion of cleared area at the beginning of this run which will help when crossing Robinson Branch. Outside of the Robinson Branch area, there will be a good bit of steep mountainous terrain. Clearing will be similar to previous sections where it depends on how recently TVA has serviced their easement.

Easement Identification: The proposed easement will run on the west side of the TVA easement until crossing Johnson Hollow Road. After the road crossing. The easement will run along the east side of the TVA easement.

Traffic Impact: If the terrain prevents a jack and bore option, traffic along Johnson Hollow Road would have to be re-routed. There are several houses near the alignment crossing, so these residences would be affected by the detour, but they would still have access to their homes by closing this small section.

116+000 to 117+000

Route Analysis: The proposed alignment crosses an existing gas line at station 116+700.

Trenchless Crossings: A jack and bore crossing will be recommended at the gas line crossing.

Field Information: The closest public road is about a mile away, so any equipment will need to navigate through the TVA easement. Aerial imagery indicates there is a decent amount of brush and tree clearing required in this area.

Easement Identification: The proposed easement will run parallel to the existing TVA easement and cross perpendicular to the gas line easement.

Traffic Impact: N/A

117+000 to 121+000

Route Analysis: This stretch will require some tributary crossings.

Trenchless Crossings: N/A

Field Information: Most of this run will be in maintained fields, with some moderate tree and brush clearing possible. There are likely some private fences that need to be crossed as well.

Easement Identification: The proposed easement will follow the existing TVA easement on the east side.

Traffic Impact: There is a private driveway off Fairview Road that would require a temporary detour during construction.

121+000 to 122+000

Route Analysis: The proposed alignment will cross multiple driveways, Fairview Road, and Carters Creek which is classified by TDEC as “Not Assessed”. The flat terrain will make this section easier.

Trenchless Crossings: Jack and bore could be utilized under Fairview Road to mitigate traffic impacts. The driveways and streams that are near the proposed crossing could also be crossed using trenchless techniques.

Easement Identification: The proposed easement will follow the existing TVA easement on the east side.

Traffic Impact: The private driveways would need temporary entrances or detours to work around the project area.



Figure 3-25: View from Fairview Road Looking North



Figure 3-26: View from Fairview Road Looking South at Carters Creek

122+000 to 124+000

Route Analysis: The Vineyard under the power lines forces the proposed route outside of the TVA easement. The proposed route bends to the west through a field. There will be multiple fences to cross as well as fence line brush clearing. Les Robinson Road will also need to be crossed after traversing the orchard.

Trenchless Crossings: Jack and bore could be utilized under Les Robinson Road.

Field Information: The route follows mostly open fields. There will be a good bit of tree and brush clearing on the north side of Les Robinson Road.

Easement Identification: Easement will need to be obtained to the west of the existing TVA easement through a private parcel.

Traffic Impact: Boring under Les Robinson Road would mitigate impact to through traffic.



Figure 3-27: The Orchard Under the TVA Powerlines

124+000 to 126+000

Route Analysis: After crossing Les Robinson Road, a hill will need to be crossed to follow the TVA easement. There is also another road crossing after the hill at B Dodson Road.

Trenchless Crossings: Crossing B Dodson Road will require a jack and bore to mitigate traffic impacts.

Field Information: After the hill, terrain levels back out and will mostly open fields.

Easement Identification: The proposed easement will follow the existing TVA easement on the west side.

Traffic Impact: Boring under B Dodson Road would mitigate impact to through traffic.



Figure 3-28: The Hill After Crossing Les Robinson Road

126+000 to 129+000

Route Analysis: This section crosses multiple "Not Assessed" tributaries to Carters Creek. The proposed alignment follows the TVA easement but will run through a larger section of private property.

Trenchless Crossings: Jack and bore could be used to cross the private driveway and the tributary to Carters Creek but additional cost and permitting efforts will need to be investigated. The method largely depends on landowner permissions.

Field Information: The terrain is relatively gentle along this stretch. There are some low spots that could present challenges, but the main concern is the well-maintained piece of property off B Dodson Road.

Easement Identification: The proposed easement will follow the existing TVA easement on the west side.

Traffic Impact: There is one private driveway that could be impacted, but a detour around the work area will be provided.

129+000 to 133+000

Route Analysis: Steep terrain, road crossings, and a stream crossing are present in this section. The Spring Hill and MCWS tie in point is around station 133+000.

Trenchless Crossings: Jack and bore could be utilized to cross Grants Road and Gravel Hill Road, minimizing traffic impact.

Field Information: Most of this section is open fields, but there is a steep wooded hill close to the tie in point. Following the existing TVA easement will reduce tree clearing efforts.

Easement Identification: The proposed easement will follow the existing TVA easement on the west side.

Traffic Impact: A couple private driveways could require temporary detours around the construction area, but jack and bore under the public roads will mitigate traffic impacts.



Figure 3-29: Standing on Gravel Hill Road Looking North

133+000 to 141+000

Route Analysis: Navigating livestock areas and cattle farms will be required in this area. The terrain is steep at first, but most of this stretch is gently sloping fields. There are two ponds around station 140+000 that will need to be planned for.

Trenchless Crossings: N/A

Field Information: There are multiple tributaries to cross including the "Not Assessed" Terrell Branch at station 136+200. The terrain is gently sloping for the majority of this portion. A minor amount of tree and brush clearing could be necessary. Private fences containing livestock will need to be crossed and repaired.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: N/A

141+000 to 150+000

Route Analysis: Steep terrain and a road crossing is present at station 141+900. A stream crossing will be necessary at Basham Branch, which TDEC qualifies as "Not Assessed.

Trenchless Crossings: Jack and bore could be utilized to cross Roy Sellers Road, minimizing traffic impact.

Field Information: This stretch is a mix of open fields and large wooded hills. Following the TVA maintained easement will minimize brush and tree clearing. There are fences that will need to be crossed and repaired.

Easement Identification: The proposed easement will follow the existing TVA easement.

Traffic Impact: Utilizing the jack and bore method under Roy Sellers Road would mitigate any traffic impacts.



Figure 3-30: View from Roy Sellers Road Looking North



Figure 3-31: View from Roy Sellers Road Looking South

150+000 to 152+000

Route Analysis: This section includes intersecting powerline easement, a road crossing, and a stream crossing. The terrain is relatively gentle, and open fields.

Trenchless Crossings: Jack and bore could be utilized to cross Mahon Road, minimizing traffic impact.

Field Information: This section contains open fields with a stream crossing. The stream, Basham Branch, is qualified by TDEC as “Not Assessed”. There are also fences that will need repair after construction.

Easement Identification: The proposed easement will continue to follow the existing TVA easement, but an intersecting powerline easement will come into play. This is an area to note during the easement acquisition process.

Traffic Impact: Utilizing the jack and bore method under Roy Sellers Road would mitigate any traffic impacts.



Figure 3-32: View from Mahon Road Looking North



Figure 3-33: View from Mahon Road Looking South

152+000 to 159+000

Route Analysis: The proposed alignment follows mostly open fields with another powerline easement that intersects the pipeline easement.

Trenchless Crossings: N/A

Field Information: The terrain is steep and there is a private driveway that will be impacted at the top of the hill. It appears that there is some livestock activity in the fields that will be traversed as well. At least one tributary will need to be crossed on the downslope side of the hill.

Easement Identification: The proposed alignment follows the existing TVA easement. There is an additional powerline easement that intersects the waterline easement and then runs parallel to the transmission main. Avoiding the dual power poles will be critical with the construction of the transmission main.

Traffic Impact: The tie-in point for the transmission main is on Darks Mill Road. Although the proposed alignment is not shown to cross the road, construction activity will likely impact traffic at this point.



Figure 3-34: Tie-In Point: Multiple Parallel Powerline Easements

4. Pumping and Storage

Two pump stations and a 5 MG storage tank (with the potential of a 2nd 5 MG storage tank) will be necessary to support conveyance of water along the proposed transmission main. Hydraulic analysis was utilized in conjunction with visual site assessments to locate the pump station sites at the start and midpoints of the transmission main.

4.1 Pump Station #1 – Beech Creek

A pump station at the beginning of the proposed transmission main will be required to boost the HGL to approximately the midpoint of the transmission main while maintaining 30 psi over higher elevations in the pipeline. The site footprint needed for Pump Station #1 (Beech Creek) is estimated at 0.3 acres to accommodate a 60 MGD pump station, an electrical / mechanical building, two 10,000-gallon surge tanks, and an on-site generator. The two surge tanks and on-site standby generator enhance system redundancy and operational reliability, mitigating the risk of service interruptions. The pump station site would be located at approximately 621 Beech Creek Road, Brentwood, TN and is shown in **Figure 4-1**.

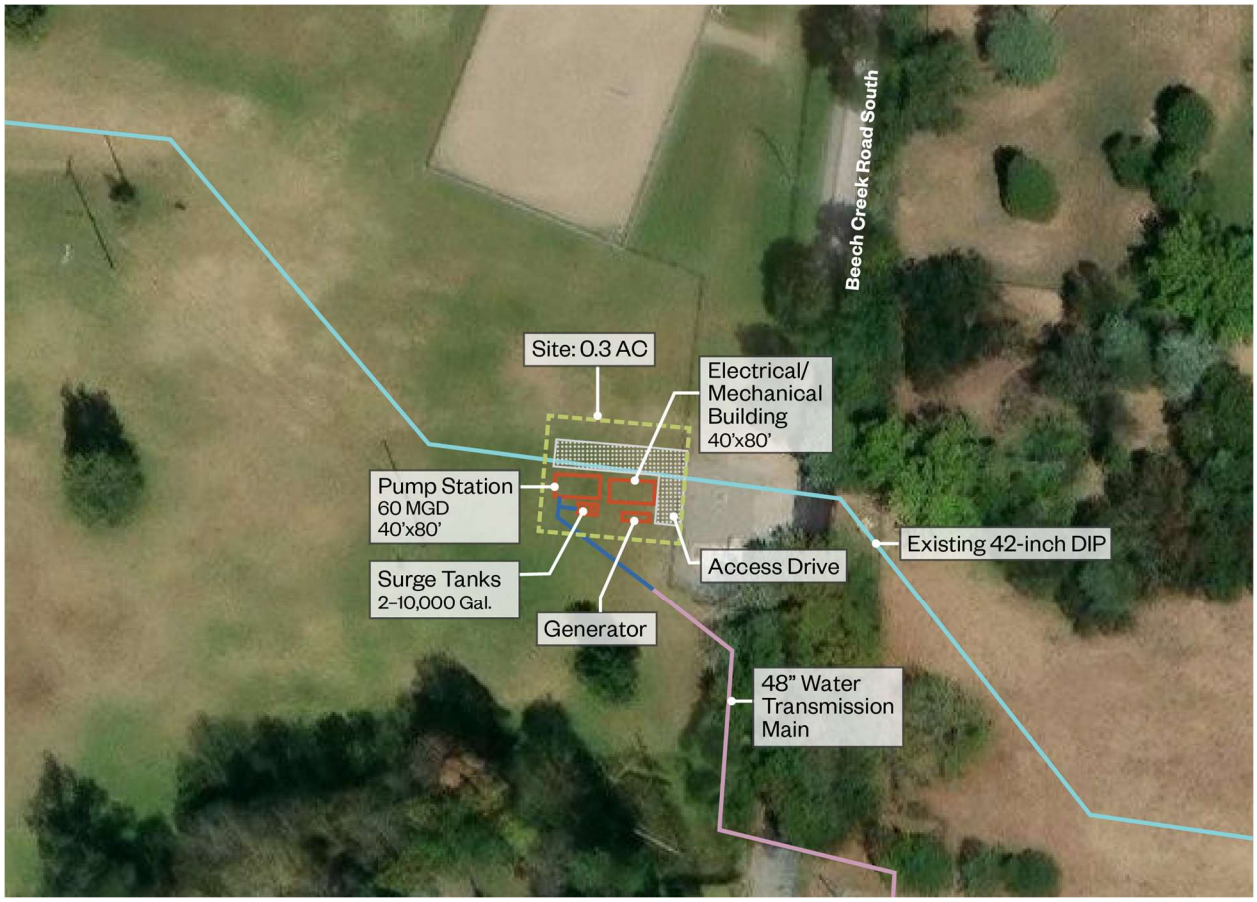


Figure 4-1: Pump Station #1 (Beech Creek)

4.2 Pump Station #2 & Storage Tank (Floyd Rd)

A second pump station is necessary at the approximate midpoint of the transmission main route where system storage would also be required. The location of this intermediate pump station facility will be determined during a future phase should the project move forward. A site visit confirmed suitable locations are available for a pump station and storage tank. A conceptual site footprint (see **Figure 4-2**) is estimated to be 6.25 acres which would be capable of fitting a 60 MGD pump station, an electrical / mechanical building, two 10,000-gallon surge tanks, an on-site generator, two 5-MG storage tanks, and a storage building. The two surge tanks and on-site standby generator enhance system redundancy and operational reliability, mitigating the risk of service interruptions.

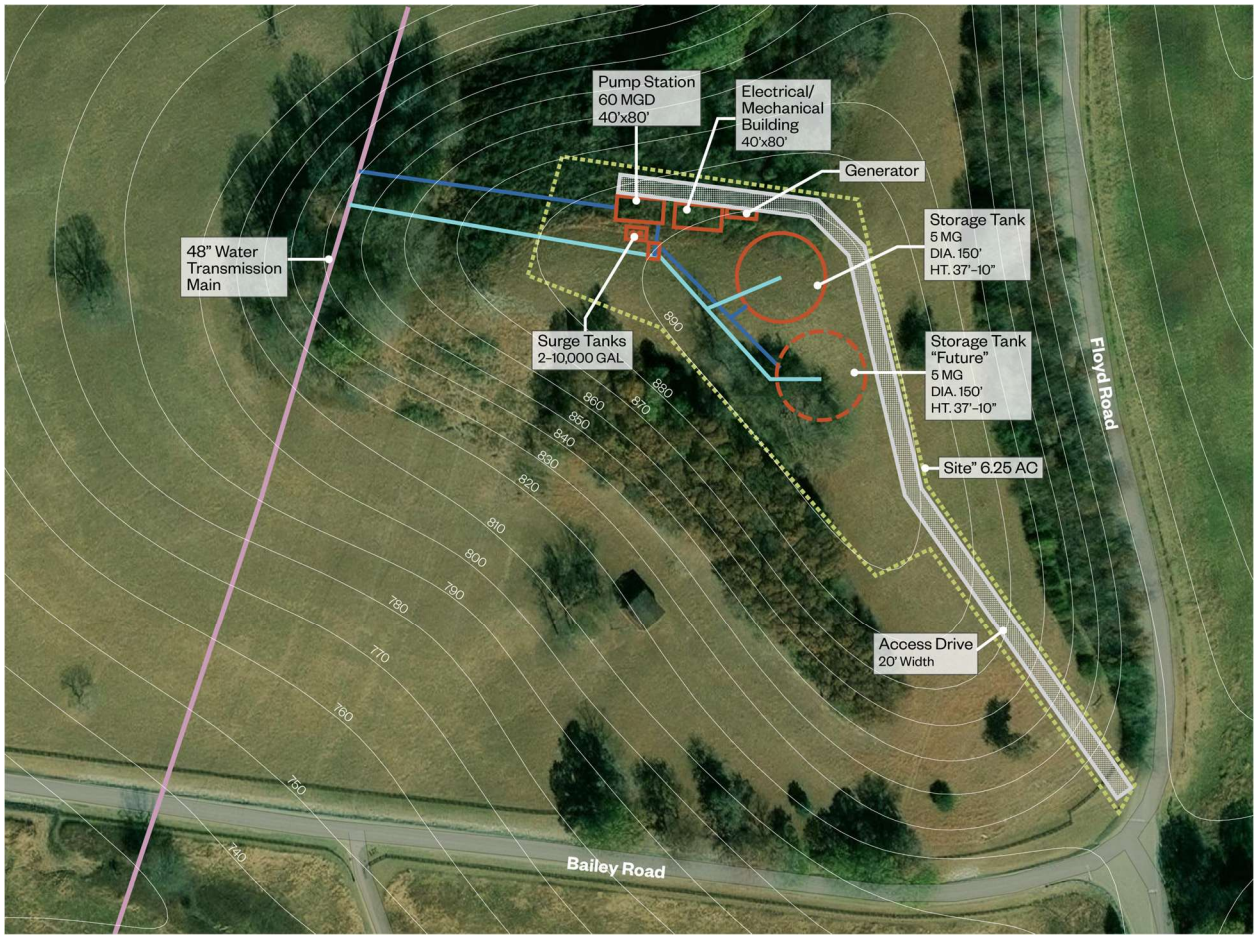


Figure 4-2: Pump Station #2 & Storage Tank (Concept)

5. Water Quality Considerations

The MVUD transmission main feasibility study included a water quality assessment to consider the potential impacts on the finished water in the downstream systems, chlorine decay along the transmission line, the disinfection byproducts (DBP) formation potential, and potential corrosion impacts. This desktop assessment is based on data provided from the key stakeholders: MVUD, HVUD, CPWS, MCWS, Spring Hill, and Mt. Pleasant utilities for the feasibility study. Since MCWS purchases water from CPWS, CPWS data was used for that utility assessment. The goal for this assessment is to provide a high-level review of the data and provide recommendations for further study during the preliminary design phase.

5.1 Utility Water Quality Assessment

The first water quality assessment step was a finished water parameter comparison between the finished water producer, HVUD, and the four receiving utilities: CPWS, Spring Hill, Mt. Pleasant, and MCWS. A data request was sent to all impacted water utilities for monthly operating reports for a finished water quality assessment. Data was received from HVUD, CPWS, Spring Hill, and Mt Pleasant. As previously mentioned, CPWS data was used for MCWS utility assessment.

The finished water parameters used for the initial water quality assessment were pH, alkalinity, hardness, and chlorine residual. These four parameters were chosen to inform the analysis on potential corrosion impacts (pH and alkalinity), disinfection and potential DBP formation (chlorine residual), and potential scaling in the distribution system (hardness). **Figure 5-1**, **Figure 5-2**, **Figure 5-3**, and **Figure 5-4** show plots of each water quality parameter from January 2019 to April 2025 for each of the four water utilities.

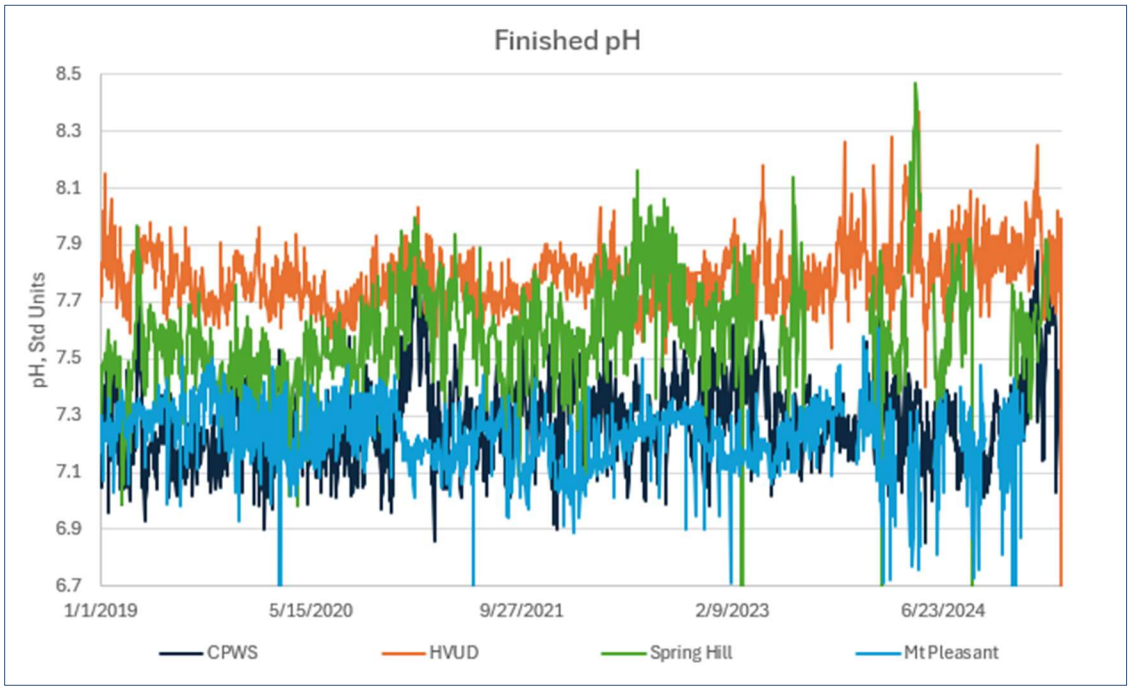


Figure 5-1: Water Quality Assessment Utility pH Comparison

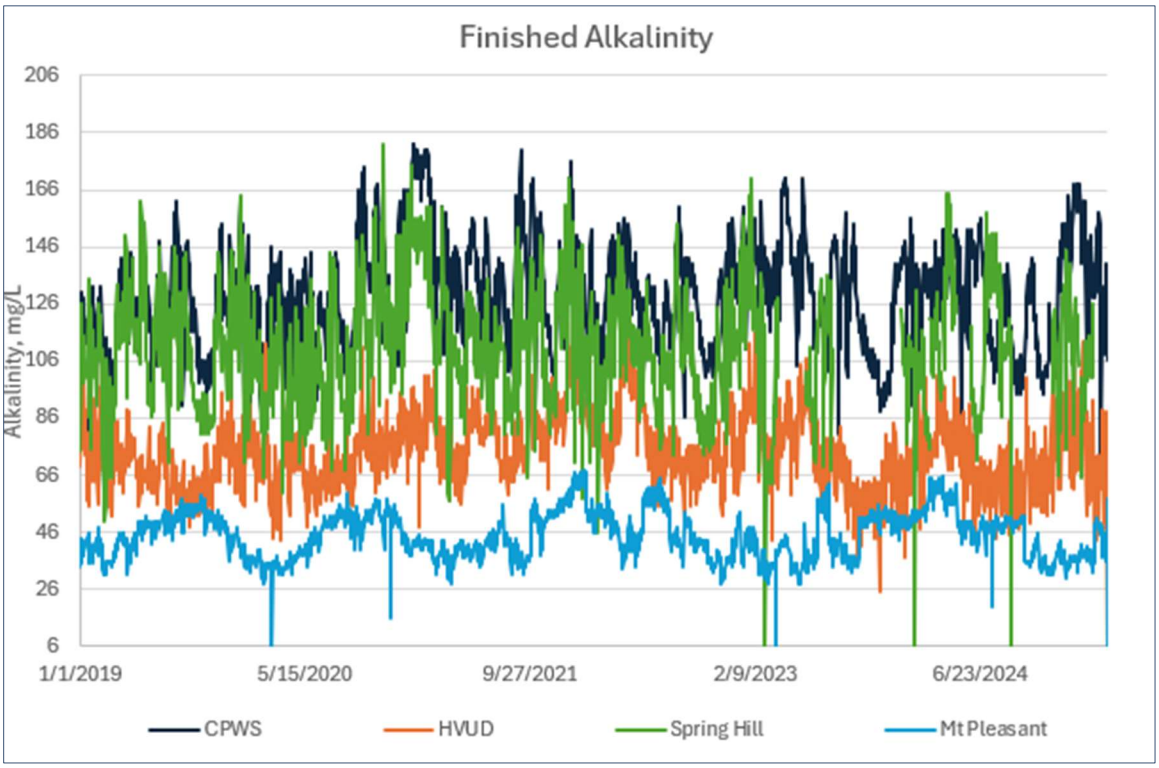


Figure 5-2: Water Quality Assessment Utility Finished Alkalinity Comparison

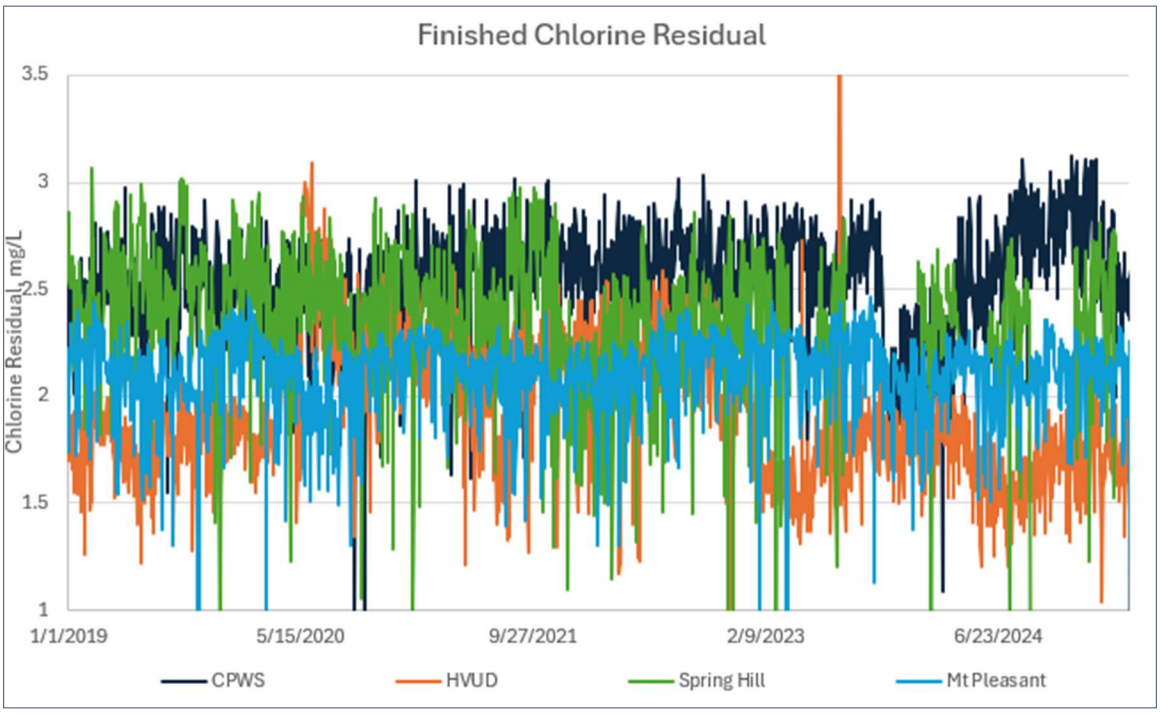


Figure 5-3: Water Quality Assessment Utility Finished Chlorine Residual Comparison

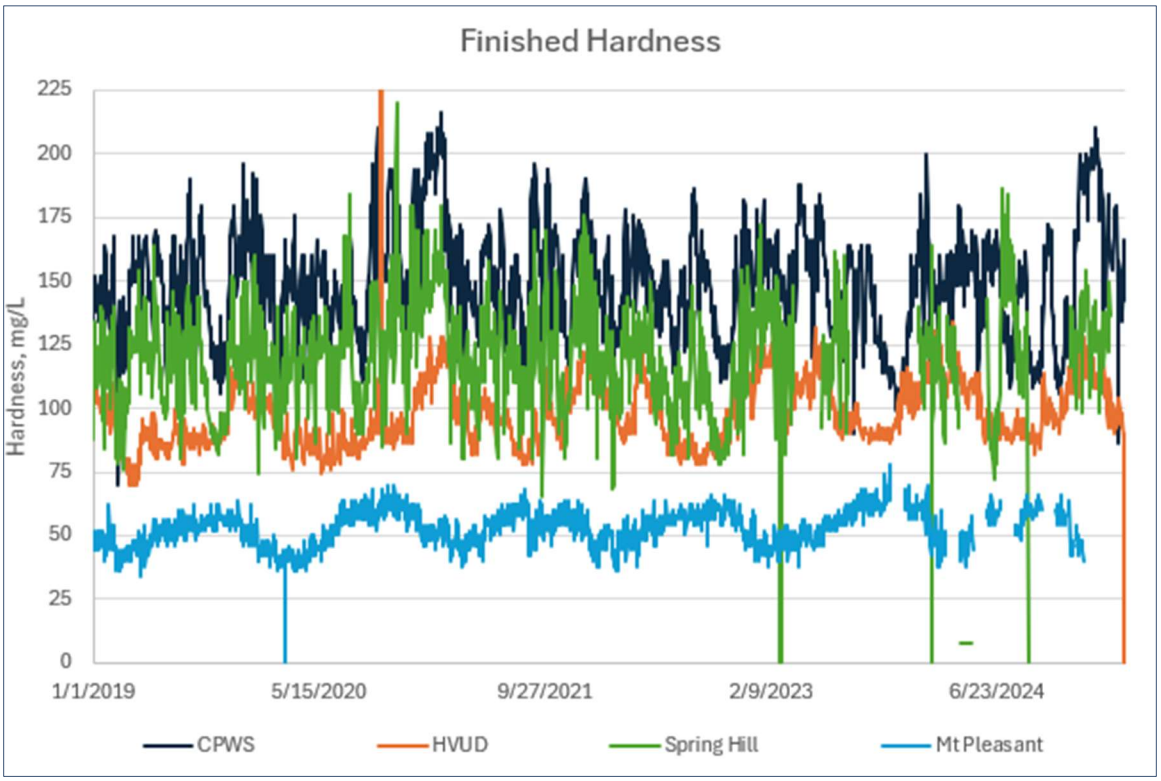


Figure 5-4: Water Quality Assessment Utility Finished Hardness Comparison

A high-level comparison between the four water quality parameters show that the water from the four systems are mostly compatible. However, there are observable differences between the utilities as the four utilities have three water sources: the Cumberland River (HVUD), the Duck River (CPWS and Spring Hill) and groundwater sources (Mt. Pleasant). All of the utilities have a finished water chlorine residual leaving the plant between 1.5 mg/L and 3.0 mg/L, and this could correspond to the different chlorine demands in the treated water required to maintain an acceptable chlorine residual in each distribution system Additionally, differences are apparent in the alkalinity and hardness comparison as the groundwater source has much lower alkalinity and hardness than the two surface water sources.

One additional difference between the four waters is the finished pH in the system. The MVUD pipeline source water (HVUD) is approximately 0.5 s.u. higher than the CPWS and Mt. Pleasant waters. The waters appear to be well buffered, but there is the possibility of an increase in downstream pH upon mixing at the distribution points. A pH increase is also possible due to the long travel distance for the water feed in the transmission line with new cement mortar lining. This pH increase could impact scaling and/or corrosion in the water systems.

Based on the noted differences above in pH, alkalinity, and hardness between the different water sources it would be recommended to monitor alkalinity, hardness, and pH at the entrance points for each system during the transmission main startup as well as monitor each system for other impacts from the mixed waters. Slow introduction of the MVUD transmission line water into each system will help assess any impact to the water systems.

The primary finished water parameter assessment was to inform the high-level corrosion potential assessment. The following section details the observations and next steps for the corrosion potential assessment.

5.2 Potential Corrosion and Scaling Impacts

One primary concern when mixing water from various distribution systems is if the new water source could have an impact on corrosion potential, pipe wall scaling, and release of iron, lead, copper, or other inorganics within the distribution system and premise plumbing. Changes in system water quality parameters, such as pH, can impact metal solubility and pose a risk for leaching contaminants such as lead or copper into the drinking water. A high-level corrosion potential review for the MVUD transmission line and introduction of a new source water into the utilities was based on water quality data (as discussed in Section 5.1) and information from the 2003 EPA Revised Guidance Manual for Selecting Lead and Copper Control Strategies.

Lead and copper leaching into drinking water from pipes and plumbing fixtures can be controlled by optimizing certain water quality characteristics such as pH and alkalinity or the addition of a corrosion inhibitor such as orthophosphate. Drinking water lead and copper levels are regulated under the National Primary Drinking Water Regulations for Lead and Copper Rule (LCR) and its revisions, which establishes the action levels for lead and copper. For the action levels to be triggered, more than 10 percent of tap water samples would have to exceed the action levels. Inquiries and reviews of each utility's data show that no utility has a lead or copper violation at the current time; however, careful evaluation of each utility water will be recommended to ensure each system is protected from lead or copper levels especially since the Lead and Copper Rule Improvements (LCRI) lowers the lead action level from 0.015 mg/L to 0.010 mg/L.

As discussed in Section 5.1, the pH and alkalinity for each utility was considered for the corrosion impact. One additional parameter included was dissolved inorganic carbon (DIC). DIC is an estimate of total carbonates in the finished water that influence lead and copper levels as well as finished water pH stability (Revised Guidance Manual for Selecting Lead and Copper Control Strategies). According to the OCCT Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems, DIC directly measures the available carbonate species in the water that can react with lead and copper to form the passivating scales. DIC levels were estimated based on the tables in Appendix B of the OCCT Evaluation with the pH and alkalinity data from each utility's Monthly Operating Report (MOR) data. These levels are shown below in Table 5-1.

Table 5-1: DIC Estimations from MOR Data

Water Utility	Minimum	Average	Maximum
Harpeth Valley Utility District	9.0	18.0 - 18.3	25.0
Spring Hill	12.0	27.6 - 27.9	44.0 - 45.0
Columbia Power & Water Systems	16.0 - 17.0	33.8 - 34.6	47.0
Mt. Pleasant	2.0 - 5.0	12.5 - 12.8	19.0 - 21.0

A second corrosion control factor is the use of a corrosion inhibitor in the finished plant water. Three of the utilities feed a corrosion inhibitor to reduce the chances of lead or copper leaching into the drinking water. These utilities used different manufacturers for the corrosion inhibitor feed but do maintain a target orthophosphate residual in the systems. Mt. Pleasant does not feed a corrosion inhibitor, but, with the lower DIC and alkalinities shown in the previous assessment, Mt. Pleasant would benefit from raising its pH (in small increments) or adding an orthophosphate-based corrosion inhibitor. For the MVUD transmission main feasibility report, it is recommended that all connected utilities feed a corrosion inhibitor. The idea would be for all utilities to feed a common product with similar target orthophosphate residual, but each utility feeding a corrosion inhibitor with comparable orthophosphate residual would benefit the overall system.

One additional water quality consideration for the MVUD transmission main would be limiting potential scaling in the distribution systems. Increases in finished pH in waters with high hardness could lead to calcium carbonate precipitating in the water lines (scaling). Monitoring pH at the connection points as well as considering water quality indices such as the Langlier Saturation Index (LSI) or the carbonate precipitation potential (CCPP) is encouraged to limit water quality aesthetic issues for the stakeholder utilities.

Based on the information reviewed during the feasibility study, it was determined that these waters are generally compatible, but bench- or pilot-scale testing during the preliminary design and a thorough review of plumbing materials inventories are recommended to inform any permitting concerns related to water quality and corrosion. The feasibility study review was based on provided MOR data, but comprehensive chloride and sulfate data was not included for all utilities. Since the Chloride-to-Sulfate Mass Ratio can also help predict lead corrosion potential, it is recommended for each utility to either provide the chloride and sulfate data or, if not available, conduct a sampling campaign to obtain chloride and sulfate data in each system. This sampling assessment should go along with a review of the detailed plumbing material inventories for each utility to verify there are no lead service lines in each utility.

5.3 Water Age and Chlorine Decay

Additional water quality concerns result from the potential long water ages along the transmission main prior to the receiving systems. Water age is defined as the time water spends in a distribution system before reaching consumers. The U.S. EPA does not specify a strict numerical limit for water age in a distribution system. Water age impacts on water quality vary based on different factors, including pH and temperature. In combination with conditions, increased water age can lead to water quality issues such as DBP formation and loss of disinfectant residual, so minimizing the water age impact in all systems should be a priority in the MVUD transmission main design.

Water age estimates for the feasibility study were provided by the HDR water model. HDR calculated the water age within the proposed transmission main using the age of the water at the point of connection with the HVUD distribution system at Beech Creek (determined by the HVUD distribution system model) as the baseline water age from the HVUD water treatment plant. As MVUD purchases water from HVUD, all water entering the MVUD system will have a baseline water age prior to conveyance through

the transmission main. The water age from Beech Creek to the end of the proposed transmission main was then modeled for each of the pipeline alternatives.

Assuming two parallel 42" water lines, the HDR model estimates the total water age from the HVUD plant to the point of delivery to the downstream systems of 77 hours (3.2 days) during 20 mgd flows to 51 hours (2.1 days) at 60 mgd flows. While there is no strict numeric limit, U.S. EPA and AWWA sources suggest a rule of thumb is to limit water age to less than seven days.

Increased water age can result in additional chlorine decay in the transmission main due to the longer reaction time with reactive species in the water. TDEC CFR 0400-45-01-.17 requires that all points in a water system have a minimum chlorine residual of 0.2 mg/L (though the EPA may be considering a higher minimum chlorine residual as part of future revisions to the M/DBP Rules). Although the stakeholder utilities will need to decide the minimum chlorine residual at the entry points to avoid dropping below the 0.2 mg/L limit in the receiving utilities' distribution systems, chlorine booster station(s) may need to be considered along the transmission main (e.g., at the intermediate pump station) or at the entry points to the systems to avoid a low chlorine residual.

For the feasibility assessment, an approximation of the potential chlorine decay in the MVUD transmission main was based on the provided HVUD MOR chlorine and sampling data and the MVUD chlorine sampling data. HVUD chlorine data from the MVUD Beech Creek Meter was used as a starting chlorine residual level entering the MVUD system. As stated above, the parallel 42" lines would add approximately 9 to 28 hours to the water age when flowing between 20 and 60 mgd. Since the MVUD chlorine residual sample data was limited to only a few daily samples around the time of the historical HVUD samples, providing a chlorine decay range with the attainable data would be limited to two data sets. For this approximation, the two sample assessment points were selected as a one-day and two-day water age to provide a greater potential range for the approximation. **Table 5-2** below shows the sampling data in this time range for MVUD.

Table 5-2: One Day Chlorine Decay Approximation

Date of Sample at Beech Ck Meter	Chlorine Residual (mg/L)	MVUD Sample Date	MVUD Sample Location	MVUD Chlorine Residual (mg/L)	Chlorine Decay (mg/L)
7/15/2024	1.74	7/16/2024	7128 GALLERIA BLVD.	1.1	0.64
7/29/2024	1.85	7/30/2024	204 ALCOTT CT.	1.0	0.85
7/30/2024	1.31	7/31/2024	1025 BUDDLEIA LN.	1.0	0.31
8/7/2024	1.68	8/8/2024	1840 BRENTWOOD PT.	1.2	0.48
8/22/2024	1.39	8/23/2024	8078 SUNRISE CIRCLE	1.3	0.09
10/30/2024	1.57	10/31/2024	532 KILBURN CT.	1.2	0.37
				Average	0.36
				Minimum	0.09
				Maximum	0.85

Table 5-3: Two Day Chlorine Decay Approximation

Date of Sample at Beech Creek Meter	Chlorine Residual (mg/L)	MVUD Sample Date	MVUD Sample Location	MVUD Chlorine Residual (mg/L)	Chlorine Decay (mg/L)
6/18/2024	1.55	6/20/2024	209 GOTHIC CT.	1.1	0.45
7/15/2024	1.74	7/17/2024	200 BATEMAN AVE.	1.2	0.54
7/29/2024	1.85	7/31/2024	1025 BUDDLEIA LN.	1.0	0.85
7/30/2024	1.31	8/1/2024	170 CLIFFE RUN	1.2	0.11
8/7/2024	1.68	8/9/2024	331 PREMIER CT.	1.4	0.28
10/30/2024	1.57	11/1/2024	528 BRENNAN LN.	1.5	0.07
				Average	0.38
				Minimum	0.07
				Maximum	0.85

As shown in the tables above, the chlorine residual difference between the HVUD meter and points one to two days later in the MVUD system ranges from 0.07 mg/L to 0.85 mg/L. Chlorine demand is a function of water temperature, finished water organics, biological activity, and other dynamic variables. Based on the tables above, if the free chlorine residual at the entrance to the proposed transmission main is 1.6 mg/L (average of above data), the chlorine residual at the downstream distribution system entry points could be 0.7 – 1.5 mg/L. The high end is likely sufficient to avoid low disinfectant residuals within the downstream distribution systems, but the low end (e.g., 0.7 mg/L) could be problematic depending on additional water age in the downstream distribution system. As such, considerations for a chlorine booster station(s) to ensure the downstream utilities will maintain residuals in the intended ranges should be made in the preliminary design stage. Additional chlorine decay testing can be performed during the preliminary design with water from the HVUD connection location along with further analysis with the MVUD water age model to get a more exact decay curve for the chlorine booster station design. Additionally, considerations for a water quality monitoring station at the intermediate pump station to monitor the chlorine residual as well as water pH and temperature should be made during preliminary design to further inform MVUD on water quality in the transmission line.

5.4 Disinfection Byproduct Formation

Disinfection byproduct (DBP) formation in distributions systems is a consequence of the chlorine residual continuing to react with organic precursors in the water. The two regulated DBP groups, trihalomethane (THM) and haloacetic acid (HAA) compounds, have maximum contaminant levels (MCLs) established in the EPA Disinfection Byproducts Rule (DBPR). This rule limits the total THM (TTHM) and five regulated HAA compounds (HAA5) to a maximum locational running annual average (LRAA) of 0.080 mg/L and 0.060 mg/L, respectively.

For this feasibility study, the DBP considerations were limited to a review of the regulatory requirements for consecutive systems as well as the DBP data from MVUD. DBP distribution levels are regulated by the EPA DBPR with additional regulations in TDEC's CFR 0400-45-01. These regulations establish the DBP MCLs as well as monitoring requirements if they are exceeded. According to CFR-0400-45-01-.38,

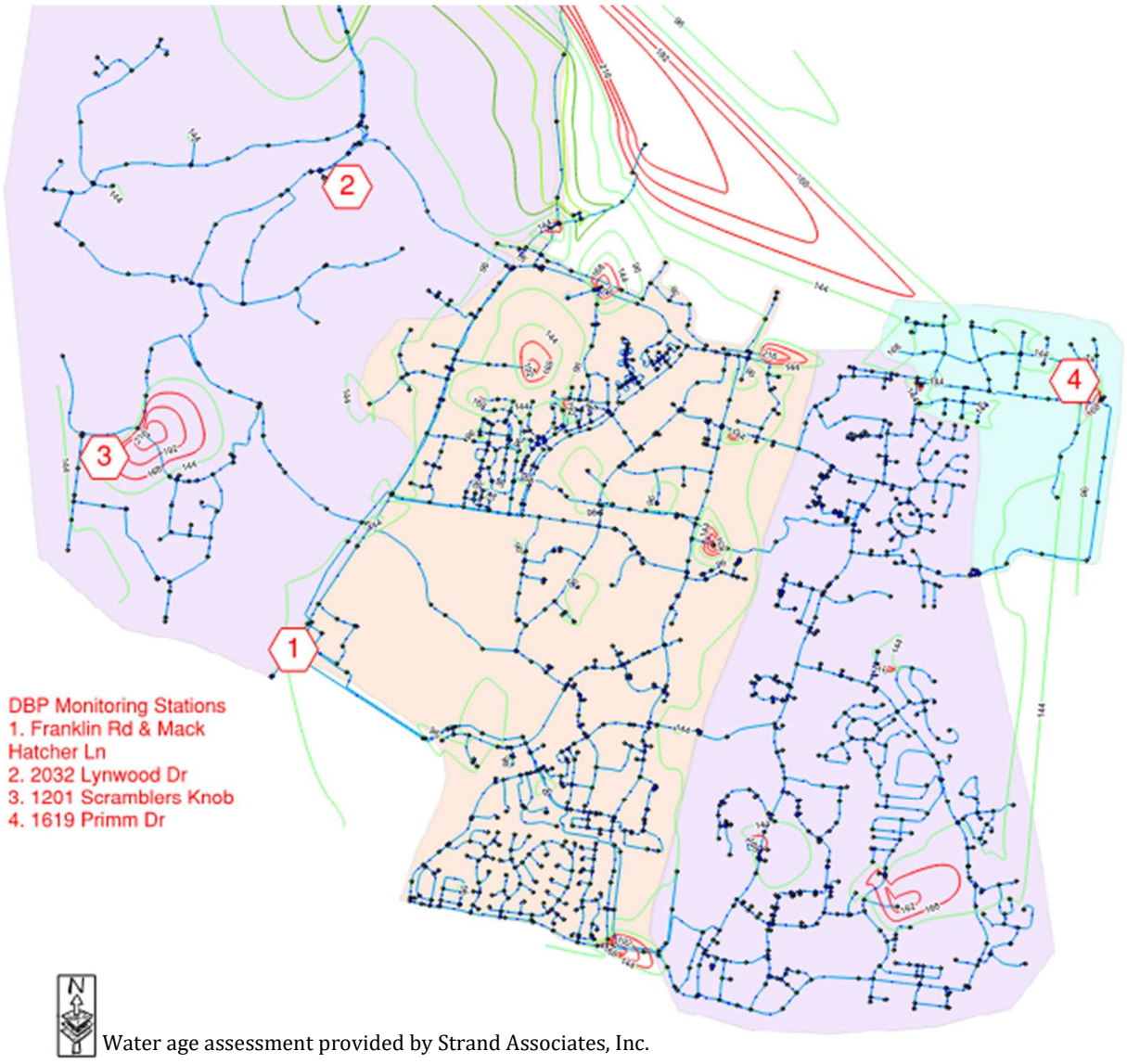
if DBP levels exceed the MCLs, the violating utility or utilities will be required to provide an operational evaluation report (OEL) to show how they will reduce the DBP levels.

For the MVUD transmission line, a recommended target will be a high limit of 60% of the DBP MCL to avoid the upstream and any downstream utilities requiring an OEL if a DBP exceedance were to occur in one of the downstream systems. Should an exceedance occur in one of the downstream systems, the upstream systems would also be required to be in the OEL if sampling shows DBP levels at the master meter are more than 60% of the DBP MCL. This 60% DBP MCL would not only limit the MVUD requirement for an OEL but also assist downstream utilities by limiting the amount of preformed DBPs entering their systems. During the feasibility study, MVUD provided the current LRAAs from four monitoring sites in the distribution system to gauge the 60% DBP MCL (shown below in **Table 5-4**) as well as a water age overview map (**Figure 5-5**).

Table 5-4: MVUD DBP Sample Site LRAAs

Sampling Location	Approximate Water Age (hours)	Current Year TTHM LRRA [1] (mg/L)	Previous Year TTHM LRRA [1] (mg/L)	Current Year HAA5 LRRA [2] (mg/L)	Previous Year HAA5 LRRA [2] (mg/L)
Franklin Rd & Mack Hatcher Ln	96	0.035	0.038	0.024	0.028
2032 Lynwood Dr	96	0.035	0.042	0.024	0.034
1201 Scramblers Knob	144	0.040	0.042	0.027	0.033
1619 Primm Dr	144	0.045	0.039	0.031	0.030

1. TTHM MCL = 0.080 mg/L; 60% of MCL = 0.048 mg/L
2. HAA5 MCL = 0.060 mg/L; 60% of MCL = 0.036 mg/L



Water age assessment provided by Strand Associates, Inc.

Figure 5-5: MVUD Water Age Map with Approximate Locations of DBP Monitoring Sites

The provided MVUD data from this year and the previous year show that the TTHM and HAA5 LRAAs are below the 60% MCL recommended target even up to an approximated 144-hour water age with the Scramblers Knob and Primm Dr monitoring location. The 144-hour water age is higher than the previously discussed 77-hour water age at 20 mgd (assuming parallel 42" lines) at the MVUD transmission line termination point. Nevertheless, the use of chlorine booster stations in the transmission line (i.e., higher chlorine residual) must also be considered for the DBP formation potential in the water. Further sampling and analysis should be considered during preliminary design to assess the impact of each on the DBP formation potential.

Establishing DBP formation potential in a water system can be estimated with a desktop modeling process; however, this modeling process is not a standardized model and is highly site specific to the source waters and treatment processes. Each water system has different water quality parameters and DBP precursor constituents, so a thorough calibration and sampling effort is required to produce an accurate model. This effort could be performed during the preliminary design stage alongside a sampling campaign to produce a more accurate model prediction of DBP formation within and downstream of the proposed transmission main.

Bench-scale testing can also be used during the preliminary design to quantify DBP formation potential such as with simulated distribution system (SDS) tests. The SDS effort would allow the design team to test various water blends from the receiving customer systems as well as different chlorine booster residual chlorine concentrations. It is recommended to initiate a DBP sampling study that can assess the DBP formation in the blended waters of the receiving utilities as well as the DBP formation impact on various chlorine residual booster station chlorine concentration targets to inform the booster station design. These tests can also be integrated with the corrosion impacts sampling and testing noted above.

5.5 Water Quality Next Steps

This desktop analysis revealed that, based on historical water quality data, the finished water from HVUD could be compatible with the downstream systems, with differences and risks noted above. Should this project move forward, it is recommended that further sampling and analysis be performed during the preliminary design process to further assess the corrosion potential, DBP formation, and chlorine decay in the MVUD transmission line. These sampling targets and analyses would include:

- Conduct chloride and sulfate sampling in the connected utilities to further assess corrosion impacts in the water systems.
- Review each utility's plumbing materials inventory to determine if presence of lead, copper, and/or galvanized materials presents an increased risk of corrosion impacts.
- Conduct a chlorine decay and DBP formation study based on water near the future connection point to better inform water quality changes and chlorine booster pump station design/
- Consider an integrated water model to assess water age, water blending impact, and other impacts for all connected water systems.

6. Identification of Future Field Information

This study did not include field data collection that will be necessary to perform a detailed design. However, a list of the required information was compiled based on the desktop study and survey performed. The following includes a summary list of the detailed information required should the project move forward.

1. Topographic Survey along the pipeline route, at meter vault locations, and pump station and storage facility locations.
2. Geotechnical exploration at strategic locations along the pipeline route (river crossings, major roadway crossings, etc.), and at pump station, storage, and meter vault locations.
3. Major utility crossings and congested areas that potentially warrant further evaluation of construction methods and viability
4. Delineation of waters of the US and waters of the State along full pipeline route.
5. Habitat assessment for federally and state protected species along full pipeline route. In areas of suitable habitat for one or more protected species, surveys for individuals of the protected species will be necessary.
6. Visual assessment of historic resources in the vicinity of the pipeline route.
7. Archaeological surveys may be warranted.
8. Confirmation of suitability of routing the pipeline along the existing TVA easement as part of the overall field data gathering effort.
9. Conduct additional data collection and analysis to support the various permit application processes required for the project.

7. Environmental, Cultural, and Historical Considerations

Hazen conducted a desktop review of natural and cultural resources associated with the MVUD transmission main project. The review consisted of desktop review of publicly available published information. The findings of the environmental evaluation are described in the following section.

7.1 Waters of the U.S. and State

Jurisdictional waters of the U.S. include open waters, streams, and wetlands. Wetlands, as defined by federal regulations [40 Code of Federal Regulations (CFR) 230.3(t)] are "…areas that are inundated or saturated by an accumulation of surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." The U.S. Army Corps of Engineers (USACE) requires the presence of three parameters (hydrophytic vegetation, hydric soils, and evidence of hydrology) in support of a jurisdictional wetland determination (Environmental Laboratory, 1987) as well as a continuous surface connection to a waterbody that is a water of the US in its own right. The State of Tennessee further protects Waters of the State, which are defined as "any and all water, public or private, on or beneath the surface of the ground, that are contained within, flow through, or border upon Tennessee or any portion thereof, except those bodies of water confined to and retained within the limits of private property in single ownership that do not combine or effect a junction with natural surface or underground waters" (Part 1-Tennessee Water Quality Control Act of 1977 69-3-103 Part Definitions).State waters identified as wet weather conveyances have a lower level of protection that those defined as streams and may be physically altered without an Aquatic Resource Alteration Permit subject to the requirements of 69-3-108(q). The boundary between wetlands and deepwater habitat is defined as the maximum depth where rooted emergent vegetation may be found. Rooted emergent vegetation is generally present at depths less than six feet below mean low water during the growing season.

Hazen biologists conducted a desktop review of National Wetland Inventory (NWI) mapping, United States Geologic Survey (USGS) topographic quadrangles, and TDEC Water Resources Map Viewer to determine the likely presence of jurisdictional wetlands in the vicinity of the proposed project corridor. Along the assessed corridor, NWI mapping depicts nine freshwater wetland features, one emergent and eight forested types **(**Figure 7-1**)**. The emergent wetland is bisected by the proposed corridor and is located immediately north of Boyd Mill Pike. The forested wetlands are shown as linear features roughly following Cartwright Creek, a tributary to Cartwright Creek, Parker Branch, a tributary to Leipers Creek, a tributary to Robinson Branch, Carters Creek, Terrell Branch, and Bassham Branch.

The project corridor is located in two 8-digit Hydrologic Unit Codes (HUCs), specifically 05130204 Harpeth River and 06040003 Lower Duck River, both of which are tributaries to the Tennessee River. Within the Harpeth River watershed, the project corridor crosses nine named streams and several unnamed tributaries thereto **(**Figure 7-2**)**. The named streams include Fulton Creek, Cartwright Creek, Harpeth River, Brown Creek, West Harpeth River, Parker Branch, Leipers Fork, Bear Creek, and Robinson Branch. Within the Lower Duck River watershed, four named streams and several unnamed tributaries thereto are traversed by the project corridor. The four named streams include Carters Creek, Terrell Branch, Bassham Branch, and Mahon Branch.

The limits of the jurisdictional waters of the US or streams as defined in TWQCA have not been verified via onsite investigations and have not been delineated or surveyed for the purpose of the study. Upon selecting a preferred alternative and identification of the limits of disturbance associated with the selected alternative, delineation of waters of the US and Tennessee stream determinations will be performed. Impacts to jurisdictional areas will be calculated based on the delineation and project design. The project design will be developed to ensure compliance with all regulations applicable to impacts to waters of the US or State. The desktop review of jurisdictional waters indicates that the proposed project is feasible under the applicable regulations and laws.

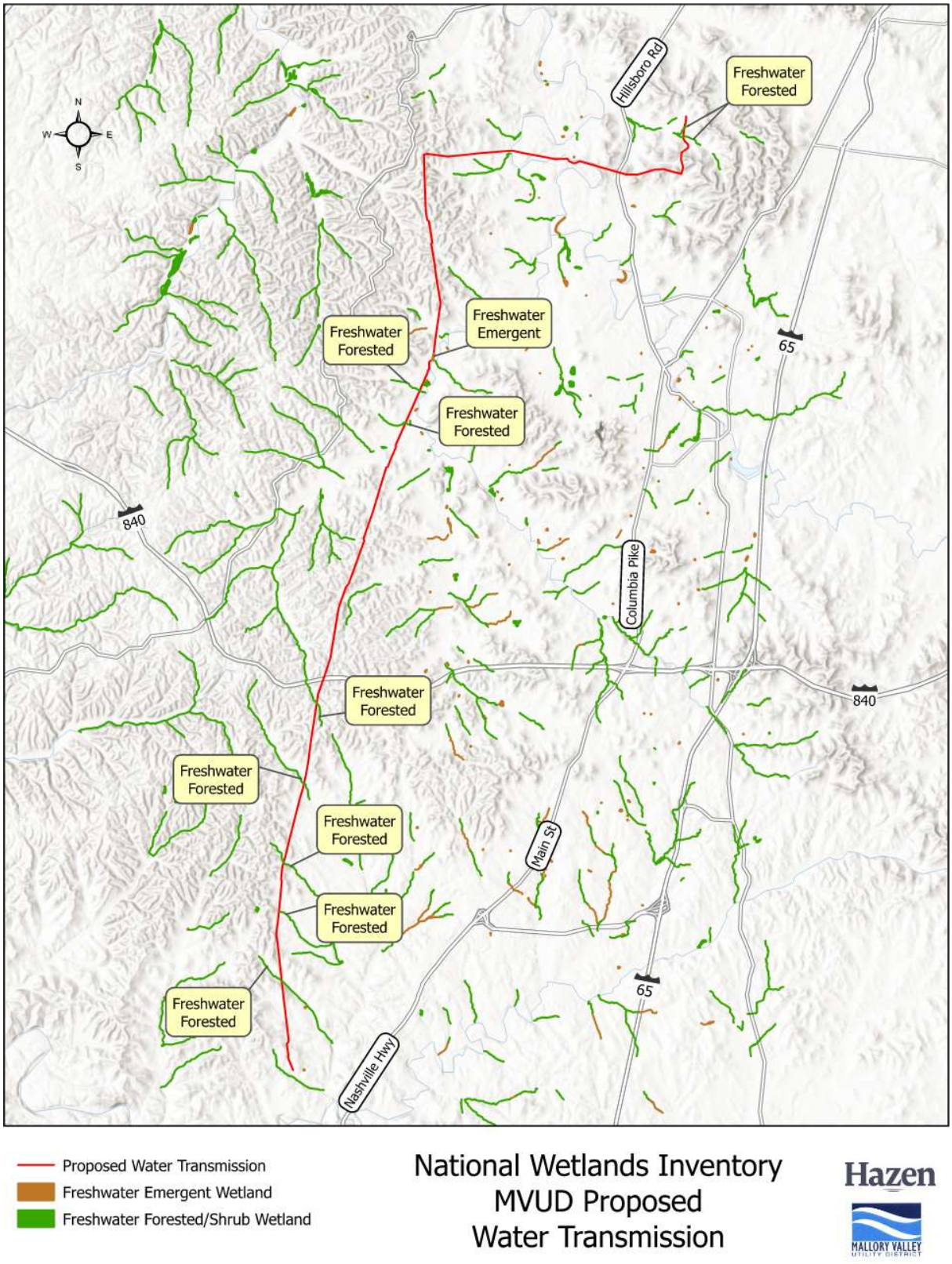


Figure 7-1: National Wetlands Inventory in Proximity to Proposed Transmission Main

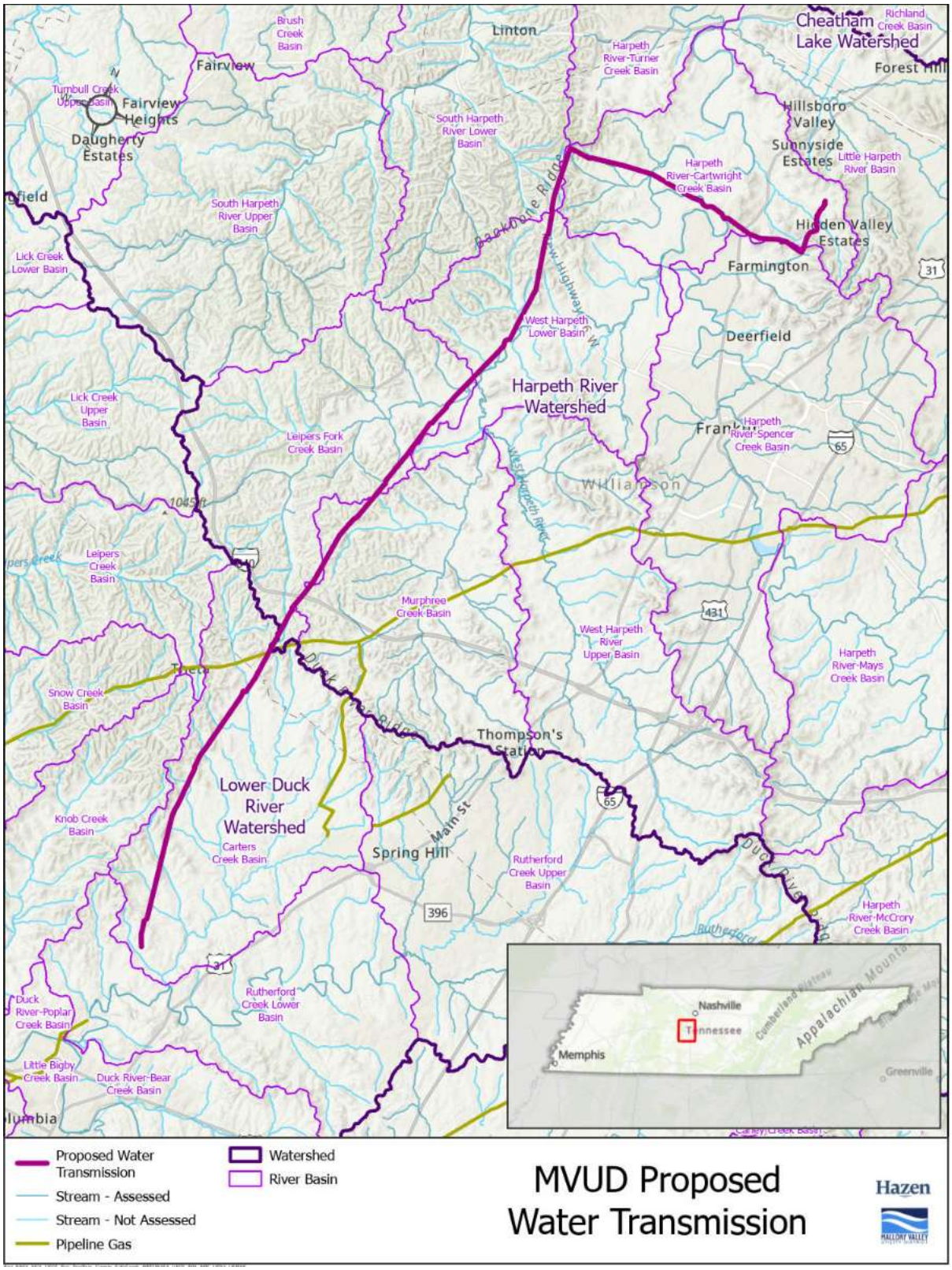


Figure 7-2: Watersheds and Waterways in Proximity to Proposed Transmission Main

7.2 Protection of State Waters

Activities in all waters that are not wet weather conveyances are subject to review and authorization by TDEC pursuant to Tennessee's General Water Quality Criteria Rule, 0400-04-03 (the Rule). Tennessee identifies these waters as waters with unavailable parameters, waters with available parameters, Exceptional Tennessee Waters (ETWs) and Outstanding Natural Resource Waters (ONRWs). There are no ONRWs located within the project area.

7.2.1 Waters with Unavailable Parameters

Unavailable parameters exist where water quality is at, or fails to meet, the levels specified by the applicable water quality criteria. In these waters, TDEC will only authorize activities that cause no measurable degradation. In the case of physical alterations to these waters, TDEC will only authorize activities that do not cause significant habitat degradation.

7.2.2 Waters with Available Parameters

Available parameters exist where water quality is better than the levels specified by the applicable water quality criteria. TDEC will only authorize activities that cause less than *de minimis* degradation unless there are no practicable alternatives to lessen degradation and the proposed activity is necessary to accommodate important economic or social development.

7.2.3 Exceptional Waters

Exceptional Tennessee Waters are protected under the Rule. Exceptional Tennessee Waters include surface waters other than wet weather conveyances that are in one or more of the following categories:

- within state or national parks, wildlife refuges, forests, wilderness areas, or natural areas
- State scenic river or Federal Wild and Scenic River
- Federally designated critical habitat or other waters with documented non-experimental populations of State or Federally listed threatened or endangered aquatic or semi-aquatic plants or animals
- within areas as Lands Unsuitable for Mining pursuant to the federal Surface Mining Control and Reclamation Act where such designation is based in whole or in part on impacts to water resource values
- with naturally reproducing trout
- with exceptional biological diversity as evidenced by a score of 40 or 42 on the Tennessee Macroinvertebrate Index (or a score of 28 or 30 in sub-ecoregion 73a) using protocols found in the Department's 2017 Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys, provided that the sample is considered representative of overall stream conditions

- other waters with outstanding ecological or recreational value as determined by the Department.

Exceptional Tennessee Waters include the following waterways and their tributaries: Little East Fork, Wilkie Branch, and Trace Creek. The waterways are located near the site, and a tributary thereto may cross the project corridor. See Figure 7-3 for the location of the Exceptional Tennessee Waters in proximity to the project area.

Activities within Exceptional Tennessee Waters are subject to review and authorization by TDEC. The Rule requires that the degradation of habitat or any available parameter be either *de minimis* or demonstrated to have no practicable alternatives to prevent or lessen the degradation and be necessary to accommodate important economic or social development in the area. Furthermore, the degradation must not violate water quality criteria for uses existing in the receiving waters.

7.3 Federally Protected Species

The U.S. Fish and Wildlife Service (USFWS) identifies species of plants and animals that are in the process of decline and at risk of extinction. Federal law, under the provisions of Section 7 of the Endangered Species Act (ESA) of 1973, as amended, requires that any action likely to adversely affect a federally protected species be subject to review by USFWS. Other species may receive additional protection under separate federal laws.

Hazen consulted the Information for Planning and Conservation (IPaC) tool, which is maintained by USFWS, on April 24, 2025. On the IPaC report, USFWS identified five endangered species, one threatened species, three species that are proposed for listing, and one nonessential, experimental population that have the potential to occur in the project vicinity. The species, their listing status, habitat description, and habitat availability within or adjacent to the project corridor is provided in **Table 7-1**. Based on desktop review of species protected under federal law, the proposed project is feasible and may require coordination with the USFWS.

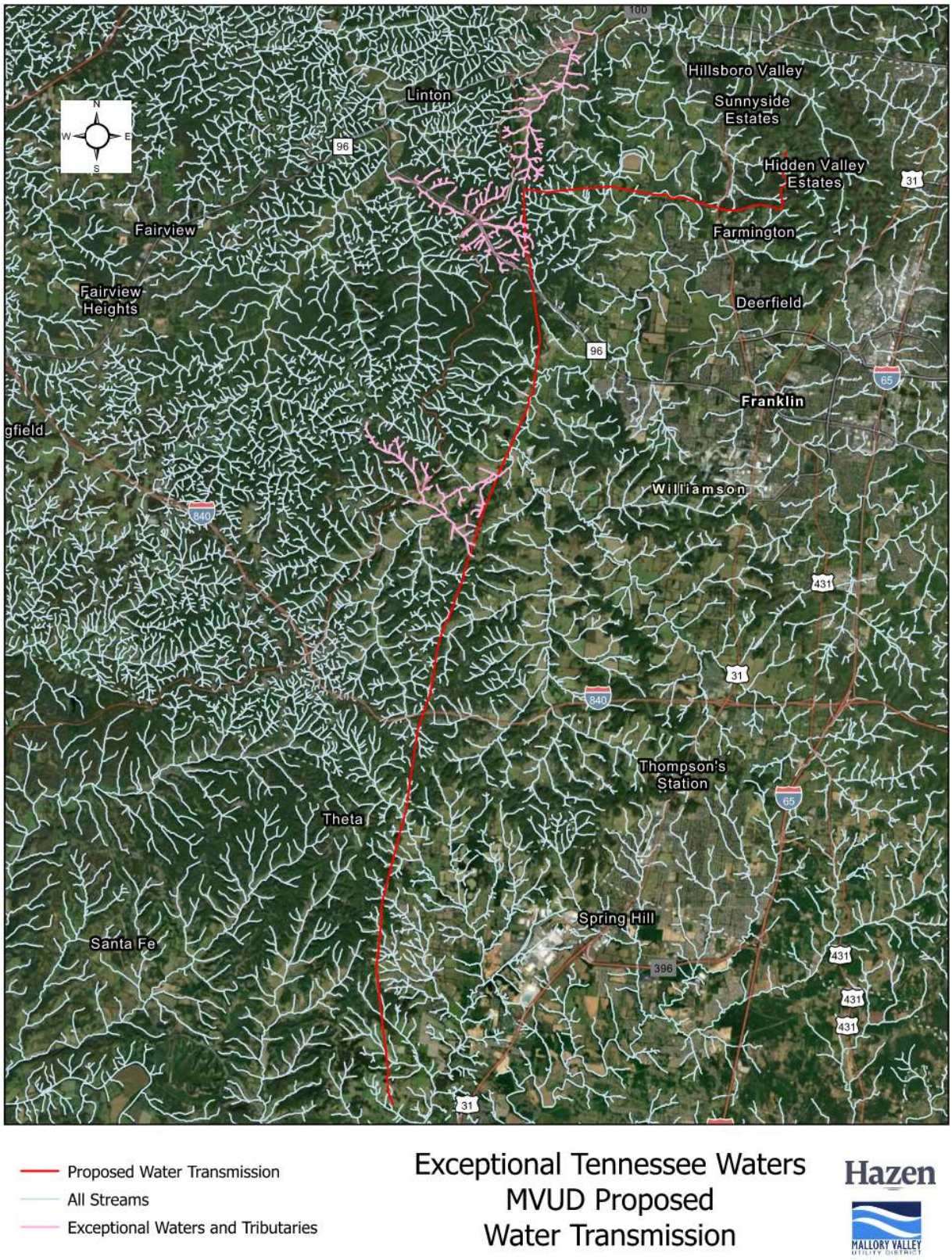


Figure 7-3: Exceptional Tennessee Waters in Proximity to Proposed Transmission Main

Table 7-1: Federally Protected Species

Common Name	Scientific Name	Federal Status	Habitat Description	Habitat Availability*
Mammals				
Gray bat	*Myotis grisescens*	Endangered	Caves year-round; may feed over waterbodies	Y
Indiana bat	*Myotis sodalis*	Endangered	Hibernates in caves; roosts under loose bark of trees	Y
Northern long-eared bat	*Myotis septentrionalis*	Endangered	Hibernates in caves; roosts include structures and the loose bark of trees	Y
Tricolored bat	*Perimyotis subflavus*	Proposed Endangered	Hibernates in caves, rock crevices, and mines; summer roosts include trees, cliffs, and buildings	Y
Birds				
Whooping crane	*Grus americana*	Nonessential, experimental	Breeds in freshwater marshes and prairies; uses grain fields, shallow lakes and lagoons, and saltwater marshes on migration and in winter	N
Invertebrates				
Monarch butterfly	*Danaus plexippus*	Proposed Threatened	Open areas with milkweed and other flowering plants	Y
Salamander mussel	*Simpsonaias ambigua*	Proposed Endangered	Swift-flowing rivers and streams with areas of shelter under rocks or in crevices	Y
Vascular Plants				
Leafy prairie-clover	*Dalea foliosa*	Endangered	Rocky washes in glades	Y
Price's potato-bean	*Apios priceana*	Threatened	Openings in rich woods	Y
Short's bladderpod	*Physaria globosa*	Endangered	Limestone talus slopes and cliffs	Y

* - Habitat availability represents the expectation of suitable habitat within or immediately adjacent to the project corridor based on review of publicly available published mapping. An entry of 'N' in this column indicates that desktop review resulted in a finding of no expectation of the possibility of habitat within or adjacent to the project corridor.

7.4 State-Listed Species

The Tennessee Fish and Wildlife Commission is authorized under TN Code Section 70-8 to issue regulations necessary to restrict the take, possession, transportation, exportation, or shipment of species or subspecies of wildlife that appear on the state list of endangered or threatened species, on the USFWS list of Endangered Native Fish and Wildlife, or on the USFWS List of Endangered Foreign Fish and Wildlife. The Rare Plant Protection and Conservation Act of 1985 (TN Code 70-8) may be used by TDEC in commenting on proposed public works projects. TDEC shall encourage voluntary efforts to prevent the plants on the list of threatened and special concern species from becoming endangered species. The act shall not be used to interfere with, delay, or impede any public works project. **Table 7-2** provides state-listed species for Maury and Williamson counties that are not also federally threatened or endangered and identified in the IPaC report for the project corridor. Based on desktop review and understanding of TN Code Section 70-8, the proposed project is feasible with respect to state-listed species.

Table 7-2: State-Listed Species

Common Name	Scientific Name	State Status	County	Habitat Requirements	Habitat Availability*
Fish					
Coppercheek darter	*Etheostoma aquali*	T	Maury	Deep riffles, runs, and flowing pools in Duck and Buffalo River watersheds	Y
Rabbitsfoot	*Theliderma cylindrica cylindrica*	T	Maury	Large rivers in sand and gravel	Y
Striated darter	*Etheostoma striatulum*	T	Maury	Bedrock pools of headwaters and creeks with large slabrock cover in the upper Duck River watershed	N
Amphibians					
Hellbender	*Cryptobranchus alleganiensis*	E	Maury	Rocky, clear creeks and rivers with large shelter rocks	Y
Streamside salamander	*Ambystoma barbouri*	E	Williamson	Seasonally flowing karst streams	Y
Tennessee cave salamander	*Gyrinophilus palleucus*	T	Maury	Cave streams and rimstone pools of the Central Basin, Eastern Highland Rim, and Cumberland Plateau	N
Invertebrates					
Birdwing pearlymussel	*Lemiox rimosus*	E	Maury	Small to medium-sized rivers in riffle areas with sand and gravel substrates in moderately-fast currents	Y
Cracking pearlymussel	*Hemistena lata*	E	Maury	Medium-sized rivers of moderate current; burrow deeply in mud, sand, gravel, and cobble substrates	Y
Cumberland monkeyface	*Theliderma intermedia*	E	Maury	Shallow riffle and shoal areas of headwater streams and bigger rivers, in coarse sand/gravel substrates	Y
Cumberlandian combshell	*Epioblasma brevidens*	E	Maury	Large creeks to large rivers, in coarse sand or mixtures of gravel, cobble, or rock	Y
Duck River dartersnapper	*Epioblasma ahlstedti*	E	Maury	Gravel shoals in medium to large rivers; Duck River upstream of Columbia	N
Nashville crayfish	*Faxonius shoupi*	E	Williamson	Streams with bedrock bottom; endemic to Mill Creek watershed	N
Orangefoot pimpleback	*Plethobasus cooperianus*	E	Maury	Large rivers in sand-gravel-cobble substrates in riffles and shoals with deep flowing water	Y
Pale lilliput	*Toxolasma cylindrellus*	E	Maury, Williamson	Small tributaries in firm rubble, gravel, and sand in shallow riffles and shoals; lower Tennessee River system	Y
Round hickorynut	*Obovaria subrotunda*	T	Maury	Medium to large rivers in sand and gravel substrate with moderate flow	Y

Common Name	Scientific Name	State Status	County	Habitat Requirements	Habitat Availability*
Slabside pearlymussel	*Pleuronaia dolabelloides*	E	Maury	Large creeks to moderately-sized rivers, in riffles and shoals over sand, fine gravel, and cobble substrates with moderate current	Y
Tan riffleshell	*Epioblasma walkeri*	E	Maury	River headwaters in riffles and shoals in sand and gravel substrates	Y
Vascular Plants					
Butternut	*Juglans cinerea*	T	Maury, Williamson	Rich woods and hollows	Y
Eastern yampah	*Perideridia americana*	E	Williamson	Cedar barrens	N
Pale umbrella-wort	*Mirabilis albida*	T	Maury	Glades	Y
Pope's sand-parsley	*Ammoselinum popei*	T	Maury	Glades	Y
Porter's reedgrass	*Calamagrostis porteri*	E	Maury	Rich mountain woods	
Sand grape	*Vitis rupestris*	E	Maury	Sandy, rocky riverbanks	Y
Spring blue-eyed Mary	*Collinsia verna*	E	Maury	Rich wet-mesic woods	Y
Velvety cerastium	*Cerastium velutinum var. velutinum*	E	Maury	Bluffs	Y
Wooly sandwort	*Arenaria lanuginosa*	E	Maury	Bluffs	Y
Yellow sunnybell	*Schoenolirion croceum*	T	Maury	Wet areas in glades	Y

* - Habitat availability represents the expectation of suitable habitat within or immediately adjacent to the project corridor based on review of publicly available published mapping. An entry of 'N' in this column indicates that desktop review resulted in a finding of no expectation of the possibility of habitat within or adjacent to the project corridor.

7.5 Historic and Cultural Resources

The National Historic Preservation Act of 1966 (NHPA) established a system of procedural protections that encourages the identification and protection of historic resources. The National Register of Historic Places (NRHP) constitutes the federal inventory of districts, sites, buildings, structures, and objects that are significant on a national, state, or local level in American history, architecture, archaeology, engineering, and/or culture. The NRHP is managed and maintained by the National Park Service, and implementation of NHPA protections is conducted by the Tennessee Historical Commission.

The nearest NRHP-listed site to the project corridor in Maury County is more than four miles east. In Williamson County, there are 21 NRHP-listed sites within a 2-mile radius of the project corridor. The NRHP-listed sites in Williamson County in proximity to the project corridor include three sites with a restricted address and two sites with nonspecific addresses (e.g., address provided as TN 96). Three of the 21 NRHP listings in proximity to the project corridor consist of archaeological sites, including the Old Town Archeological Site, Coats-Hines Archeological Site, and the Glass Mounds Discontinuous Archeological District. Other archaeological resources may be present along the project corridor.

During the design process, necessary steps to identify cultural resources and the potential for the proposed project to impact them will be taken. Coordination, when and where needed, will be undertaken with the Tennessee Historical Commission to ensure that cultural resources that have the potential to be affected by the project are protected. The proposed project is feasible to be implemented in compliance with laws and regulations protecting cultural resources.

8. Permitting Requirements

Gaining regulatory approval and filing the proper permits for the Mallory Valley Water Transmission Main project will require a coordinated effort between the MVUD team, the design team, the responsible regulatory agencies, and utilities prior to and during the construction of the transmission main. Construction of the transmission main will require permits from the following regulatory agencies:

- Tennessee Department of Environment and Conservation (TDEC)
- US Army Corps of Engineers (USACE).
- Tennessee Valley Authority (TVA)
- Tennessee Department of Transportation (TDOT)
- Williamson County Stormwater Management
- Maury County Highway Department

Certain permits/authorizations require coordination between TDEC, USACE and TVA. To facilitate and streamline the permitting process, Regulatory Coordination Pre-Application Meetings (RCPAM) with the Corps of Engineers (and TVA if applicable) and TDEC are typically held monthly for larger, more complex projects like the MVUD Water Transmission Main project. These meetings are opportunities for applicants to receive agency feedback on complex projects prior to application submittal.

Construction of the transmission main will also require authorization/coordination with the following utilities among others:

- Atmos Energy
- TC Energy
- Columbia Power and Water Systems
- Middle Tennessee Electric
- Communications (Google, AT&T, etc.)

During the design process it will be important to ensure all the proper documentation and information are submitted to the parties responsible for permit application and approval in consideration of the anticipated timeline for obtaining approval.

A detailed matrix of the necessary permits and authorizations can be found in Appendix B. The following tables are extracted from this regulatory matrix and lists the triggering activity, required permits, agency, the required documents for each permit, and the anticipated approval timeline. A table detailing the potential time duration for each permit/approval can be found in Appendix C and permitting flow charts can be found in Appendix D.

8.1 Required TDEC Permits

The permits and document reviews that may be required by TDEC for the MVUD transmission line project are briefly summarized below and then delineated in **Table 8-1** that includes TDEC Division, required documents and timeline:

- **Notice of Intent (NOI) for General NPDES Permit for Stormwater Discharges from Construction Activities (TNR100000)**. When one or more acres of land are cleared, graded, or excavated for construction, a Stormwater Discharge NPDES permit must be obtained for the construction activity. This permit is intended to reduce soil erosion and sedimentation and to prevent stormwater pollution from the construction site.
- **Plans review and approval for public water systems**. According to the TDEC *Community Public Water Systems Design Criteria*, all reports, final plans, and specifications should be submitted to TDEC. TDEC will not provide approval for construction until final and complete detailed plans and specifications have been found satisfactory by TDEC. The first formal submittal to TDEC will be a preliminary engineer report.
- **Aquatic Resource Alteration Permit (ARAP) / Section 401 Certification.** This permit is designed to ensure a water source, such as a river or stream, is protected from various construction activities and water withdrawal. The ARAP permit is required when alternation to a stream, river, lake, or wetland is required.
- **Inter-Basin Transfer Permit.** This permit is required for water withdrawals from basins in Tennessee which then discharge into basins that are different than the originating basins. The MVUD transmission line would transfer water from the Lower Cumberland River Basin to the basin comprised of the Duck River, the Elk River, and the Western Tennessee River Valley.

Table 8-1: Required Permits to be Approved by TDEC

Permit Name	TDEC Division	Required Documents Status	Estimated Timeline
General NPDES Permit for Stormwater Discharges from Construction Activities	Division of Water Resources	CN-0940 Notice of Intent application and fee Stormwater Pollution Prevention Plan (SWPPP) documents and plans	30-day review period
Plans review and approval for public water systems	Division of Water Resources	Online Application Project Plans & Specifications Owner Approval Letter Hydraulic Calculations Engineering Report Plans Review Fee	60-day review period
Aquatic Resource Alteration Permit (ARAP) / Section 401 Certification	Division of Water Resources	Form CN-1091 Information on the applicant, location, schedule and detailed description of the activity. Topographic location map Detailed plans Analysis of practicable alternatives. Social and economic benefit analysis	3-6 months application prep 30–60-day application review period 6-12 months to issue permit
Inter-Basin Transfer	Division of Water Resources	Purpose and justification Volume of withdrawal/ transfer Location of withdrawal, return, and transfer Volume of water returned to the basin of origin Peak withdrawal and transfer capacity. Engineering / economic justification Hydraulic/environmental impacts on gaining and losing river Evaluation of feasible alternatives Receiving system's conservation programs/practices Proposed start date of the water transfer	3-6 months application preparation 30–60-day application review period 3-6 months to issue permit

8.2 Required Federal Permits

Federal permits required for the transmission line and document reviews that may be required by TDEC for the MVUD transmission line project are briefly summarized below and then delineated in **Table 8-2** that includes agency, required documents and timeline:

TVA 26A Permit Section 26a of the Tennessee Valley Authority Act requires that TVA's approval be obtained prior to the construction, operation, or maintenance of any dam, appurtenant works, or other obstruction affecting navigation, flood control, or public lands or reservations along or in the Tennessee River or any of its tributaries.

Individual 404 Permit and Section 10 Authorization. The USACE regulates wetlands and waterbodies determined to be WOTUS under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. Federal Section 404 or Section 10. Permits issued by the USACE are also applicable to Waters of the State of Tennessee.

Nationwide 404 Permit and Section 10 Authorization Nationwide general permits authorize activities, including utility lines, road crossings. that have minimal individual and cumulative adverse environmental effects and have a term of no more than five years.

Table 8-2: Required Federal Permits

Permit Name	Regulatory Agency	Required Documents	Timeline
26A Permit	Tennessee Valley Authority	Joint USACE/TVA Application Form with Applicant Disclosure Form Application Fee Project Plans and Drawings Location Map Site Photograph(s)	6-9 months application prep 60 to 180-Day Review Period/permit issuance
404 Permit and Section 10 Rivers and Harbors Authorization	United States Army Corps of Engineers	Joint USACE/TVA permit application	6-9 months application prep 60 to 180-Day Review Period/permit issuance
Nationwide GP	United States Army Corps of Engineers	ENG Form 6082 - Nationwide Permit Pre-Construction Notification (PCN) & Plans	60-day review period

8.3 USACE Cumberland River Withdrawal Permit

MVUD has been in communication with the Nashville District Corps of Engineers regarding an increased water withdrawal from the Cumberland River to accommodate this project and serve the stakeholder communities. The USACE is currently performing a study of the Cheatham Lake impoundment of the Cumberland River through Davidson County. The study area includes the segment where the increased withdrawal would be required to accommodate this project. They anticipate completion of the study in

late 2026. The following USACE statement was approved specifically for inclusion in this study report and is also provided in Appendix E.

> "We've been informed that USACE is conducting a system study of the Cumberland River, with an anticipated completion at the end of 2026. This study is crucial for determining the availability of water from the Cumberland River for municipal and industrial water supply for the Middle Tennessee region. This proposed withdrawal aims to shift reliance from the Duck River watershed to the Cumberland River.
>
> The USACE study will help assess the available volumes from the Cumberland River in relation to the requests received from our partner utilities. It will also be vital in identifying any constraints or associated fees concerning Cumberland River withdrawals while considering existing withdrawals by current users.
>
> Once the USACE study is complete, this information will be provided to the partnering utilities to help determine the full feasibility of withdrawing water from the Cumberland River."
>
> *Statement reviewed and approved by Valerie McCormack, PhD and Ryan Wigner of the USACE, Nashville district 6.10.2025*

8.4 Other Permits and Approvals

The MVUD transmission main will also require permits or approvals for road crossings, utility crossings, and construction activities. These permits, approvals and/or notifications are listed in **Table 8-3** along with the regulating entity, required documents and timeline.

Table 8-3: Additional Permitting

Permit Name	Regulating Entity	Required Documents	Timeline
Land Disturbance Permit	Williamson County	Stormwater Management Plan (SWMP) Grading plan	30-Day Review Period
TDOT Permit	TDOT	Application and Plans Bond may be required	45-Day Review Period
Construction Permit For Maury County Roads or Right-of-Ways	Maury County	Construction Permit Form Plat or sketch of the work	3 days prior to construction
Natural Gas Line Crossing	Atmos Energy TC Energy	None; Call 811	30 days prior to construction
Electric Line Crossings	MTEMC	None; Call 811	30 days prior to construction
Utility Coordination	CPWS	None; Call 811	30 days prior to construction

9. Raw Water Transmission Main Alternative

Hazen has considered raw water transmission as an alternative that would deliver raw water from the Cumberland River to water treatment plants owned and operated by the downstream utilities. The raw water transmission main would follow the same finished water transmission main route proposed herein. It is anticipated that storage would not be needed but further study would be required to evaluate stakeholder delivery points.

Additional infrastructure would be needed beyond both proposed connection points discussed for the finished water transmission main alternative. On the southern side of the pipeline route, additional pipeline and possibly pumps would be necessary to transport flow to the existing stakeholder WTPs or terminate at a new WTP to serve one or multiple stakeholder utilities. There would also be additional undefined costs for HVUD.

On the northern side of the pipeline route, additional pipeline would be needed between the northern connection point and a new raw water intake and pump station at the Cumberland River. It is anticipated that at least one pump station would be required at the mid-point of the transmission main, to send the raw water to the treatment plant(s).

Additional considerations would also be required to include the selected pipe characteristics for materials, coatings, and diameter as these would have to be optimized for raw water use. The transmission line would have to be designed to limit low velocity areas or low points where solids could settle and reduce pipe diameter. Additionally, considerations for pipe blowdown piping and valves as well as a blowdown disposal site would be needed at the end of the line to periodically remove any solids that may have settled in the line.

If a raw water transmission line were to be further considered, assessment would be recommended in the addition of an oxidant injection, such as sodium permanganate, point at the upstream section of the pipe. This oxidant addition would help mitigate any biofilm or mussel growth in the line that would affect pipe head loss and water quality. The oxidant would also help oxidize raw water contaminants and metals, such as iron and manganese, prior to connection to the downstream utilities.

In addition, raw water transmission would require further consideration related to the interbasin transfer of raw water between the Cumberland and Duck Rivers. Detailed analysis and impacts of this type of transfer would be required, along with additional permitting challenges.

While both raw water and finished water alternatives hold challenges, the additional challenges highlighted in this section are avoided with a finished water transmission main. Further, finished water transmission is a current and well understood practice by MVUD, HVUD, and utilities within the area to be served.

10. Design and Construction Schedule

An overall project schedule was developed for the recommended route to define durations related to detailed design, permitting, easement acquisition, and construction. **MVUD and partners have noted the desire for the project to be built and operational by 2033**. The draft schedule anticipates construction completion in mid-2033. This project deadline is reflected in the schedule summary shown **Table 10-1** and the full Gantt Chart schedule is provided in Appendix F. The study made an assumption, based upon conversations with HVUD, that the HVUD infrastructure could be coordinated within the timelines established by this study.

Limited notice to proceed is estimated to begin in 2028 following the completion of a USACE withdrawal study for the Cumberland River as well as an administrative period for partnering utilities to begin financing research of the project. Time for contractor and designer procurement is also included. The design phase is predicted to take 18 months beginning in 2028 and includes time allotted for the following:

1. Subsurface Utility Engineering (SUE) Investigation(s)
2. Evaluation and Finalization of Model
3. Development and Finalization of Route
4. Detailed 30%, 60%, 90%, & Final/100% Design for the pipeline, pump stations, and tank

Estimated to begin mid-2028, a total of 18 months has been allocated for the document preparation and complete easement acquisition process. This schedule includes:

1. Time for property research and appraisal development
2. Offer preparation and presentation
3. Good faith negotiations with property owners
4. Finalization and recording of agreements
5. Legal proceedings, including condemnation where agreements cannot be reached

This timeframe is intended to ensure that all property easements are acquired before construction begins, avoiding delays and minimizing disruptions to property owners and project schedules.

Permitting is projected to last roughly 30 months and conclude mid-2030. Differing permit considerations and governing entities are highlighted in more detail in **Section 7** while expected durations for preparation, review, and issuance are summarized below.

1. TVA (26a, Easements) Preparation, Review, and Issuance: 2 years
2. TDEC (ARAP, Inter-Basin): 2 years
3. USACE (401, 404, Rivers & Harbors, Historic, USFWS, Nationwide): 2 years
4. TDEC (NPDES & Engineering): 8 months
5. TDOT & Other: 6 months

Construction of the pipeline, pump stations, and tank are estimated to last 2 years followed by a projected period of 6 months for startup. Measures can be taken to accelerate the schedule. These include beginning design earlier than currently scheduled, utilizing additional crews for pipeline construction, and other

means available through the construction delivery process. These means can be further discussed and explored as consideration is given to the project.

10.1 Critical Success Factors

The viability of this project depends on several critical success factors, each of which could significantly influence the ability to achieve the targeted operational date of 2033. Key among these are securing stakeholder support, obtaining necessary funding, and navigating the regulatory approval process. One of the most pivotal regulatory hurdles is obtaining authorization from the U.S. Army Corps of Engineers (USACE) to allow additional water withdrawals from the Cumberland River. As noted in Section 8.3, the USACE is currently conducting a study to evaluate the feasibility of increased withdrawals, with completion anticipated by the end of 2026. Ongoing monitoring and reassessment of these success factors will be essential to maintaining project momentum and ensuring timely progress.

Table 10-1: Project Schedule

Activity ID	Activity Name	Duration	Start	Finish	Total Float
Mallory Valley Feasiblity Project Schedule - MASTER					
Contracts					
CONT1100	USACE Cumberland River Study	0		31-Dec-26*	0
CONT1110	Stakeholders Obtain & Analyze Findings / Funding	252	04-Jan-27	30-Dec-27	0
CONT1130	Limited Notice to Proceed	0	30-Dec-27		3
CONT1120	Procure Contractor / Designer	126	01-Jul-27	30-Dec-27	0
Design					
30% Design					
DES3120	Model Evaluation	64	03-Jan-28	31-Mar-28	0
DES3110	SUE Investigation	128	03-Jan-28	30-Jun-28	0
DES3130	Route Development	64	03-Apr-28	30-Jun-28	0
60% Design					
DES6120	Finalize Model	123	03-Apr-28	26-Sep-28	126
DES6130	Finalize Route	123	05-Jul-28	29-Dec-28	126
DES6140	Pump Stations	64	27-Sep-28	29-Dec-28	126
DES6150	Tank	64	27-Sep-28	29-Dec-28	126
DES6160	Pipeline	123	05-Jul-28	29-Dec-28	126
90% Design					
DES9120	Hardscape Remediation	84	02-Jan-29	30-Apr-29	126
DES9130	Final Design	84	02-Jan-29	30-Apr-29	126
100% Design					
DES1110	100% Design	43	01-May-29	29-Jun-29	374
Easements					
EAS1110	Document Preparation	123	05-Jul-28	29-Dec-28	250
EAS1120	Easement Negotiation	127	02-Jan-29	29-Jun-29	250
EAS1130	Condemnation	124	02-Jul-29	28-Dec-29	250
Permitting					
PERM1170	TDOT (6 Months)	123	05-Jul-28	29-Dec-28	377
PERM1180	Other (6 Months)	123	05-Jul-28	29-Dec-28	377
PERM1140	TDEC (NPDES & Engineering) Preparation, Review, & Issuance (8 Months)	167	01-May-29	28-Dec-29	126
PERM1120	TVA (26a, Easements) Preparation, Review, & Issuance (2 Years)	500	05-Jul-28	28-Jun-30	0
PERM1130	TDEC (ARAP, Inter-Basin) Preparation, Review, & Issuance (2 Years)	500	05-Jul-28	28-Jun-30	0
PERM1150	USACE (401, 404, Rivers, & Harbors) Preparation, Review, & Issuance (2 Years)	500	05-Jul-28	28-Jun-30	0
PERM1160	USACE (Historic, USFWS, Nationwide) Preparation, Review, & Issuance (1.5 Years)	377	02-Jan-29	28-Jun-30	0
Funding					
FUND1120	Governmental Grant Process (6 Months)	126	01-Jul-27	30-Dec-27	628
FUND1130	Evaluation of Public/Private/Partnership (P3) (6 Months)	126	01-Jul-27	30-Dec-27	628
FUND1160	Bonds (1 Year)	251	03-Jan-28	29-Dec-28	284
FUND1140	Federal Funding (WIFIA) (2.5 Years)	628	03-Jan-28	28-Jun-30	0
FUND1150	State Revolving Fund (SRF) (2.5 Years)	628	03-Jan-28	28-Jun-30	0
Procurement					
MOB1150	Develop GMP (Pre-Qual, Package Develop, Final GMP)	124	01-Jul-30	30-Dec-30	0
Construction					
MOB1110	Construction NTP	0	30-Dec-30		2
MOB1140	Tank (1.5 Years)	379	02-Jan-31	30-Jun-32	126
MOB1120	Pipeline (2 Years)	505	02-Jan-31	30-Dec-32	0
MOB1130	Pump Stations (2 Years)	505	02-Jan-31	30-Dec-32	0
MOB1160	Startup (6 Months)	125	03-Jan-33	28-Jun-33	0

11. Opinion of Probable Construction Cost

The project team developed a Class 4 Opinion of Probable Construction Cost (OPCC) in accordance with AACE Classifications (Association for the Advancement of Cost Engineering) for the transmission main, and pump station and storage. The OPCC includes the cost of the pipeline, pump stations, and storage evaluated by this study. **The project team also incorporated capital costs for the HVUD-required infrastructure in 2025 dollars.** These costs include necessary capital improvements required to deliver water to the point of connection with MVUD, including a new Cumberland River intake, expanded water treatment capacity, and additional transmission main from the water treatment plant to the point of connection with this new MVUD pipeline. See Appendix E for more details related to HVUD costs.

The cost for steel is approximately 35% to 40% less than ductile iron. In addition to cost savings, steel is also available in longer segment lengths, which can further contribute to schedule reduction and additional cost savings due to the shorter schedule. Thus, the steel pipe is recommended and is used to develop the cost estimate.

Table 11-1 provides a summary of the cost estimate in 2025 dollars. The expected cost range is -22.5% to +35.0%. Based on AACE guidelines, the expected cost range for a Class 4 OPCC is -15% to -30% on the low end and +20% to +50% on the high end.

Table 11-1: Cost Estimate Summary – 2025 Dollar Basis

	Dual 42-inch	Single 54-inch
Transmission Pipeline	$ 799,221,000	$ 631,771,000
Pump Stations	$ 68,652,000	$ 68,652,000
Storage Tank	$ 16,220,000	$ 16,220,000
Engineering Services	$ 103,866,000	$ 86,994,000
Easements	$ 10,000,000	$ 10,000,000
Permits	$ 250,000	$ 250,000
MVUD *Subtotal*	**$ 998,209,000**	**$ 813,887,000**
HVUD Infrastructure	$ 875,000,000	$ 875,000,000
TOTAL	**$ 1,873,209,000**	**$ 1,688,887,000**

Based on the expected cost range for a Class 4 OPCC, the expected cost range using the 2025 Dollar Basis for the dual 42-inch alternative is $1.452 to $2.529 billion. The expected cost range for the single 54-inch alternative is $1.307 to $2.276 billion.

For illustrative purposes, consider a scenario in which the total project cost for the HVUD infrastructure, MVUD pipelines, tanks, and pump stations is $2 billion, serving 50 million gallons per day. If financed through a 30-year municipal bond at 3% interest, the estimated capital cost would be approximately $5.59 per thousand gallons of water. This simplified calculation incorporates assumptions related to municipal bond rates and overall project costs. It does not account for potential state or federal grant funding, nor does it include other possible sources of project financing.

It is important to account for the potential impacts of inflation when evaluating project costs. Doing so provides a more accurate understanding of actual project cost and the long-term financial implications for ratepayers. **Table 11-2** summarizes the project cost escalated to the mid-point of construction in March 2032 and includes assumed cost escalators. The expected cost range is -22.5% to +35.0%. Based on AACE guidelines, the expected cost range for a Class 4 OPCC is -15% to -30% on the low end and +20% to +50% on the high end.

Table 11-2: Cost Estimate Summary – Construction Mid-Point Basis (March 2032)

	Dual 42-inch	Single 54-inch
Transmission Pipeline	$ 1,105,626,000	$ 873,821,000
Pump Stations	$ 95,022,000	$ 95,022,000
Storage Tank	$ 22,278,000	$ 22,278,000
Engineering Services	$ 143,677,000	$ 116,149,000
Easements	$ 10,000,000	$ 10,000,000
Permits	$ 250,000	$ 250,000
Subtotal	**$ 1,376,853,000**	**$ 1,117,520,000**
HVUD Infrastructure	$ 1,210,125,000	$ 1,210,125,000
TOTAL	**$ 2,586,978,000**	**$ 2,327,645,000**

Based on the expected cost range for a Class 4 OPCC, the expected cost range using the Mid-point of Construction Basis for the dual 42-inch alternative is $2.005 to $3.492 billion. The expected cost range for the single 54-inch alternative is $1.804 to $3.142 billion.

Assumptions associated with the development of the OPCCs are summarized as follows:

- All open cut pipe installation is outside of pavement.
- Average depth of rock is assumed to be 4 feet. Depth will vary along the full pipeline route from surface level in some locations and deeper in others.
- Trench excavation includes four feet of cover and 0.5 feet of over excavation for pipe bedding.
- Easement width is 50 feet for a single pipe and 60 feet for dual pipes.
- Trenchless pipe installation by horizontal boring and jacking:
    - Major roadways (including I-840): 29 locations totaling 3,000 LF.
    - Major waterways: 19 locations totaling 1,900 LF
    - Natural Gas Main: One location totaling 50 LF
- Trenchless pipe installation by micro-tunnel boring machine
    - Harpeth River: Three locations totaling 2,000 LF
- Pipeline accessories
    - Air release valves: Three per mile
    - Low point blow: Two per mile
    - Access manways: 1,000-ft spacing
    - Meter vaults: One at Pump Station No. 1; Three at stakeholder connection points.
- Escalation is calculated to the assumed mid-point of construction based on the following:
    - Labor escalation: 4.5% per year
    - Materials and equipment: 5.0% per year
    - Notice to Proceed Date: 12-30-2030
    - Construction Duration: 30 months

12. Opinion of Probable Operating and Maintenance Cost

Annual operations and maintenance (O&M) expenses are another key component of the annual project costs. MVUD would be the owner and operator of all pump and pipe operations from the metering point with HVUD to the delivery points for each stakeholder. MVUD is anticipated to have operations and maintenance costs including the cost for purchasing water from HVUD, operations and maintenance of all pump equipment, storage tanks, pipelines, and administration of the system.

Annual O&M revenue requirements related to providing stakeholders with finished water through this project include the costs charged by HVUD for finished water and the costs for MVUD to operate and maintain the pipeline, pump stations, and storage facilities associated with the project. Through recent correspondence, HVUD has indicated that at this preliminary stage of assessing project feasibility they are not able to provide estimated charges for water. HVUD has indicated that an estimate of their charges would be available upon completion of a current USACE Cumberland River Basin system study, currently scheduled to be published in late 2026. Without an estimate of rates from HVUD, HVUD water charges cannot be quantified in this evaluation. It is assumed that HVUD would include a base charge for water that would include delivery of a to-be-determined required minimum purchase volume, as well as a volumetric charge for usage above the required minimum. Both the base and volumetric charge would be established by HVUD and those charges are assumed to be directly passed to stakeholders.

MVUD will have O&M expenses associated with operating and maintaining the system and is anticipated to similarly establish a base rate, volumetric rate, and minimum purchase volumes charged to stakeholders to meet their revenue requirements associated with operating the system. Table 12-1 provides a summary of the estimated MVUD annual operations and maintenance costs to support the initial-year delivery of 35 MGD of water from the connection point with HVUD to the individual connection points to each stakeholder. These budgetary level costs were developed based on a combination of engineering judgement for equipment operational expenses, and budget estimates for labor and administrative costs based on direction from MVUD. It is anticipated that in 2033, the first year of operation, over $6.2 million will be required for operation and maintenance of the project, including the pump stations, storage tank, metering points, and pipeline.

Table 12-1: Projected Operations and Maintenance Costs Assuming 35 MGD of Flow in 2033

Expense Item	Estimated 2033 Costs Associated with Project[1]
HVUD Minimum Charge[1]	To Be Determined Following USACE Cumberland River Basin Study
HVUD Volumetric Charge[1]	To Be Determined Following USACE Cumberland River Basin Study
Electricity[2]	$ 3,919,000
Maintenance & Operating Expenses[3]	$ 2,323,000
Total Estimated Annual O&M Expenses, 2033	**$ 6,242,000**

[1] Anticipated costs do not include the charges to be levied by HVUD for providing finished water as a current estimate of those charges is not available. It is anticipated that each stakeholder would be directly responsible for charges from HVUD in addition to their allocation of annual O&M costs detailed above.
[2] Electricity costs estimated based on assumption of two pump stations operating two 2,000 hp pump motors for 12 hrs/day, 365 days per year, and an electricity cost of $0.15 / kWh.
[3] Maintenance and Operating Expenses are shown in units of 2033 dollars and costs were escalated using a 6.6% escalation rate. Component costs include operating supplies, water analysis, tank repair and maintenance, pump station repair and maintenance, water line repair and maintenance, meter repair and maintenance, right of way clearing and maintenance, and labor expenses which includes four additional employees.

13. Cost of Service and Rate Analysis

To determine a conceptual level assessment of how the costs outlined in the OPCC and operations and maintenance cost sections could be equitably distributed amongst the water purchasing stakeholder utilities (CPWS, Mount Pleasant, City of Spring Hill, MCWS) a cost allocation evaluation was performed. Estimated costs to stakeholders associated with this project can be broadly classified into two categories. The first are charges that would be levied by HVUD to treat and deliver water to a delivery point. The second category of stakeholder charges would be levied by MVUD for the operation and maintenance of the proposed pipe, pumping, and storage system from the HVUD point of delivery to the point of delivery to stakeholder utilities.

To estimate the first category of charges, MVUD requested a high-level estimate of potential charges from HVUD. In a letter dated June 12th, 2025, which is provided in Appendix E, HVUD responded that they were not able to provide an estimate of costs until the completion of a US Army Corps of Engineer (USACE) study of the Cumberland River basin. This USACE study is anticipated to be completed in late 2026 and findings from that study are anticipated to provide information necessary to develop anticipated fixed and variable costs for HVUD provided water. Based on this, estimates of charges from HVUD will not be available until the completion of the USACE basinwide study and are not quantified in this feasibility study.

The costs associated with MVUD's operation and maintenance of the proposed project were quantified at the conceptual level as detailed in the Opinion of Operating and Maintenance Cost section of this report. Equitable cost allocation methodologies for capital, operating, and maintenance expenses associated with any new or existing infrastructure that will provide a benefit to stakeholders were evaluated in accordance with industry standard methodologies. The results of the cost allocation analysis and subsequent recommendations are detailed below.

13.1 Future Capital Costs and Allocations

Obtaining funding for the initial capital project will be the responsibility of stakeholder utilities. Upon completion of the initial capital project, the capital assets associated with the project would be transferred to MVUD, who will then own, operate, and maintain the pipeline, pumping, and storage assets. As the asset owner, MVUD would subsequently be responsible for future capital expenses associated with project assets and capital related expenses should be included as part of project-related revenue requirements.

In accordance with industry standard methodologies, the determination of revenue requirements associated with capital expenditures is typically done using either the cash or utility basis of determination. In the cash basis methodology, capital revenue requirements are determined based on annual debt service payments and cash funded capital needs. In the utility basis methodology depreciation expense as well as a return on investment form the basis of capital revenue requirements. As owner of the project assets, MVUD would be responsible for the replacement of those assets at the end of their useful life and therefore the utility basis methodology is recommended for this situation.

Following the utility basis methodology, capital related revenue requirements come from depreciation expense as well as a rate of return on capital investment. Since stakeholders are responsible for the upfront capital expenses, MVUD would not charge a rate of return based on investment required for the initial capital project. MVUD would charge stakeholder utilities a capital charge associated with asset depreciation expense based on the requirement that MVUD would be responsible for funding asset replacement at the end of asset useful life. It should be noted that HVUD assets would not be included in the calculation of MVUD depreciation expense as those assets will not be transferred to MVUD.

The calculation of depreciation expense is highly dependent upon the length of the asset depreciation schedule. Asset depreciation schedules are typically associated with the estimated useful life of the assets. For example, a set of assets with an estimated useful life of 50-years would typically be depreciated using a 50-year depreciation schedule. While 50-years is typically the maximum depreciation schedule allowed by the Tennessee State Comptroller's office, it is feasible that an extended schedule could be applied for based on the anticipated actual useful life of the project assets and the length of time estimated before asset replacement would be required.

It is reasonable that a useful life of 80 or 100 years could be applied to this project and a depreciation schedule based on 80 or 100 years could be requested for Comptroller approval. The approval of an extended depreciation schedule would have a significant impact on depreciation expenses, and it is assumed that MVUD would strongly pursue this opportunity. For comparison, both 80-year and 100-year depreciation schedules were evaluated and a summary of annual depreciation expenses under the utility basis methodology allocated to stakeholder utilities are provided in Table 13-1 and Table 13-2 respectively.

Table 13-1: Utility Basis Annual Depreciation Expense (80-year) Allocation Under Different Project Scenarios[1]

Stakeholder[2]	Dual 42-inch Annual Capital Depreciation Expense Charge[3]	Single 54-inch Annual Capital Depreciation Expense Charge[3]
CPWS	$ 5,901,000	$ 4,789,000
City of Spring Hill	$ 5,901,000	$ 4,789,000
MCWS	$ 4,426,000	$ 3,592,000
Mount Pleasant	$ 983,000	$ 798,000
Total	**$ 17,211,000**	**$ 13,969,000**

[1] Assumes straight-line depreciation and a project asset useful life of 80-years. Depreciation expense calculated using OPCC costs using a mid-point of construction basis (March 2032) as presented in Table 11-2. A depreciation schedule in excess of 50-years would reduce annual expenses but would be contingent on approval from the Tennessee State Comptroller.
[2] Costs allocated by stakeholder based on assumed capacity allocations of CPWS -12 mgd, City of Spring Hill – 12 mgd, MCWS – 9 mgd. Mount Pleasant – 2 mgd.
[3] HVUD Infrastructure costs are not included as part of depreciation expense calculation.

Table 13-2: Utility Basis Annual Depreciation Expense (100-year) Allocation Under Different Project Scenarios[1]

Stakeholder[2]	Dual 42-inch Annual Capital Depreciation Expense Charge[3]	Single 54-inch Annual Capital Depreciation Expense Charge[3]
CPWS	$ 4,721,000	$ 3,831,000
City of Spring Hill	$ 4,721,000	$ 3,831,000
MCWS	$ 3,540,000	$ 2,874,000
Mount Pleasant	$ 787,000	$ 639,000
Total	**$ 13,769,000**	**$ 11,175,000**

[1] Assumes straight-line depreciation and a project asset useful life of 100-years. Depreciation expense calculated using OPCC costs using a mid-point of construction basis (March 2032) as presented in Table 11-2. A depreciation schedule in excess of 50-years would reduce annual expenses but would be contingent on approval from the Tennessee State Comptroller.
[2] Costs allocated by stakeholder based on assumed capacity allocations of CPWS -12 mgd, City of Spring Hill – 12 mgd, MCWS – 9 mgd. Mount Pleasant – 2 mgd.
[3] HVUD Infrastructure costs are not included as part of depreciation expense calculation.

13.2 Stakeholder Cost Allocations

MVUD's revenue requirements for operating and maintaining the proposed project include both direct annual O&M costs and annual depreciation expenses. Table 13-3 summarizes the total estimated expenses for MVUD during a test year of 2033.

Table 13-3: Total Estimated MVUD Expenses and Illustrative Example of HVUD Expenses in Test Year 2033 Assuming Delivery of 35 MGD of Water to Stakeholders

Expense Category	Estimated Annual Expenses in Test Year 2033 ($)
MVUD Annual Operations and Maintenance[1]	$ 6,242,000
MVUD Depreciation Expense[2]	$ 11,175,000
Total MVUD Annual Expense	**$ 17,417,000**
Assumed MVUD Calculated Unit Expense ($/kgal)[3]	**$1.36 per kgal**
Current HVUD Municipal and Governmental Entity Customers (MGEC) Water Unit Rate for Illustrative Purposes ($/kgal)[4]	$2.73 per kgal
Combined MVUD and HVUD Unit Expense for Illustrative Purposes[5]	**$4.09 per kgal**

[1] Assumes 35 mgd of water purchases by stakeholders in test year 2033.
[2] Assumes a single 54-inch project and a 100-year depreciation schedule.
[3] Presented as a single unit expense (total annual expenses divided by total annual water purchases) that includes both O&M and depreciation expenses. Actual charge from MVUD to stakeholders is anticipated to be separated into a base/minimum charge and a volumetric charge.
[4] For illustrative purposes only. This value represents the current MGEC water rate charged by HVUD and does not represent a projection of the actual MGEC rate that HVUD would charge in 2033 for this project or any other sale agreement with any other customer. A projection of the HVUD MGEC rate will not be available until the completion of the USACE basin study as detailed in the letter from HVUD provided in Appendix E.
[5] **This combined MVUD and HVUD unit expenses rate is being provided for illustrative purposes only.** The HVUD component of the total unit expense presented represents HVUD's current MGEC and is not intended to be a projection of actual 2033 charges.

To recover these costs, MVUD is expected to implement two types of charges for system stakeholders:

- **Base/Minimum Charge**: The purpose of this charge will be for MVUD to recover a portion of their fixed expenses associated with the project to provide a level of revenue stability for MVUD. This charge is recommended to be allocated amongst stakeholders proportionally to the stakeholders reserved capacity in the system. For example, a stakeholder with 12 mgd of reserved capacity in the 35 mgd system would be responsible for 34.3% of the total base charges.

- **Volumetric Charge**: The purpose of this charge will be for MVUD to recover the remainder of their revenue requirements not covered by the base charge. This charge would be in the form of a volumetric rate ($/kgal purchased) and would be levied to stakeholders based on their actual water consumption in excess of any volume included as part of the base charge.

As previously described, HVUD would also charge their own base and volumetric charges to meet their revenue requirements. To estimate these costs during the feasibility study, MVUD requested a high-level estimate from HVUD. In a letter dated June 12, 2025, HVUD responded that they are unable to provide a cost estimate until the completion of a U.S. Army Corps of Engineers (USACE) study of the Cumberland River basin (Appendix E). This study is anticipated to be completed in late 2026, and its findings will provide the information necessary to develop anticipated fixed and variable costs for HVUD-provided water. Based on this, specific charges from HVUD are not quantified in this feasibility study and will not be available until the completion of the USACE basin-wide study.

An allocation of estimated annual MVUD project related expenses amongst stakeholders was performed to provide a budgetary estimate of the annual costs that would be charged to stakeholders in a test year of 2033. These costs represent the revenue requirements for MVUD to operate and maintain the water pipe, pumping and storage system and would be additive to charges levied by HVUD to the stakeholders for providing finished water. **The allocations were developed for a test year of anticipated costs in 2033, the first year the system would be in service, and are summarized in Table 13-4.**

Table 13-4: Estimate of Annual MVUD Expense Allocations by Stakeholder, 2033 Used as Test Year

Stakeholder	Demand Projection (MGD)[2]	Allocation of Estimated Annual MVUD Expenses[1]		
		Estimated 2033 Test Year MVUD O&M Charges ($)	Estimated 2033 Test Year MVUD Depreciation Expense Charges ($)[3]	Estimated Total Test Year 2033 MVUD Charges[1]
CPWS	12	$ 2,140,000	$ 3,831,000	$ 5,971,000
City of Spring Hill	12	$ 2,140,000	$ 3,831,000	$ 5,971,000
MCWS	9	$ 1,605,000	$ 2,874,000	$ 4,479,000
Mount Pleasant	2	$ 357,000	$ 639,000	$ 996,000
Total	**35**	**$ 6,242,000**	**$11,175,000**	**$17,417,000**

[1] Anticipated costs do not include the charges to be levied by HVUD for providing finished water as a current estimate of those charges is not available until the completion of the USACE Cumberland River basin study in late 2026. It is anticipated that each stakeholder would be directly responsible for charges from HVUD in addition to their allocation of MVUD detailed above.

[2] For this estimate the demand projection represents both reserved capacity in the system and actual water purchases.

[3] Depreciation expenses calculated based on a 100-year straight-line depreciation schedule and a single 54-inch option.

13.3 Total Costs

One of the key aspects of the feasibility study is determining the project's construction and operational costs. These costs are dependent upon the requested stakeholder water demand and the associated infrastructure capacity, including the river intake, water plant, pumping stations, water storage tanks, and pipelines. The pipeline is being designed to serve up to 60 mgd of water, but the costs developed in the opinion of probable operating costs are associated with an initial startup volume of 35 mgd. It's important to note that estimates for the unit cost (cost per thousand gallons) for depreciation will decrease if the initial startup quantity is increased, as the fixed capital costs will be spread over a larger volume.

For illustrative purposes only, if the project cost were $2 billion and served 35 mgd, with a 30-year bond at 3% financing, the estimated capital cost would be approximately $7.99 per thousand gallons. Combining this figure with the other estimated costs, including the illustrative estimate of HVUD charges based on their current MGEC rates, the estimated total cost per thousand gallons would be $12.08. This does not account for other potential funding sources, such as state or federal grants, or other sources of project funding that might be available. It is important to note that these are all estimates and are presented for illustrative purposes only. Upon completion of the USACE Study a more comprehensive cost of service study can be performed.

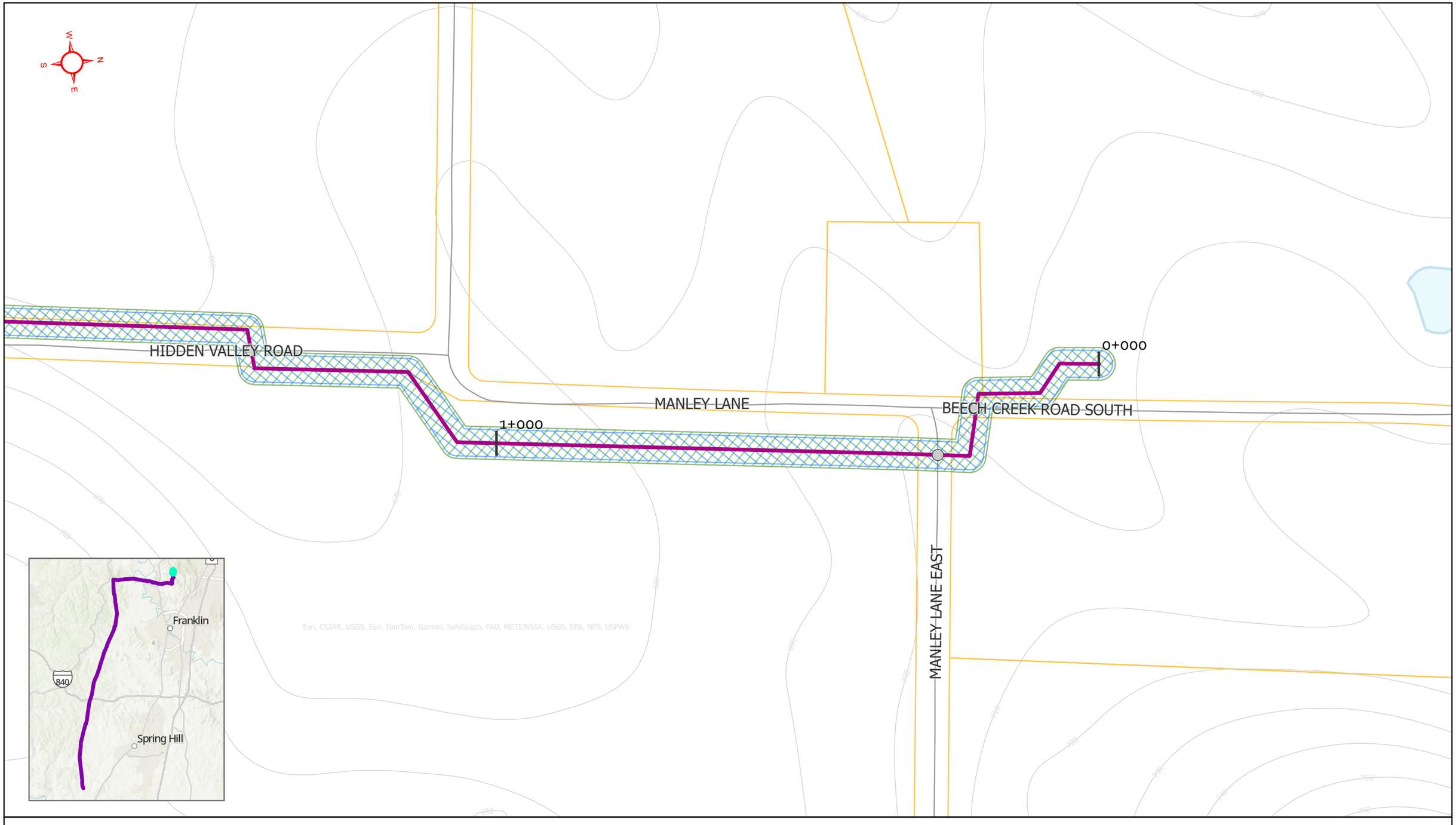
14. Summary and Conclusions

Large-scale water transfer projects and regional pipeline installations are well-established practices in the United States, including in Tennessee. Historically, municipalities have constructed pipelines to convey water from distant sources to meet growing demand. While each project presents its own set of challenges and unique characteristics, the concept of inter-basin transfers and extensive transmission networks has long been a cornerstone of utility infrastructure planning. This project, though significant for the Middle Tennessee region, builds upon decades of engineering expertise and water resource management across the country. The table below highlights several recent long-distance water pipeline projects implemented in the United States.

Project Name	Location	Type	Diameter (Inches)	Material	Length (Miles)	Year Completed
Integrated Pipeline	Texas	Raw Water	84	Steel	150	2027 (est.)
Arkansas Valley	Colorado	Raw Water	36	HDPE	130	2025
West TN Megasite	Tennessee	Treated Effluent	18	HDPE	37	2023
Bois D'Arc	Texas	Raw Water	90	Steel	35	2023
Lake Ralph Hall	Texas	Raw Water	66-72	Steel	32	2025
SE Transmission	Texas	Potable Water	54	Steel, DIP, PCCP	18	2028 (est.)

The study provides a comprehensive evaluation of constructing a new transmission main to deliver high-quality drinking water to communities in southern Middle Tennessee. The proposed alignment takes advantage of an existing TVA easement, helping to minimize both construction-related disruptions and long-term environmental impacts. The project concept is envisioned to address water supply needs while ensuring reliable long-term operation. The success of the project is dependent upon USACE approval of increased Cumberland River withdrawal, coordination with project partner HVUD, and permitting approvals by TDEC and other regulatory agencies. Based on the findings of this study, the Project Team concludes that the proposed solution is both technically feasible and well-suited to meet the region's short-term and long-term water supply needs. The water transfer benefits extend beyond initial stakeholder use, as the solution also reinforces the reliability of Duck River flows downstream of the stakeholder communities. The feasibility of the project can be further enhanced if partner utilities actively pursue and secure local, state, and federal funding. Access to these external resources can significantly reduce the financial burden and improve overall project viability.

Appendix A: MVUD Proposed Water Transmission Main Route Map Series



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

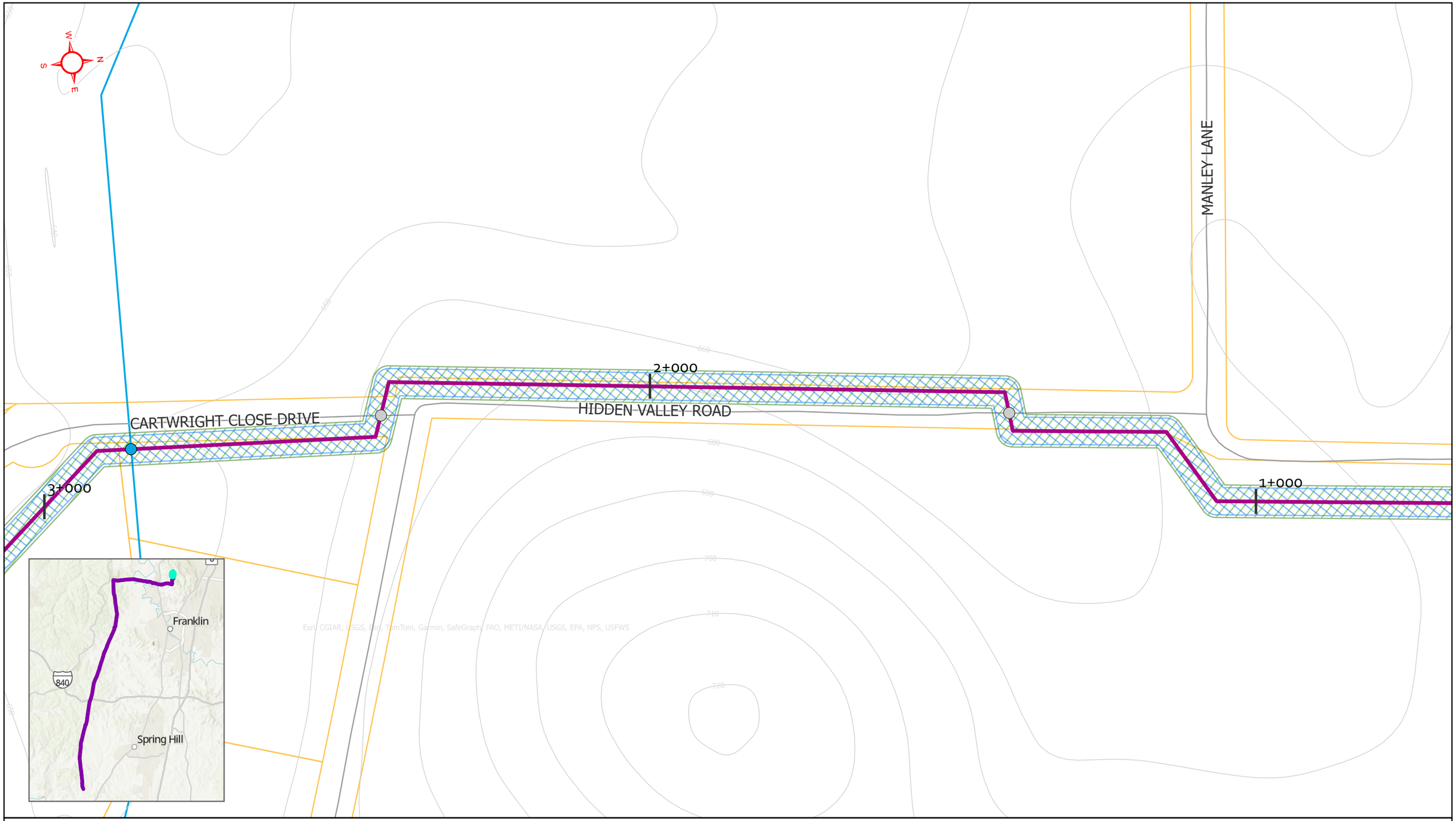
Feet

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MVUD Proposed Water Transmission

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MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

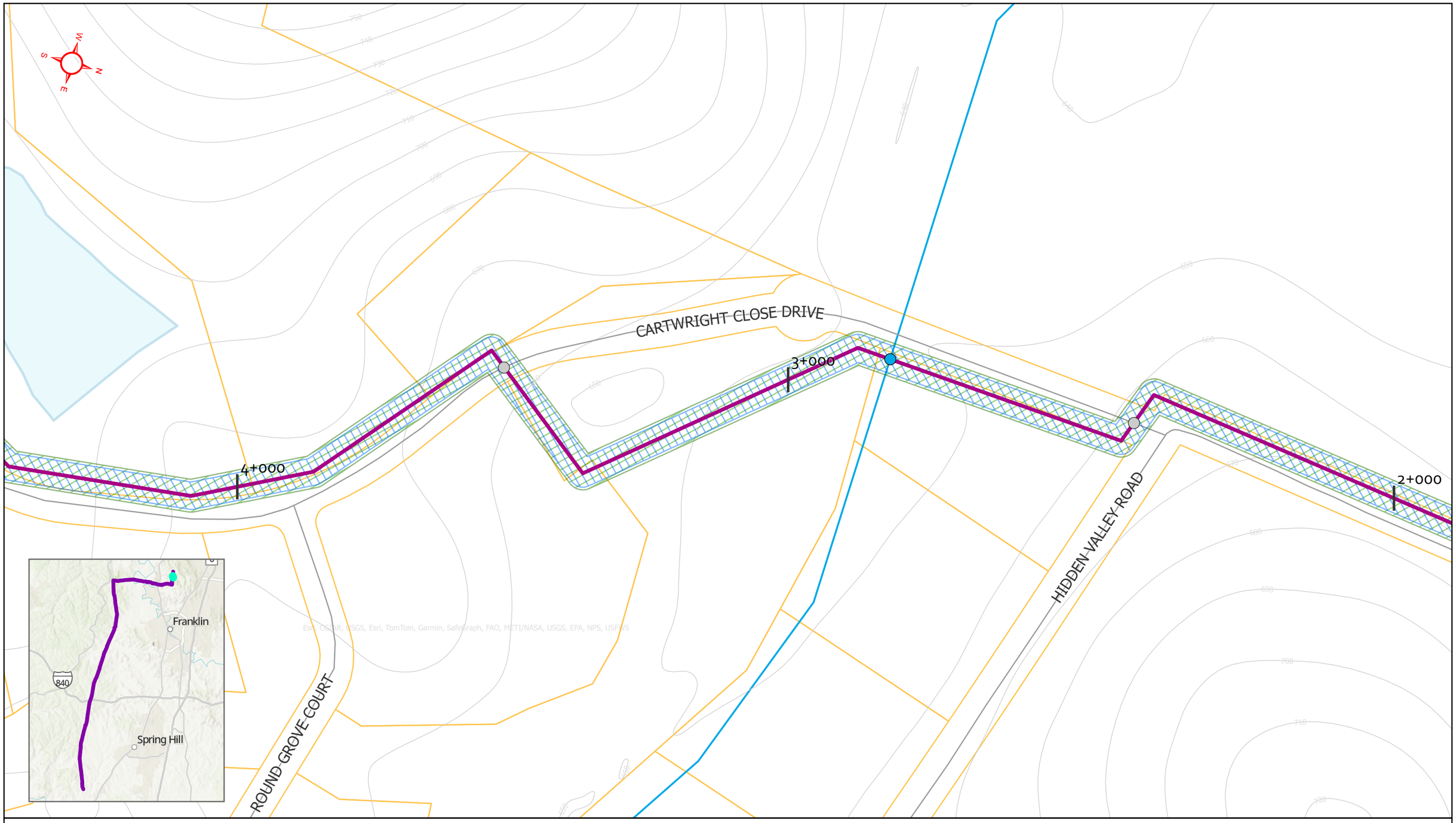
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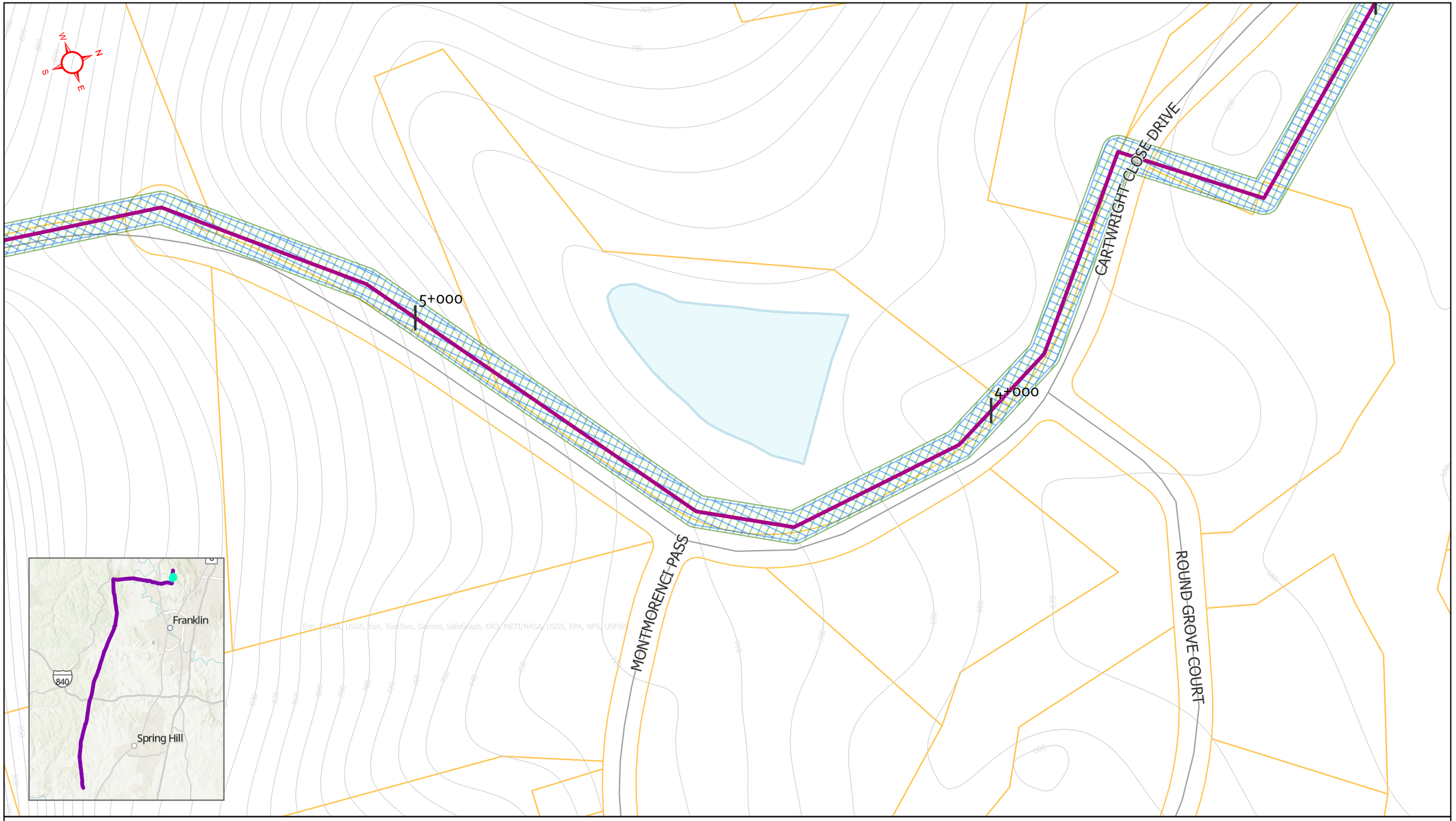
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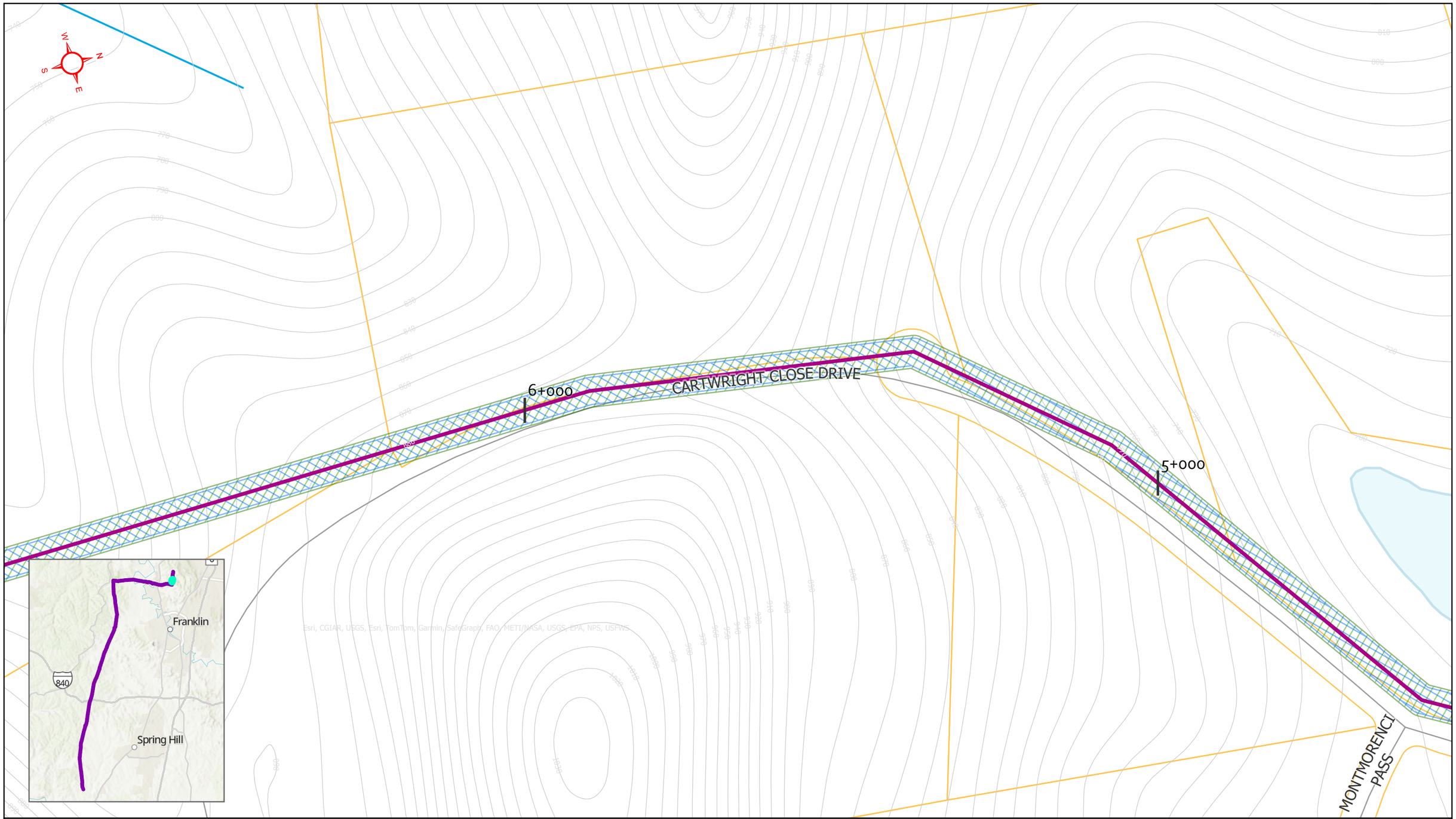
MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


CARTWRIGHT CLOSE DRIVE
4+000
3+000
2+000
HIDDEN VALLEY ROAD
ROUND GROVE COURT
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT


5+000
4+000
CARTWRIGHT CLOSE DRIVE
MONTMORENCI PASS
ROUND GROVE COURT
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

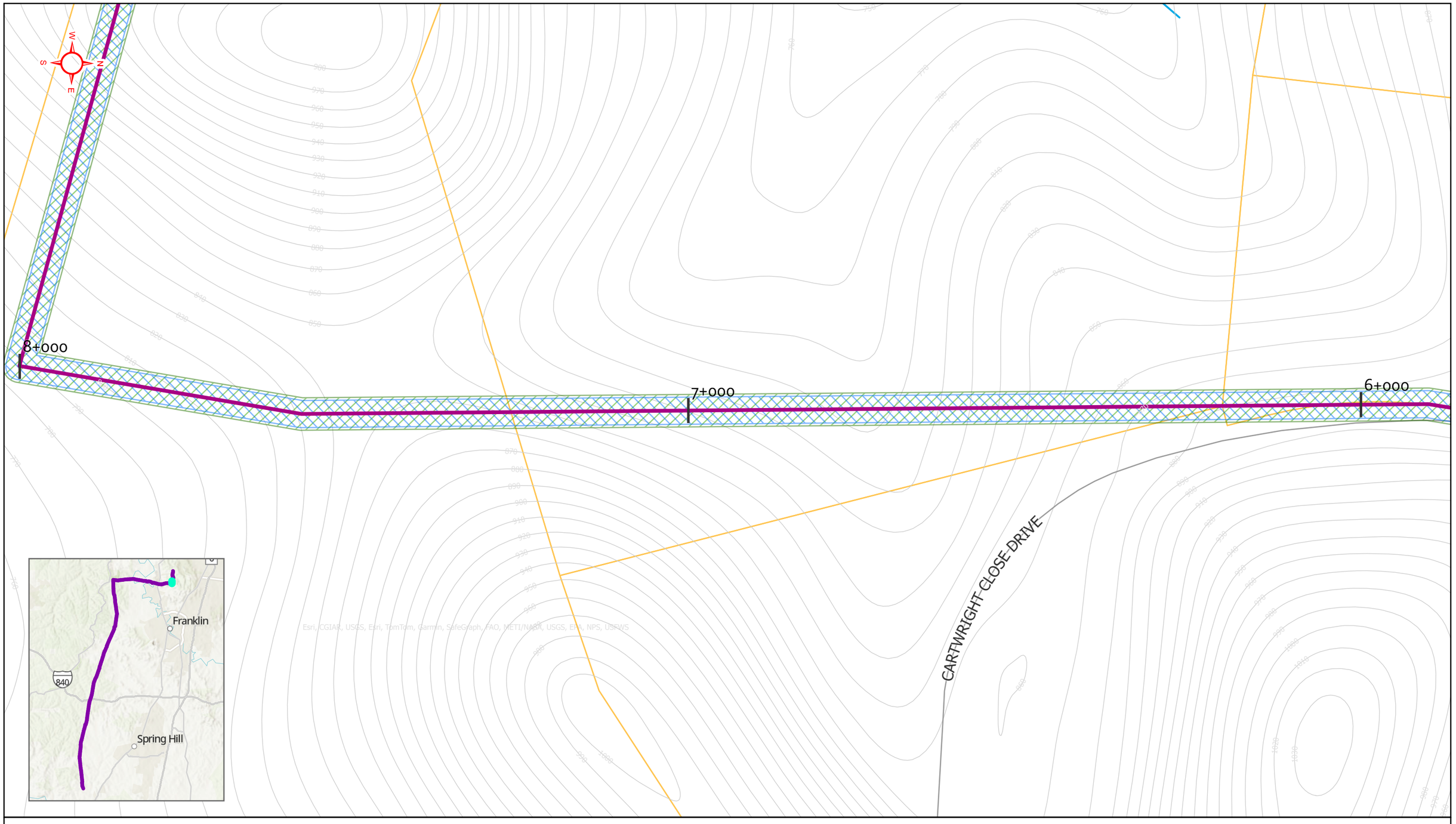
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

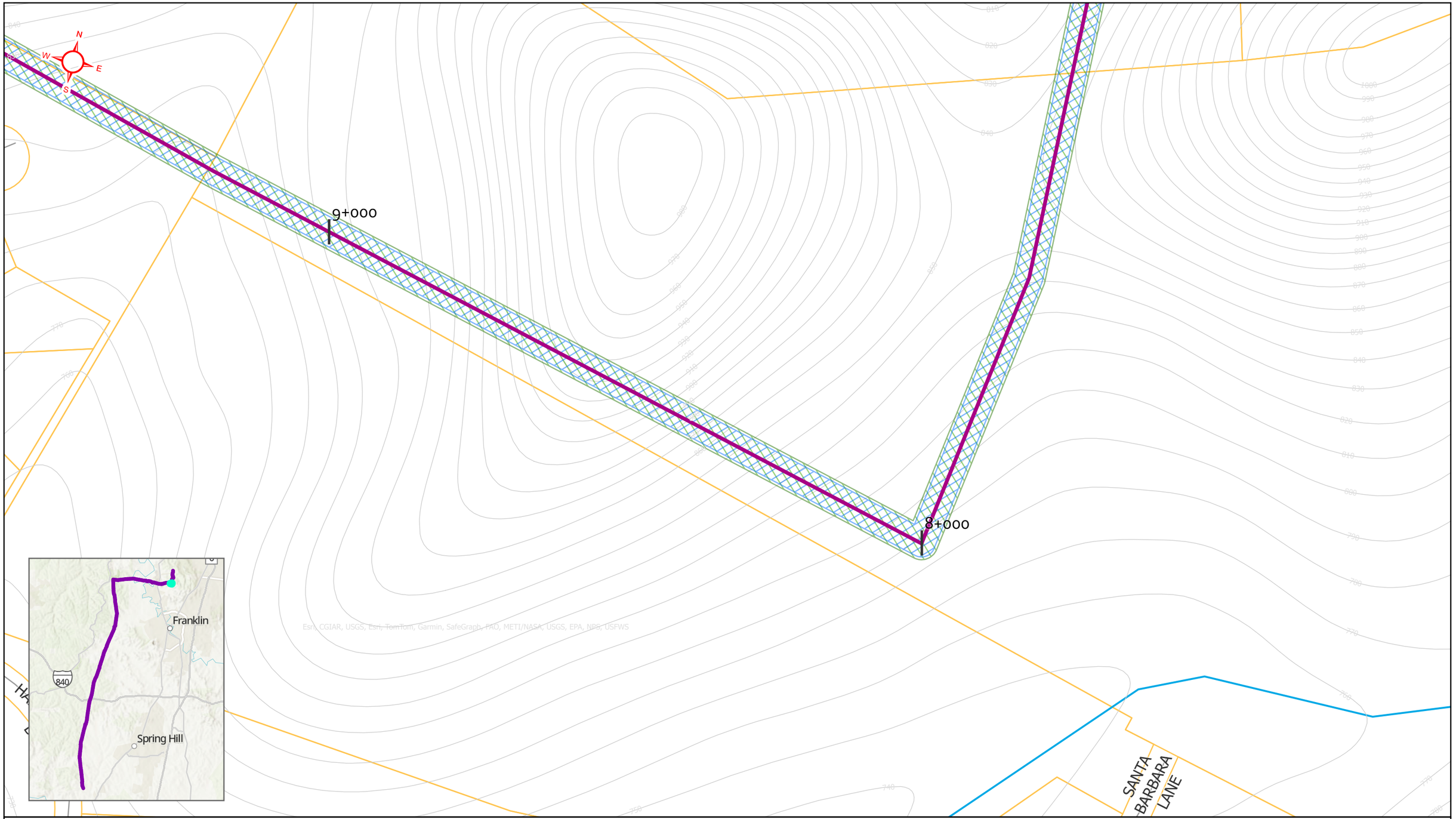
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

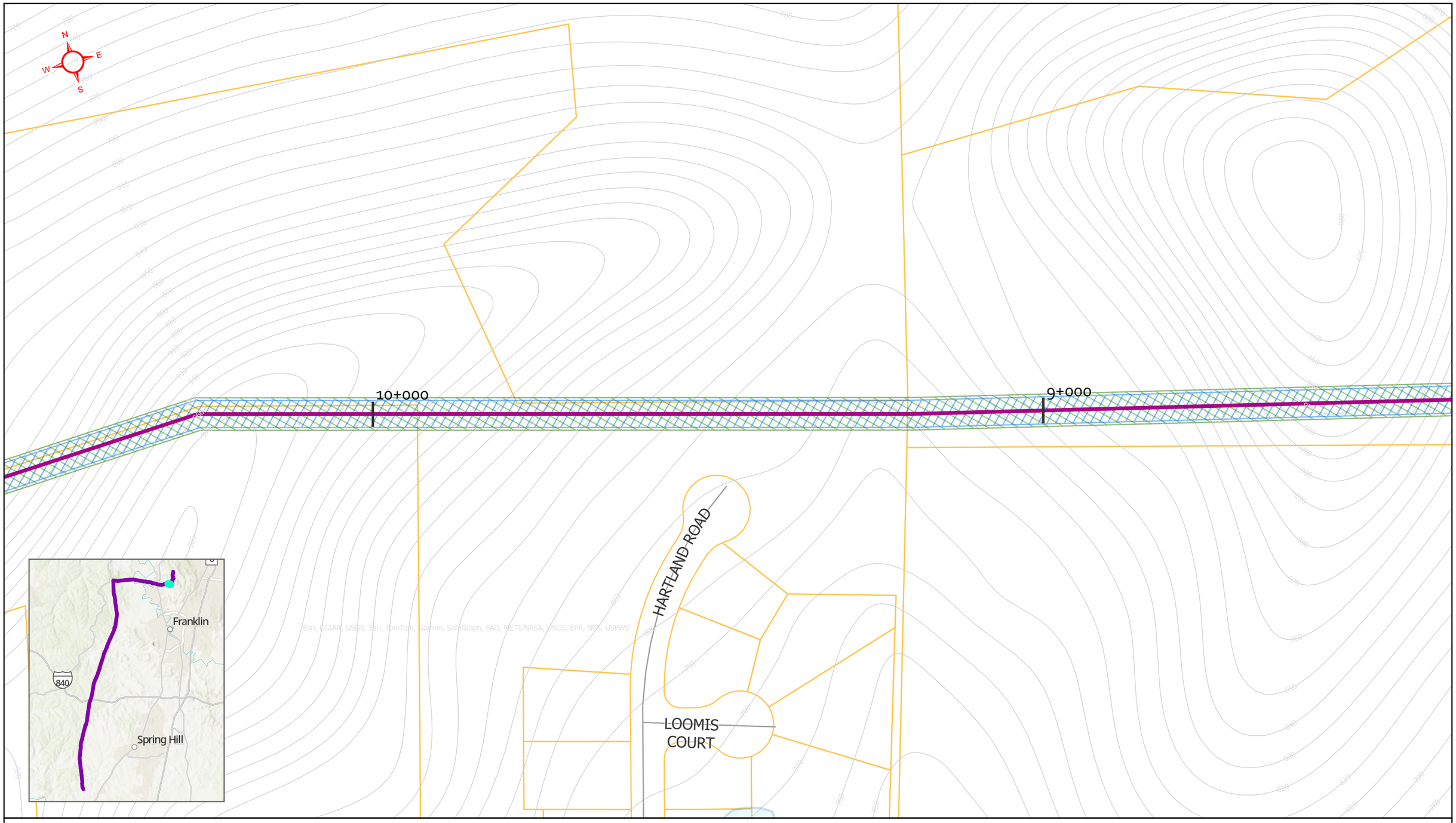
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

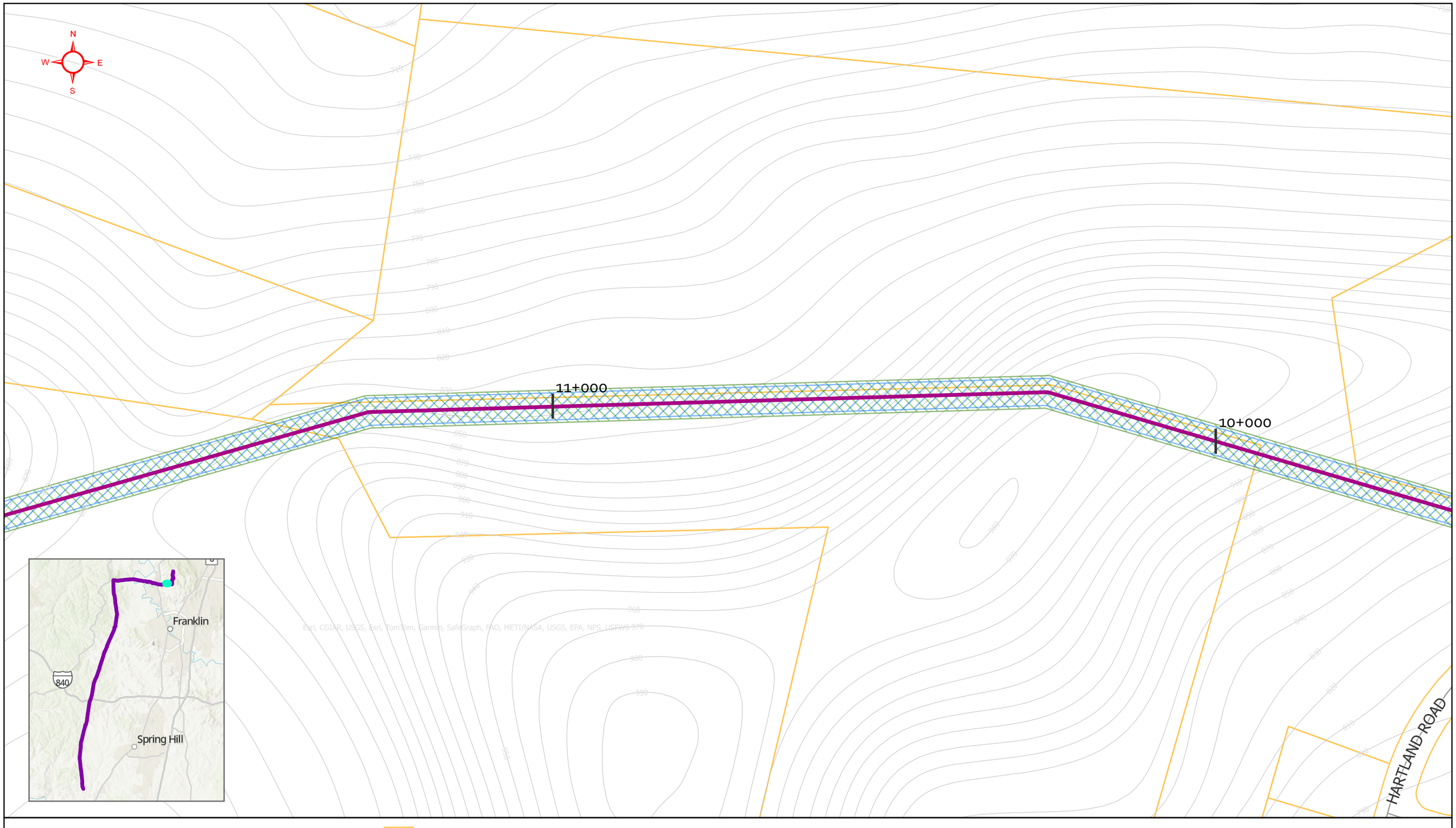
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

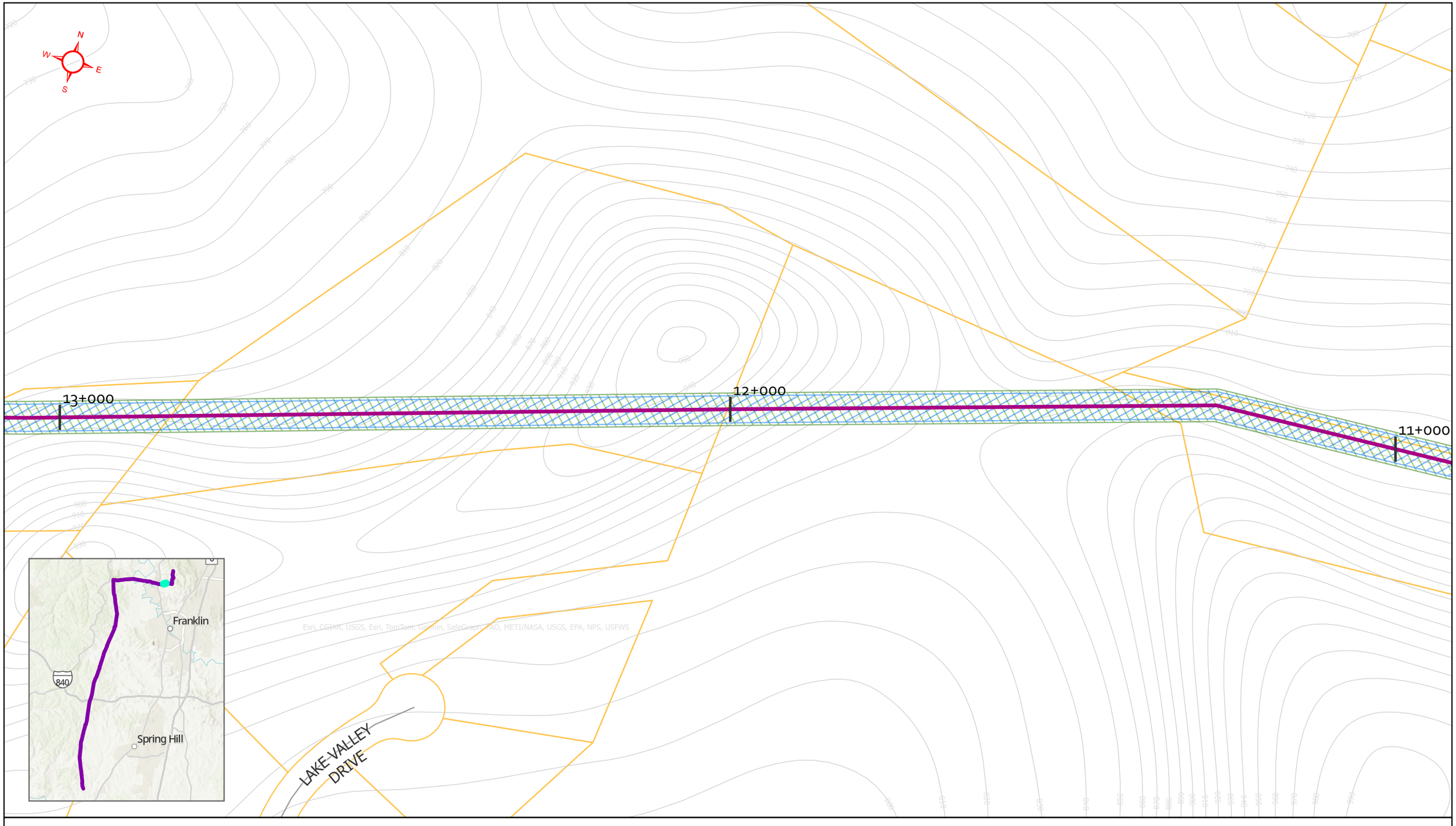
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

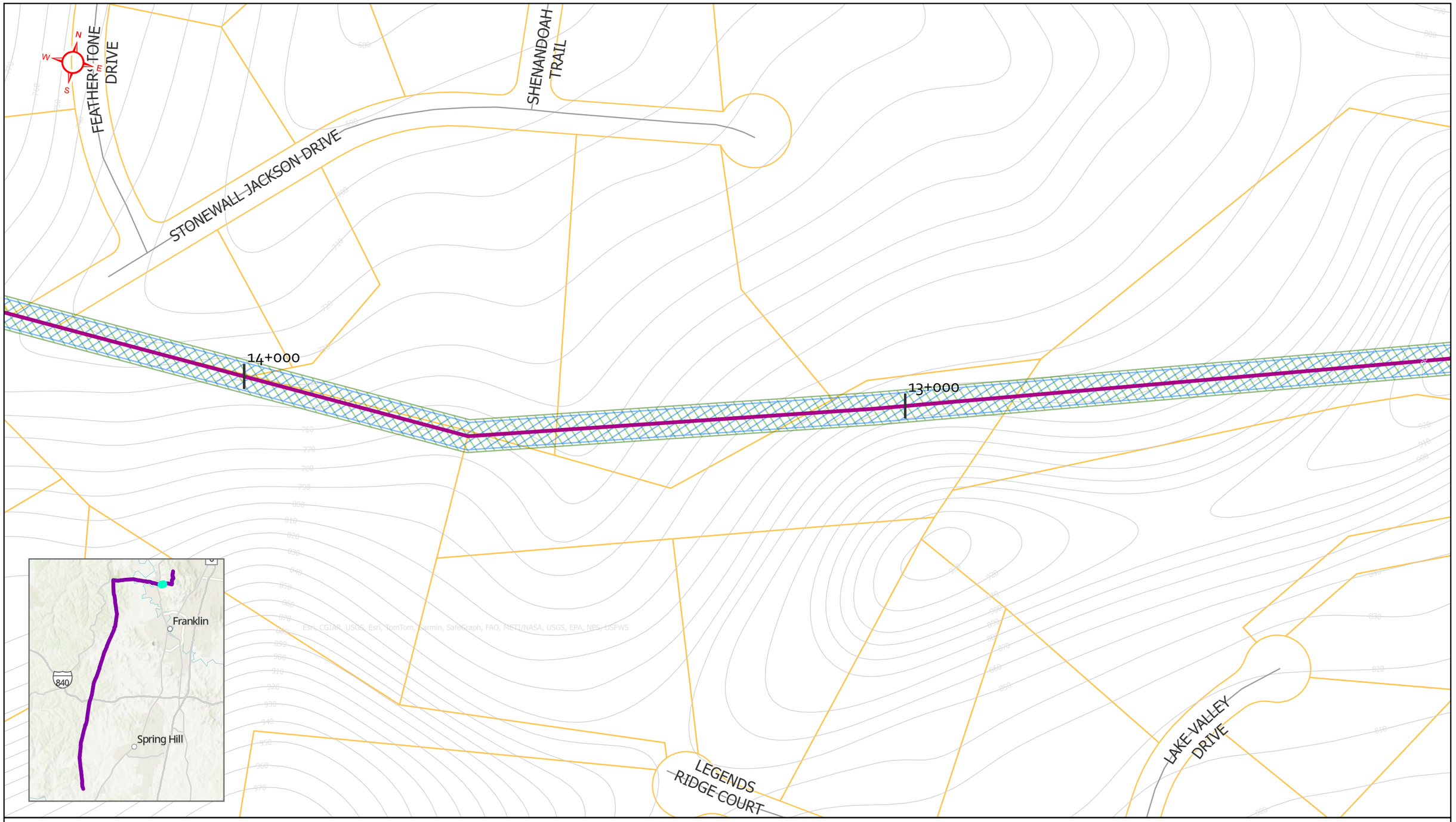
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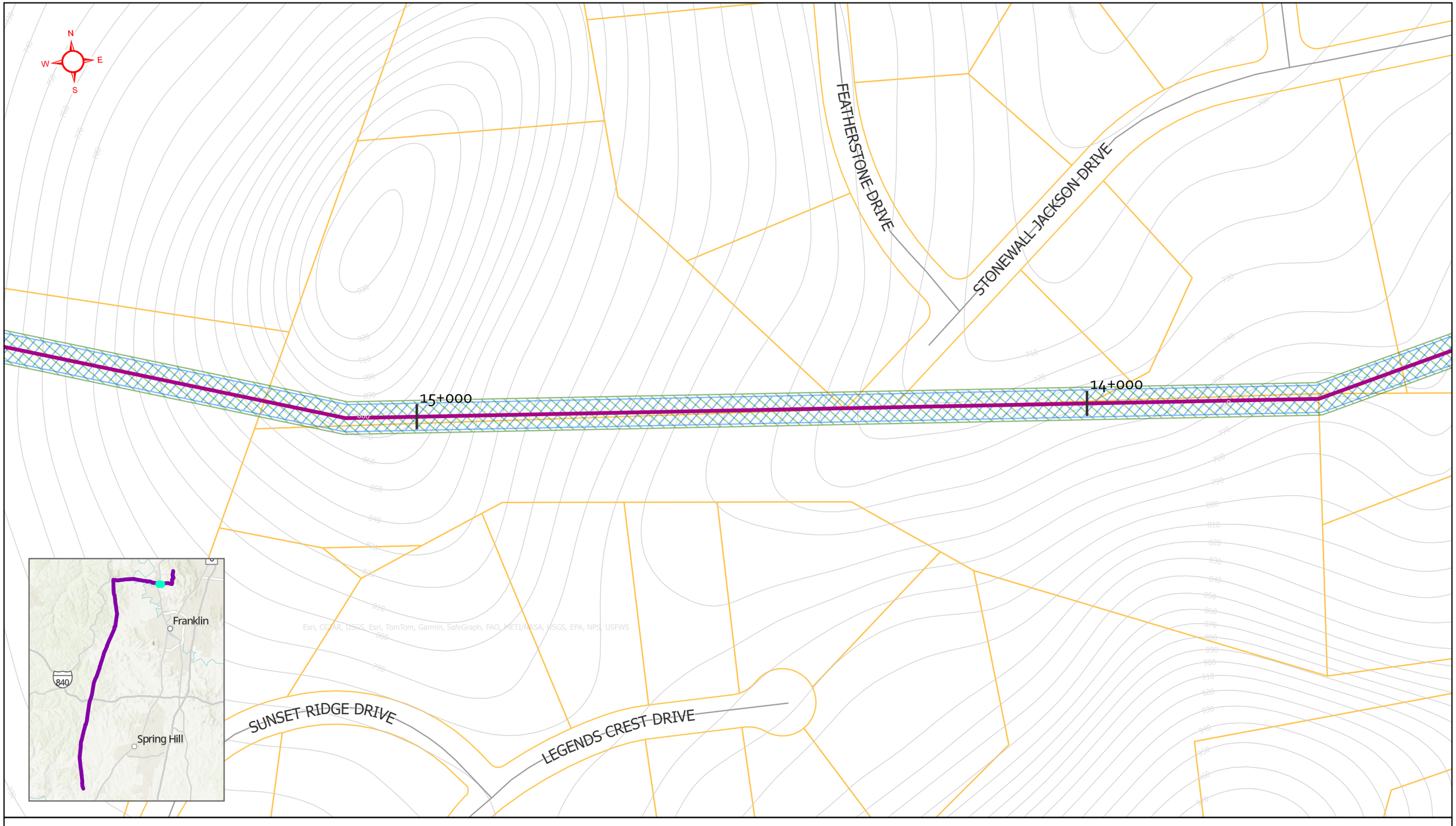
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


FEATHERSTONE DRIVE
SHENANDOAH TRAIL
STONEWALL JACKSON DRIVE
14+000
13+000
LEGENDS RIDGE COURT
LAKE VALLEY DRIVE
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

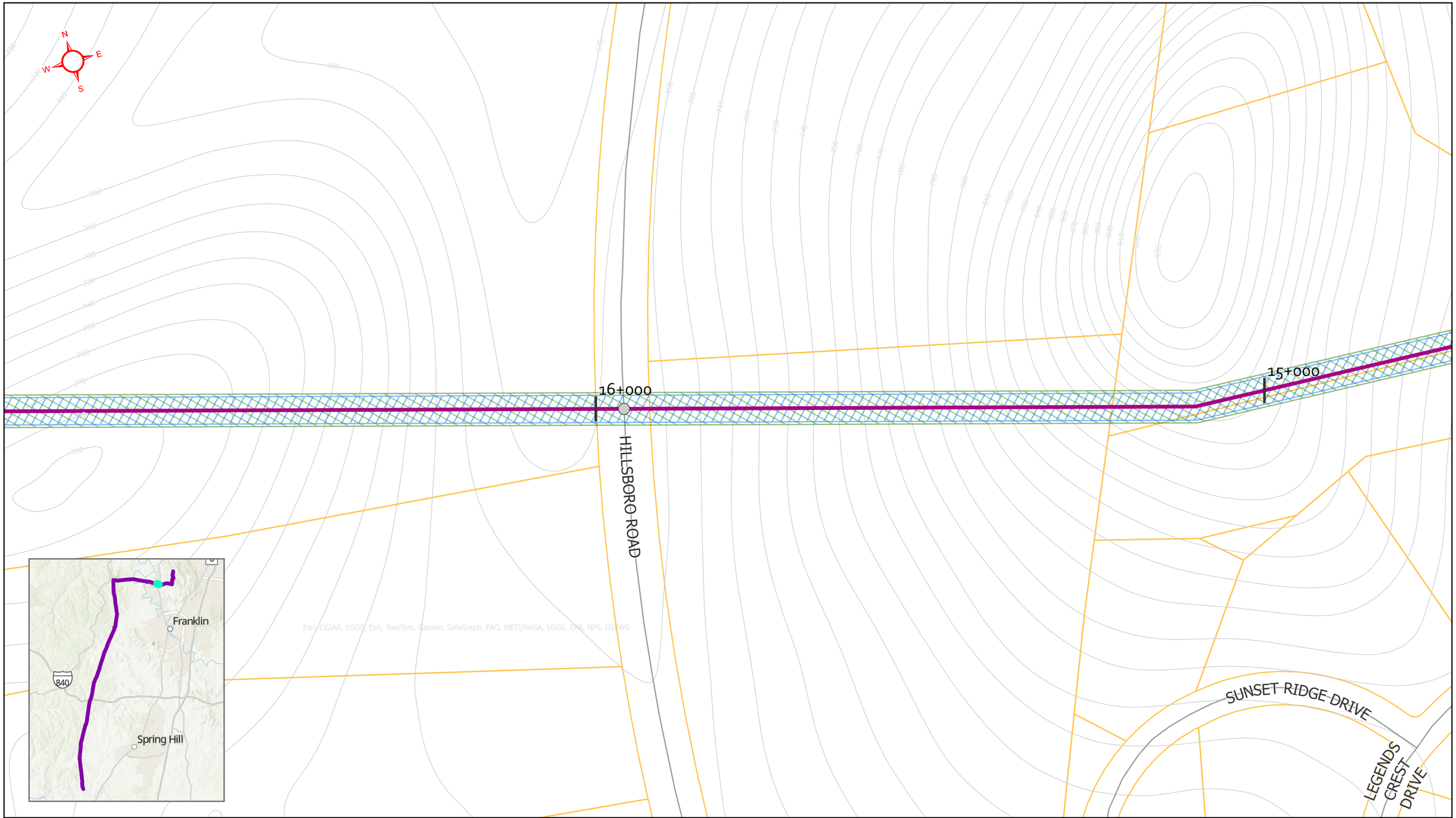
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

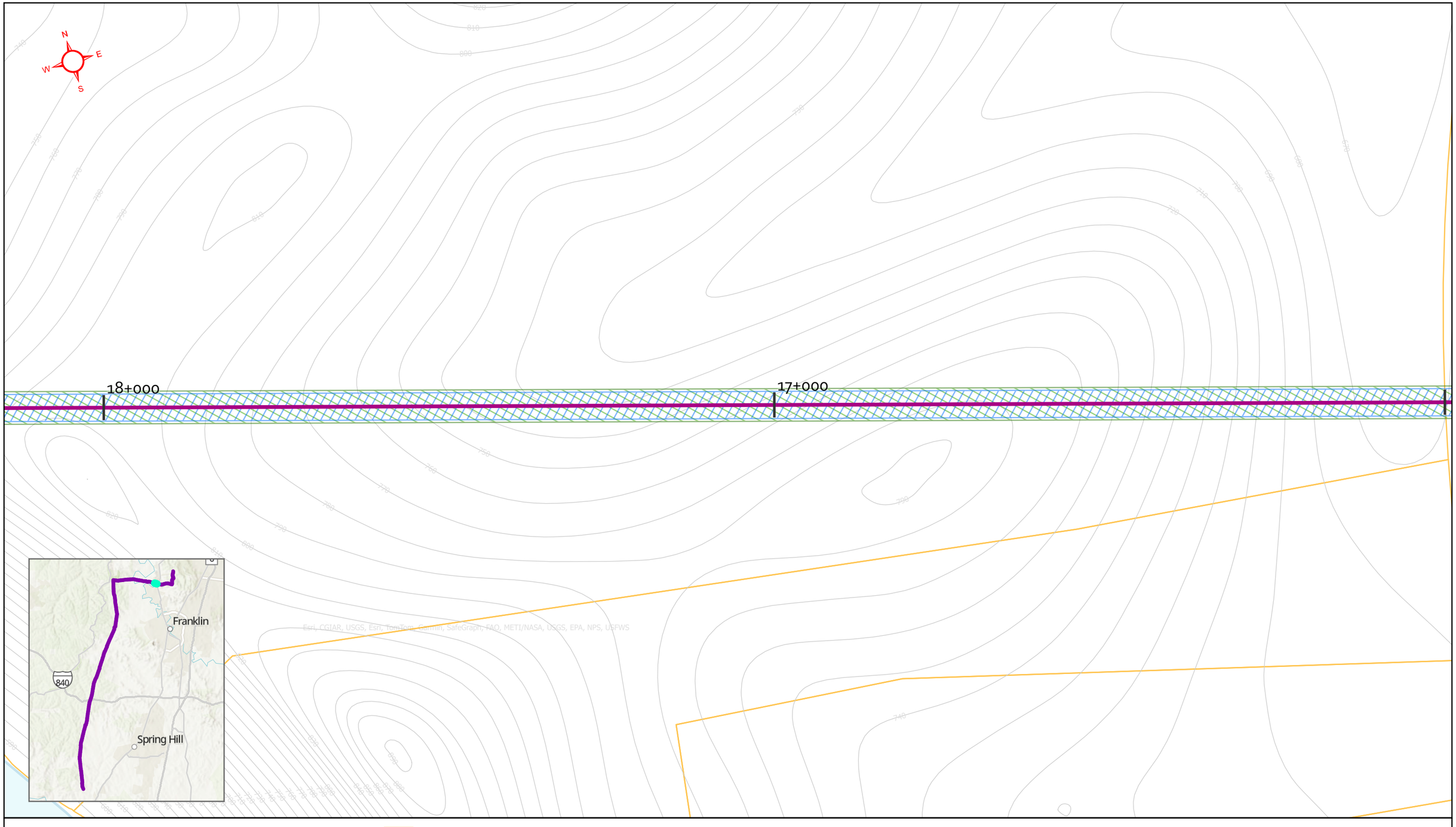
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

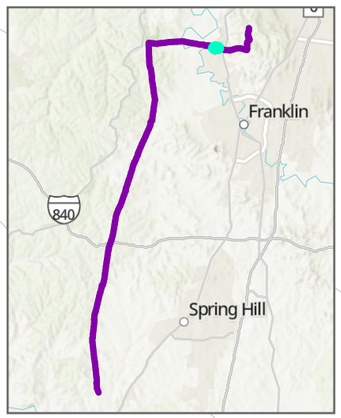
Hazen

MALLORY VALLEY UTILITY DISTRICT

N
W
E
S

19+000

18+000



Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

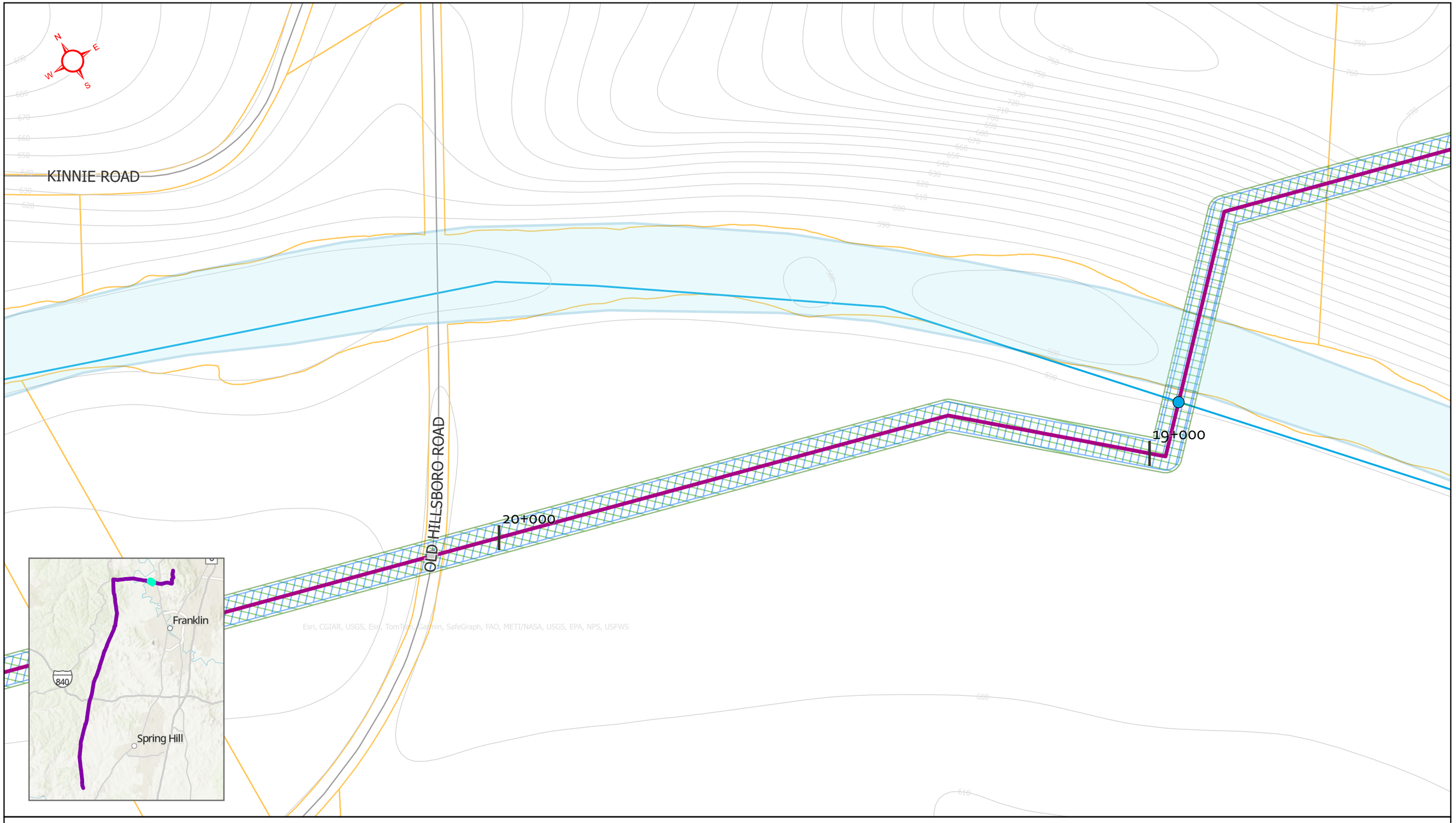
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easement
Double Transmission Line Easment
Streams
Parcels

Feet
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

N
W
E
S

KINNIE ROAD

OLD HILLSBORO ROAD

21+000

20+000

Franklin

Spring Hill

840

Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

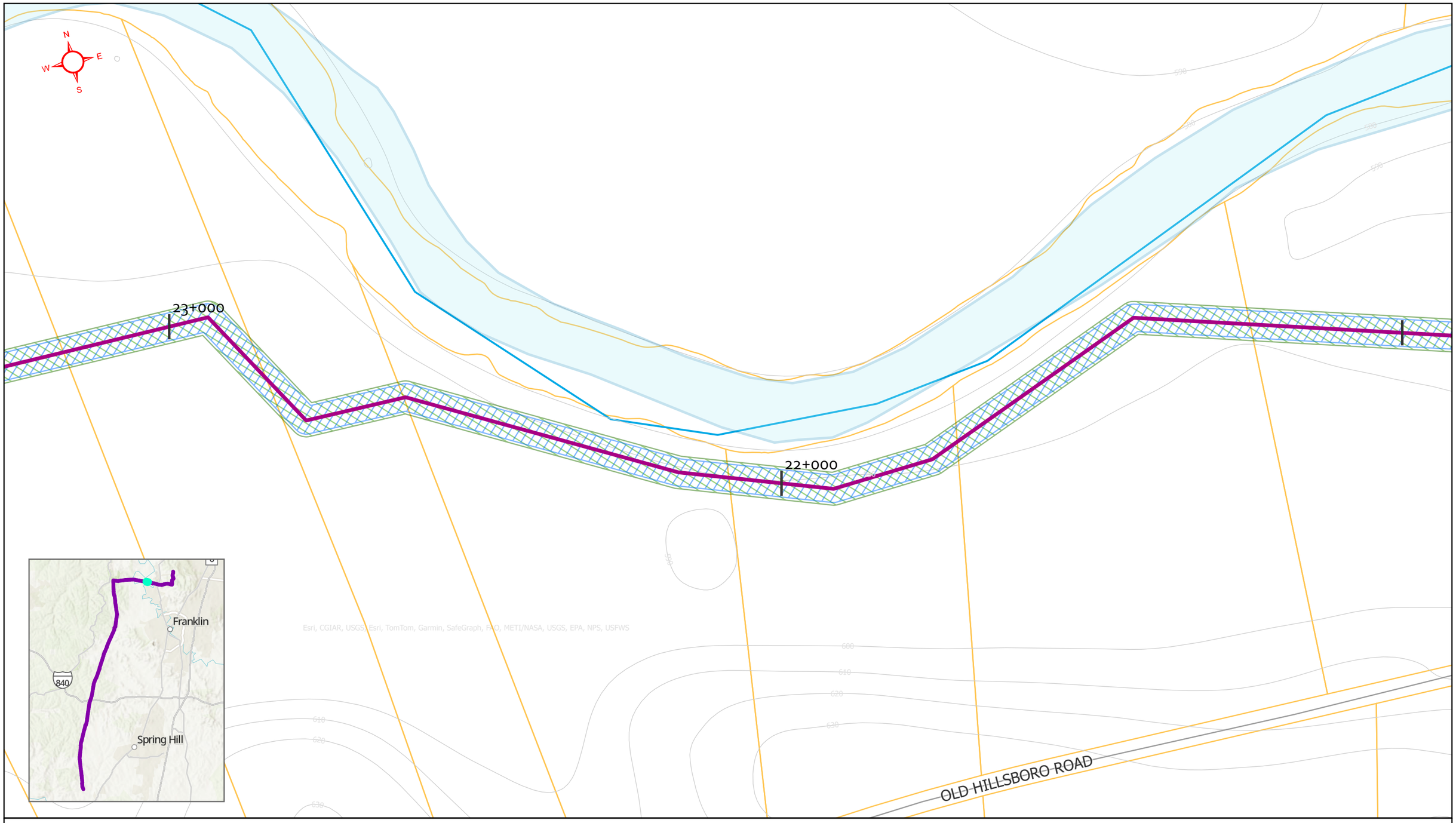
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

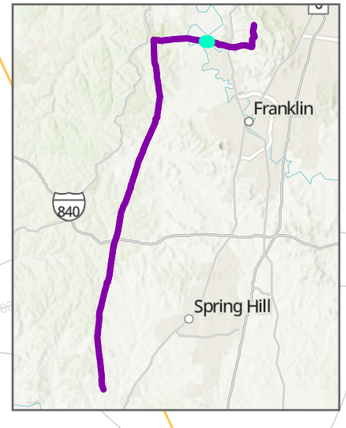
Hazen

MALLORY VALLEY UTILITY DISTRICT

N
W
E
S

24+000

23+000



Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

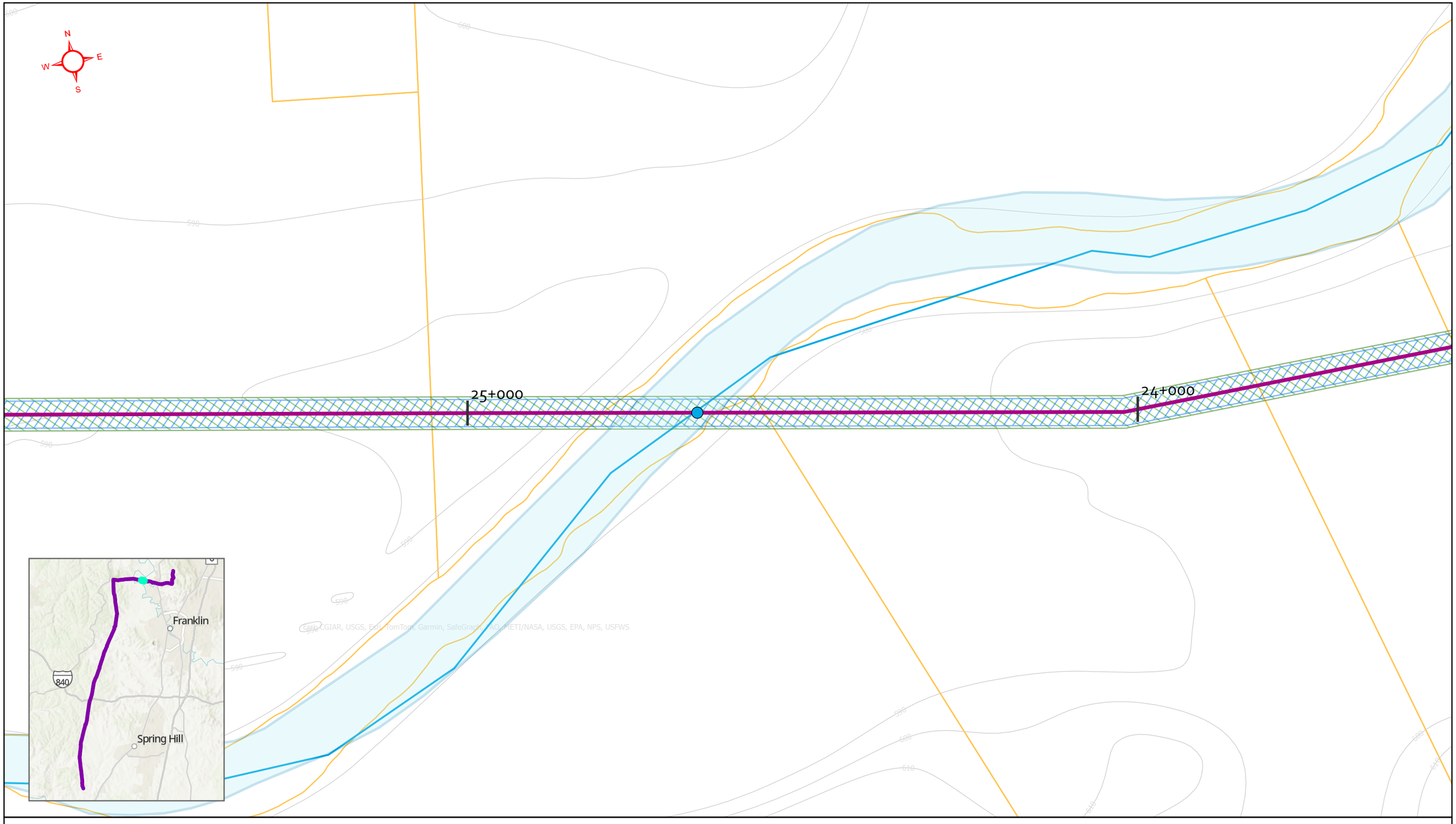
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

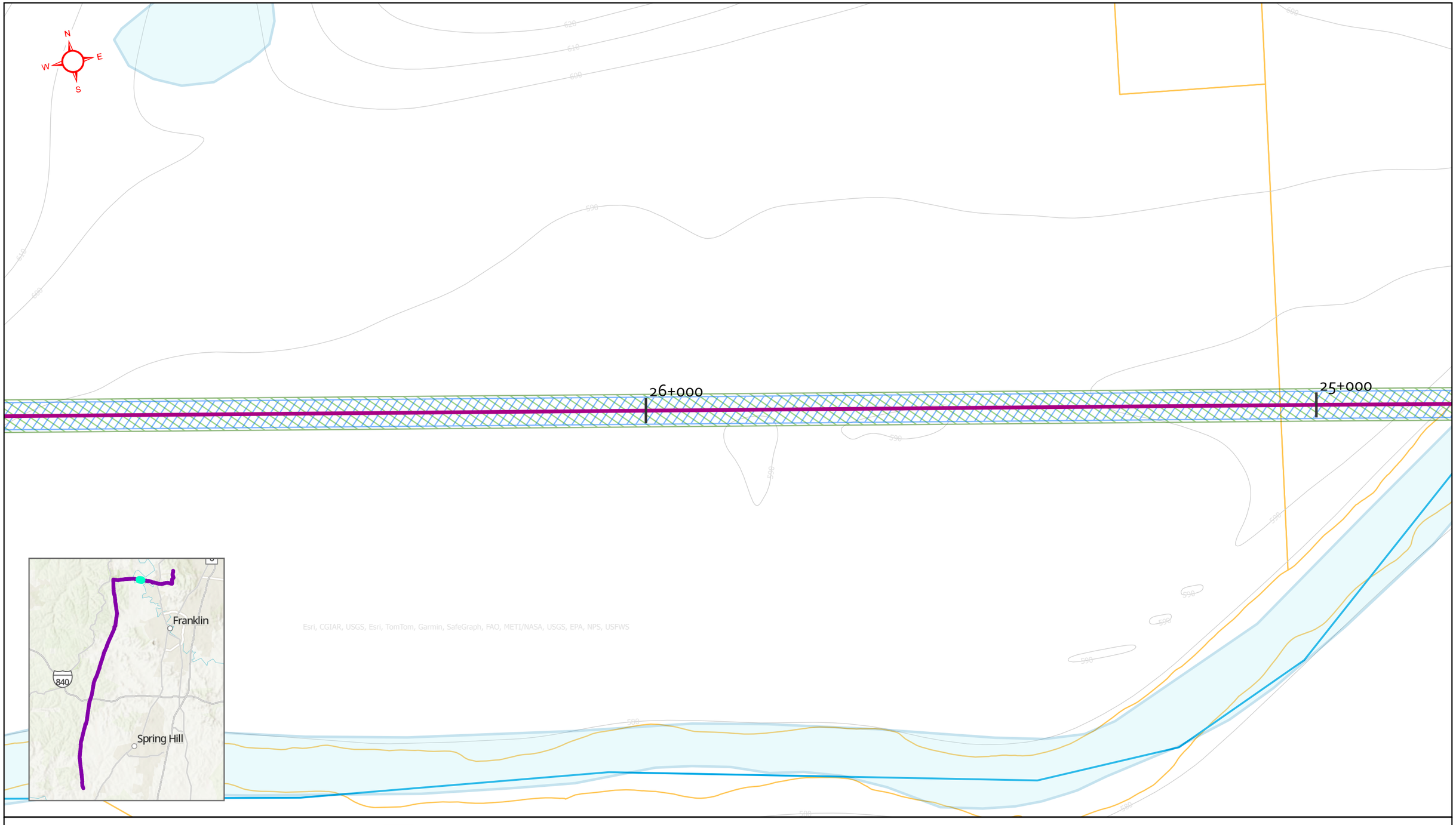
MALLORY VALLEY UTILITY DISTRICT



MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

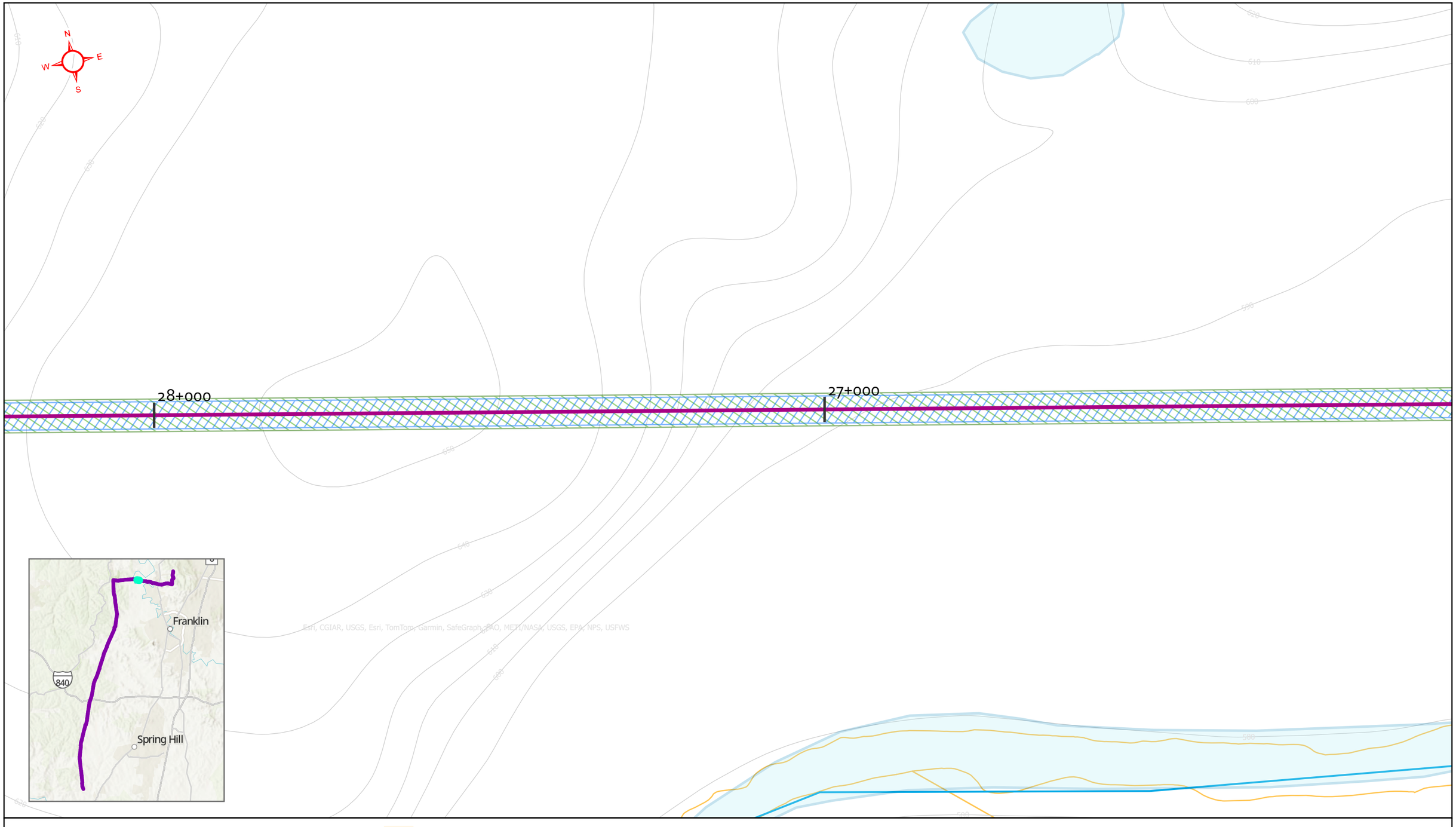
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

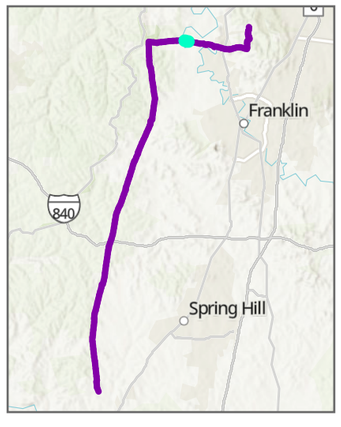
Hazen

MALLORY VALLEY UTILITY DISTRICT

N
W
E
S

29+000

28+000



Esri, CGIAR, USGS, Esri TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

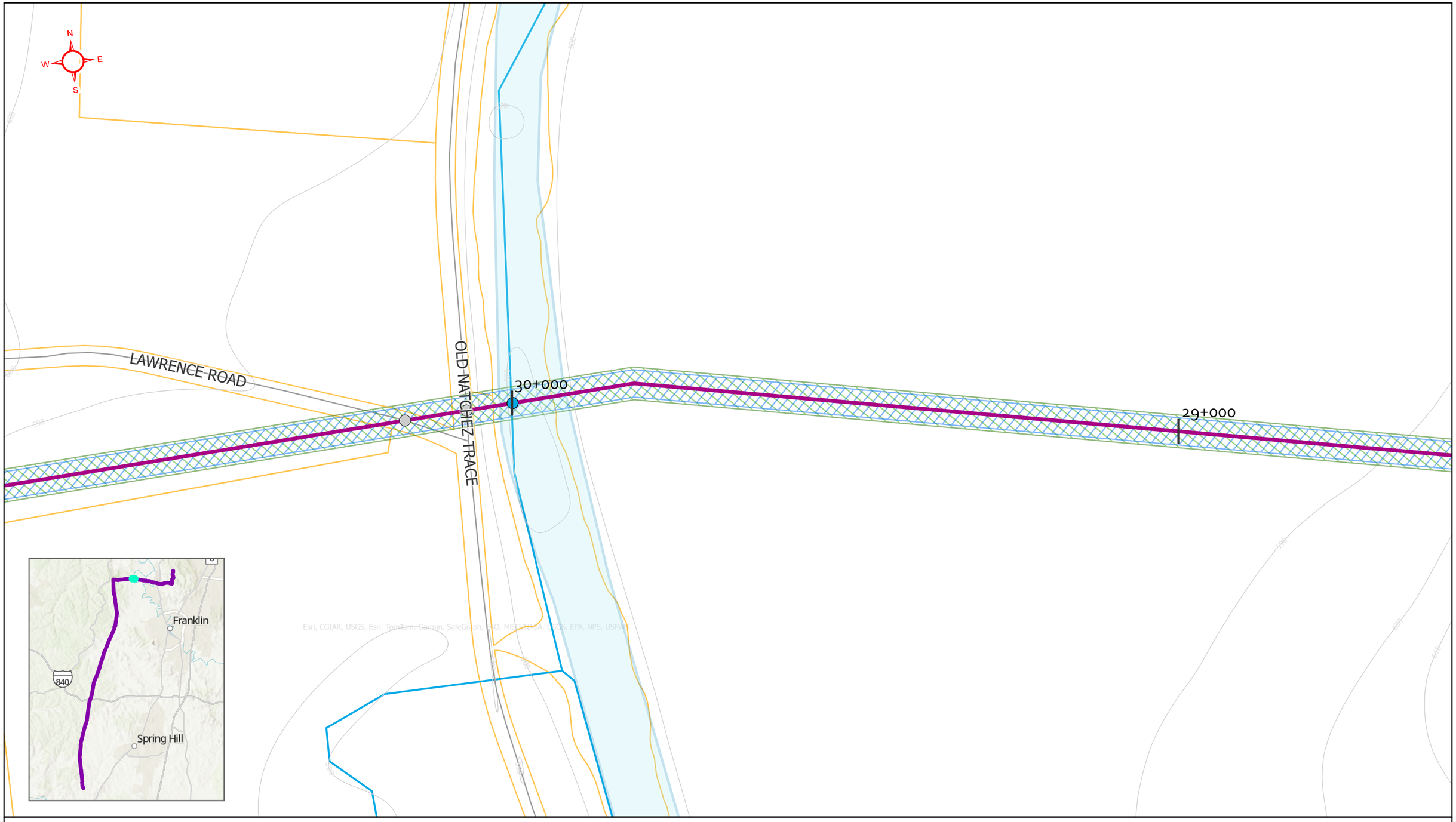
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

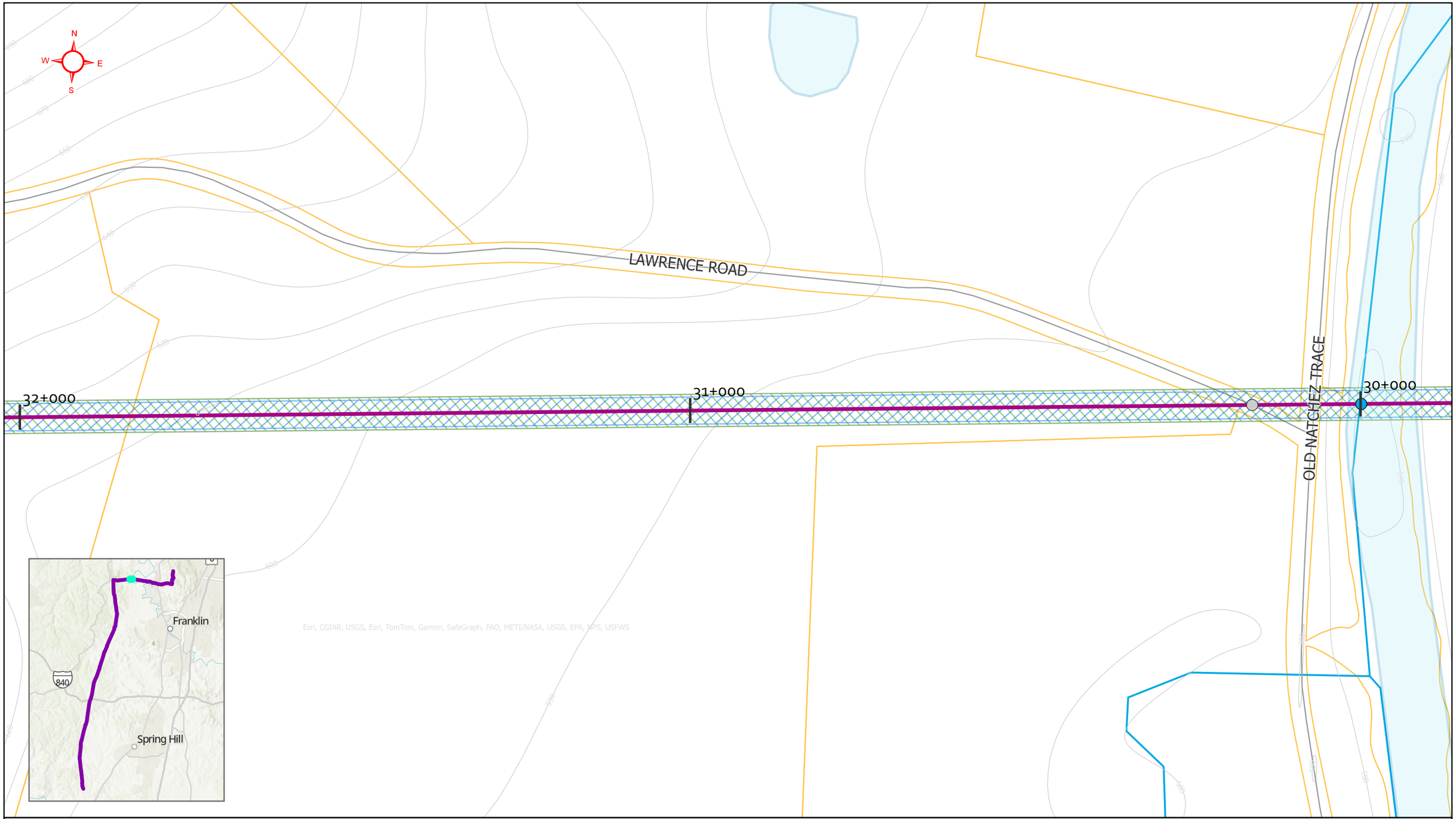
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

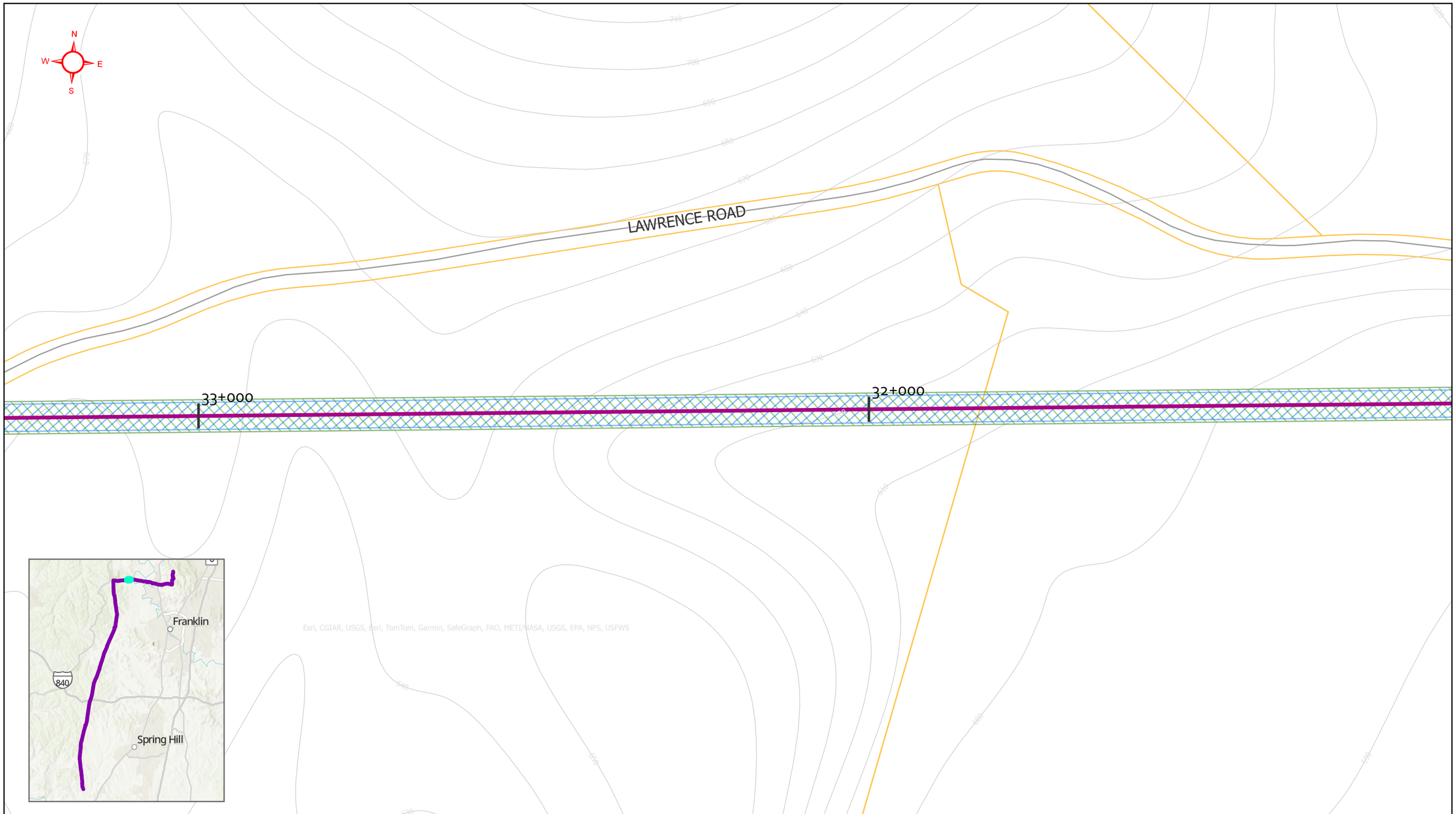


Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easement
Double Transmission Line Easment
Streams
Parcels

Feet
0 200 400 600

MVUD Proposed Water Transmission

Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

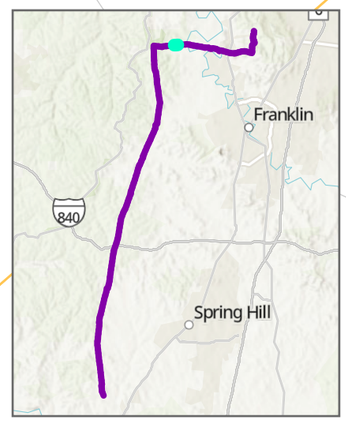
MALLORY VALLEY UTILITY DISTRICT

N
W
E
S

LAWRENCE ROAD

34+000

33+000



Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

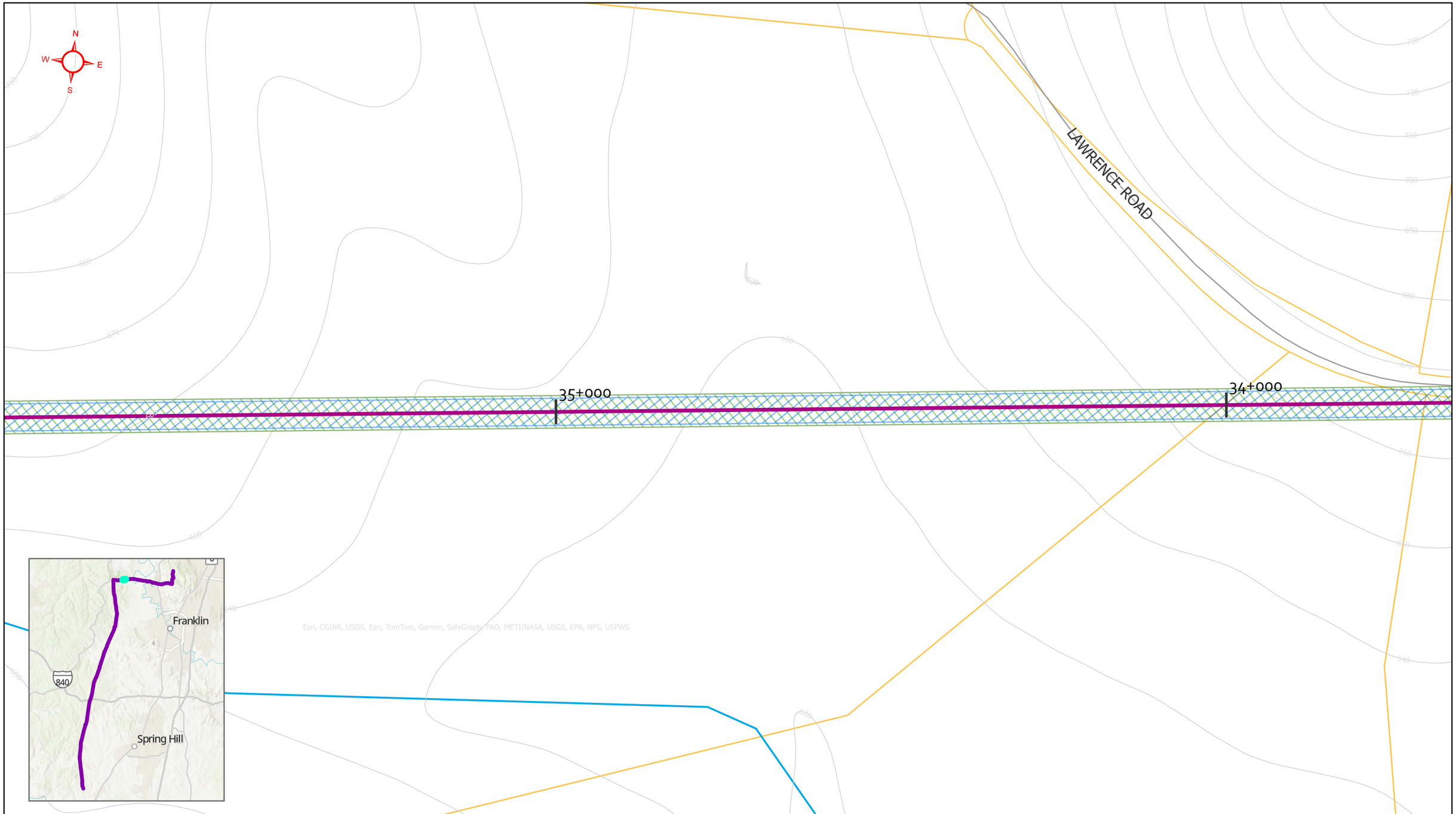
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

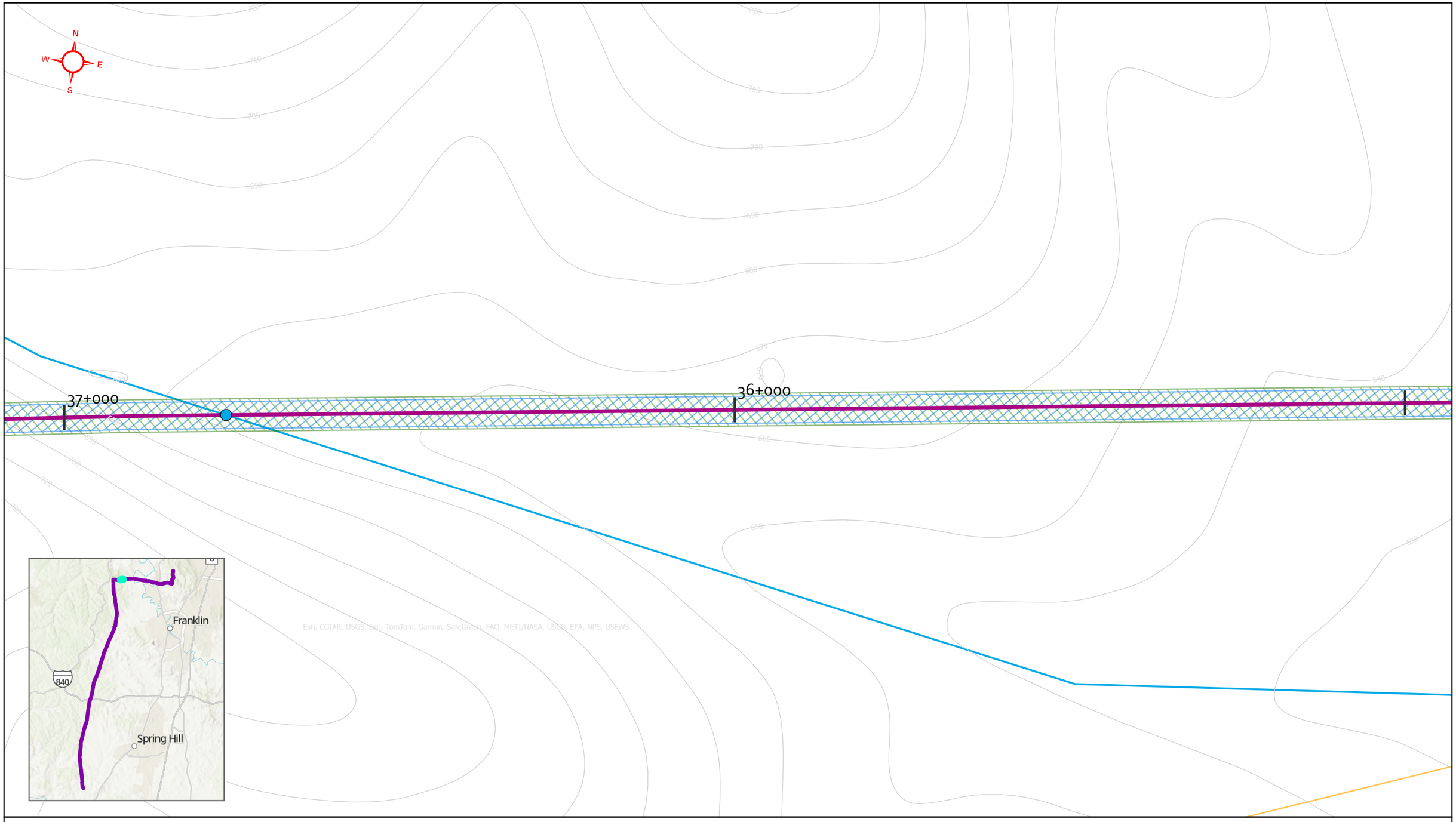
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

N
W
E
S

38+000

37+000

Franklin

840

Spring Hill

Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

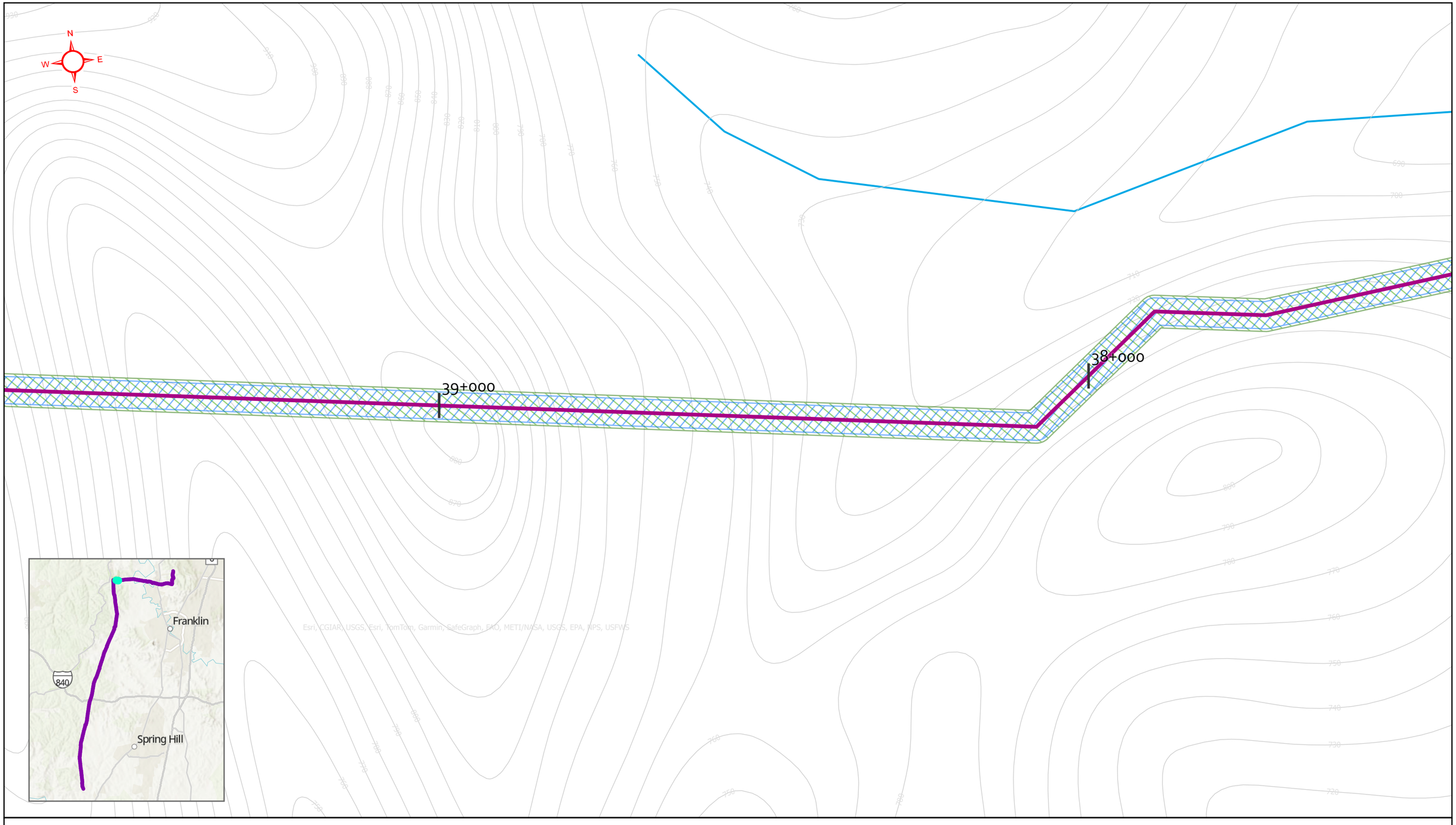
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

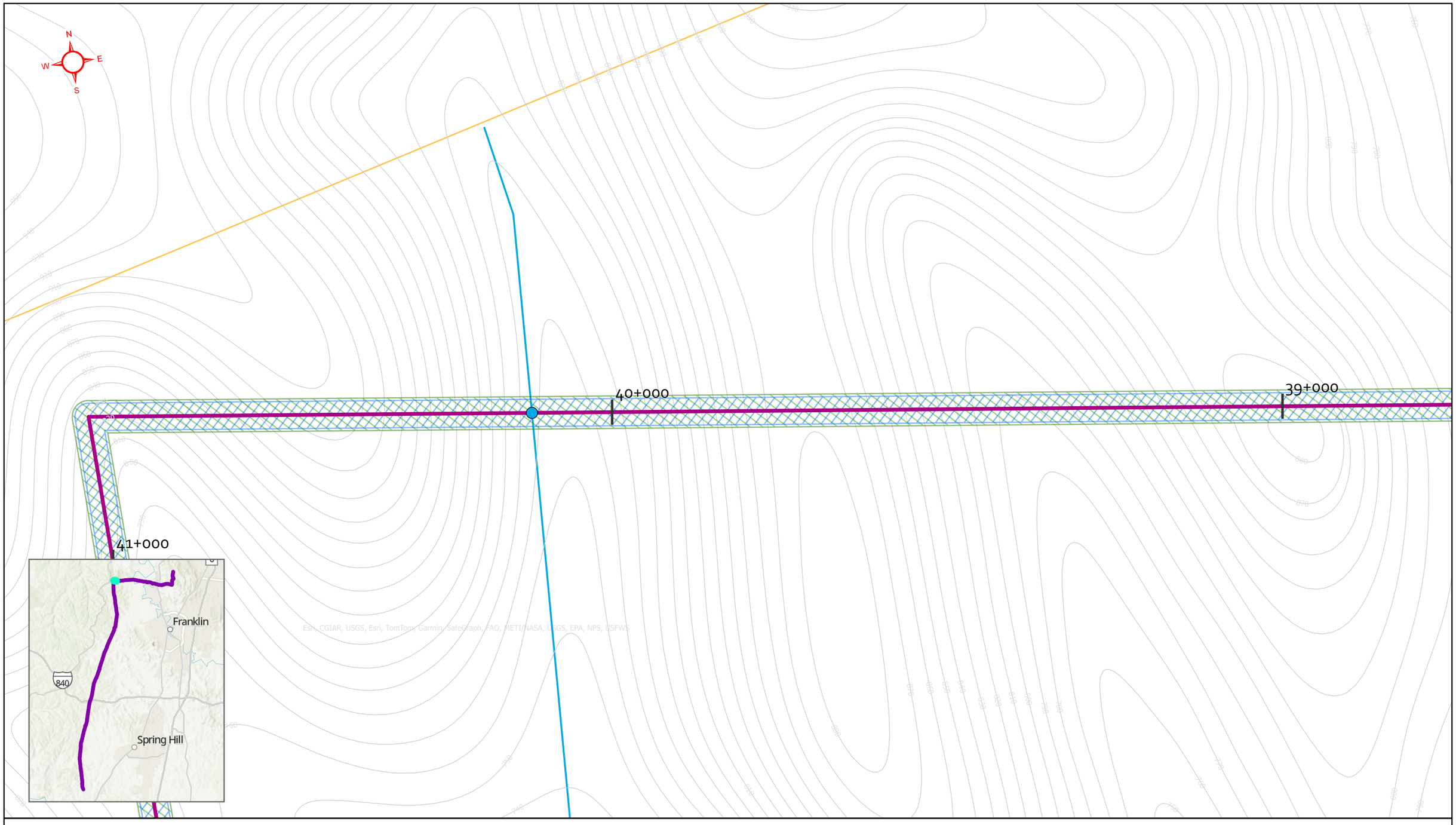
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

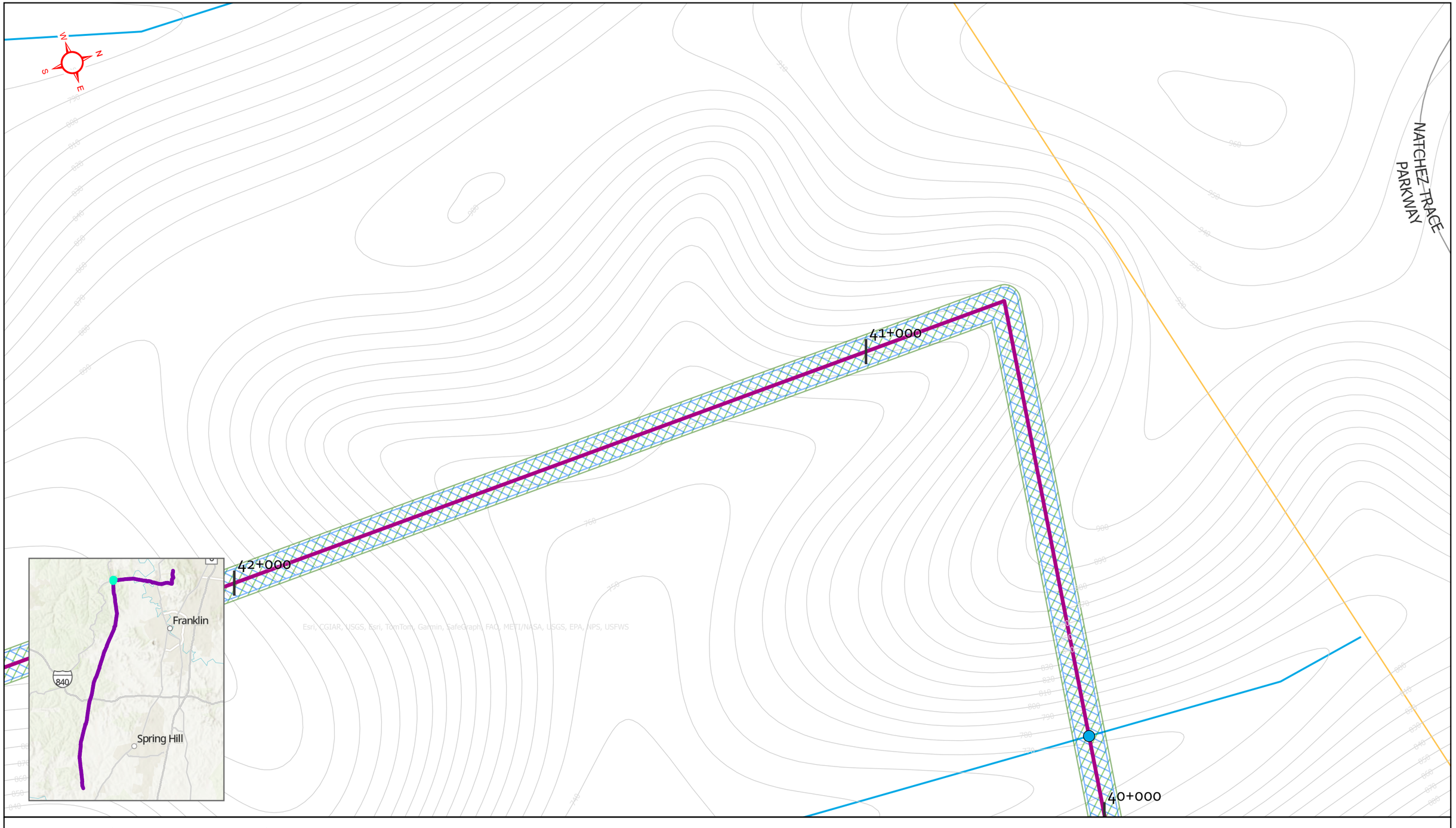
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

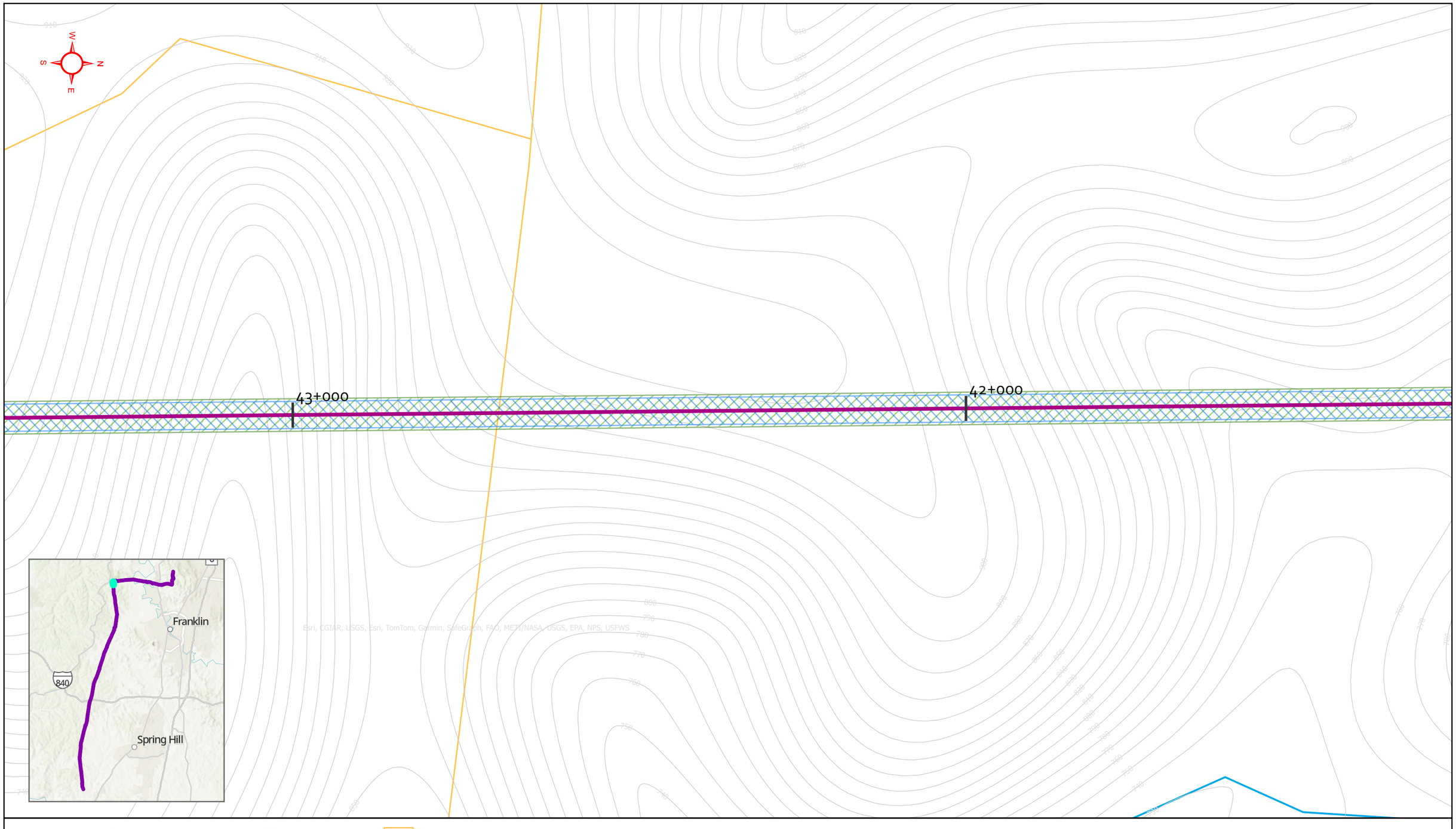
Feet

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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

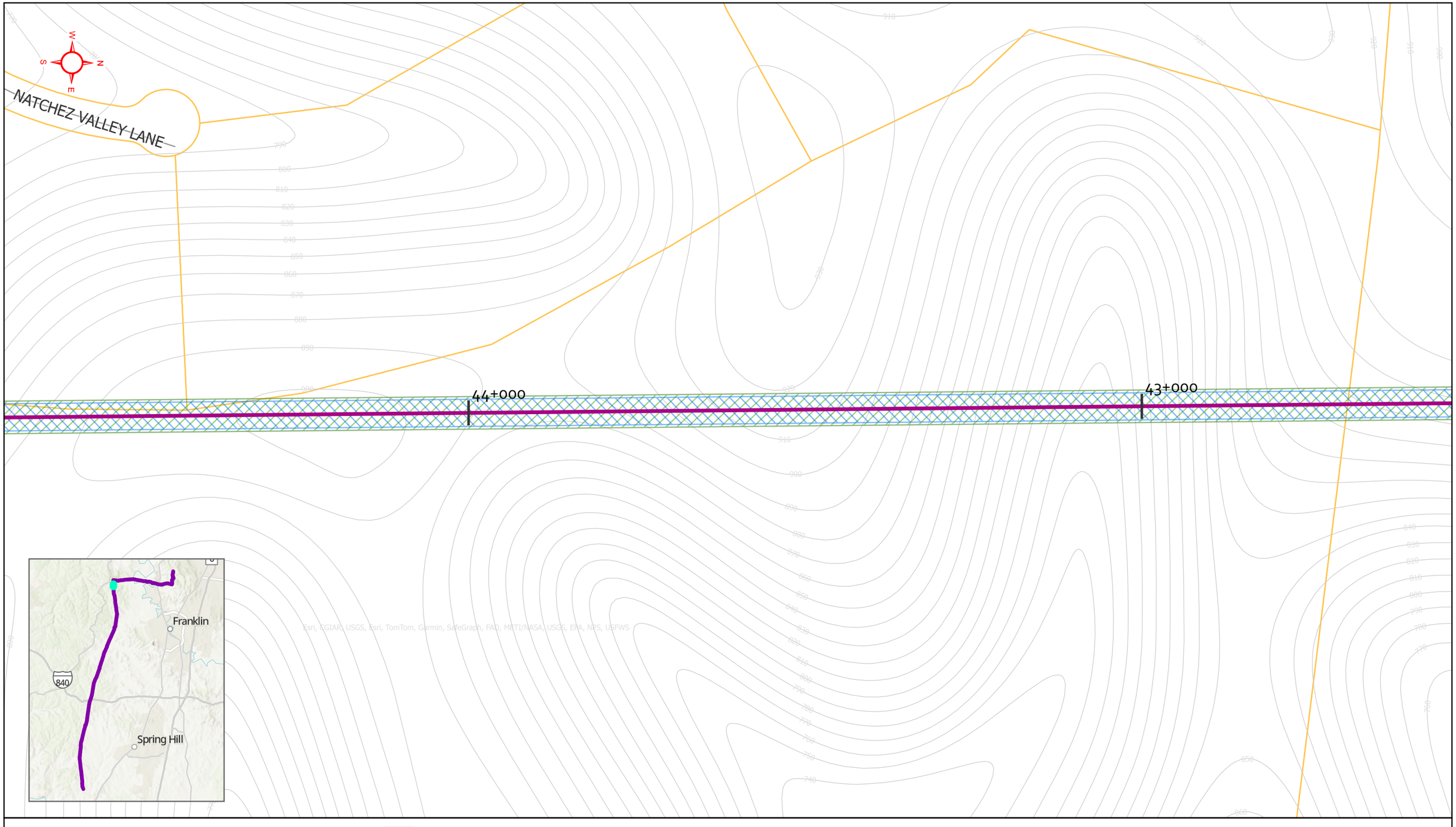
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

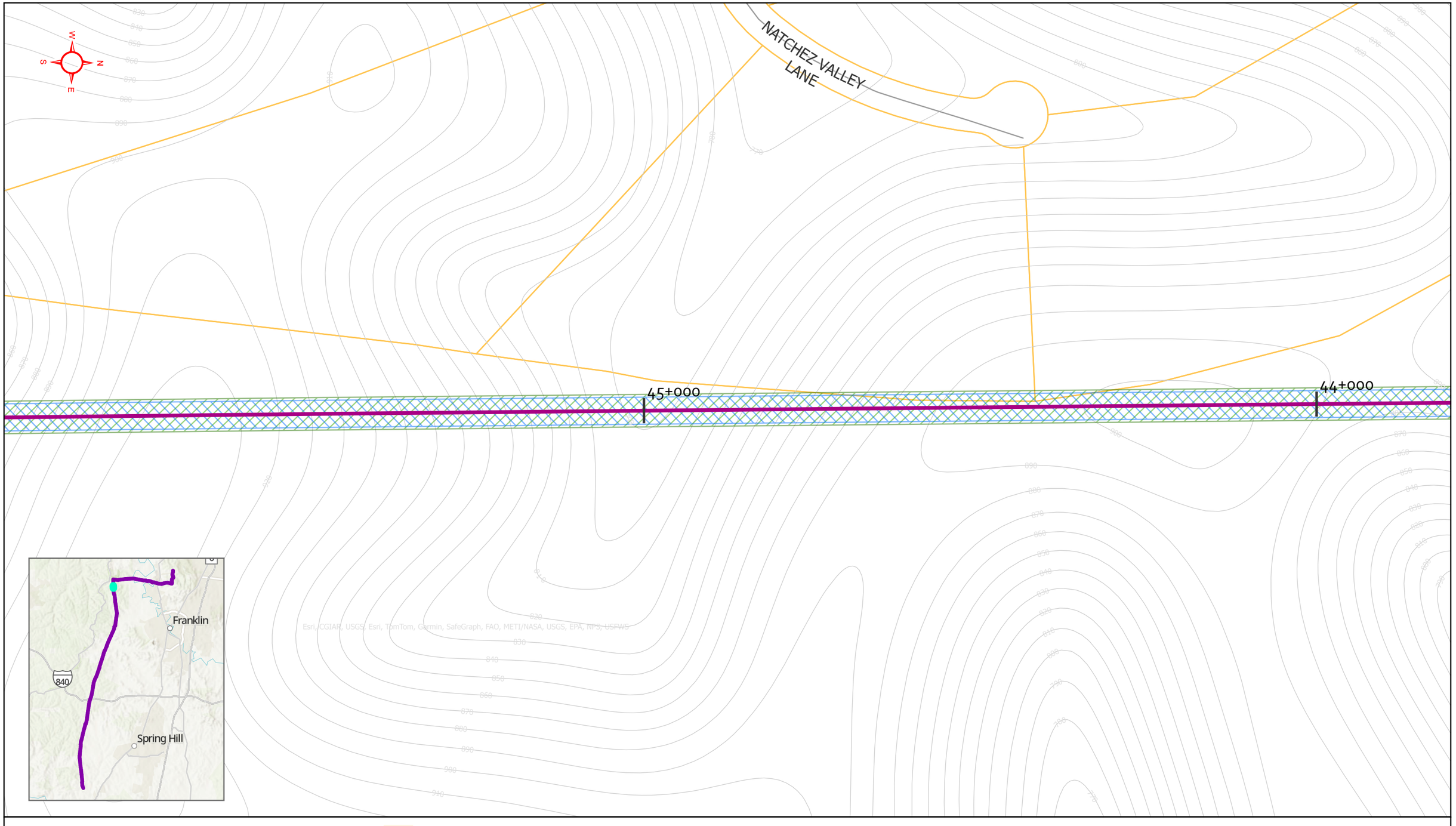
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

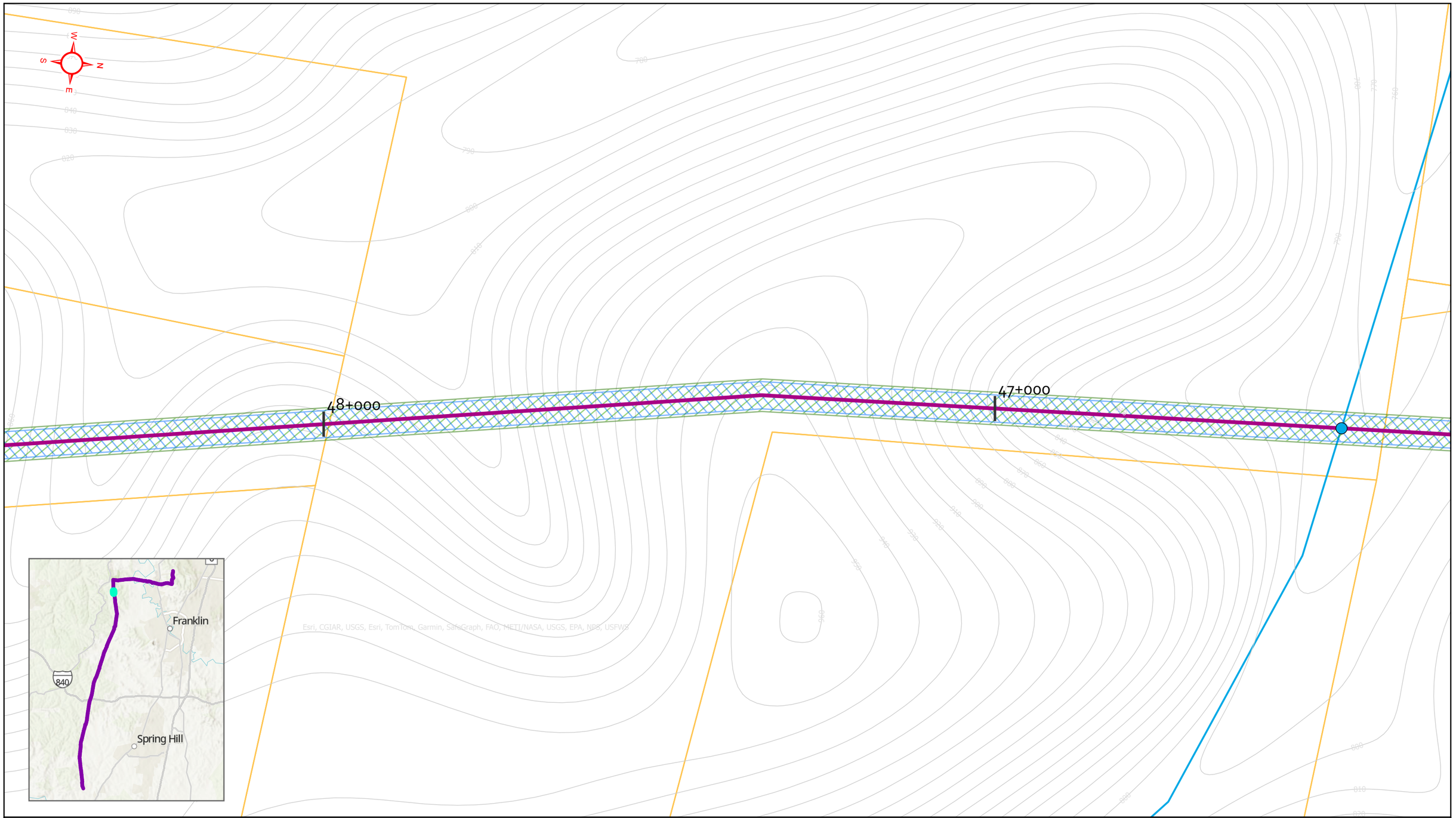
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

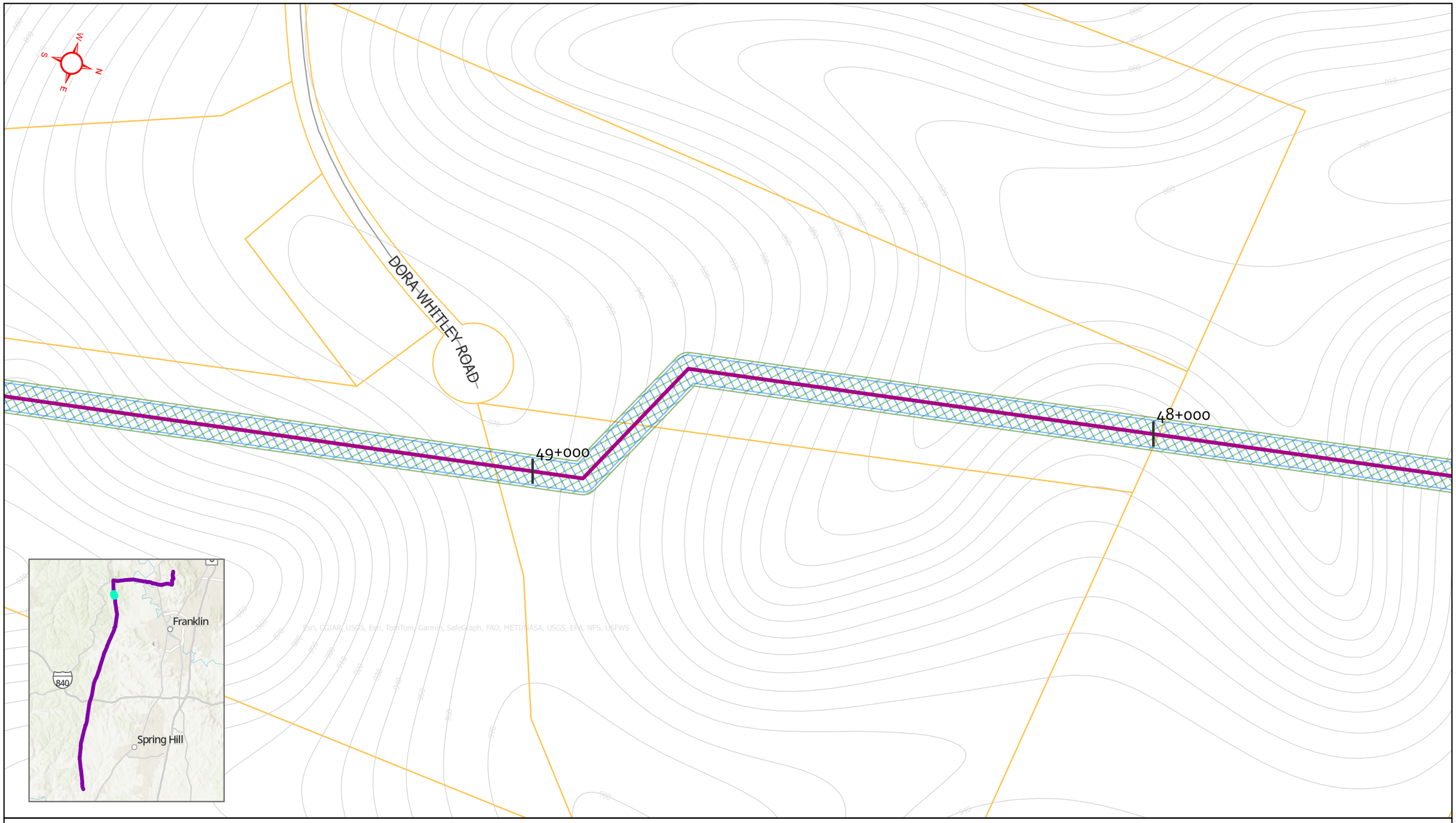
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

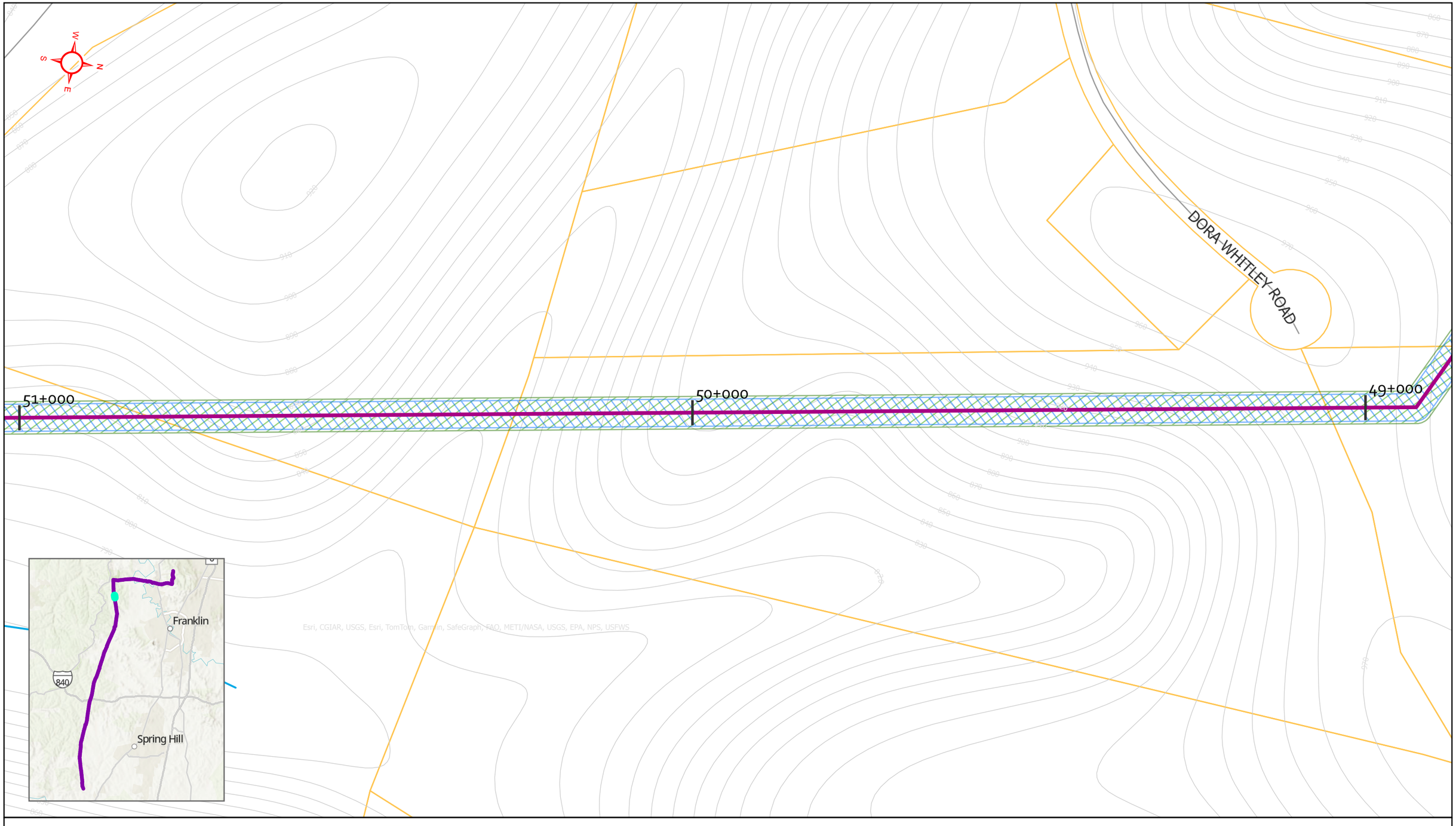
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

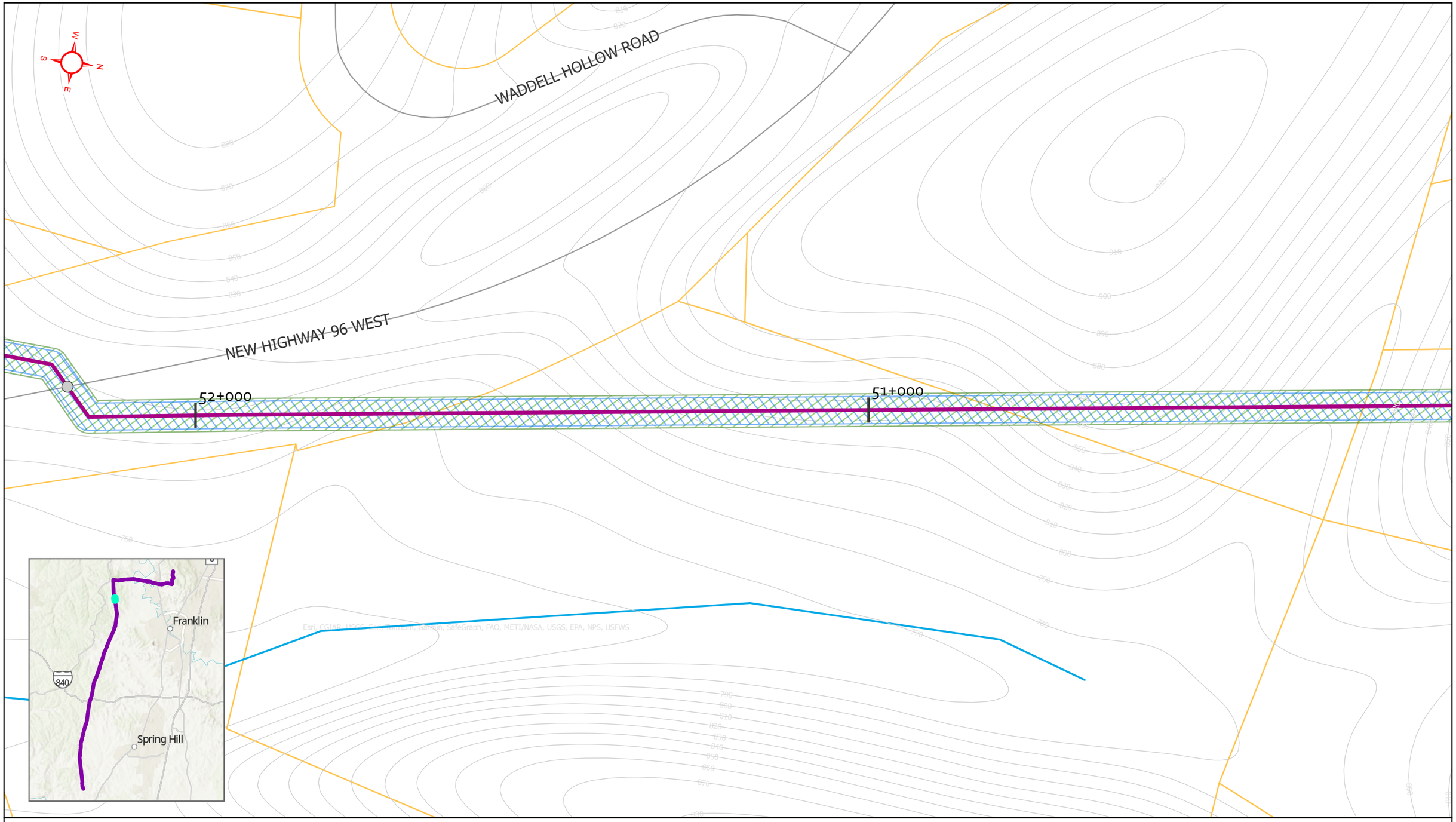
Feet

0 200 400 600

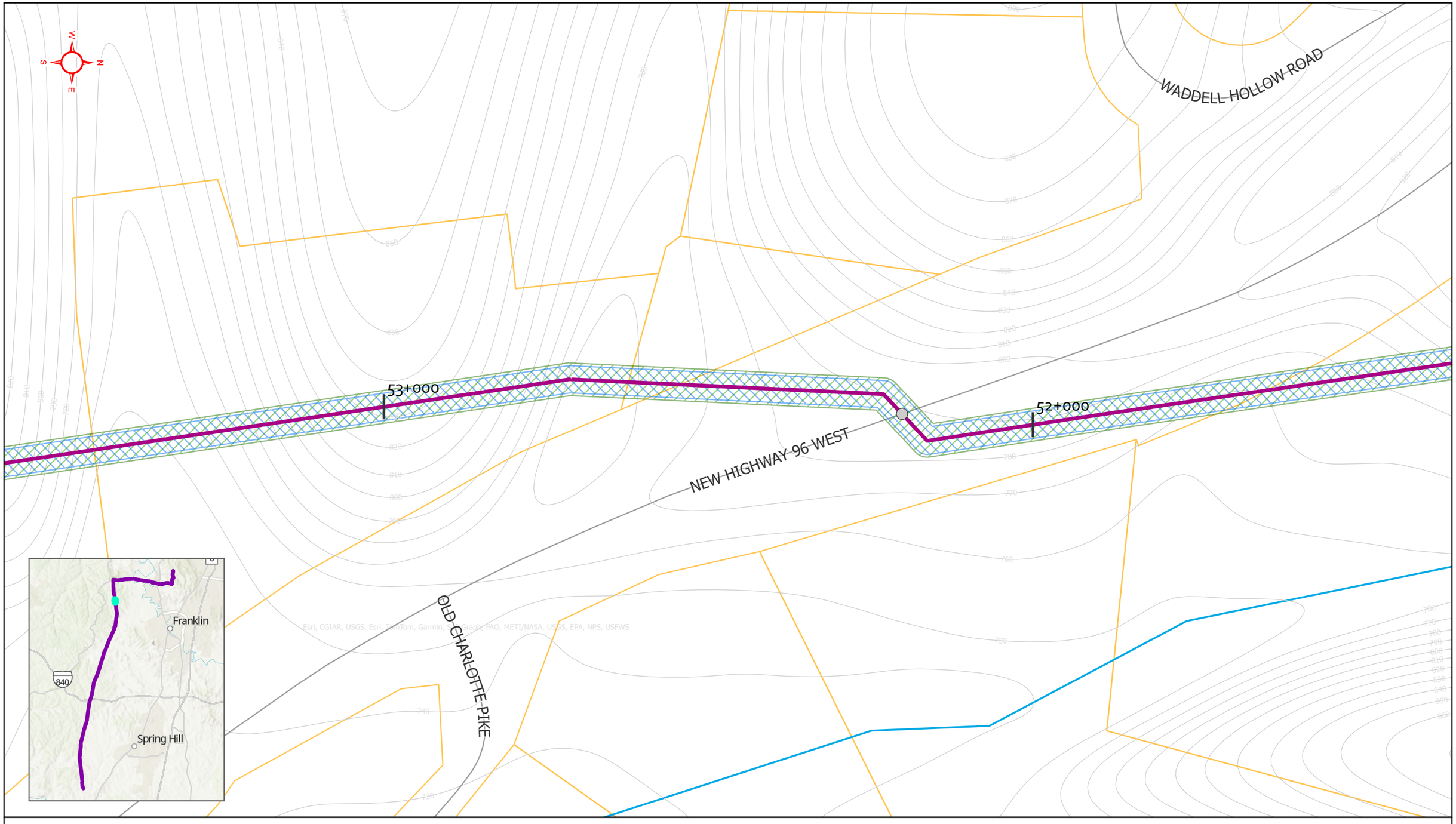
MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



MVUD Proposed Water Transmission



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

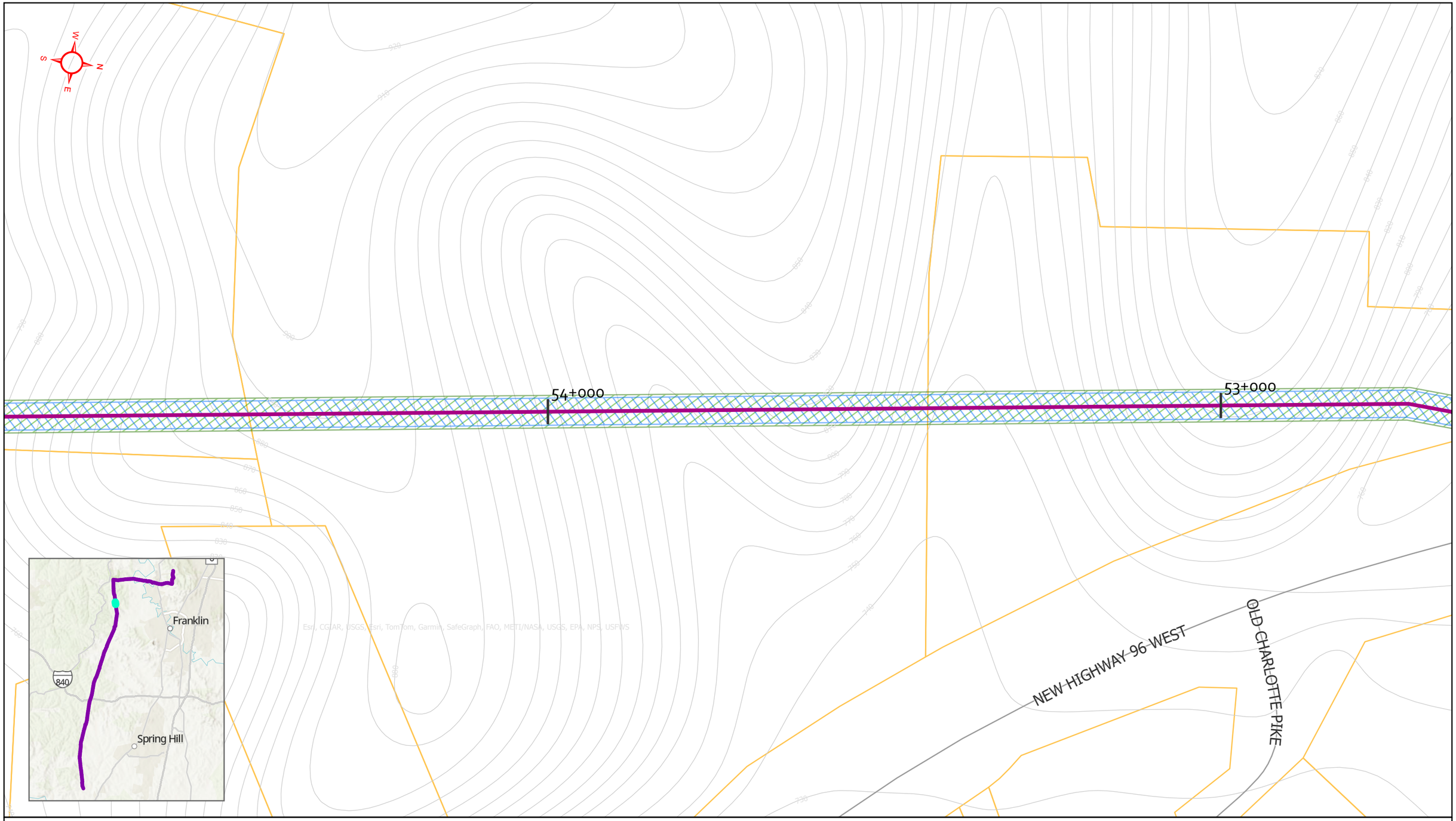
Feet

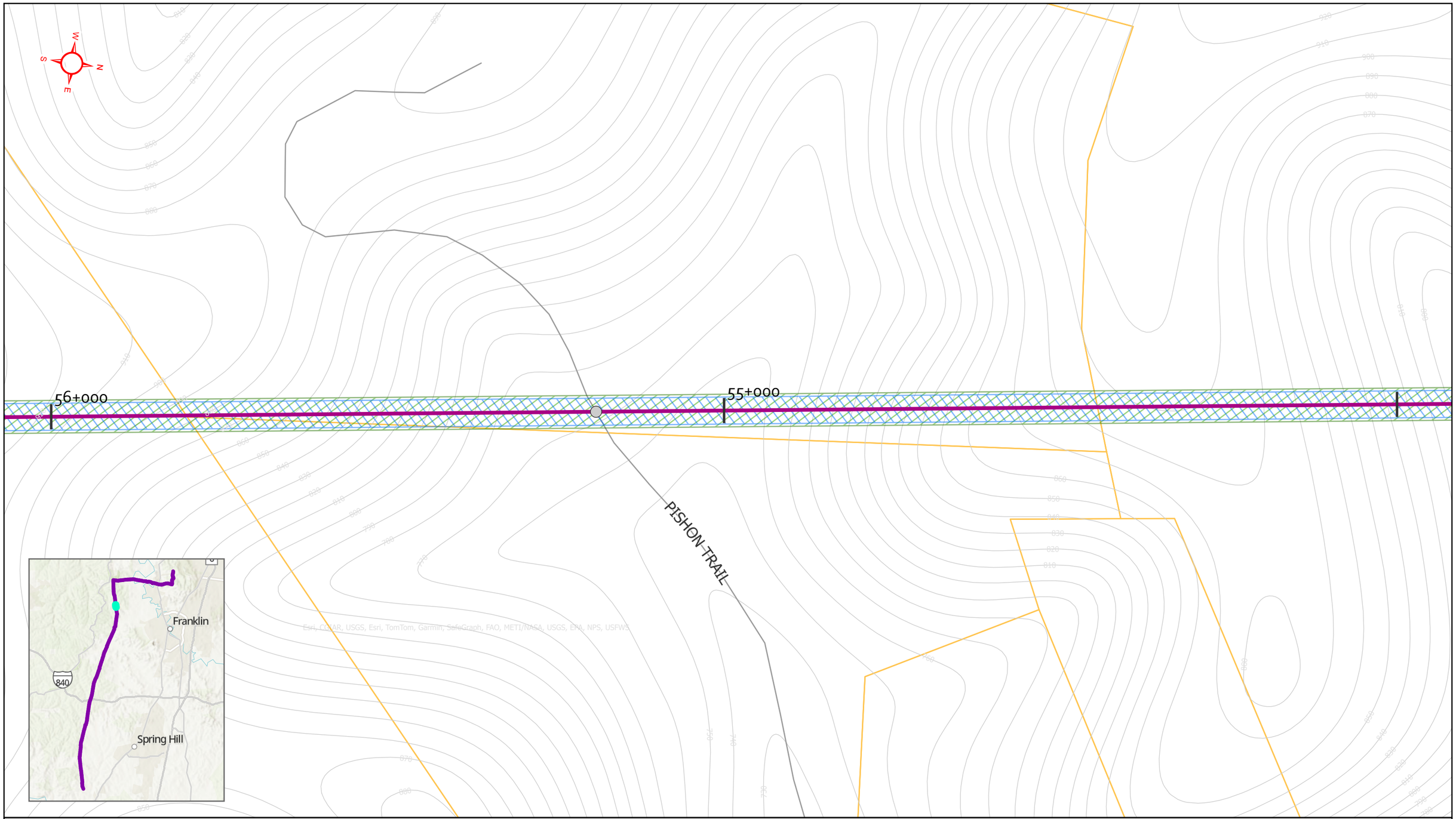
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


54+000
53+000
NEW HIGHWAY 96 WEST
OLD CHARLOTTE PIKE
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

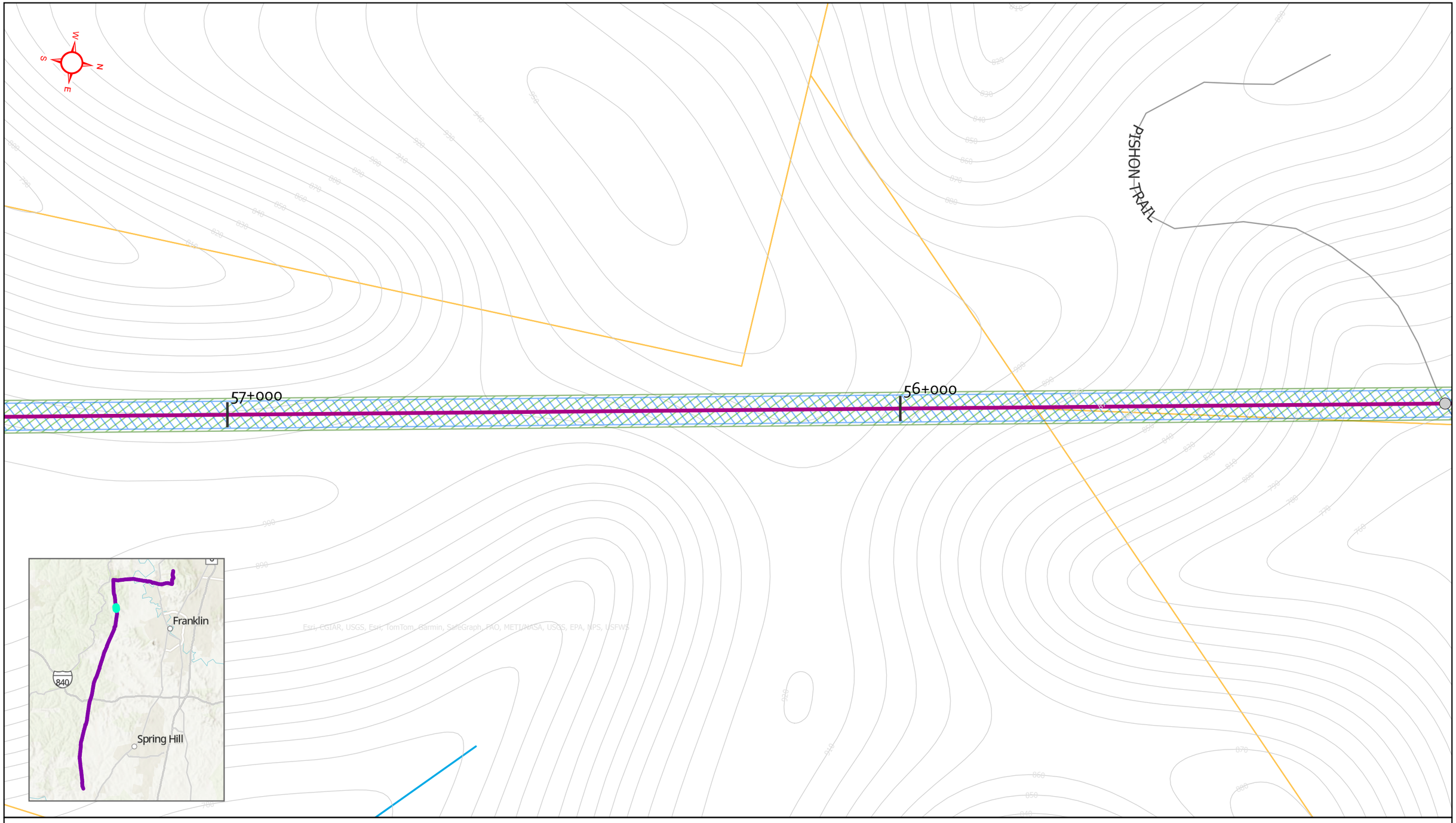
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

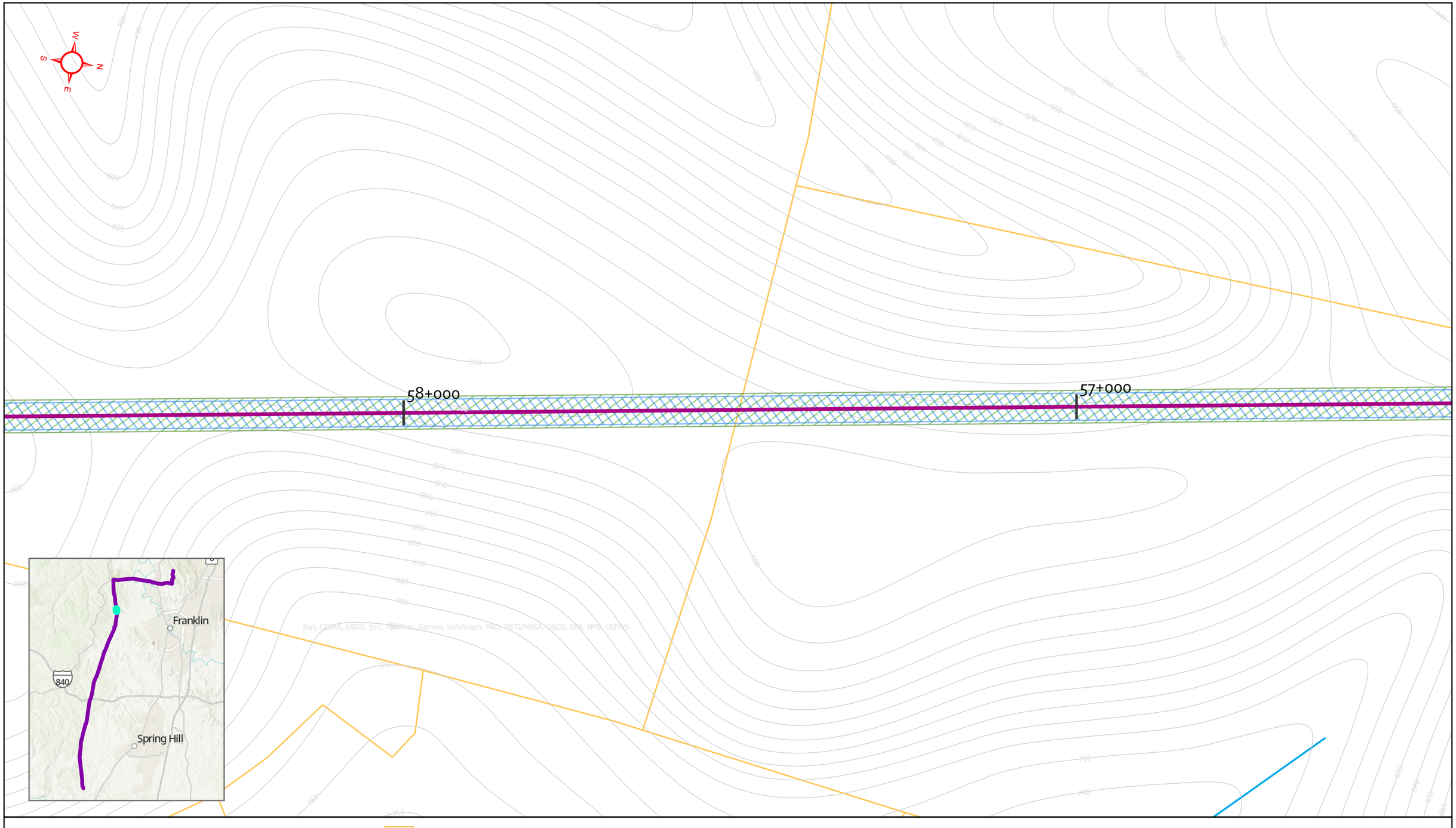
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

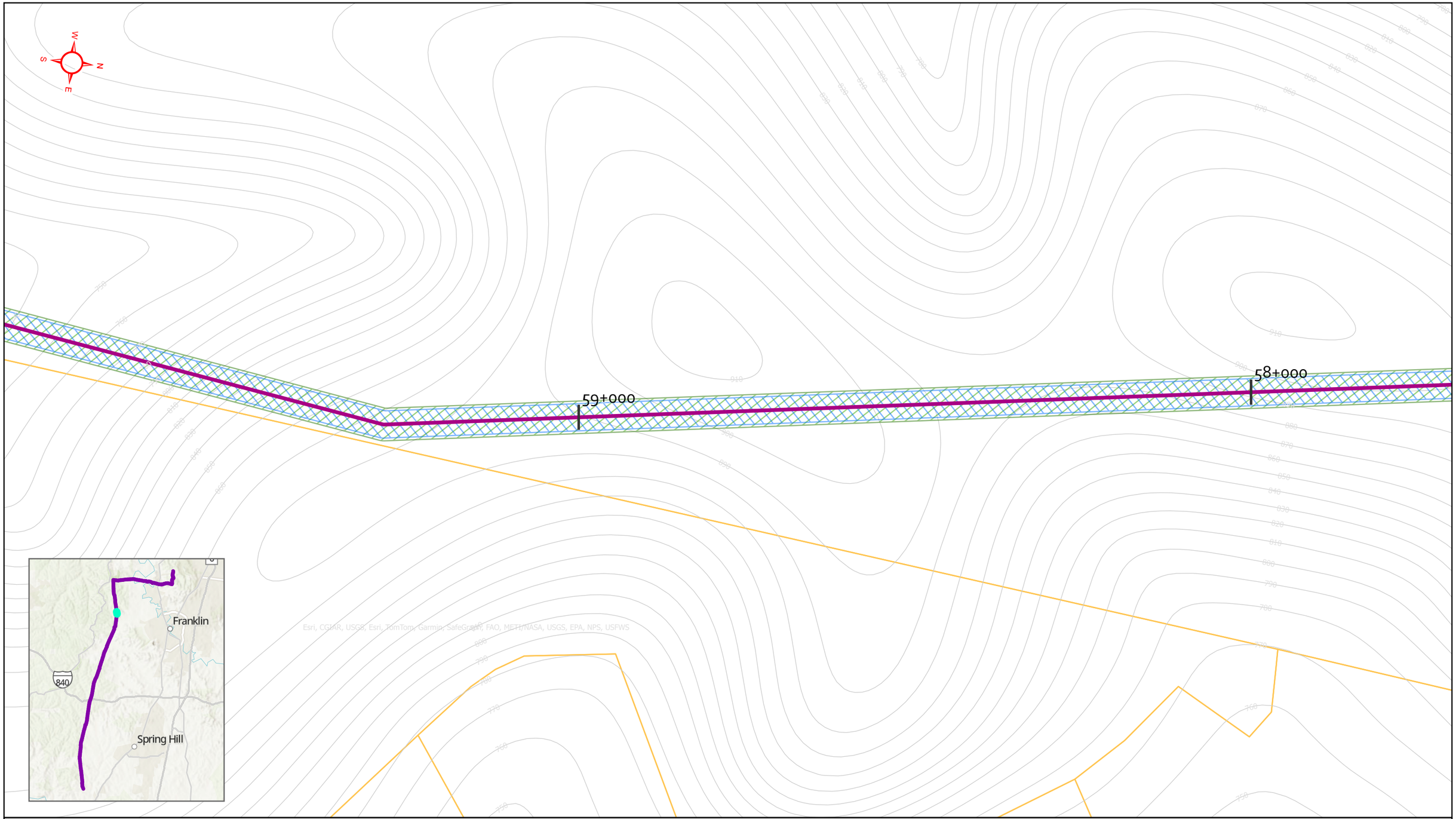
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

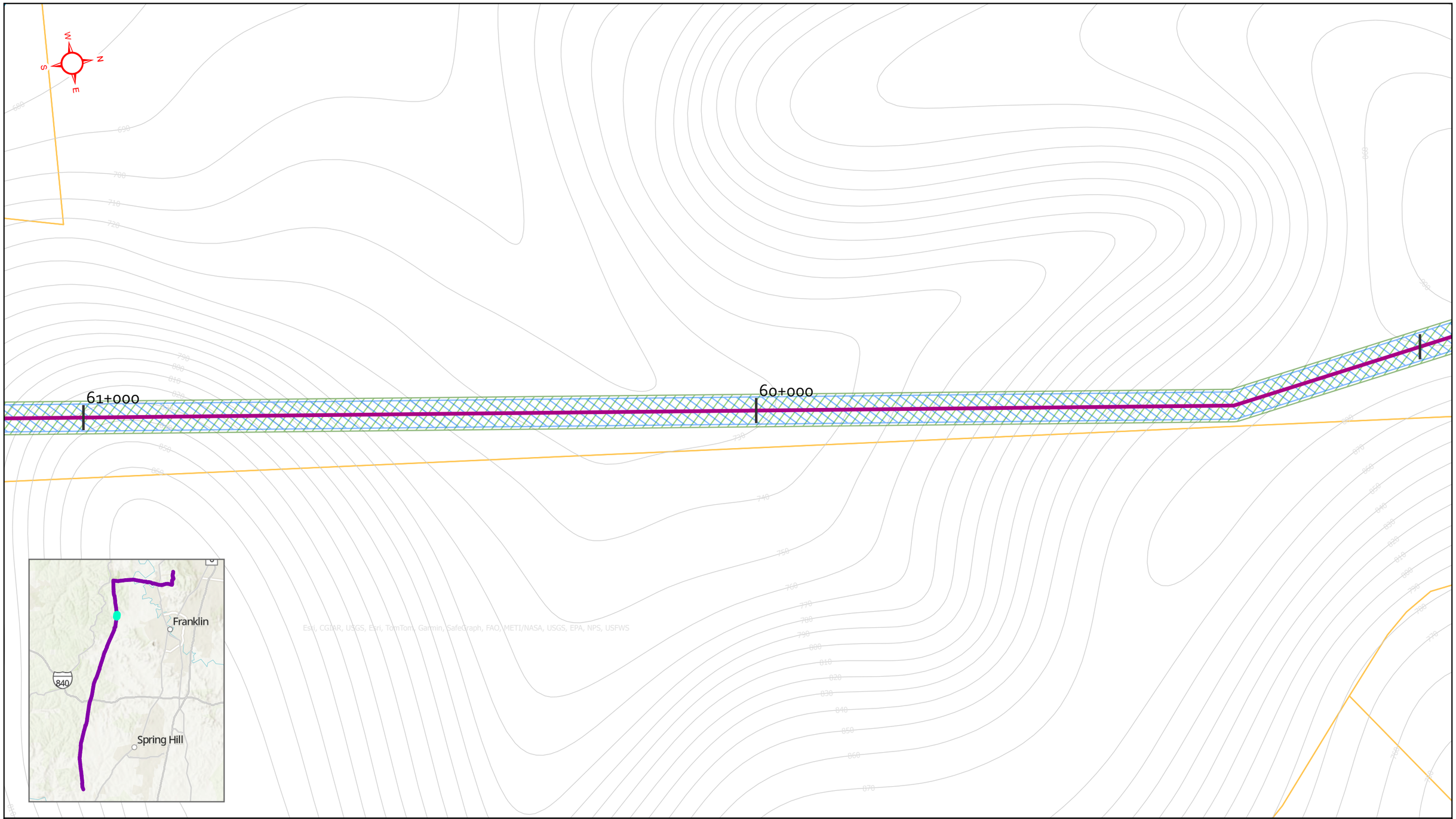
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

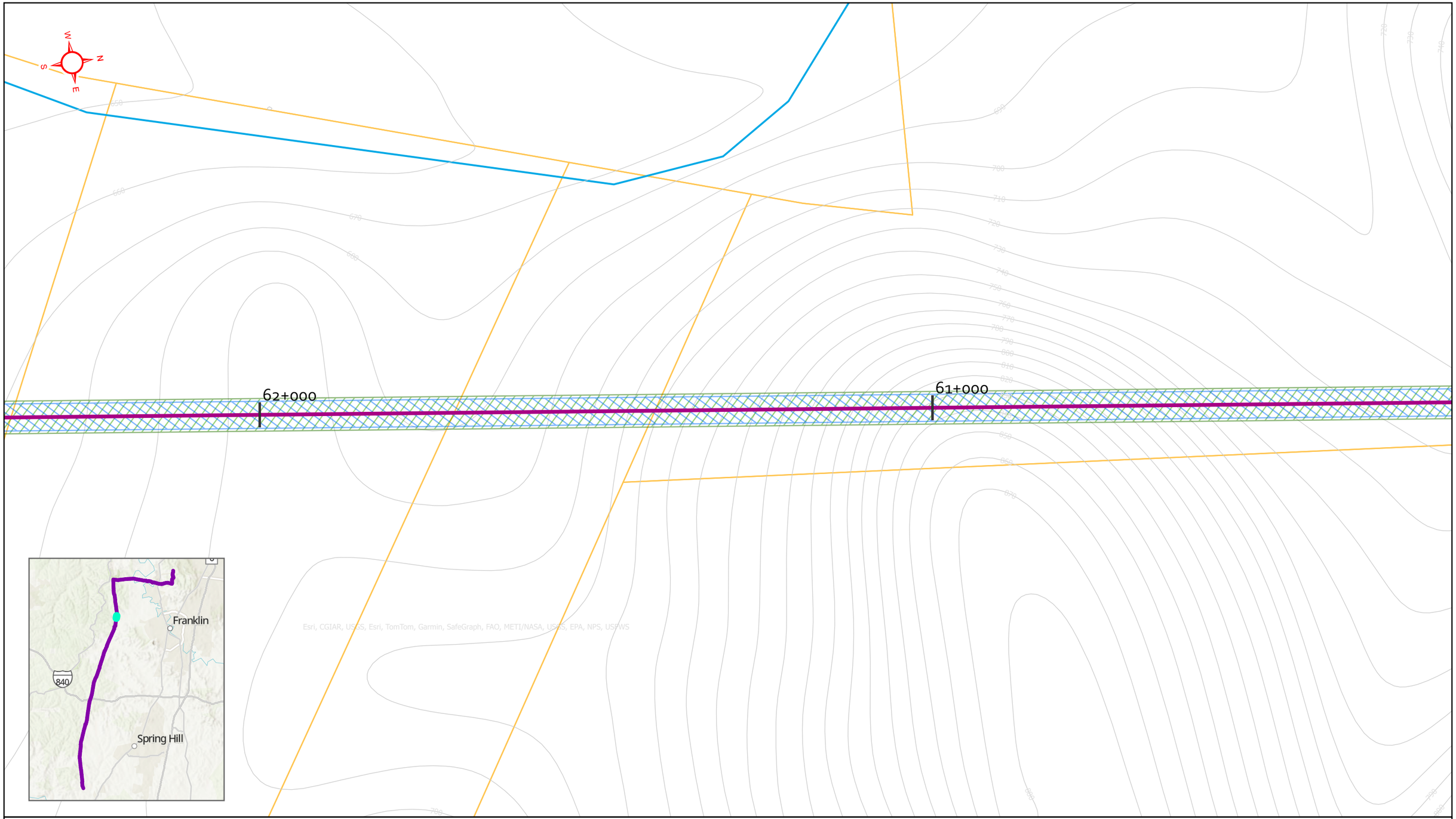
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

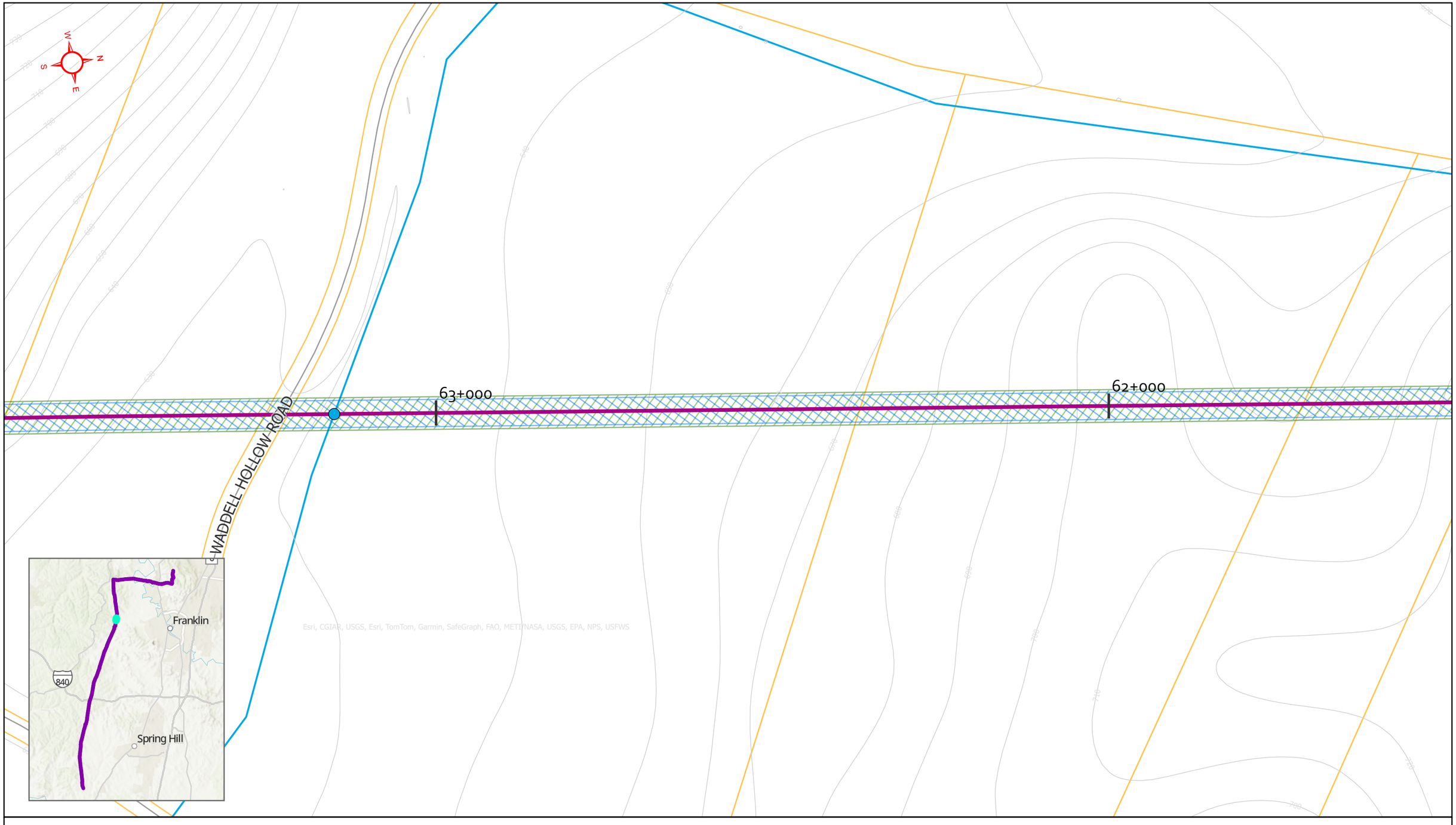
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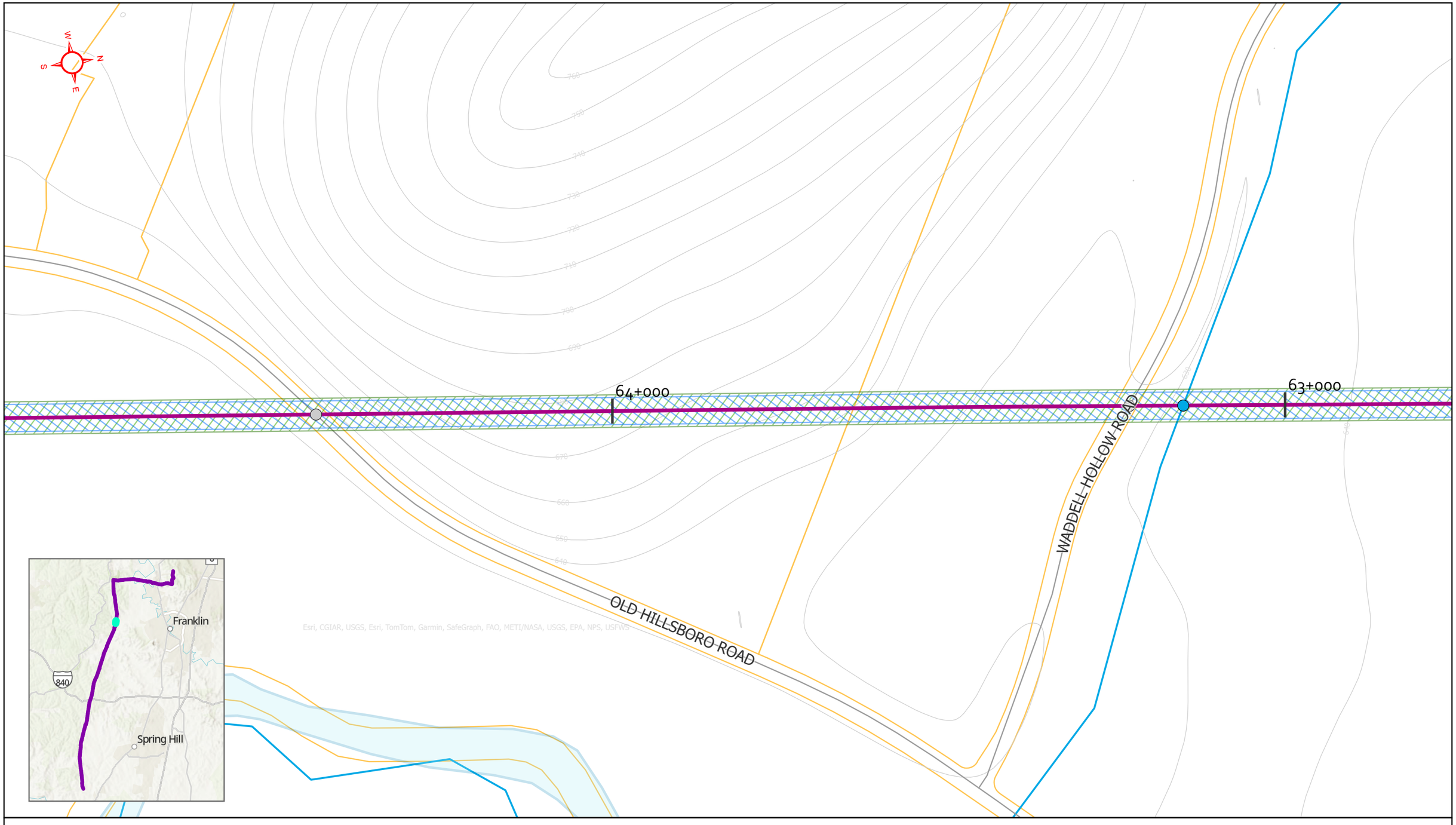
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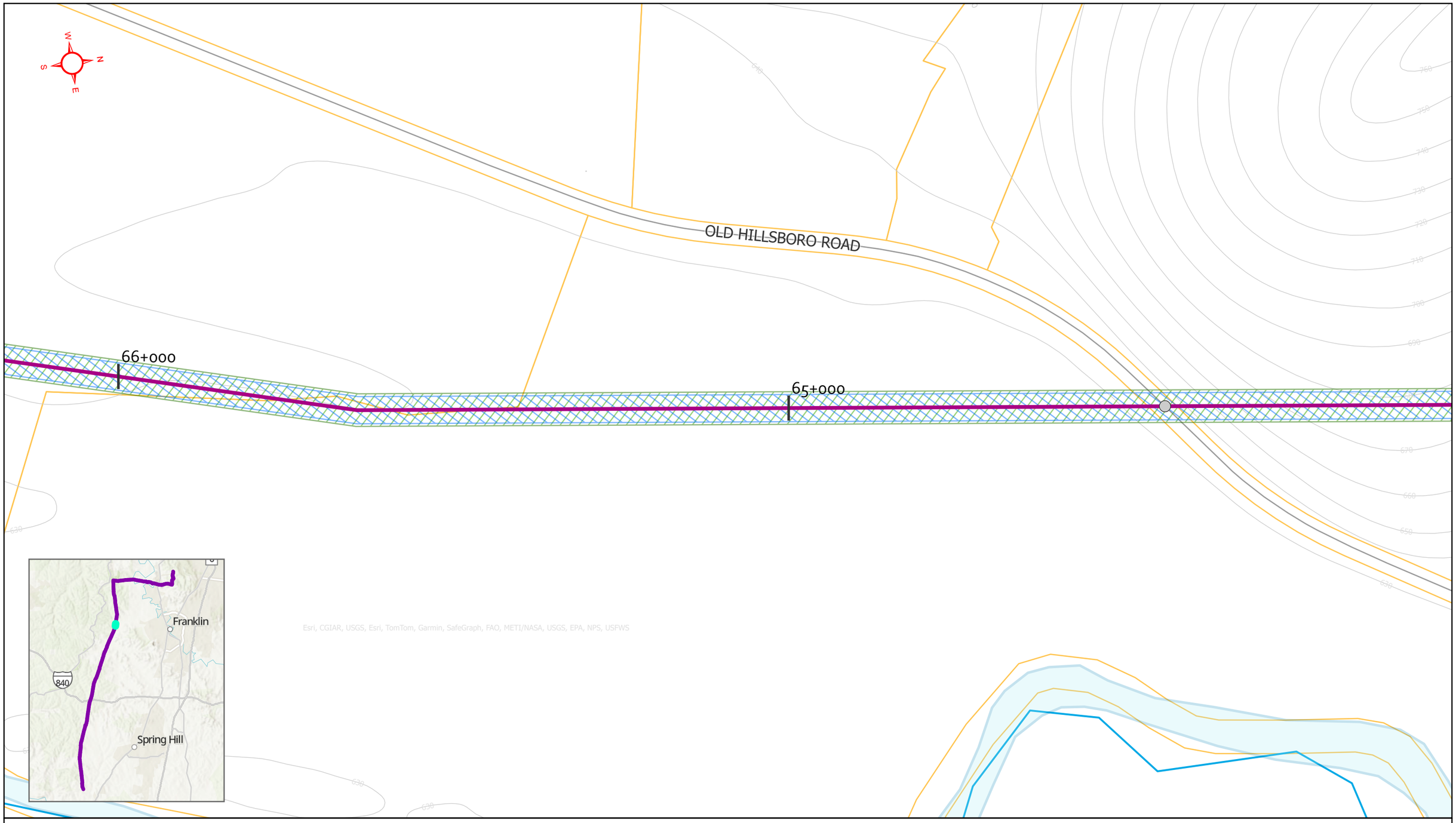
MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


W
N
S
E
63+000
62+000
WADDELL HOLLOW ROAD
Franklin
840
Spring Hill
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT


W
N
S
E
64+000
63+000
OLD HILLSBORO ROAD
WADDELL HOLLOW ROAD
Franklin
840
Spring Hill
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
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200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

OLD HILLSBORO ROAD

BOYD MILL PIKE

67+000

66+000

Franklin

840

Spring Hill

Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

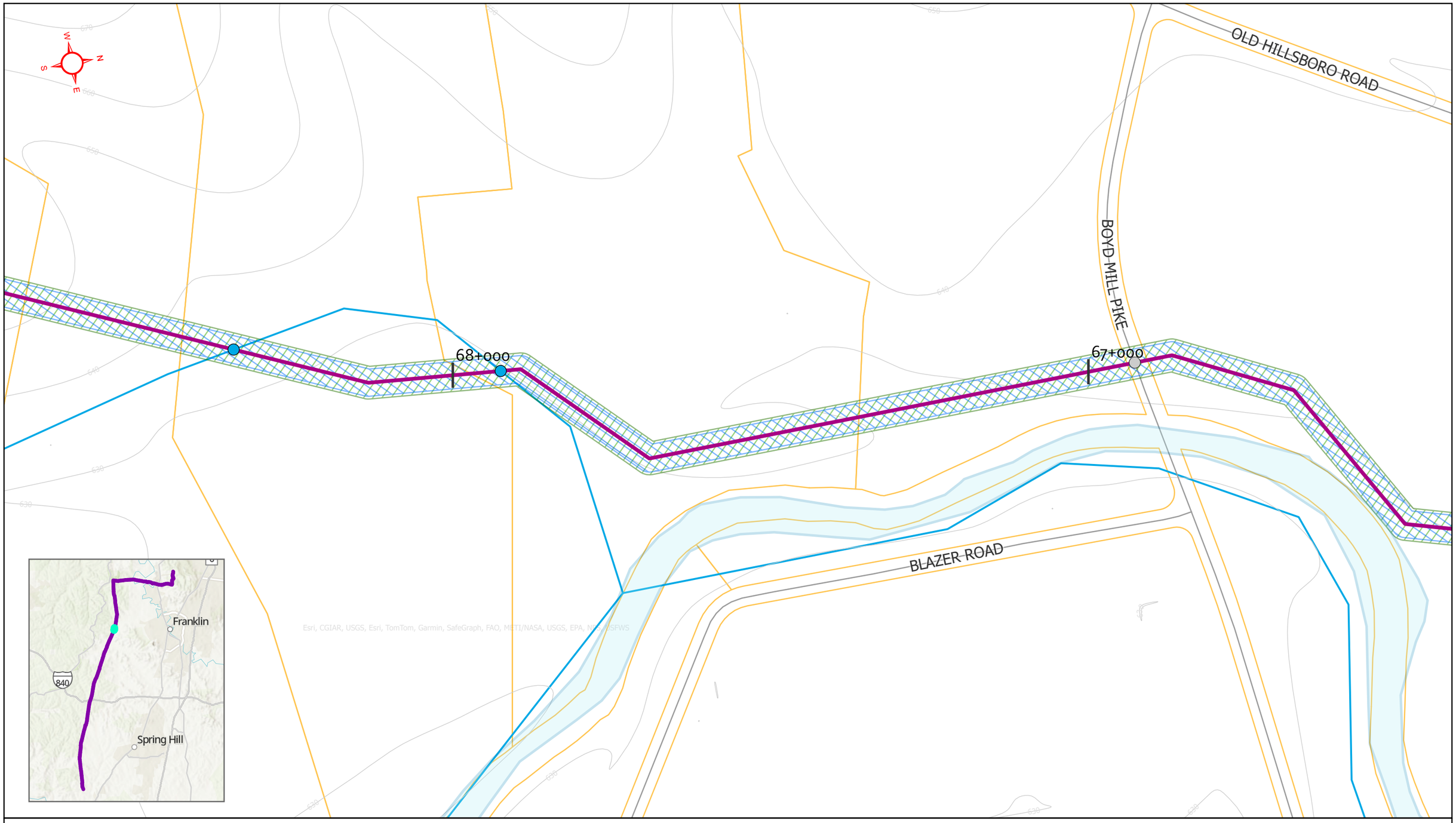
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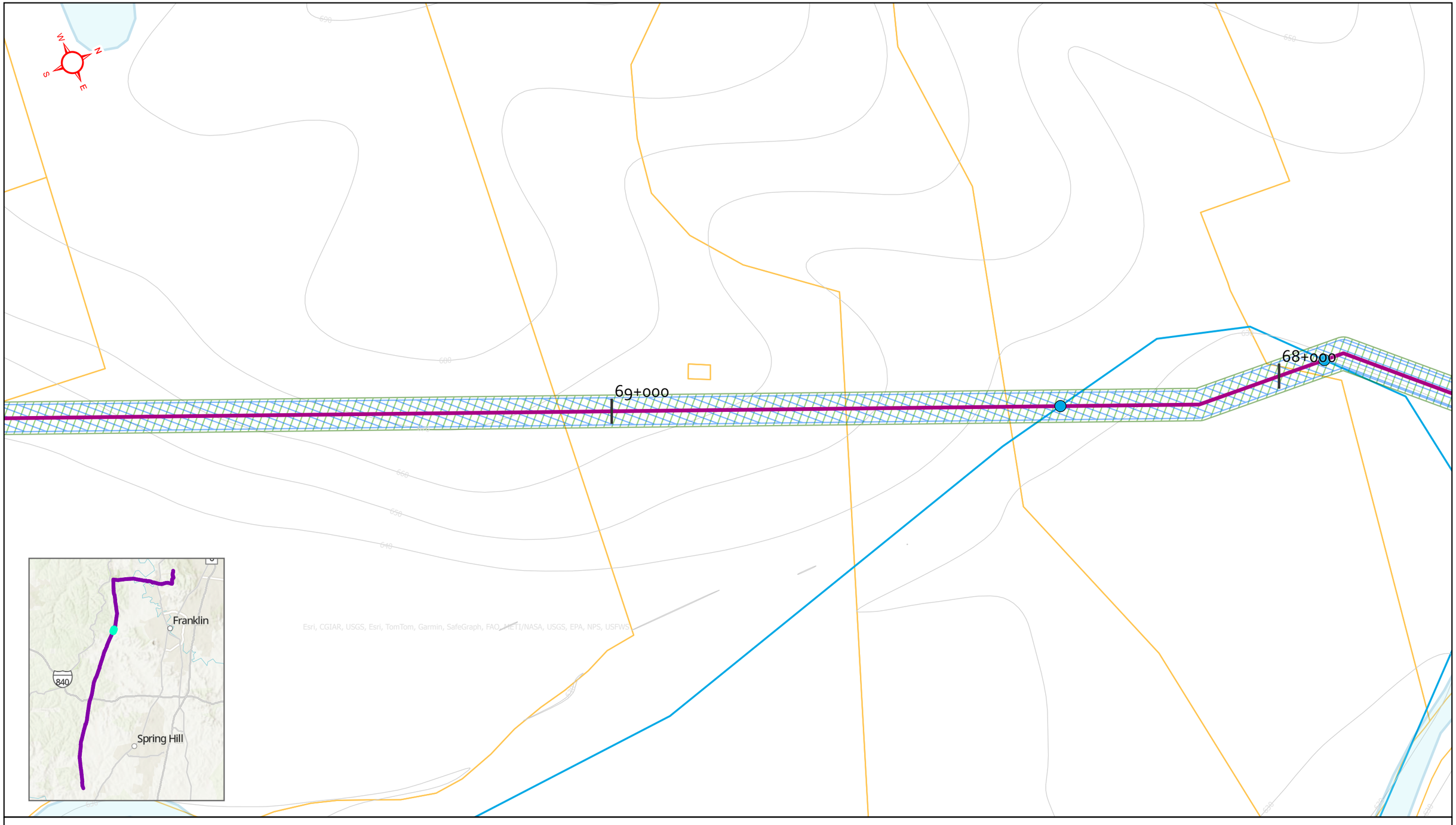
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


OLD HILLSBORO ROAD
BOYD MILL PIKE
BLAZER ROAD
68+000
67+000
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

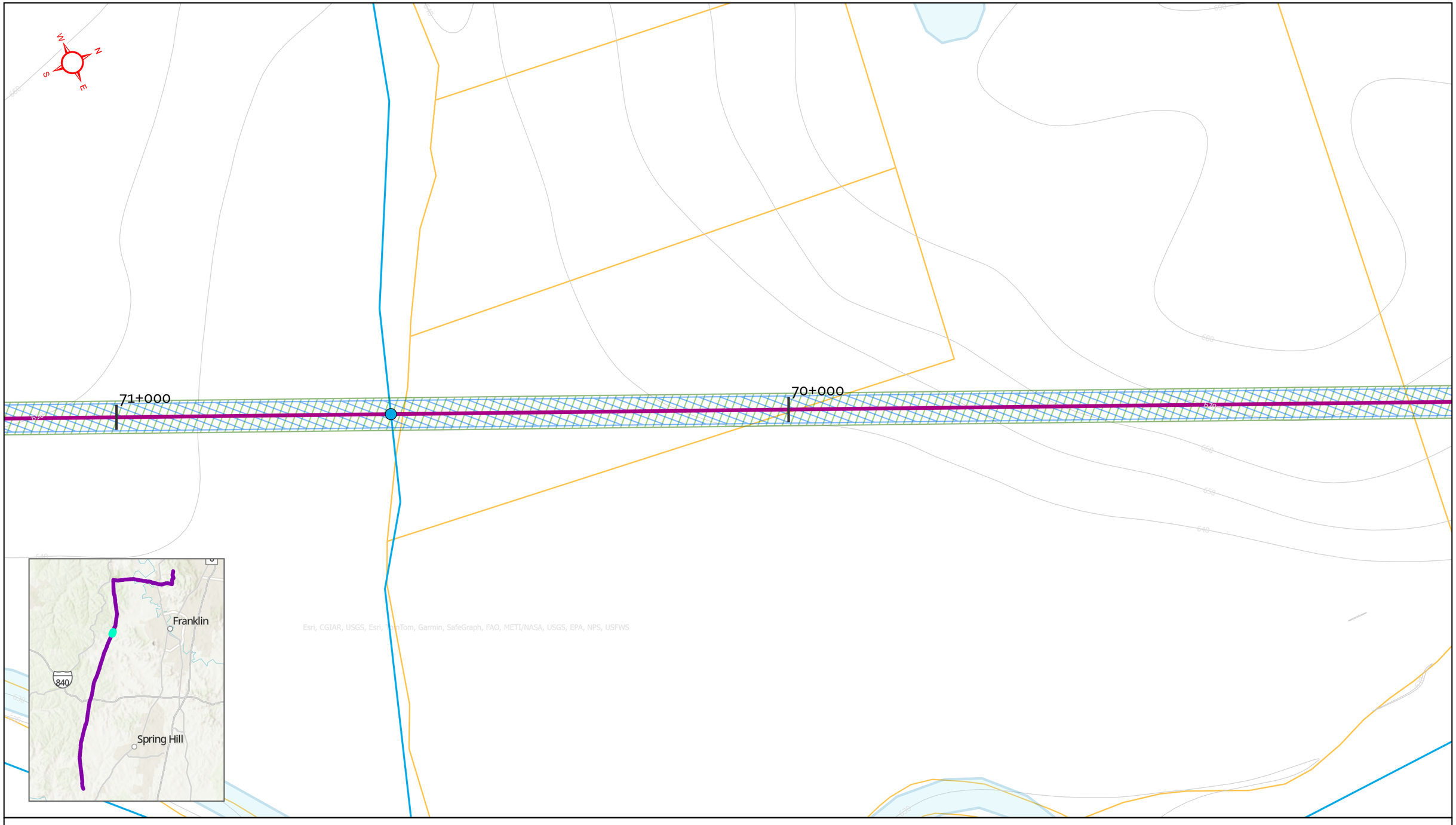
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

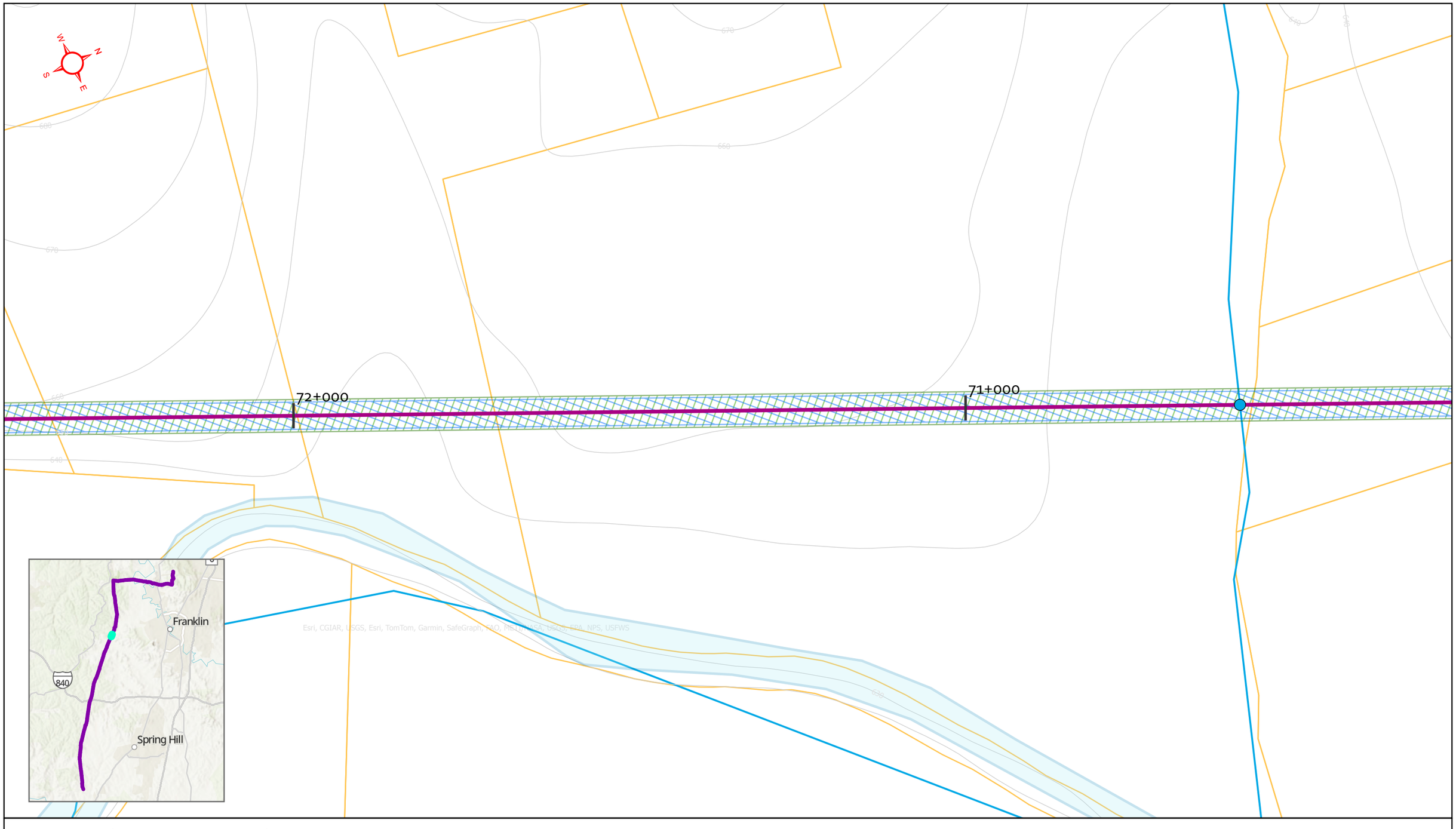
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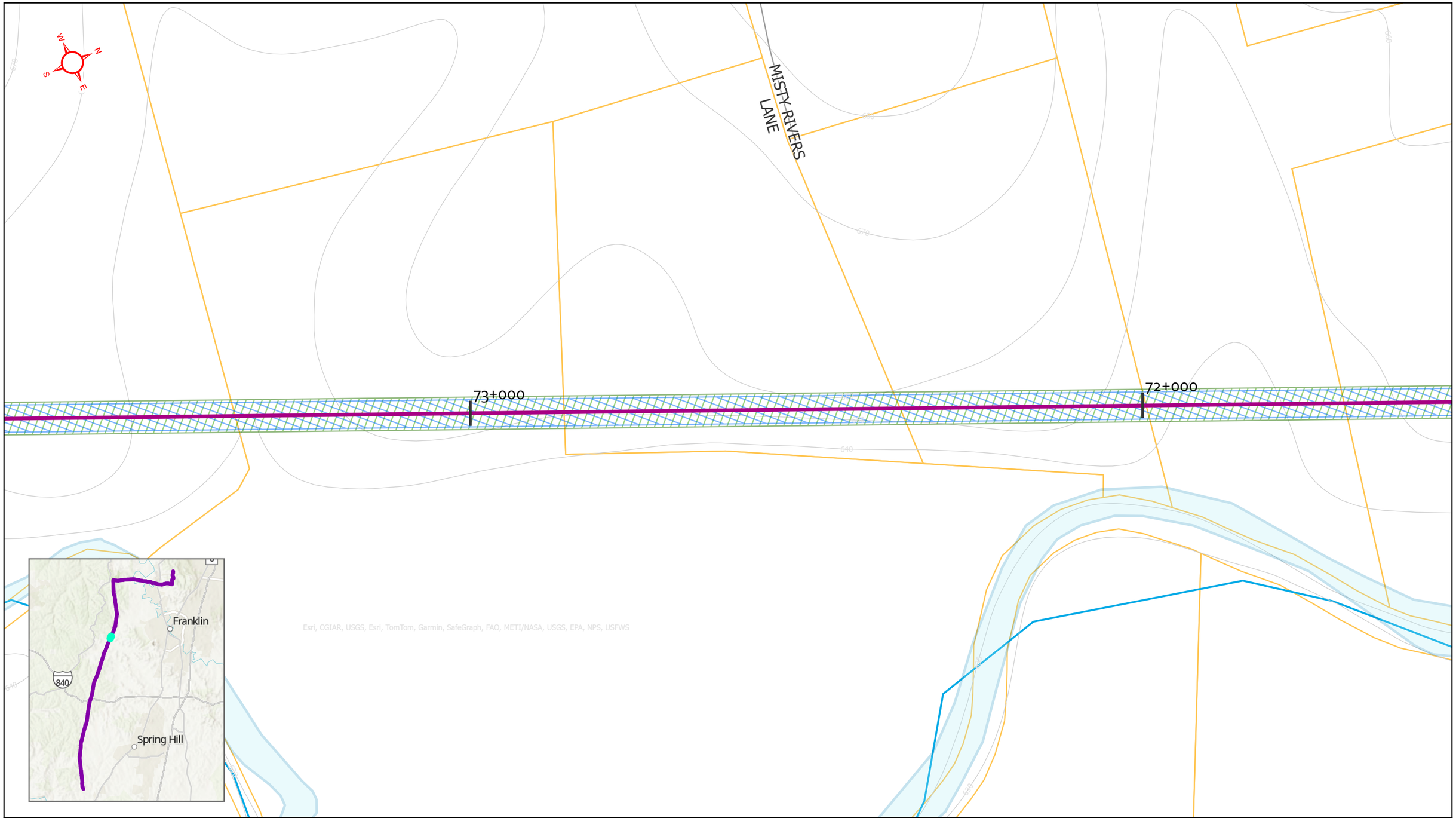
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


N
S
E
W
72+000
71+000
660
670
680
640
650
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Franklin
Spring Hill
840
Proposed Water Transmission
Stream Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

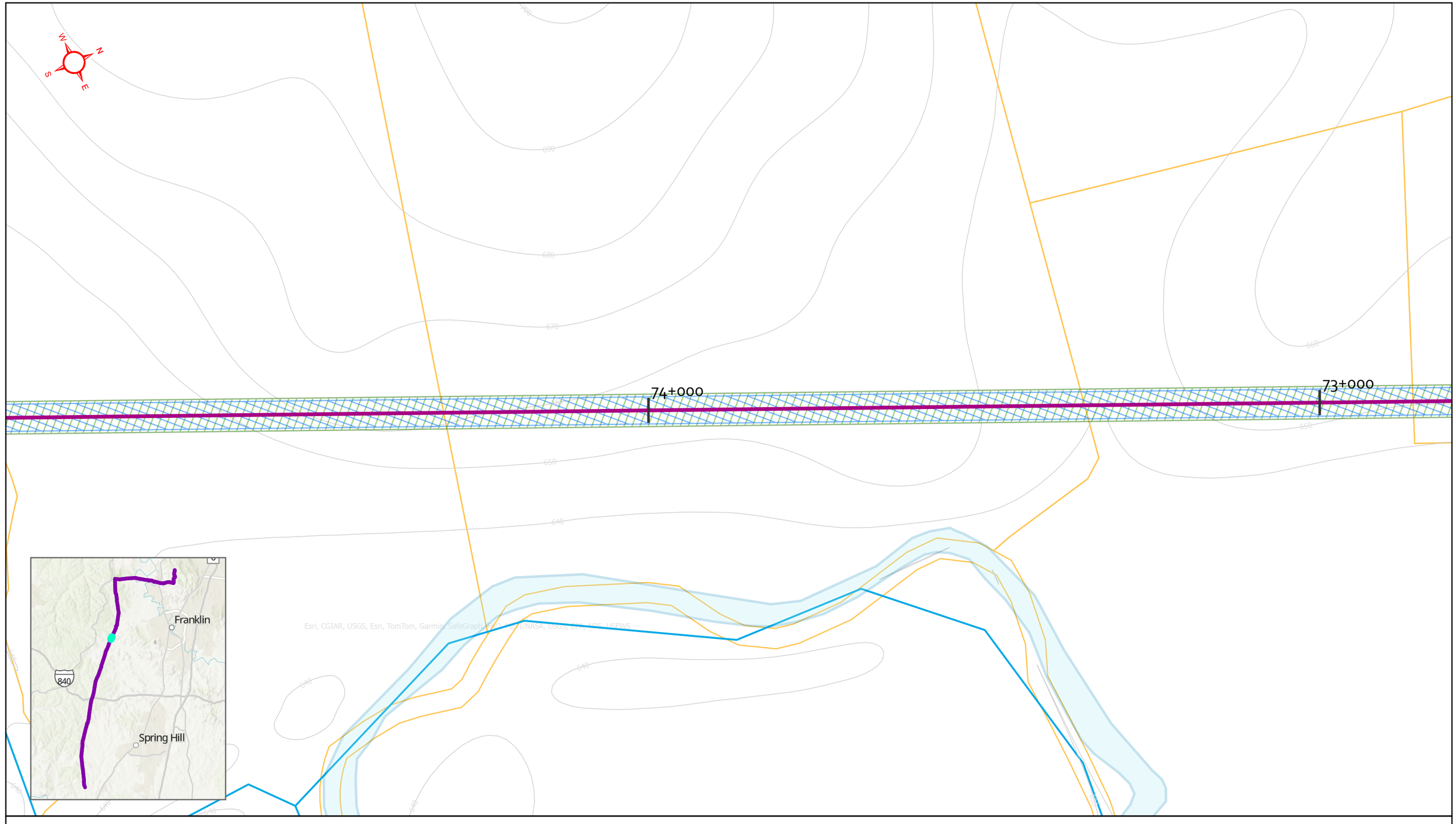
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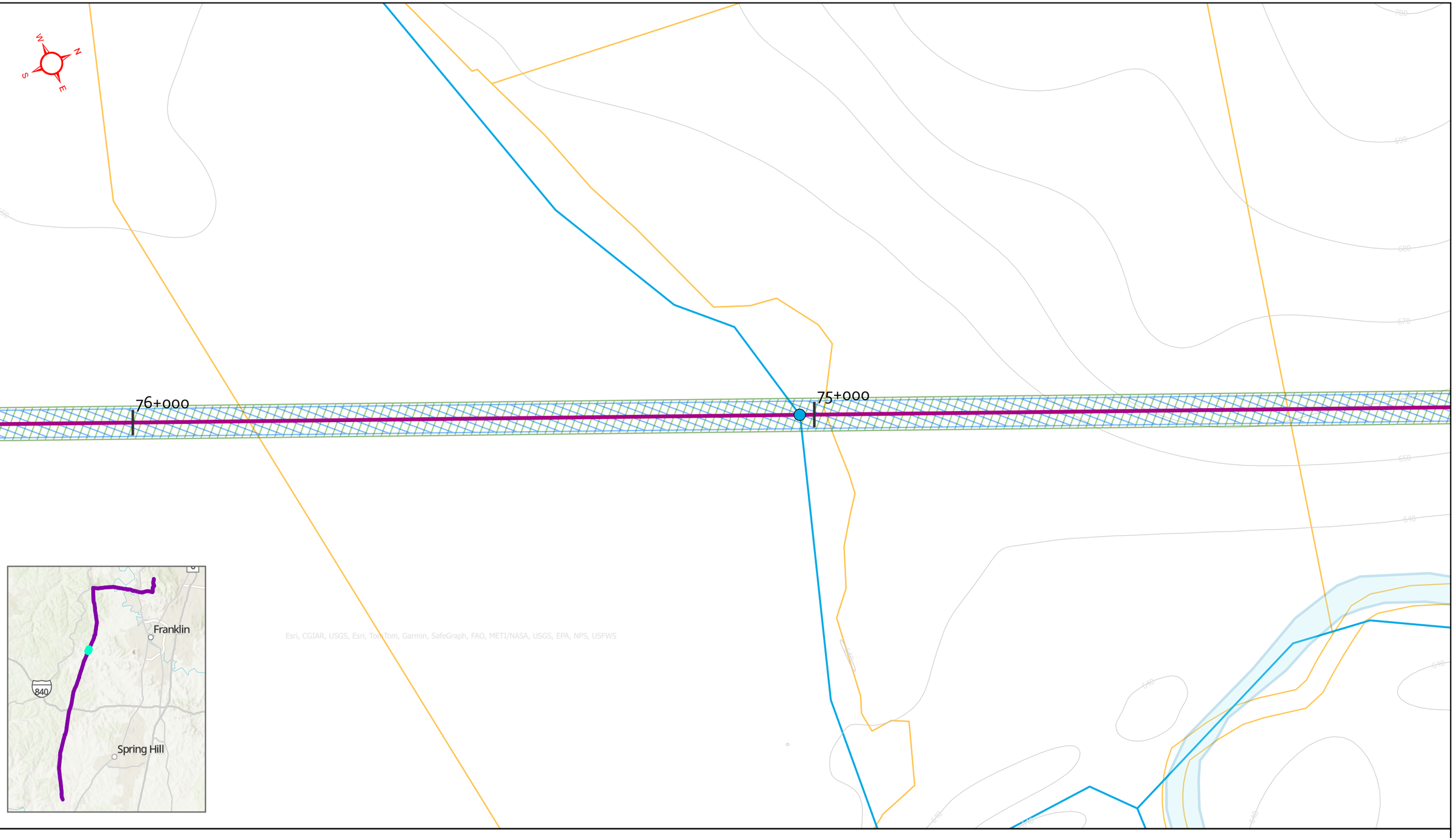
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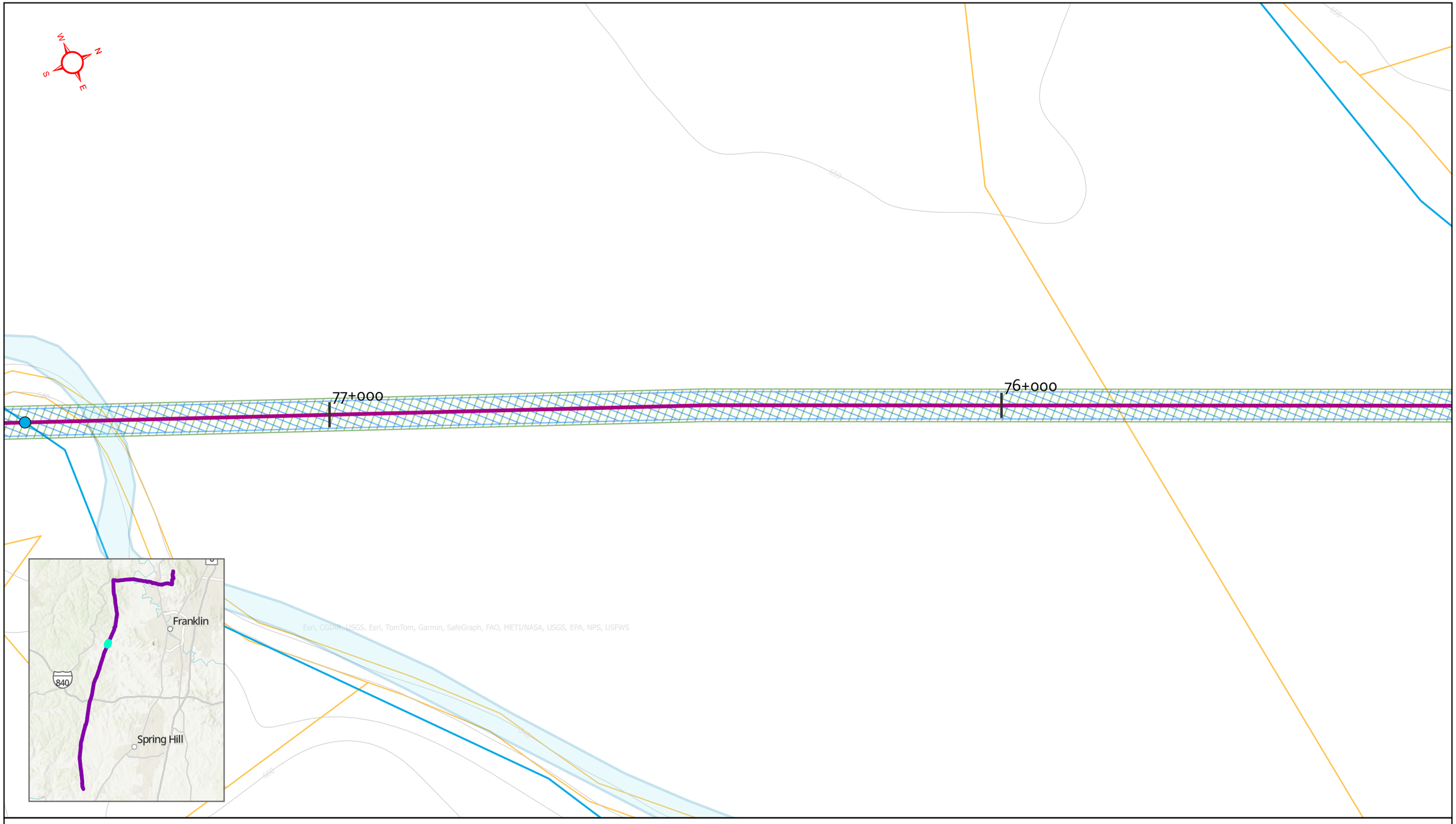
MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


N
S
E
W
74+000
73+000
680
670
660
650
640
630
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Franklin
Spring Hill
840
Proposed Water Transmission
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
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200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT


N
S
E
W
76+000
75+000
Franklin
840
Spring Hill
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Stream Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

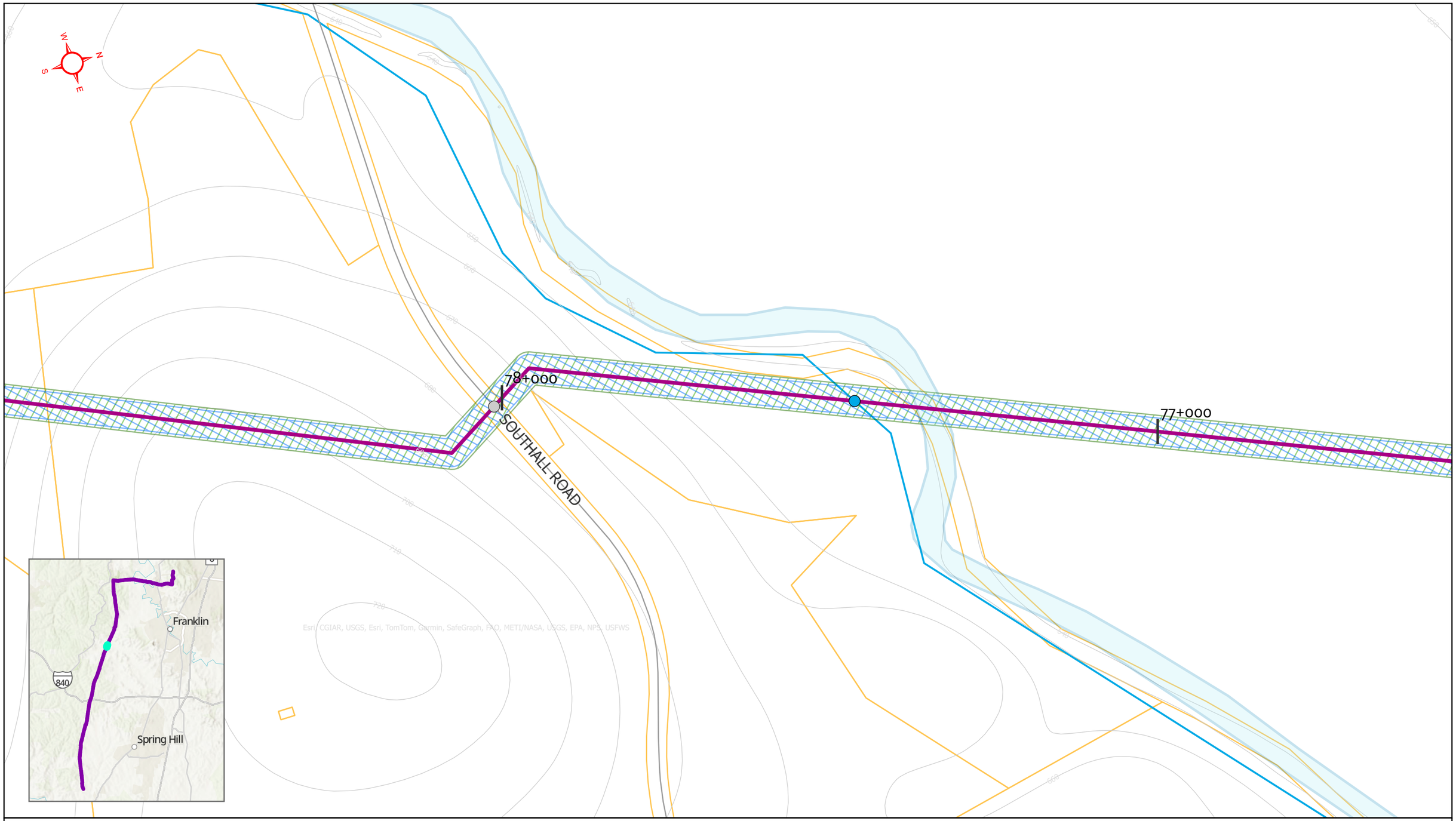
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

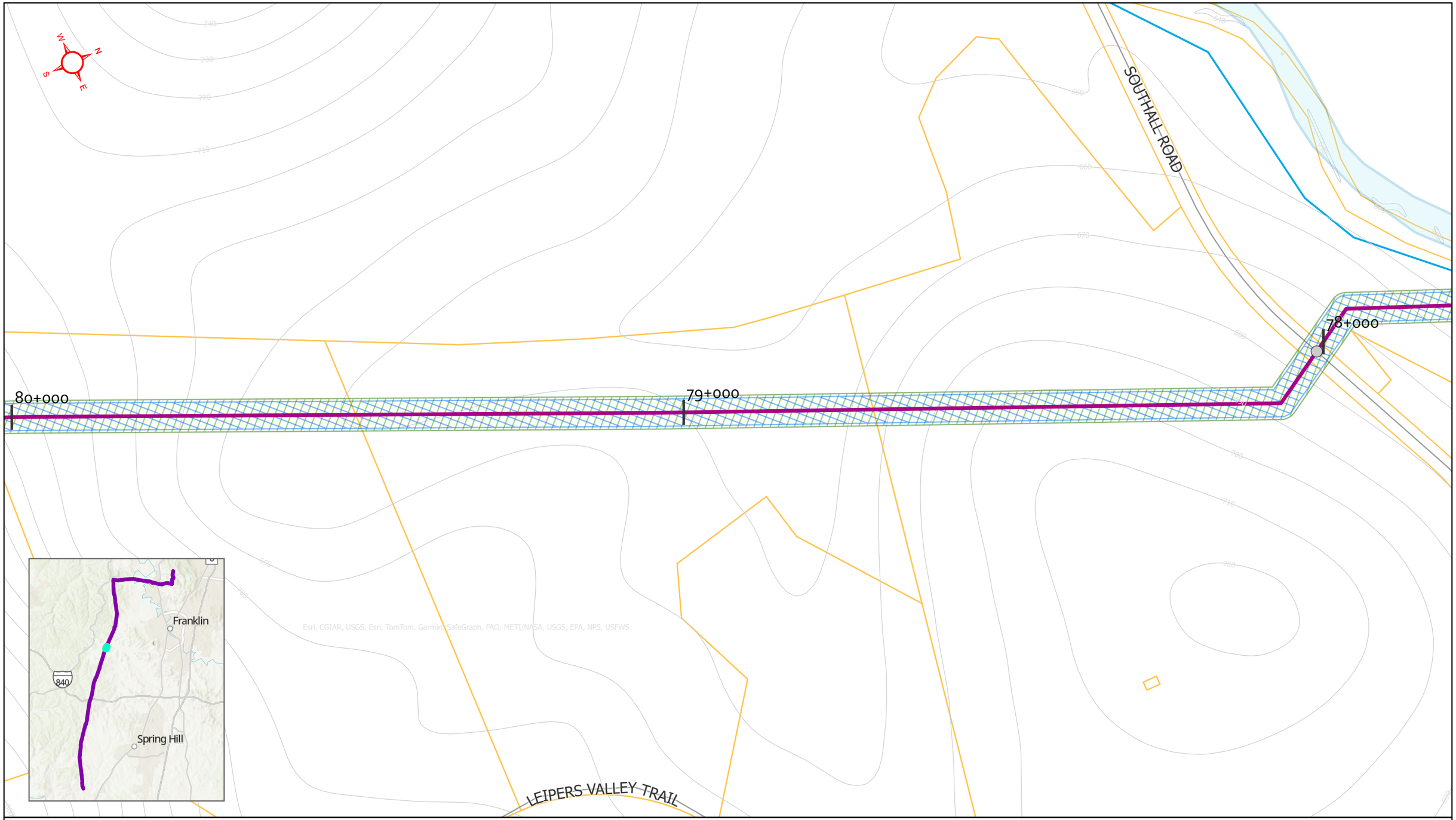


Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easement
Double Transmission Line Easement
Streams
Parcels

Feet
0 200 400 600

MVUD Proposed Water Transmission

Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

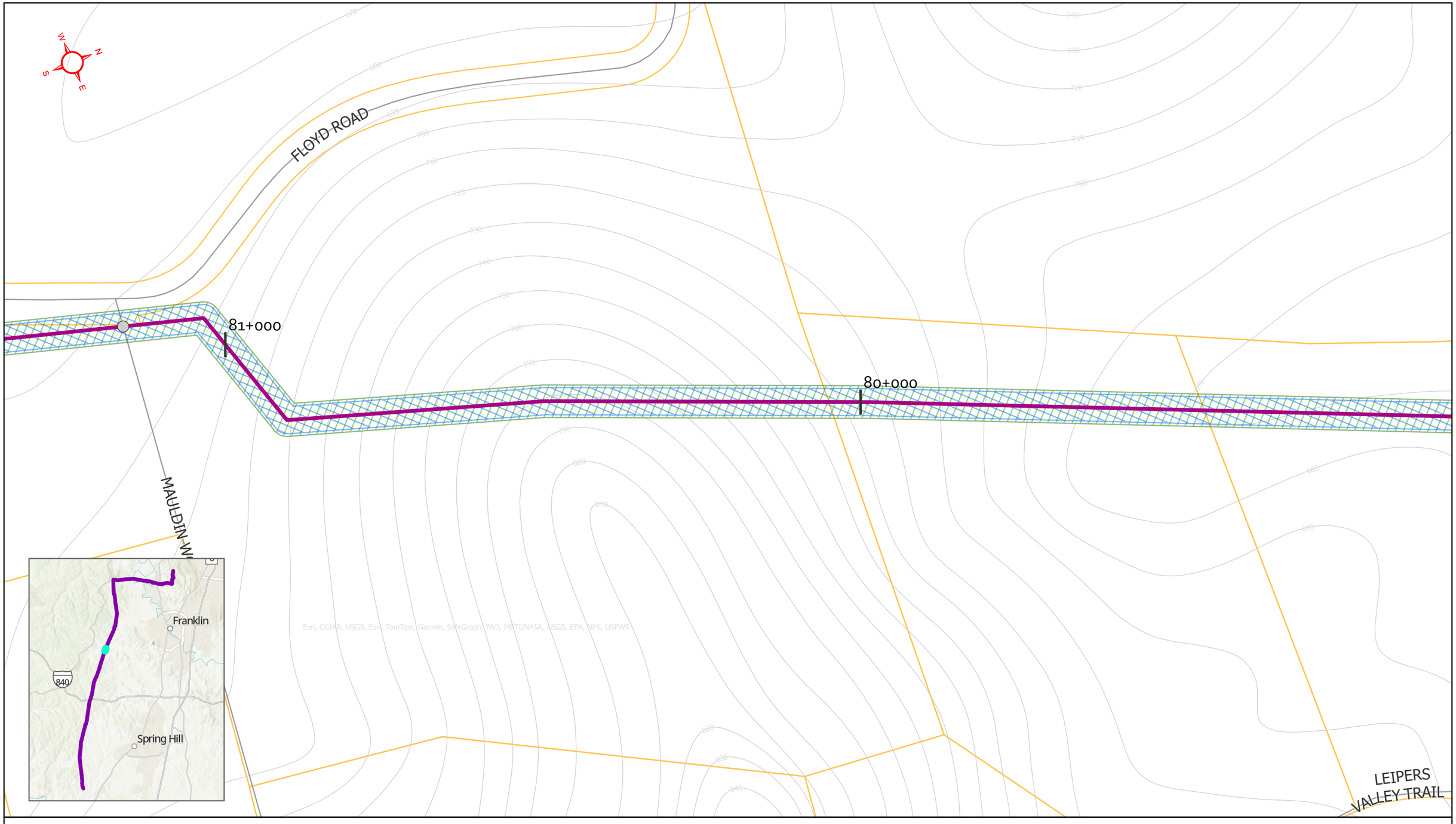
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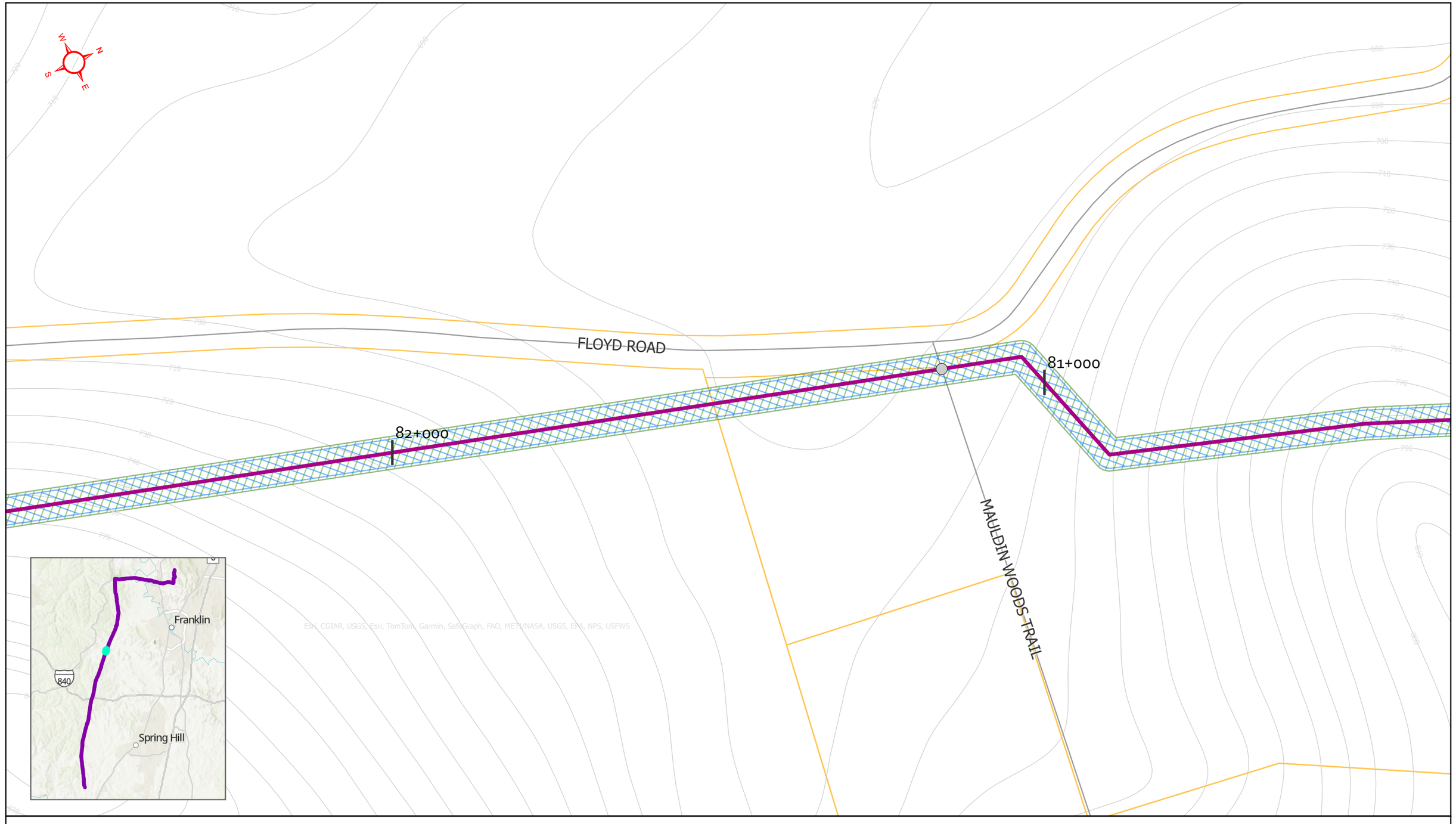
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


FLOYD ROAD
81+000
80+000
MAULDIN-W
LEIPERS VALLEY TRAIL
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
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600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

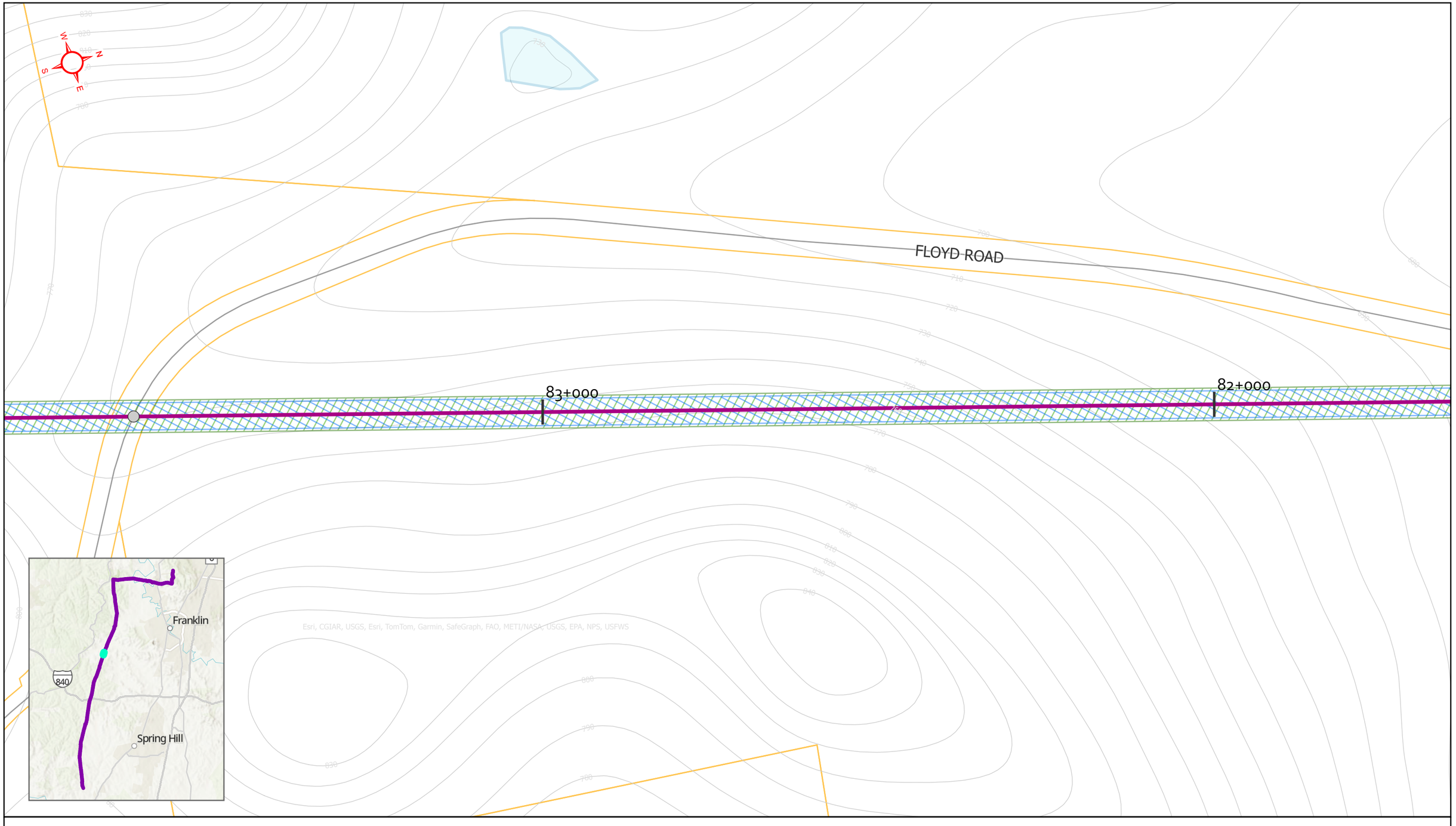
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

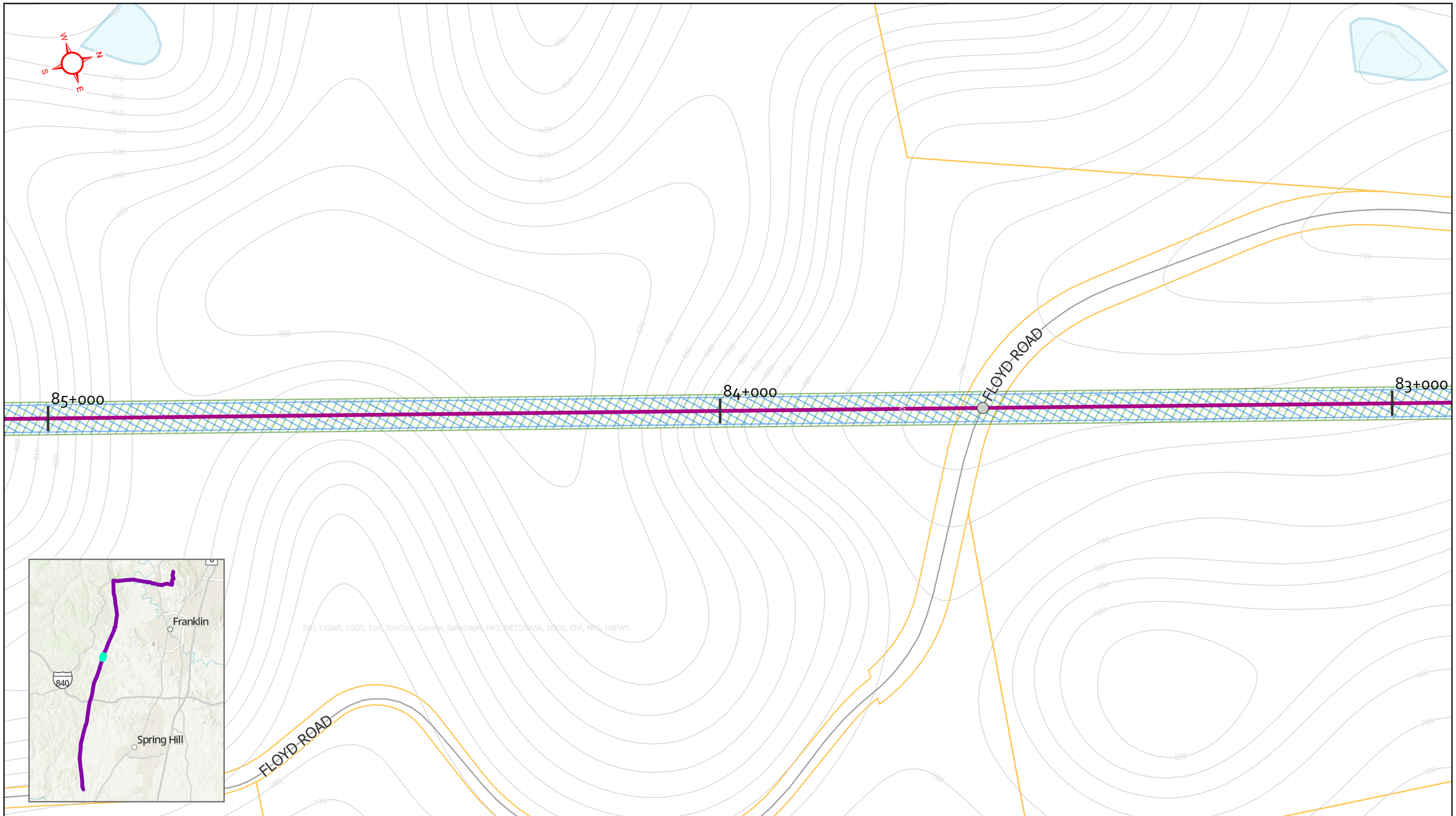
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

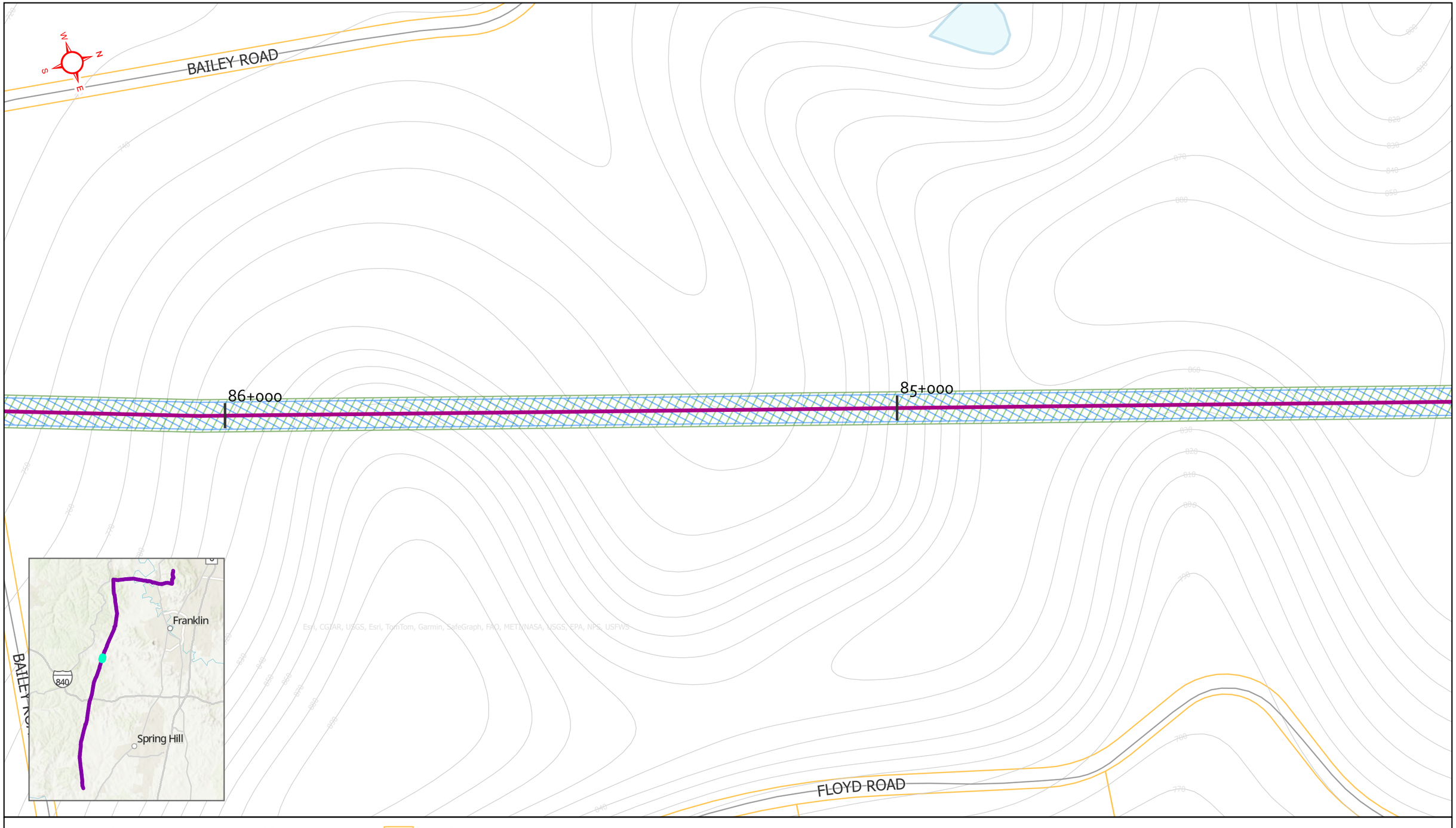
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

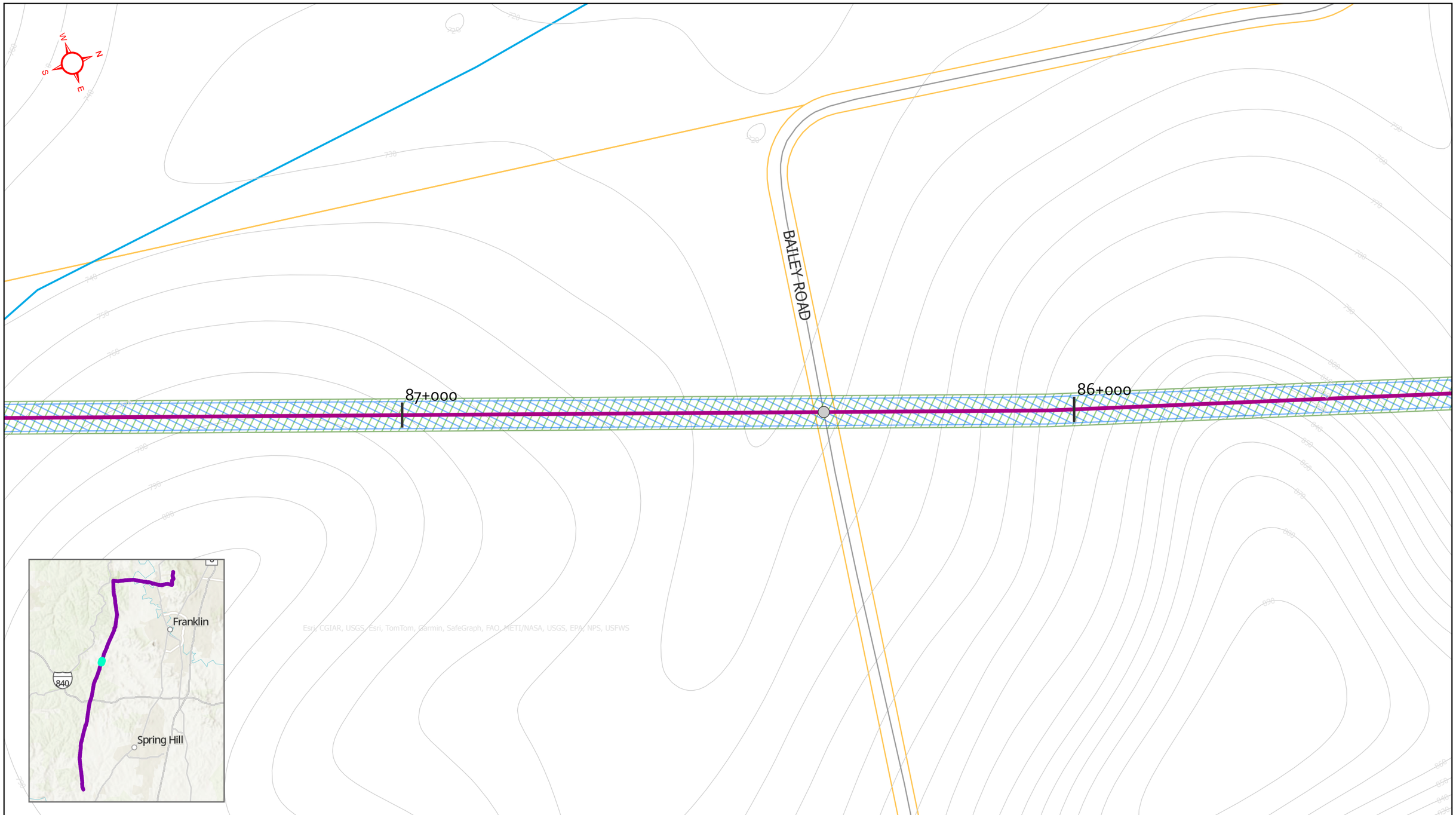
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

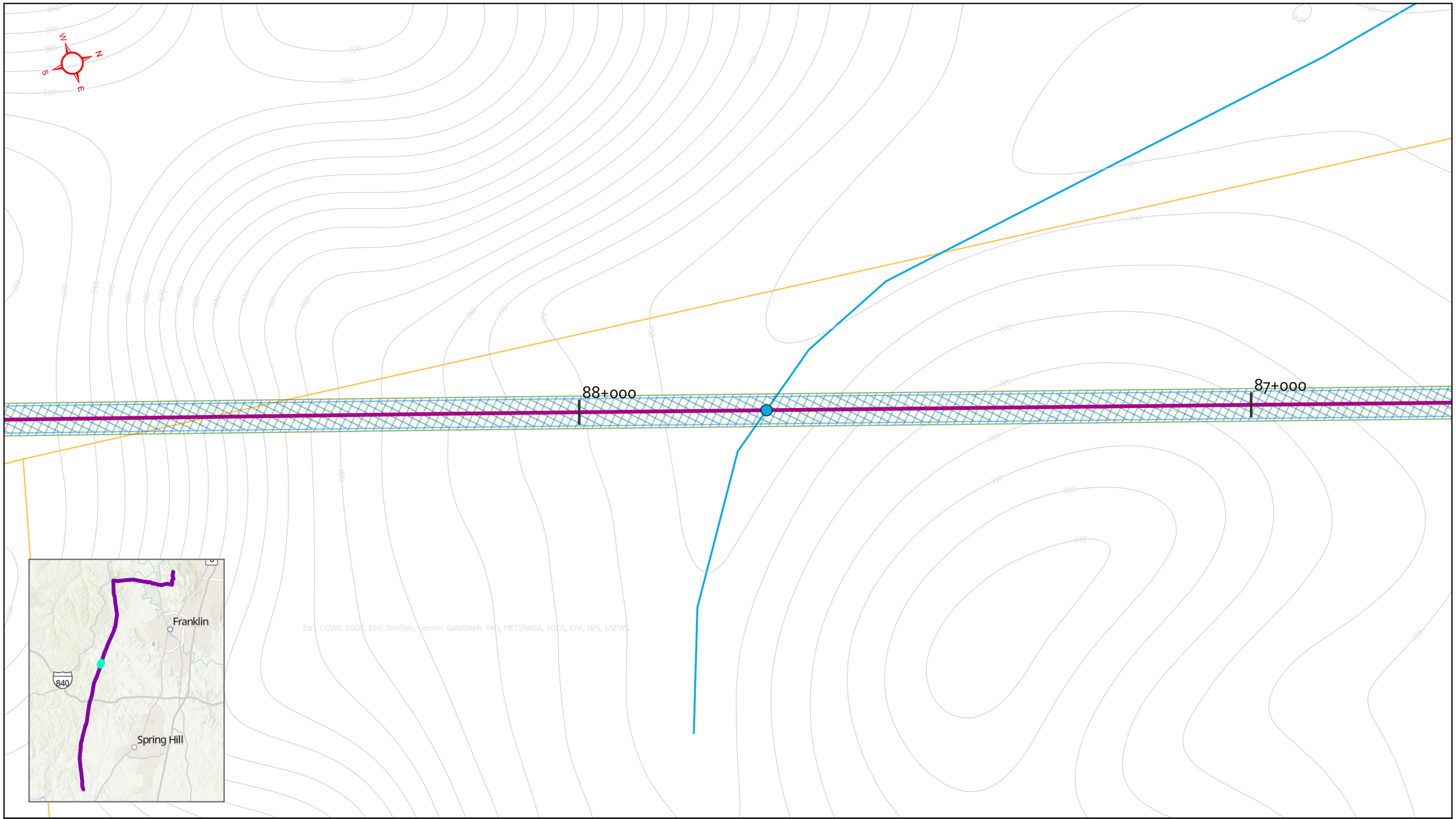
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

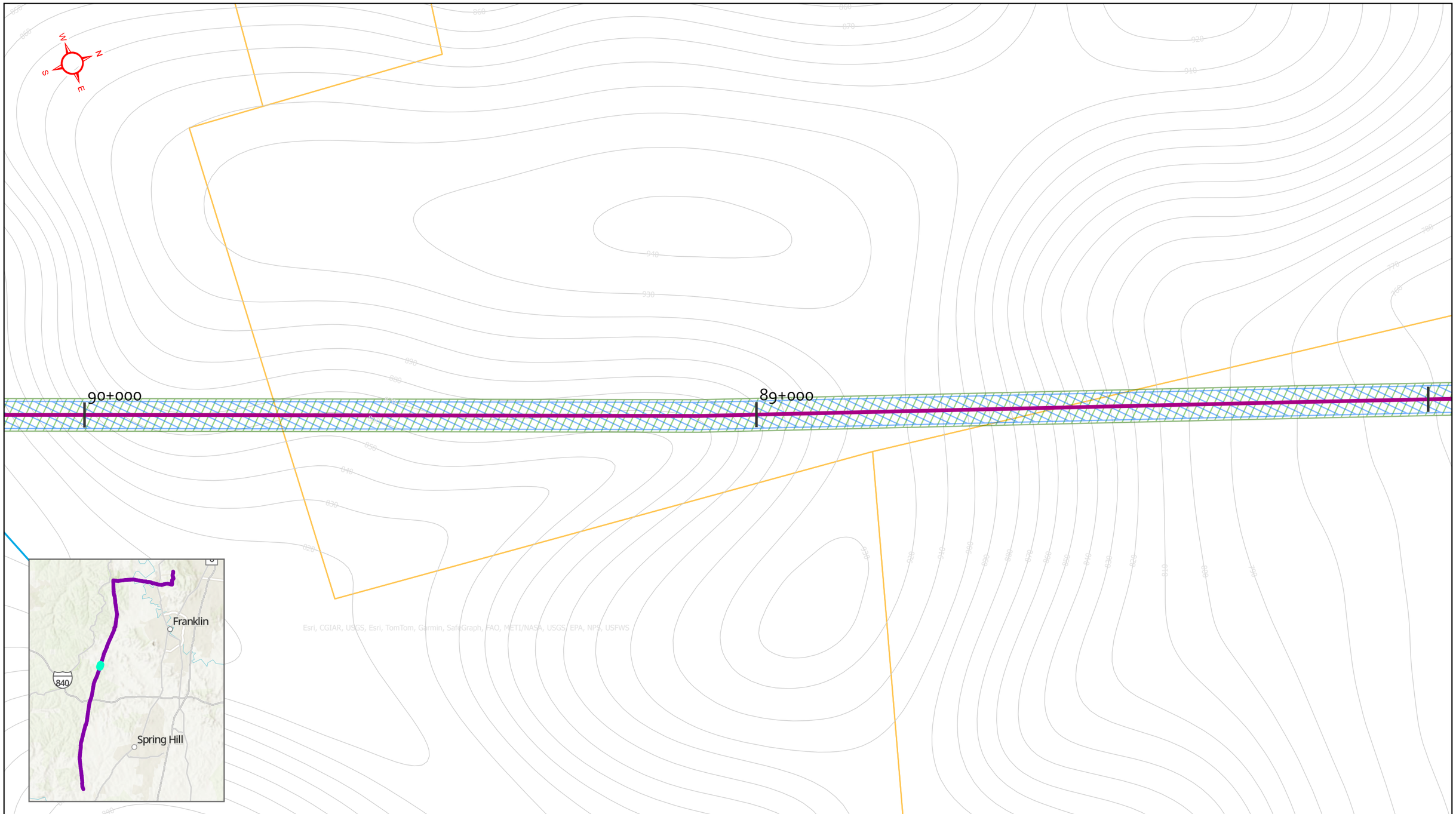
Feet

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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

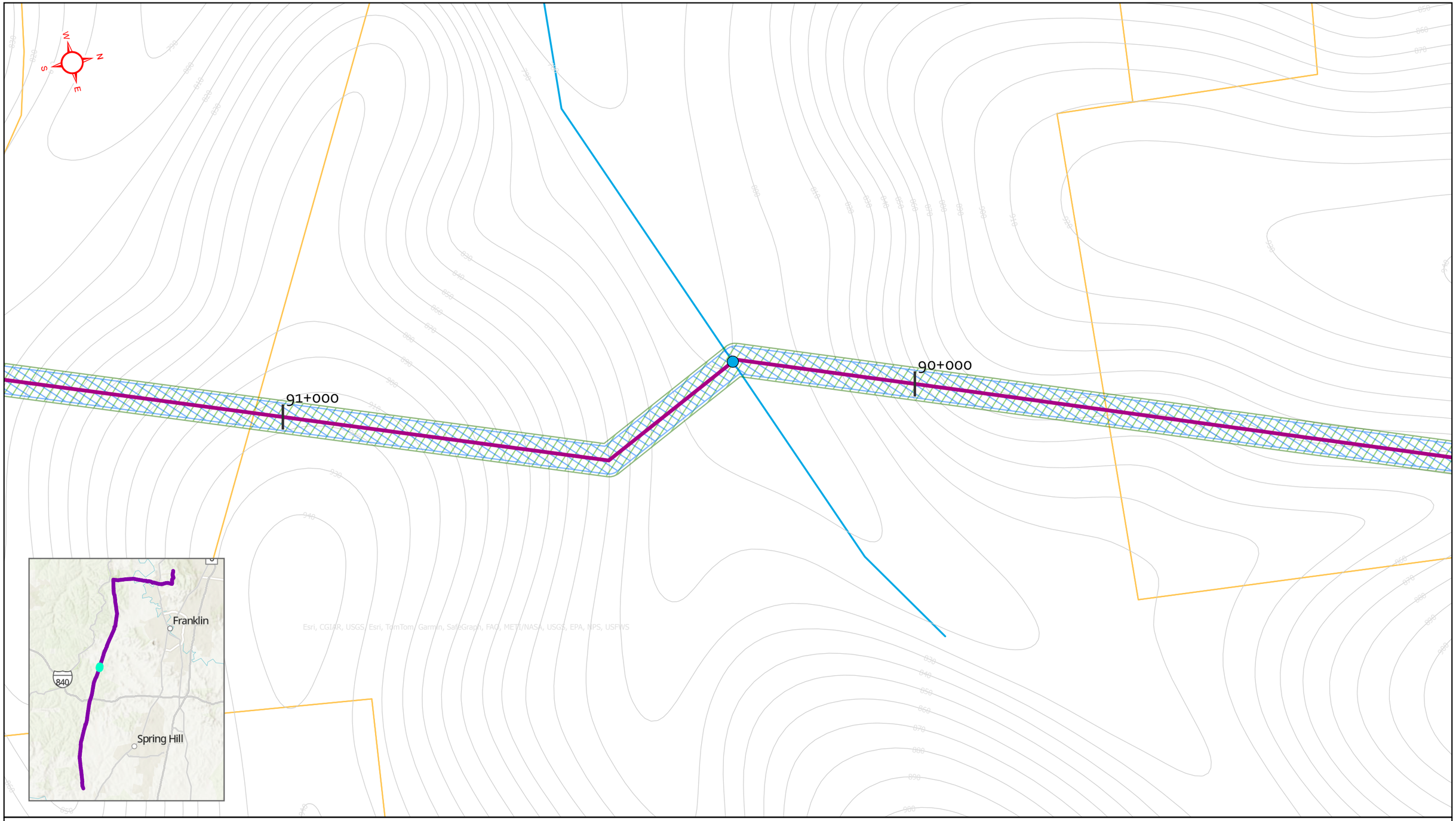
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

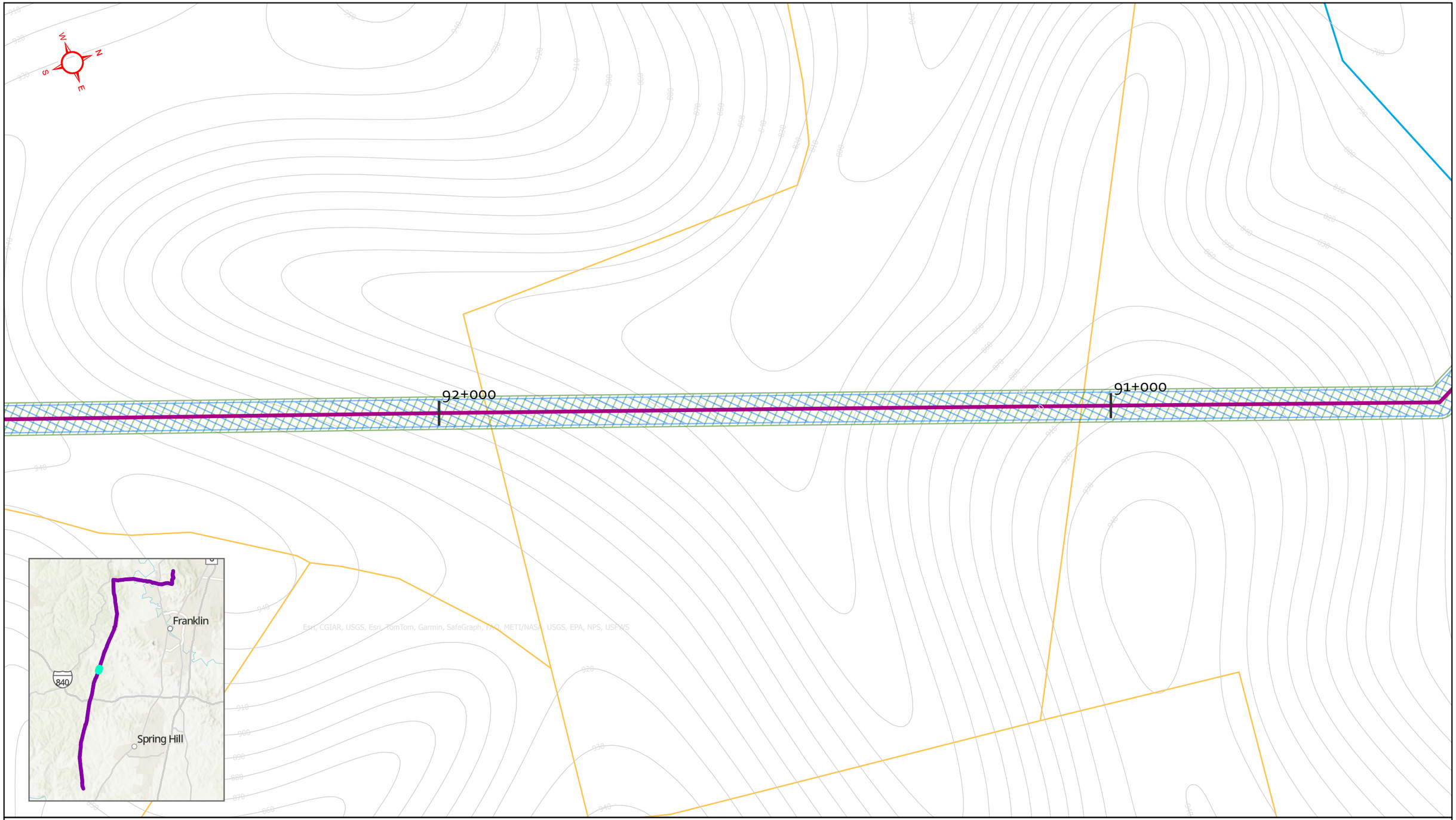
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

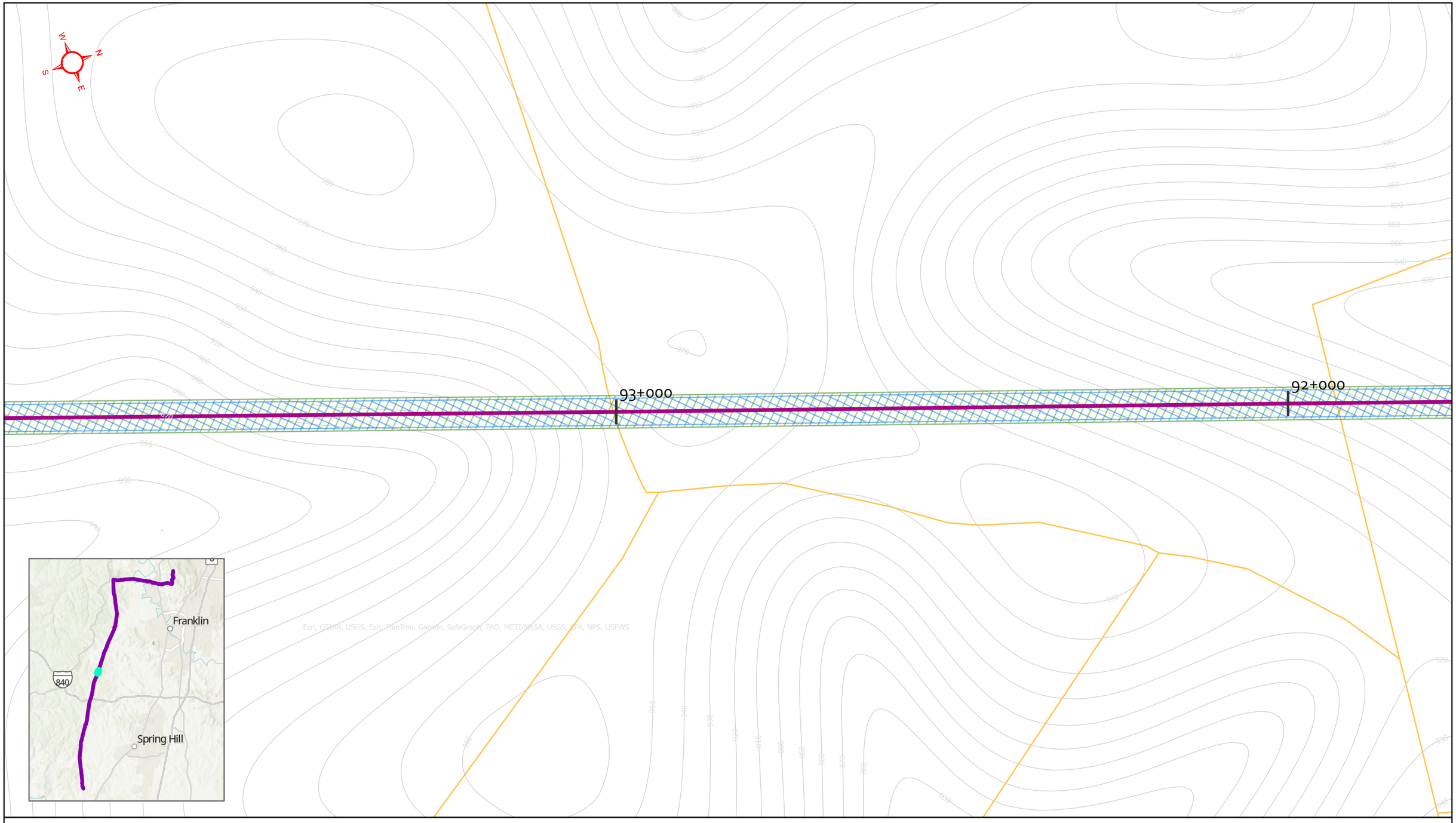
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

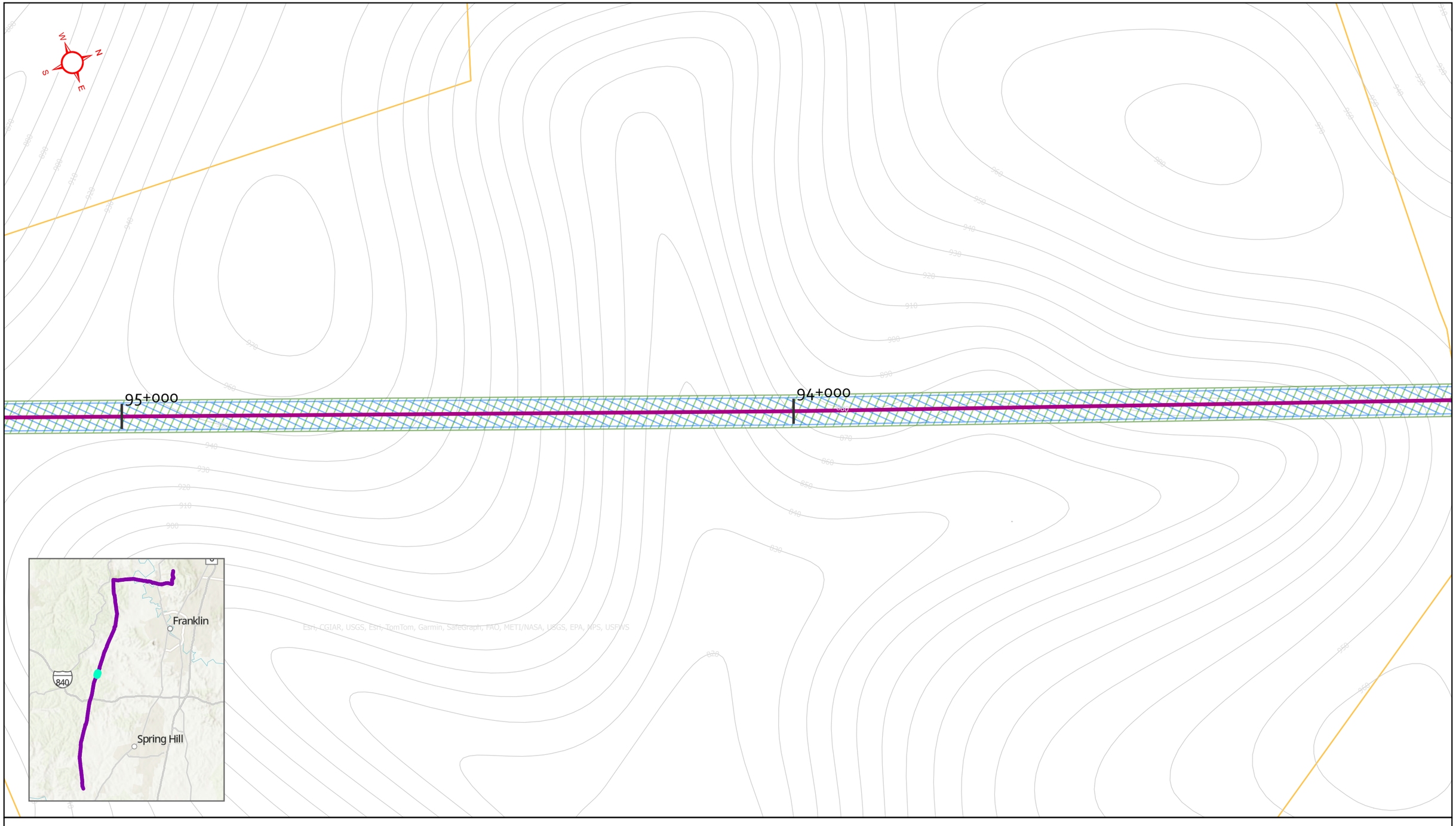
Feet

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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

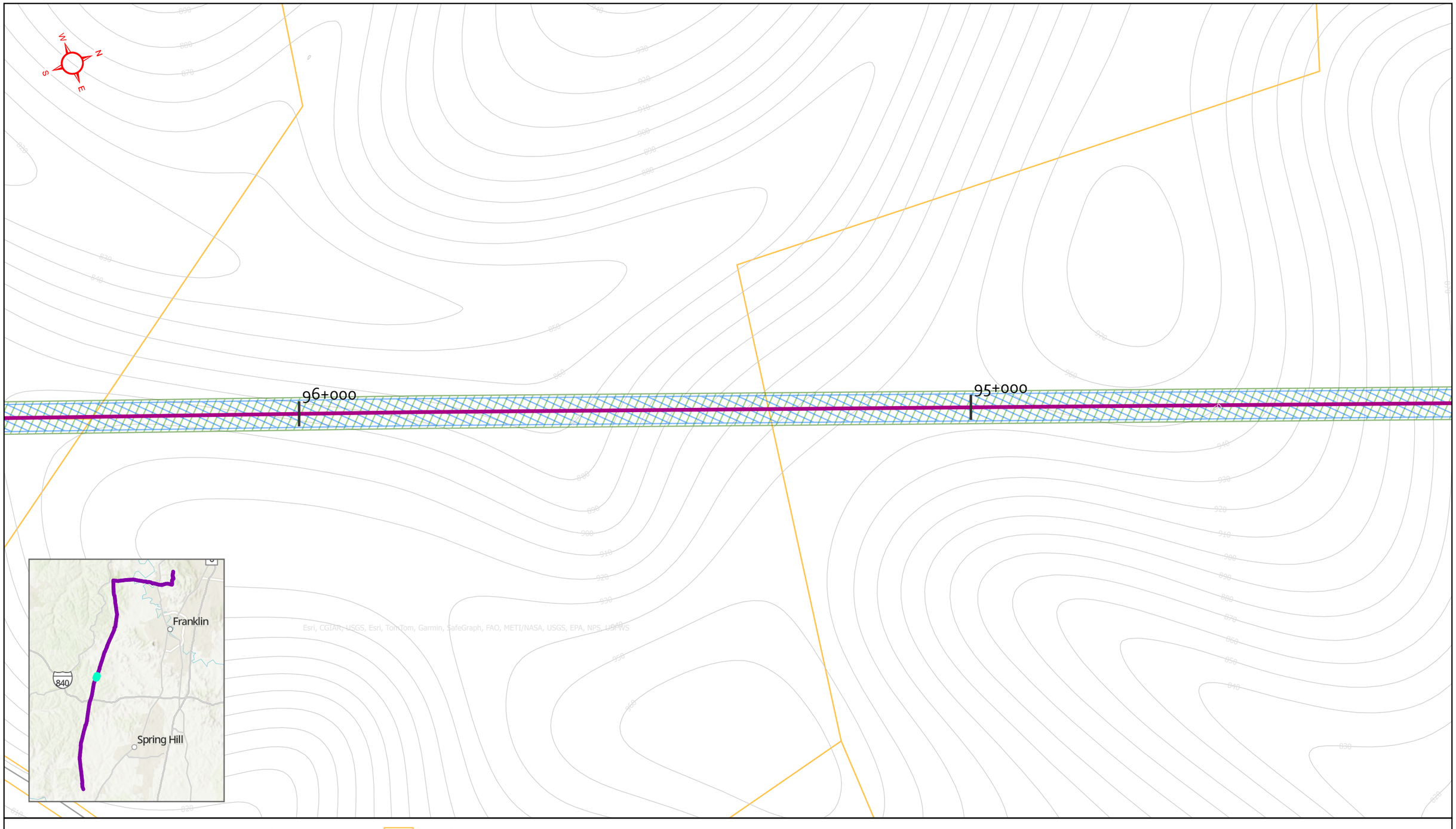
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

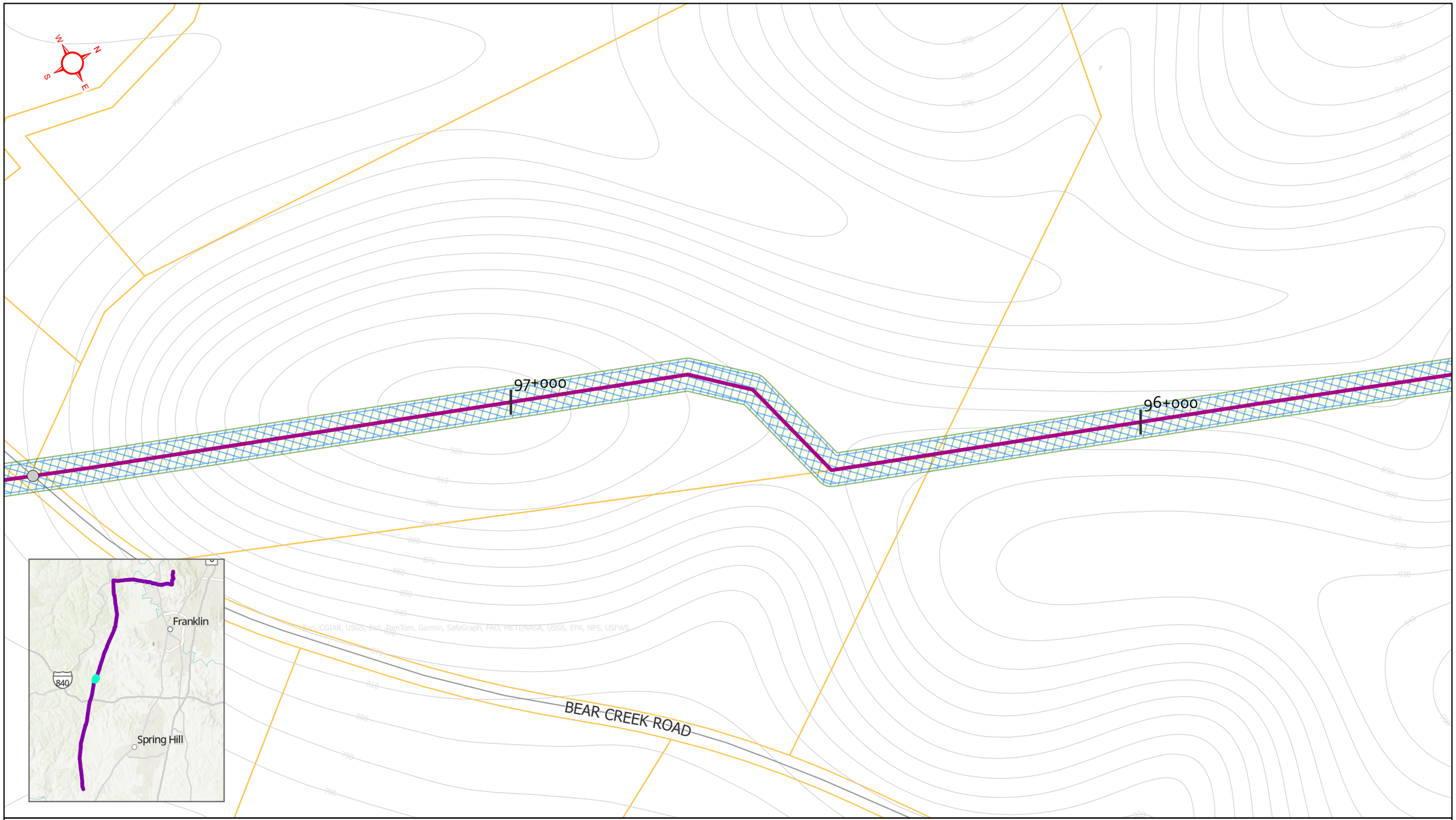
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

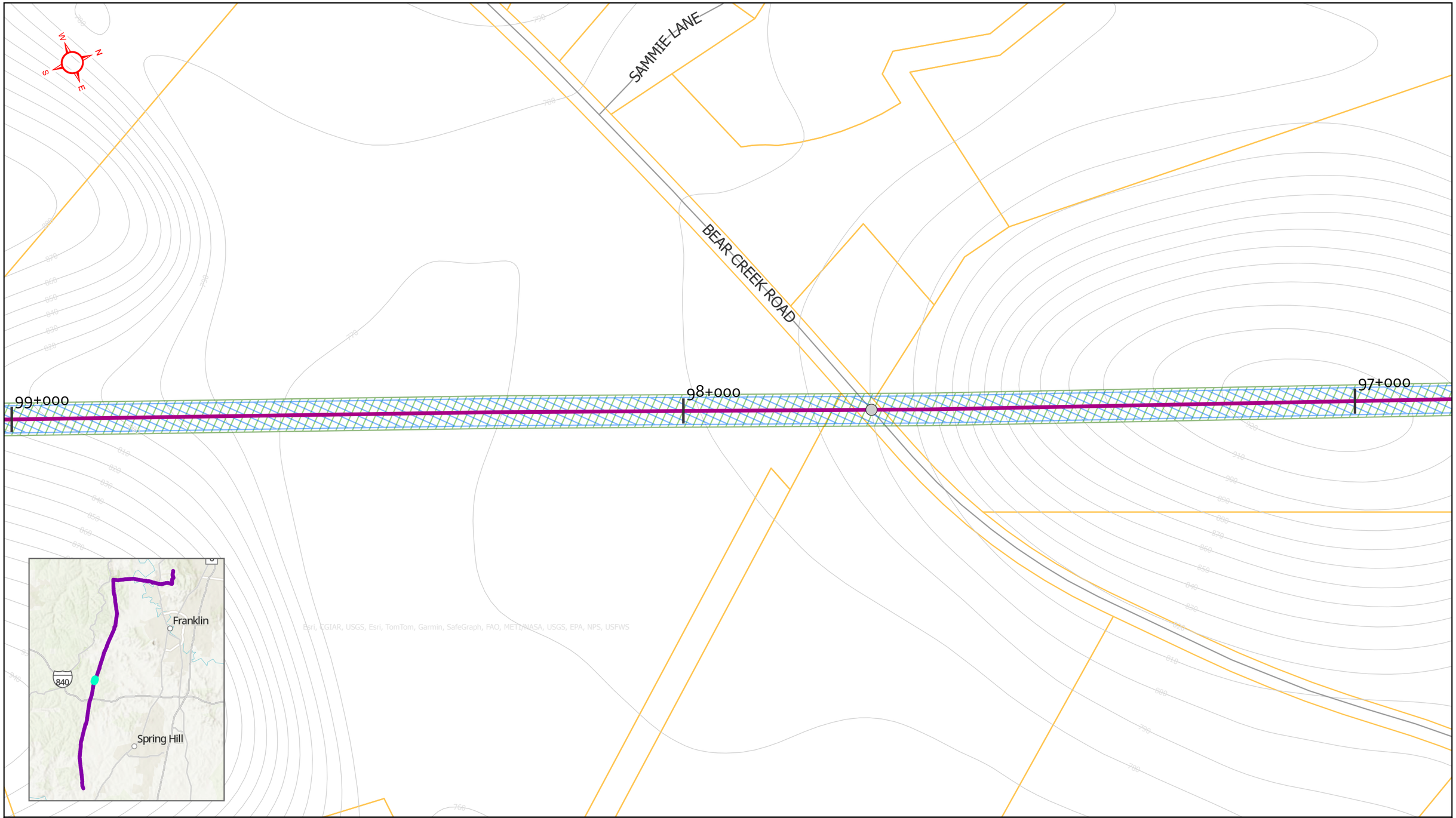
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

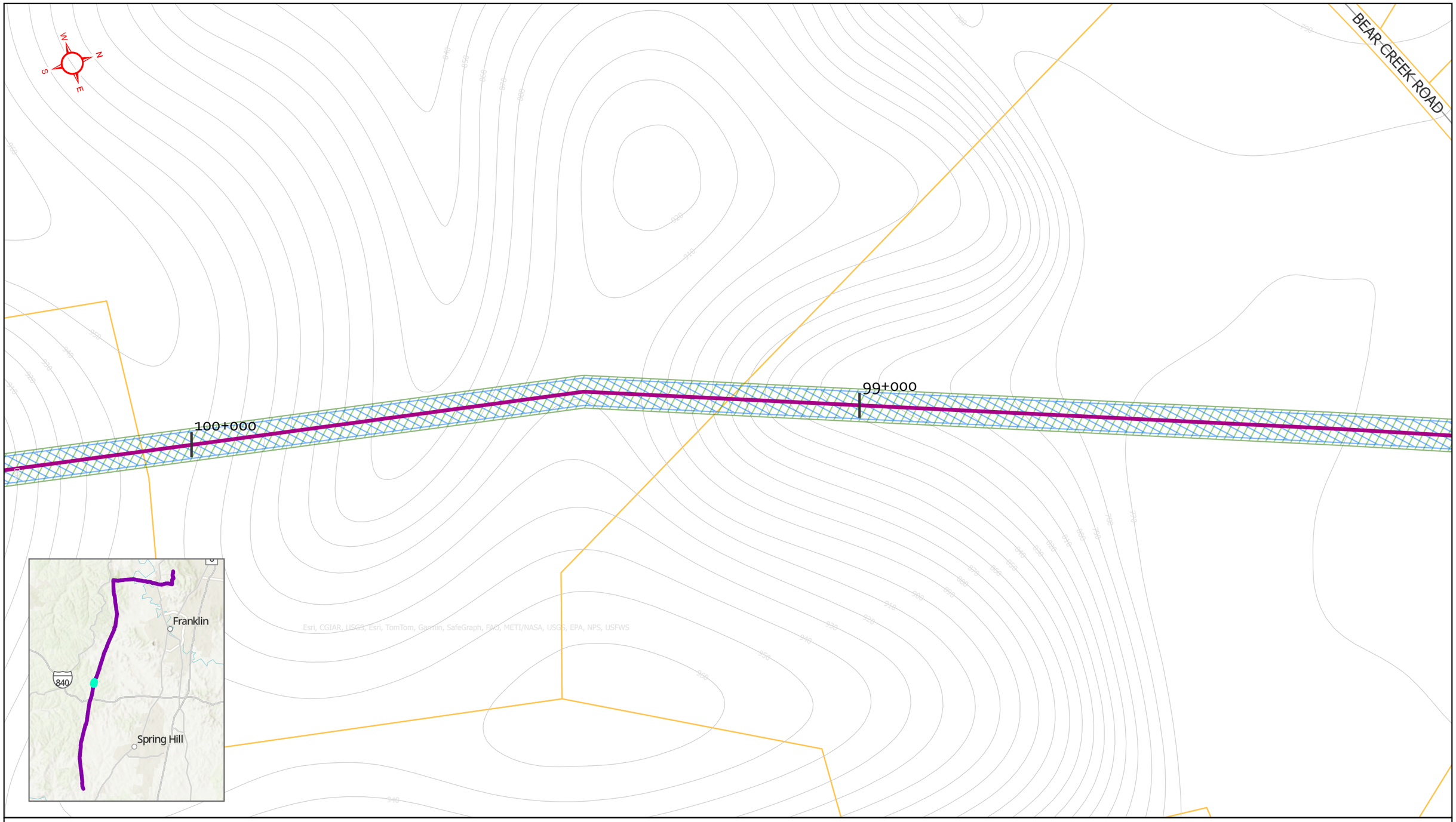
Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

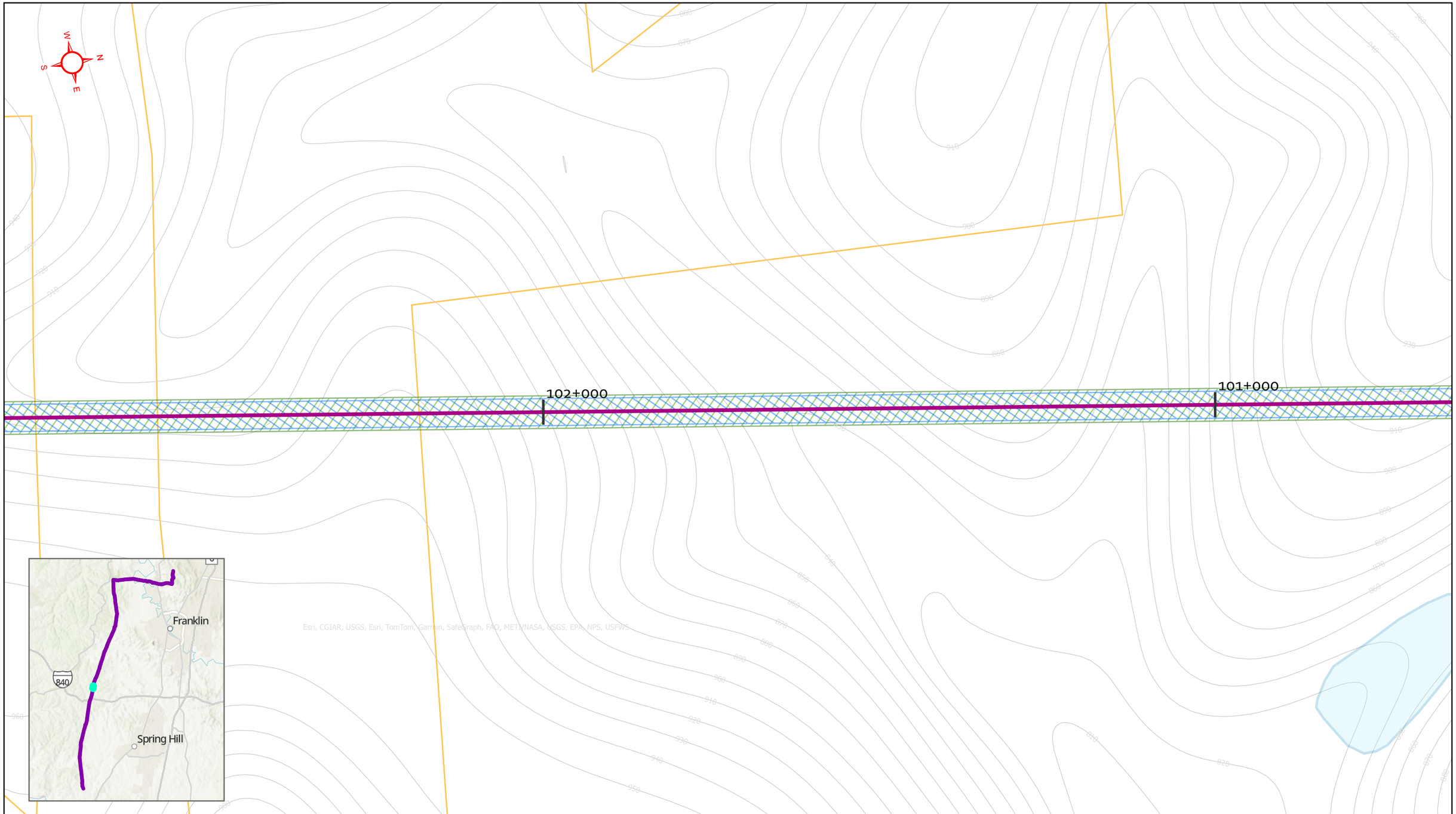
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

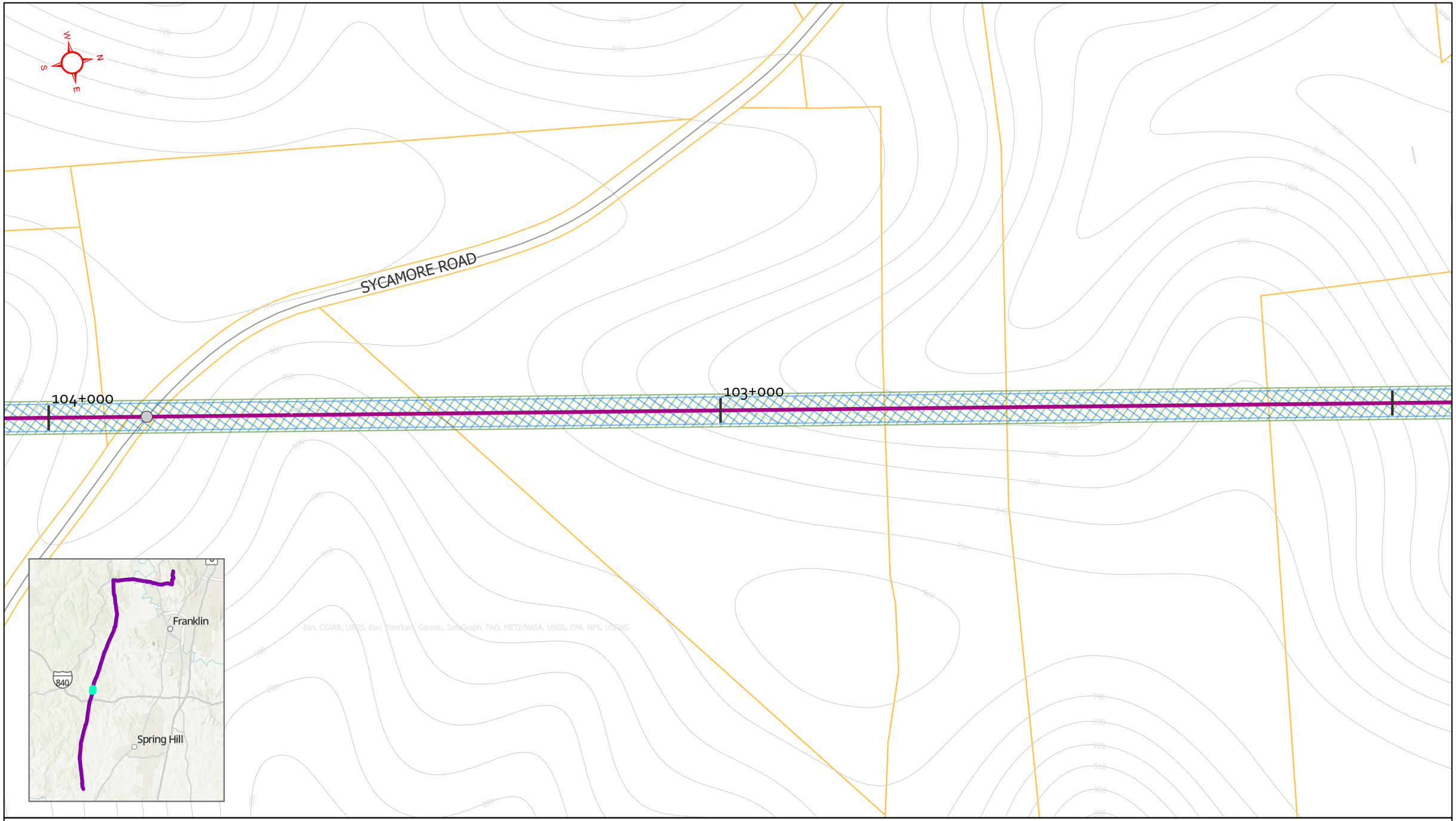
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

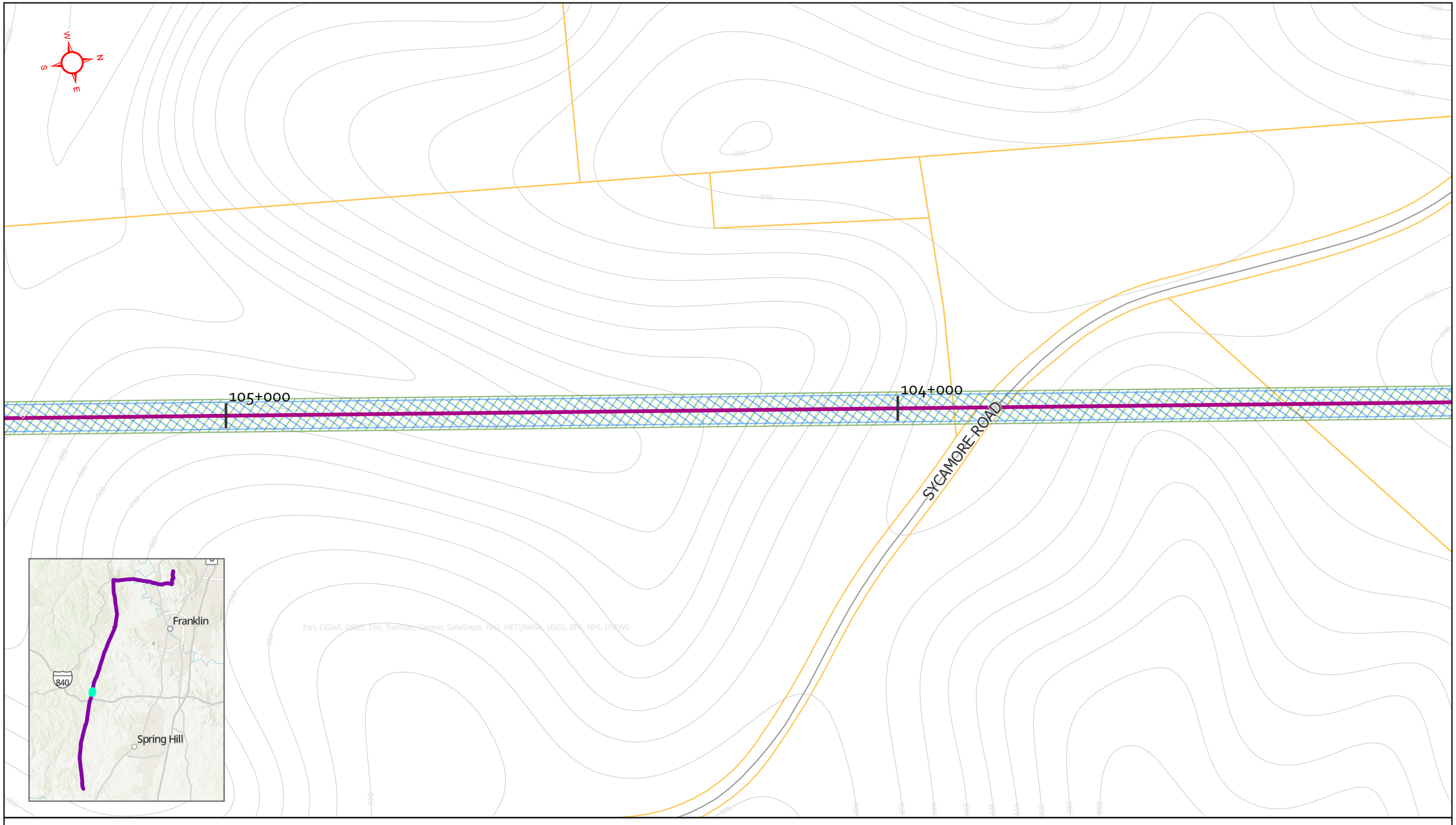
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

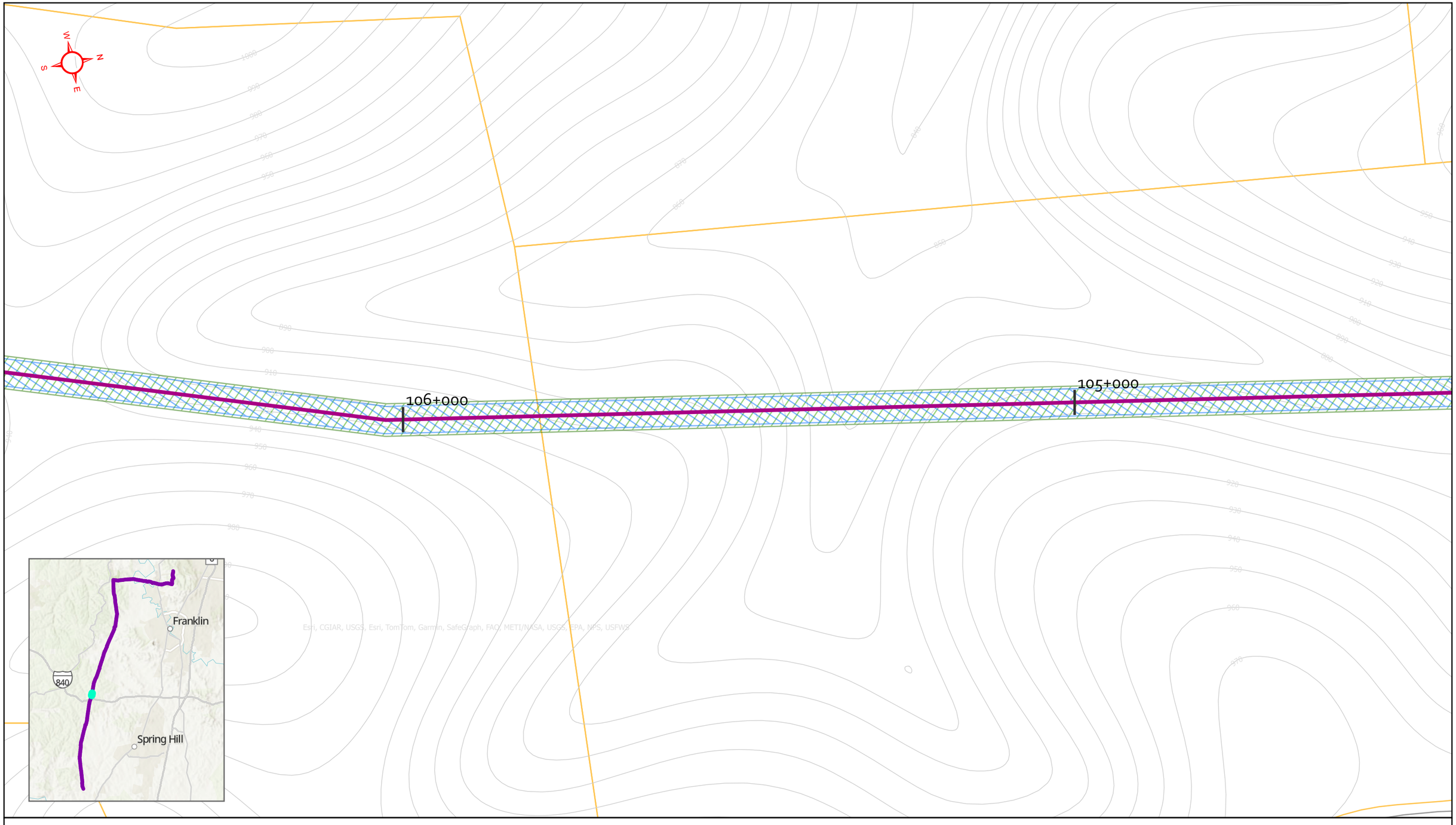
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

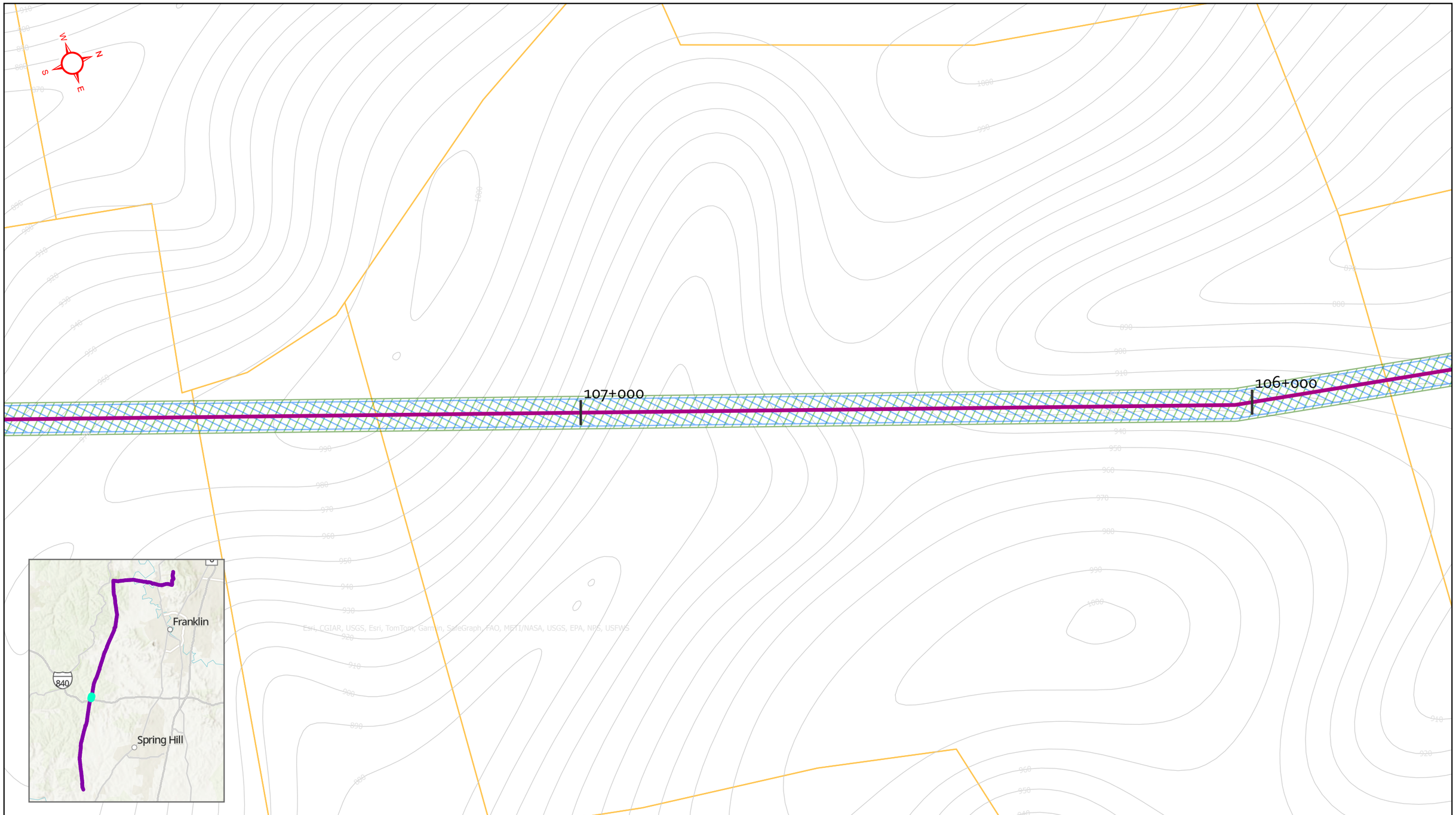
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

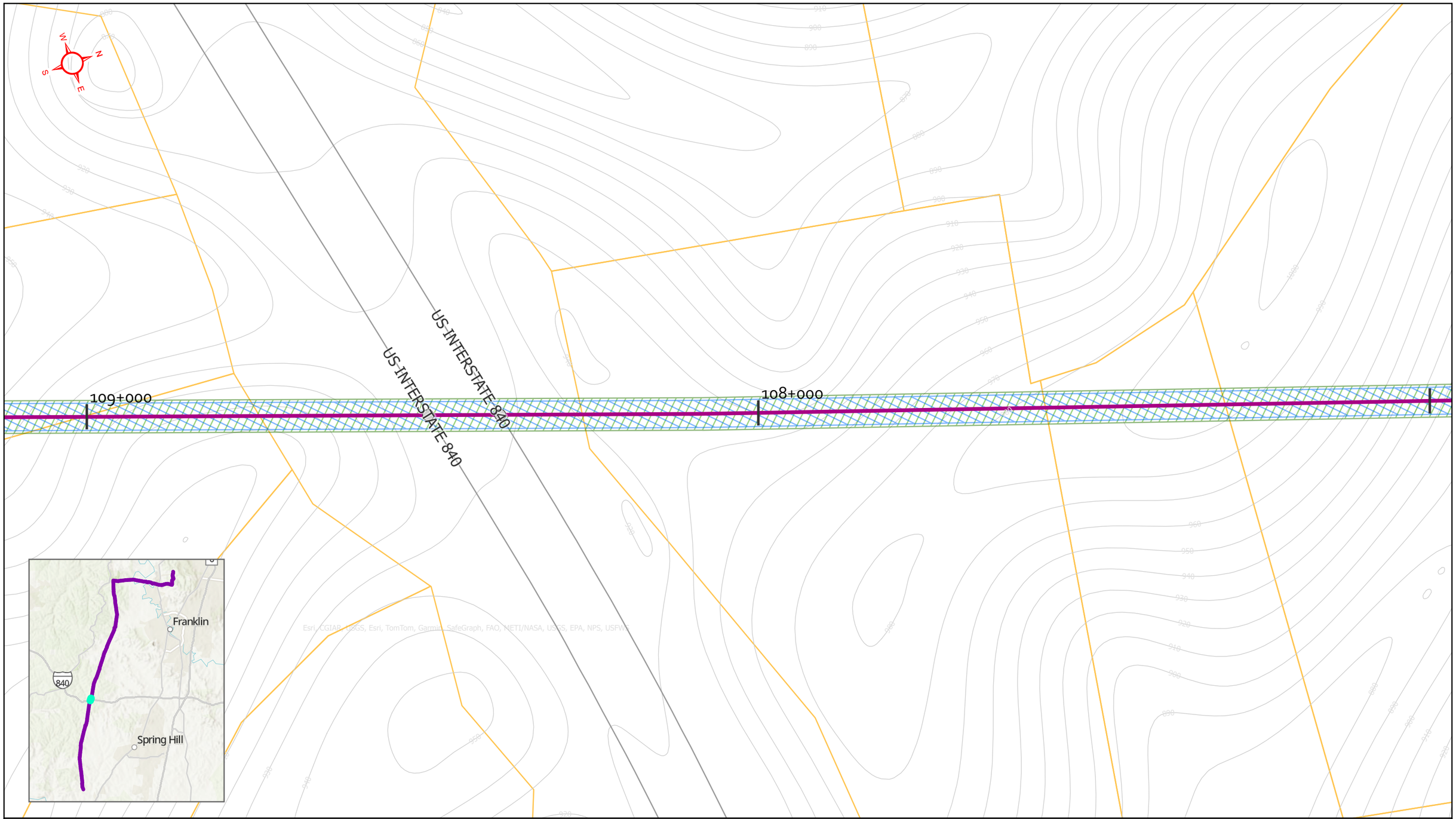
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

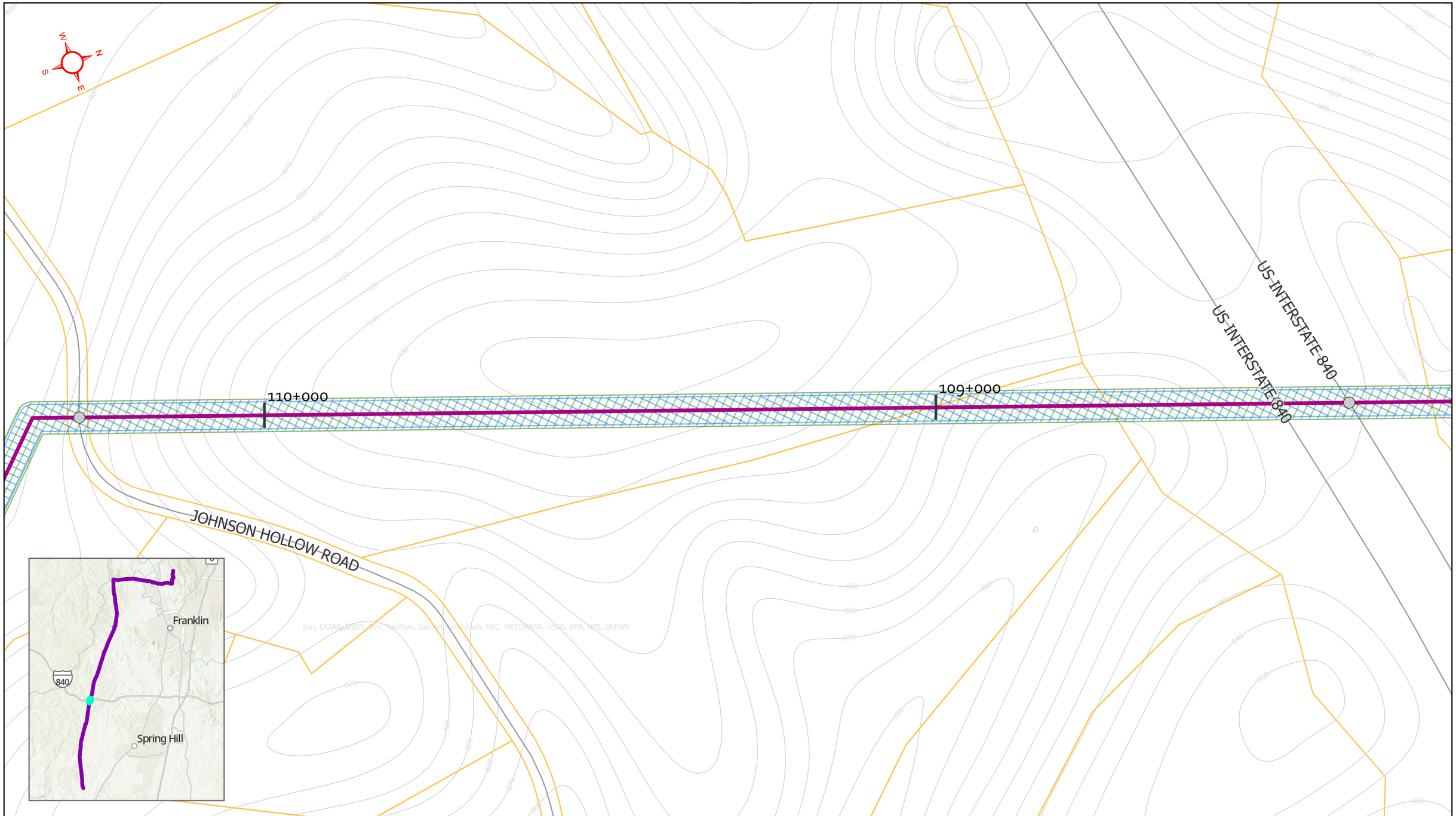
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

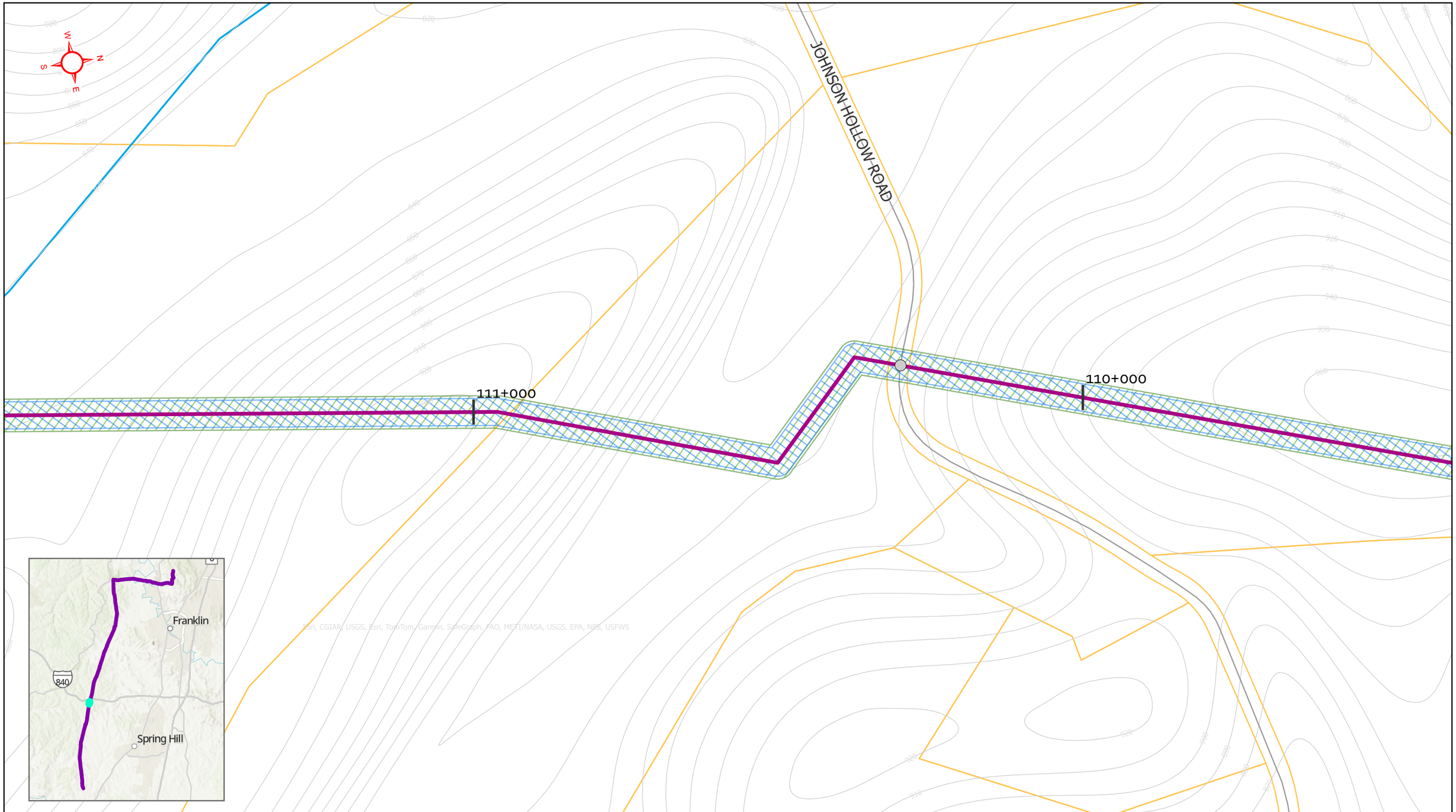
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

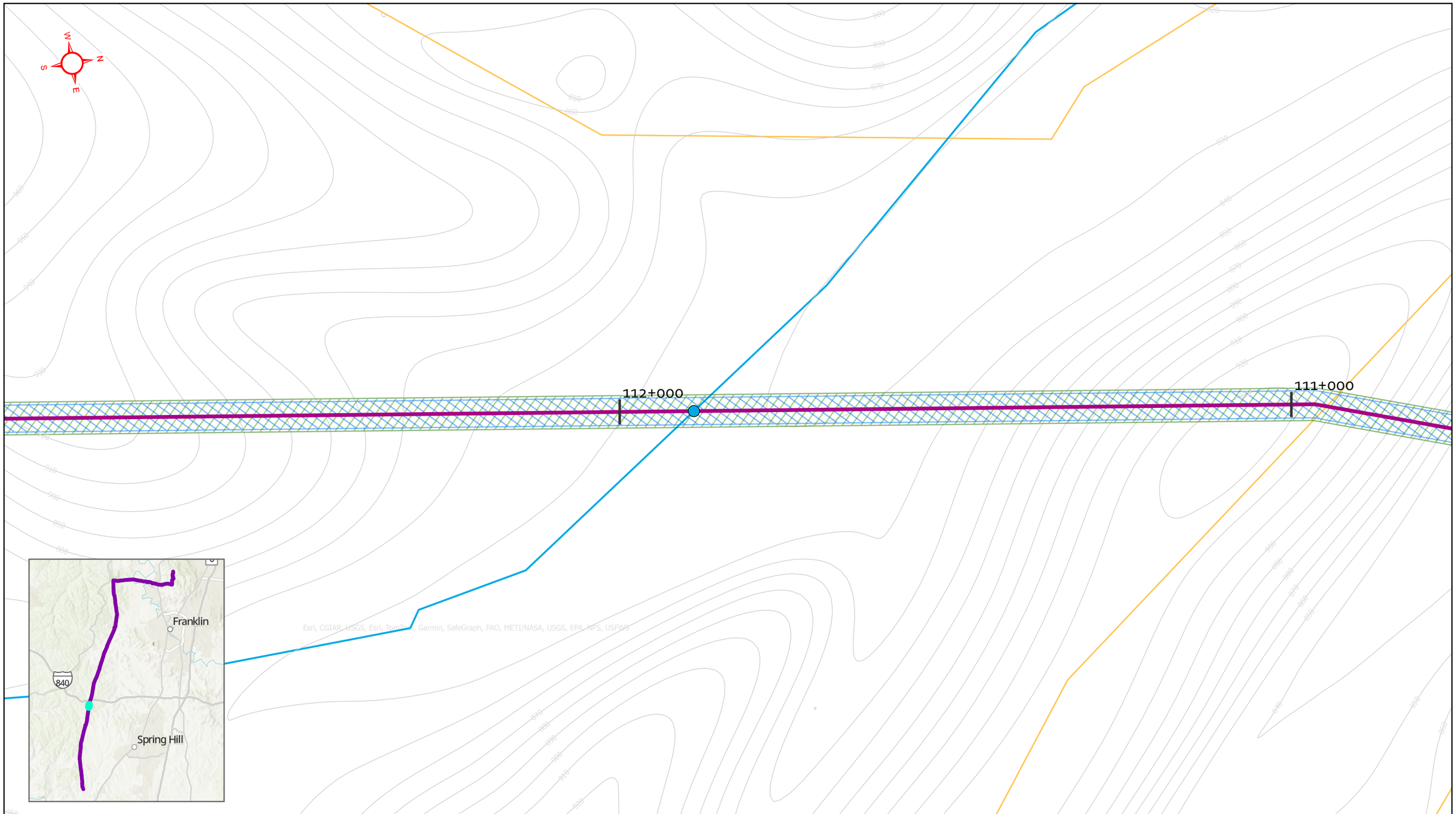
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

Feet

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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

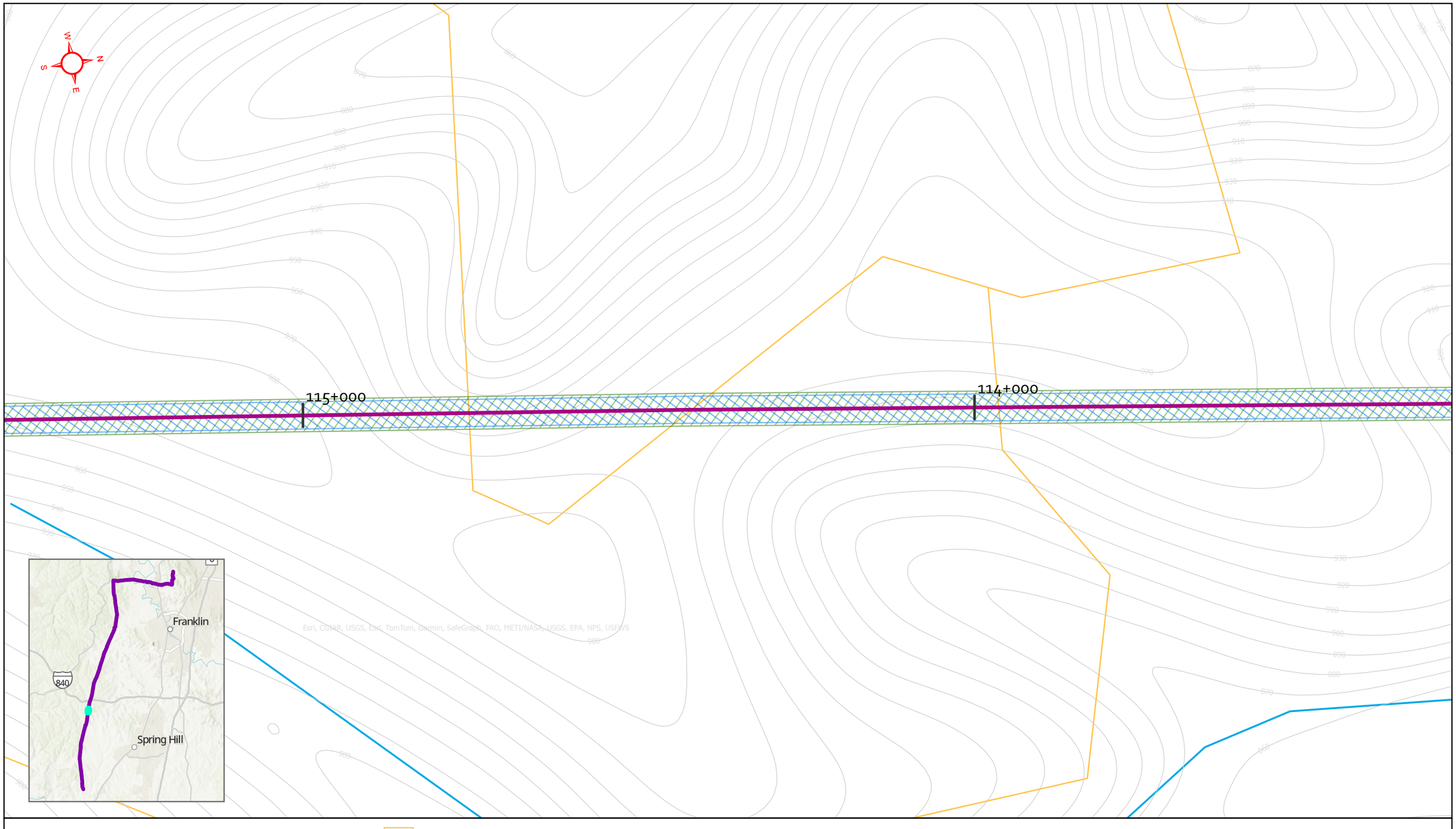
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

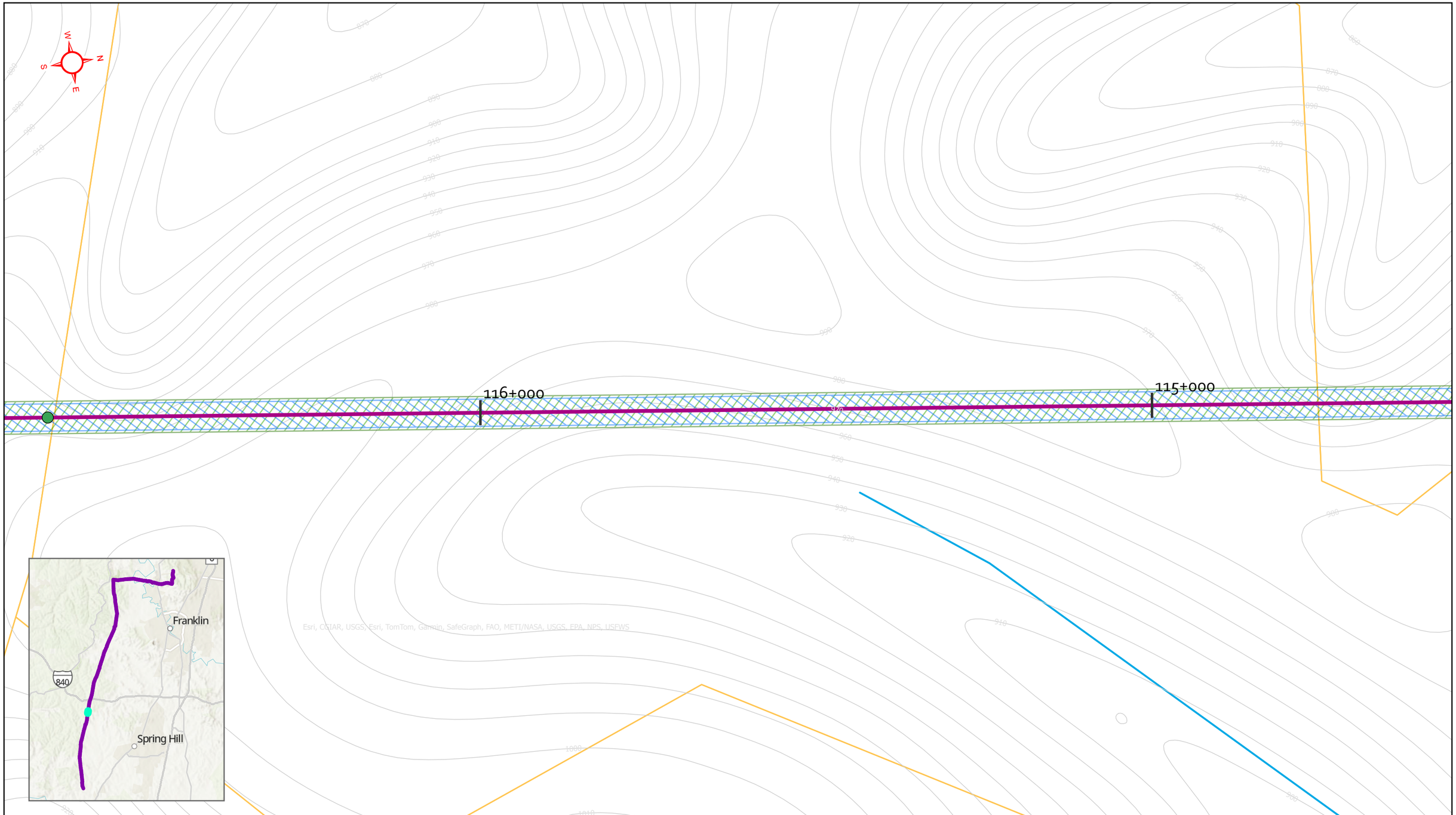
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Gas Line Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

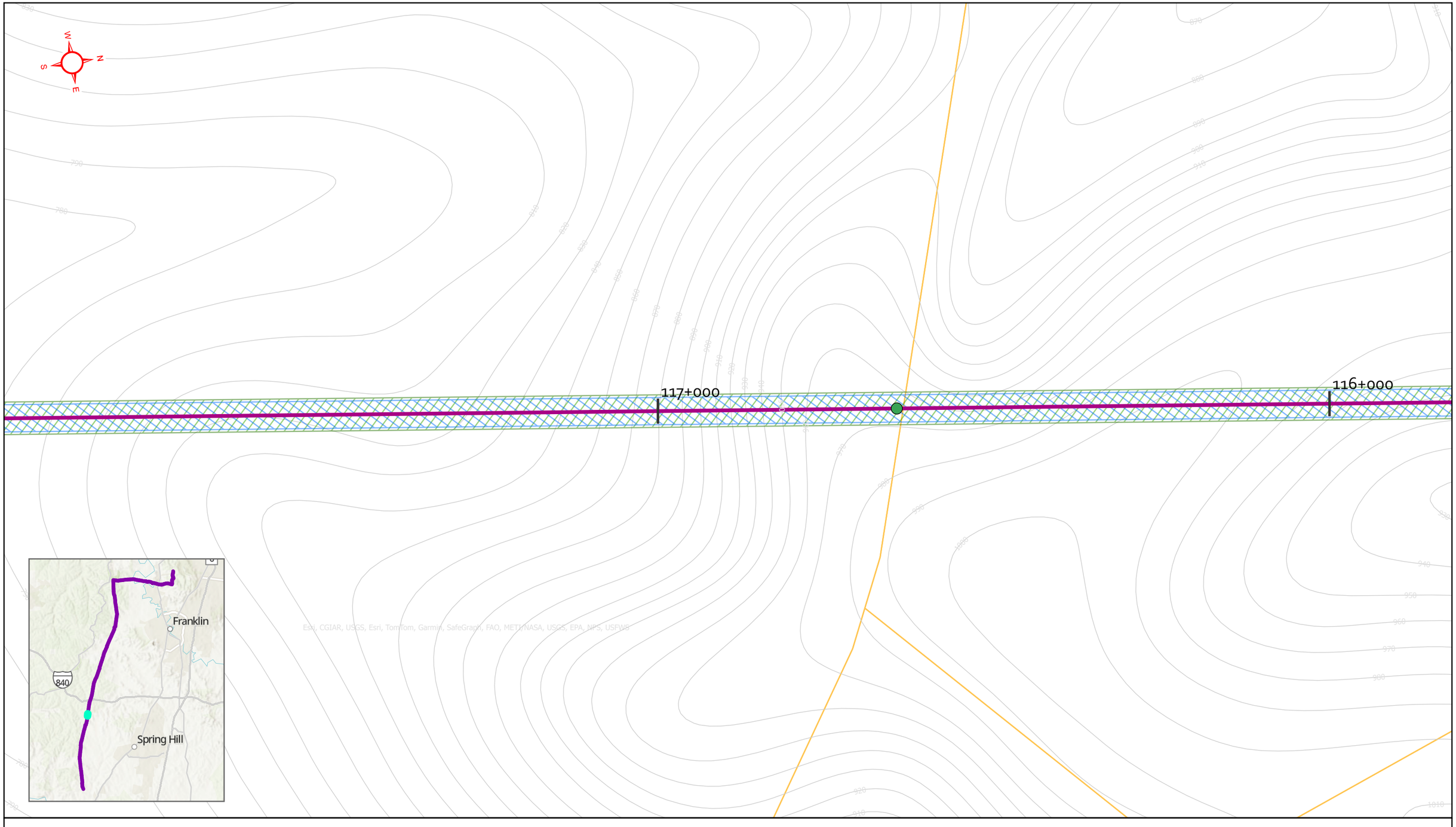
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Gas Line Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

Feet

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MVUD Proposed Water Transmission

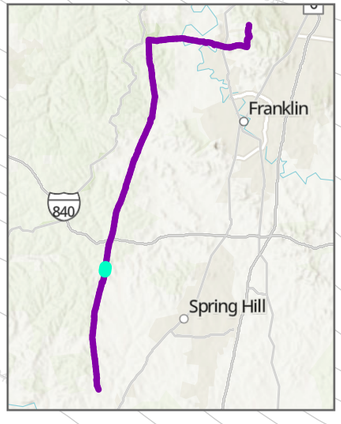
Hazen

MALLORY VALLEY UTILITY DISTRICT

CHARON LANE

119+000

118+000



Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

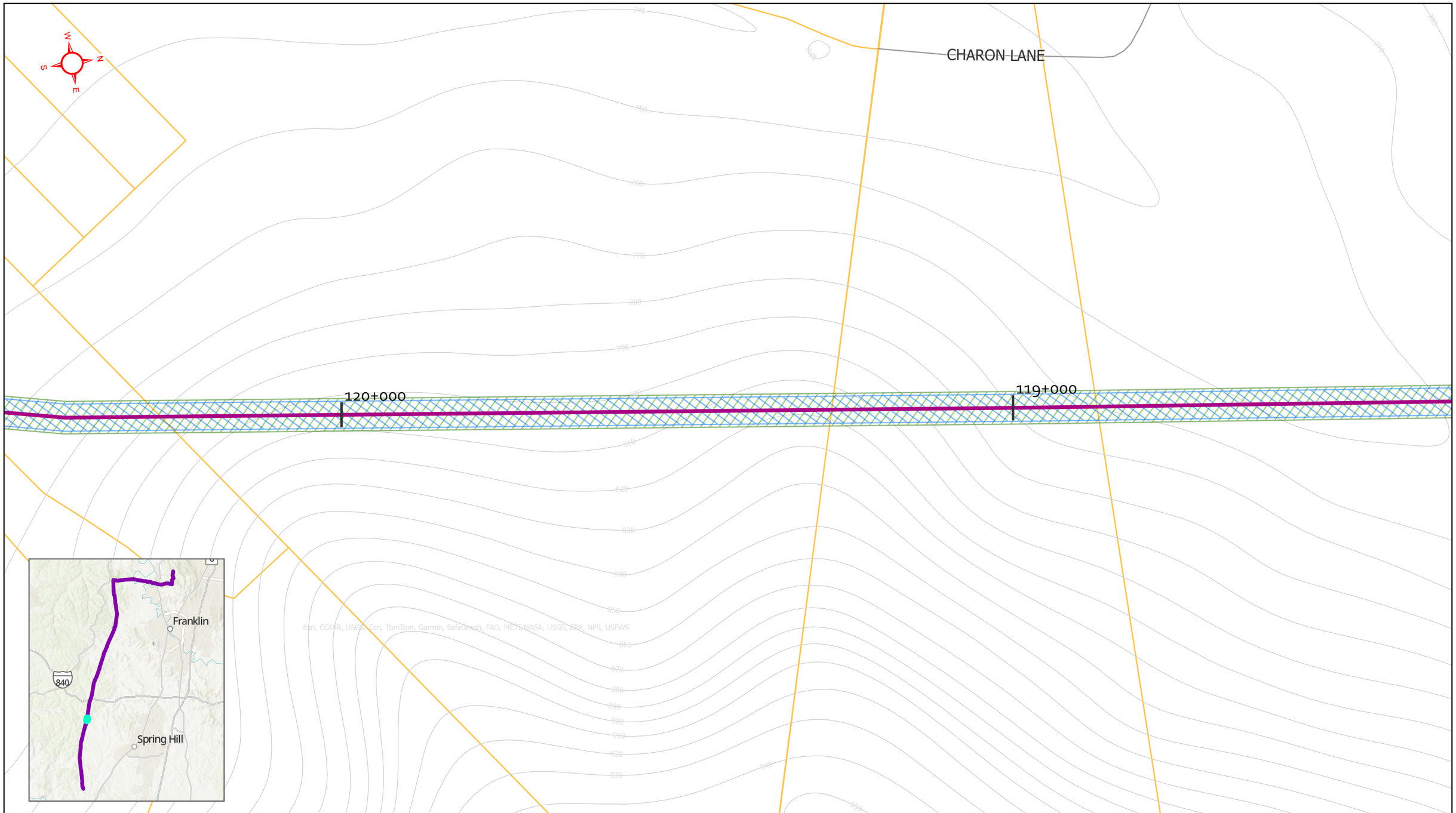
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

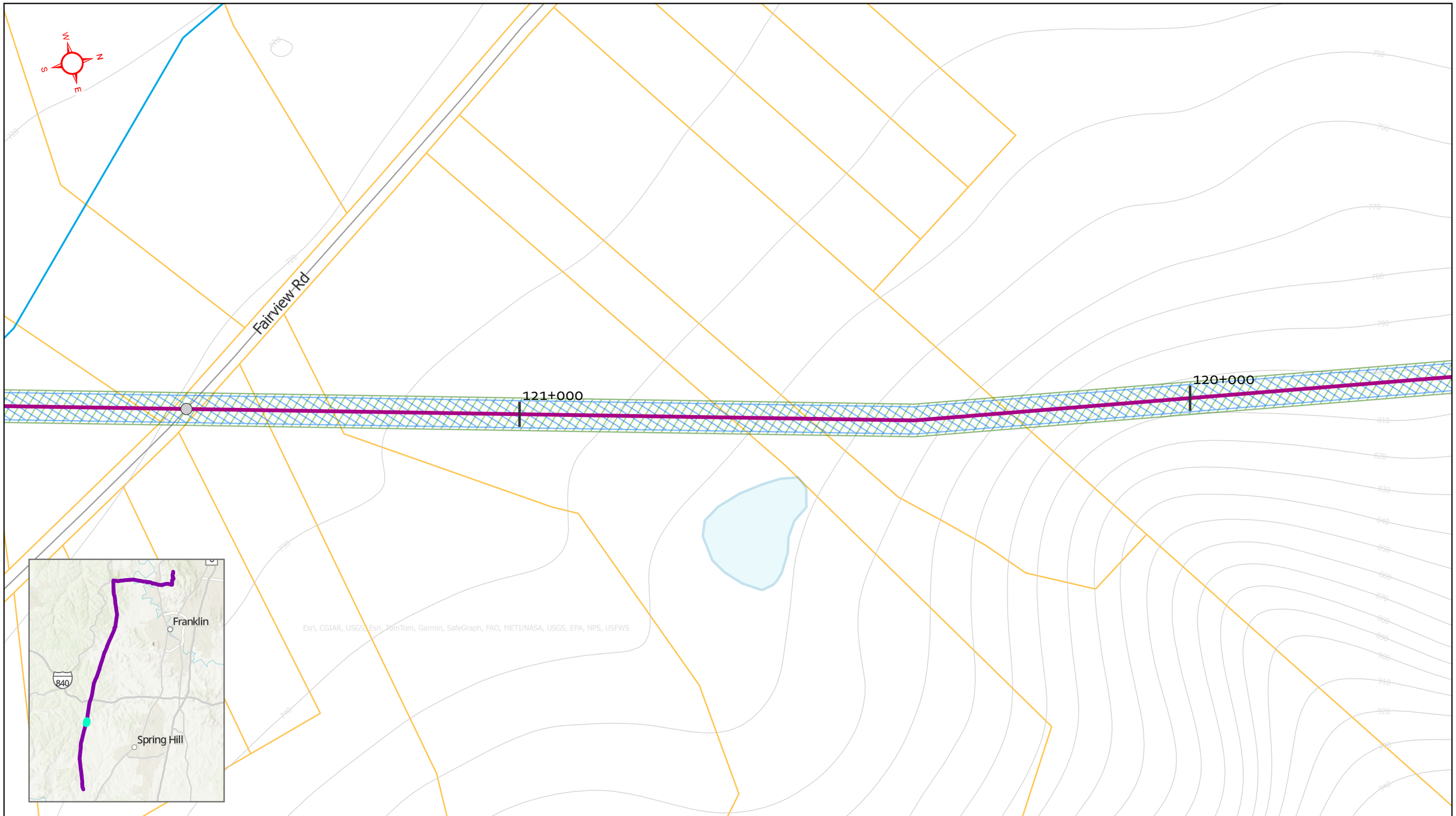
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

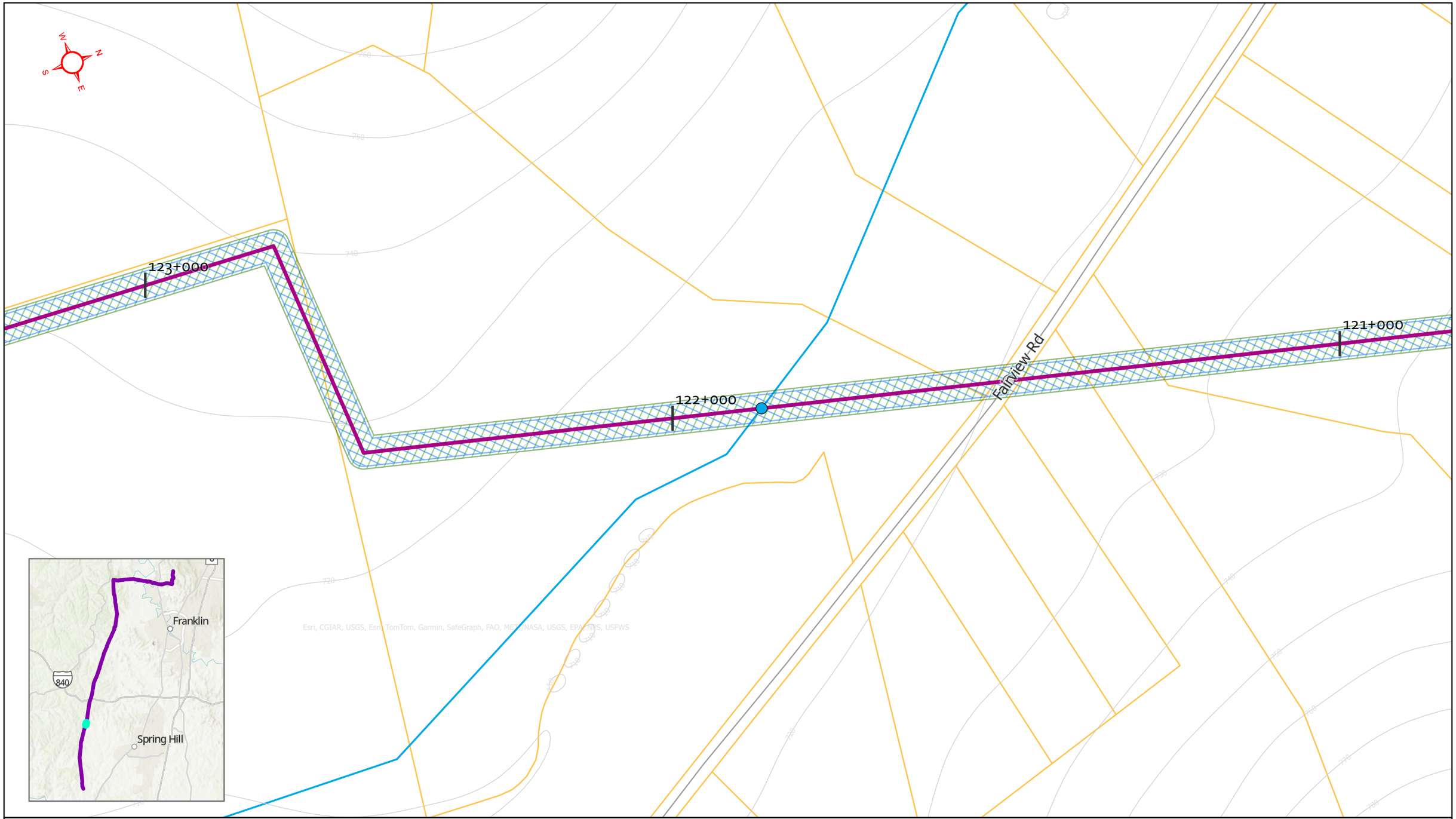
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



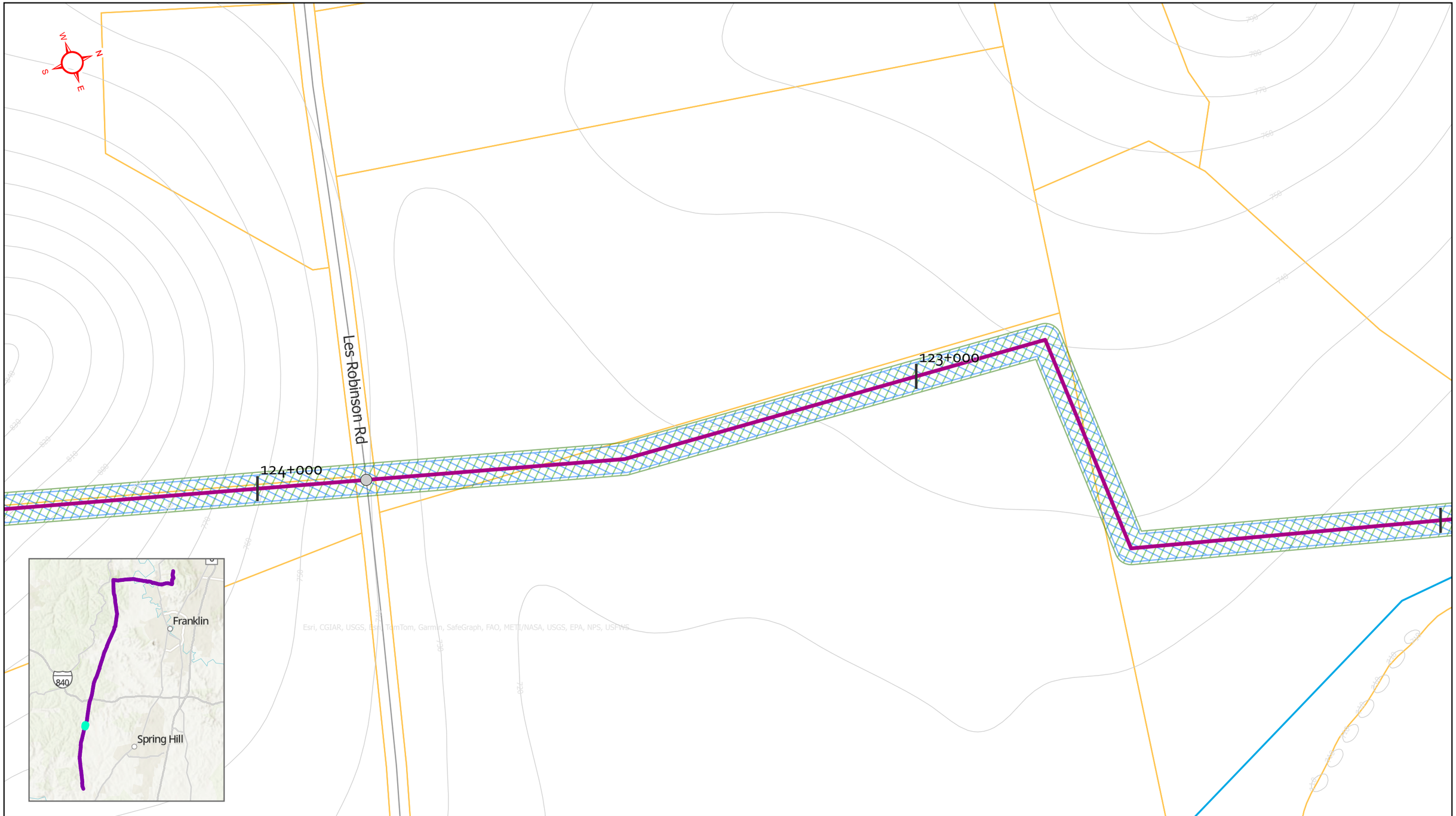
Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easement
Double Transmission Line Easement
Streams
Parcels

Feet
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

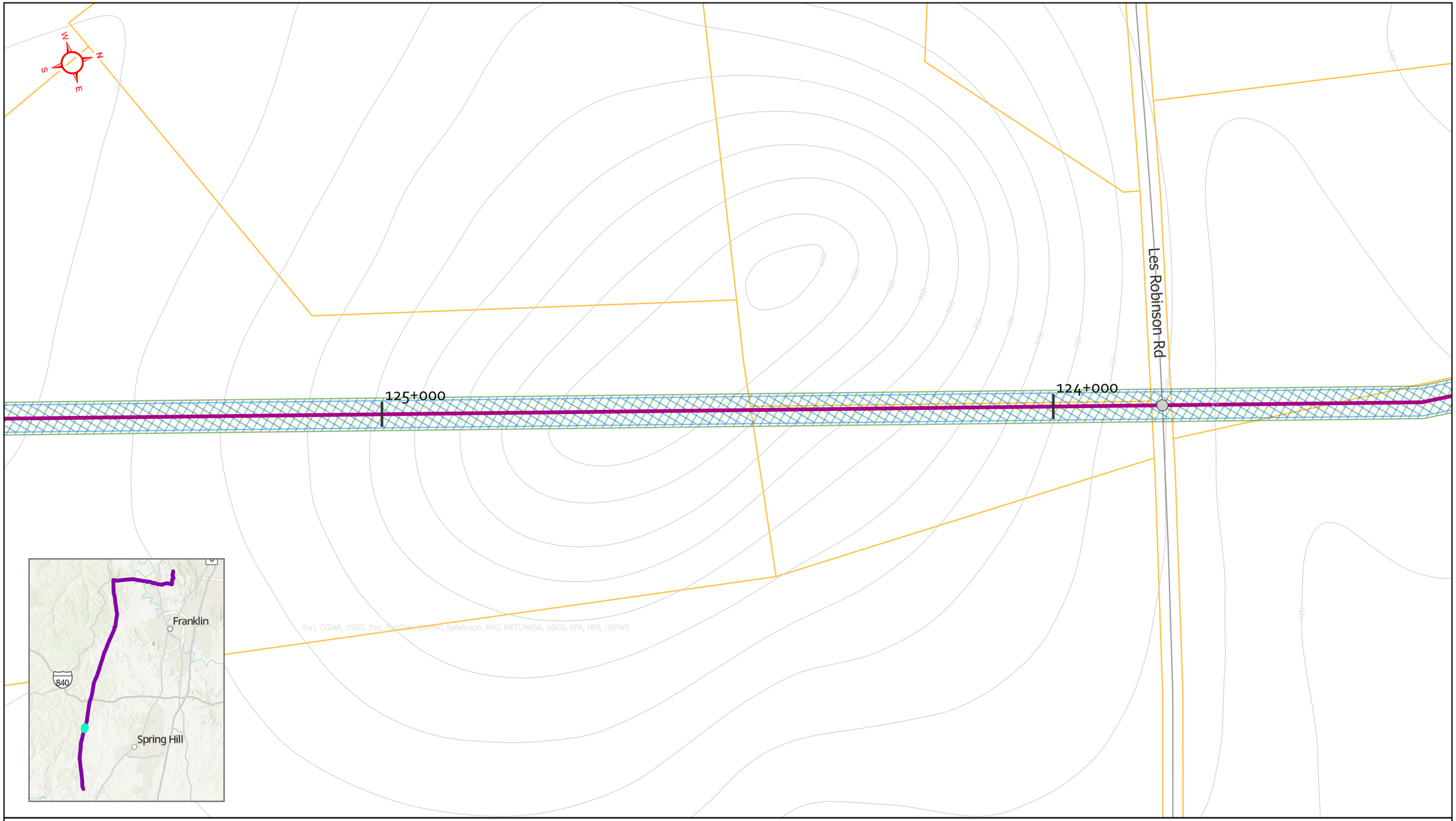
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

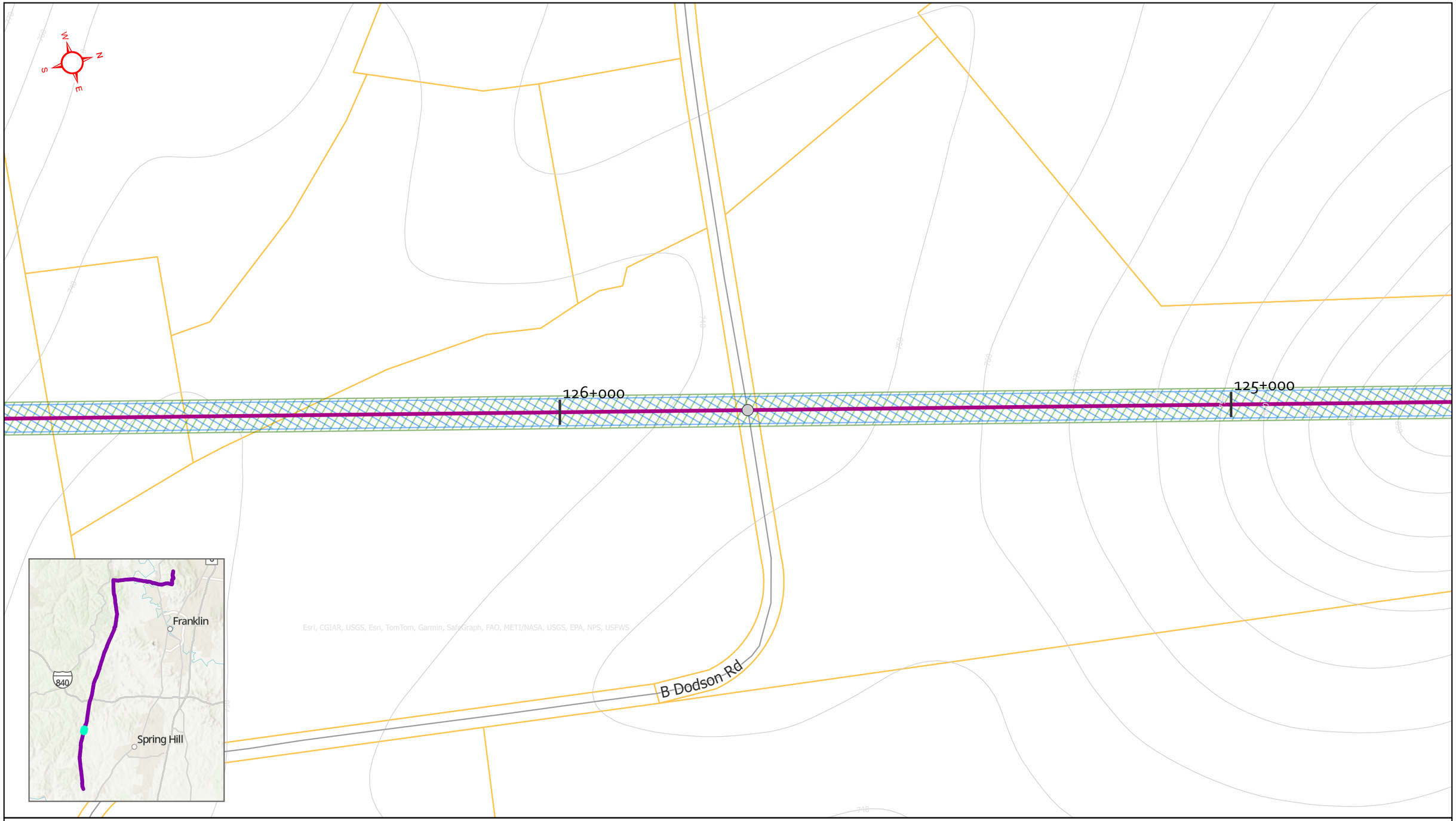
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

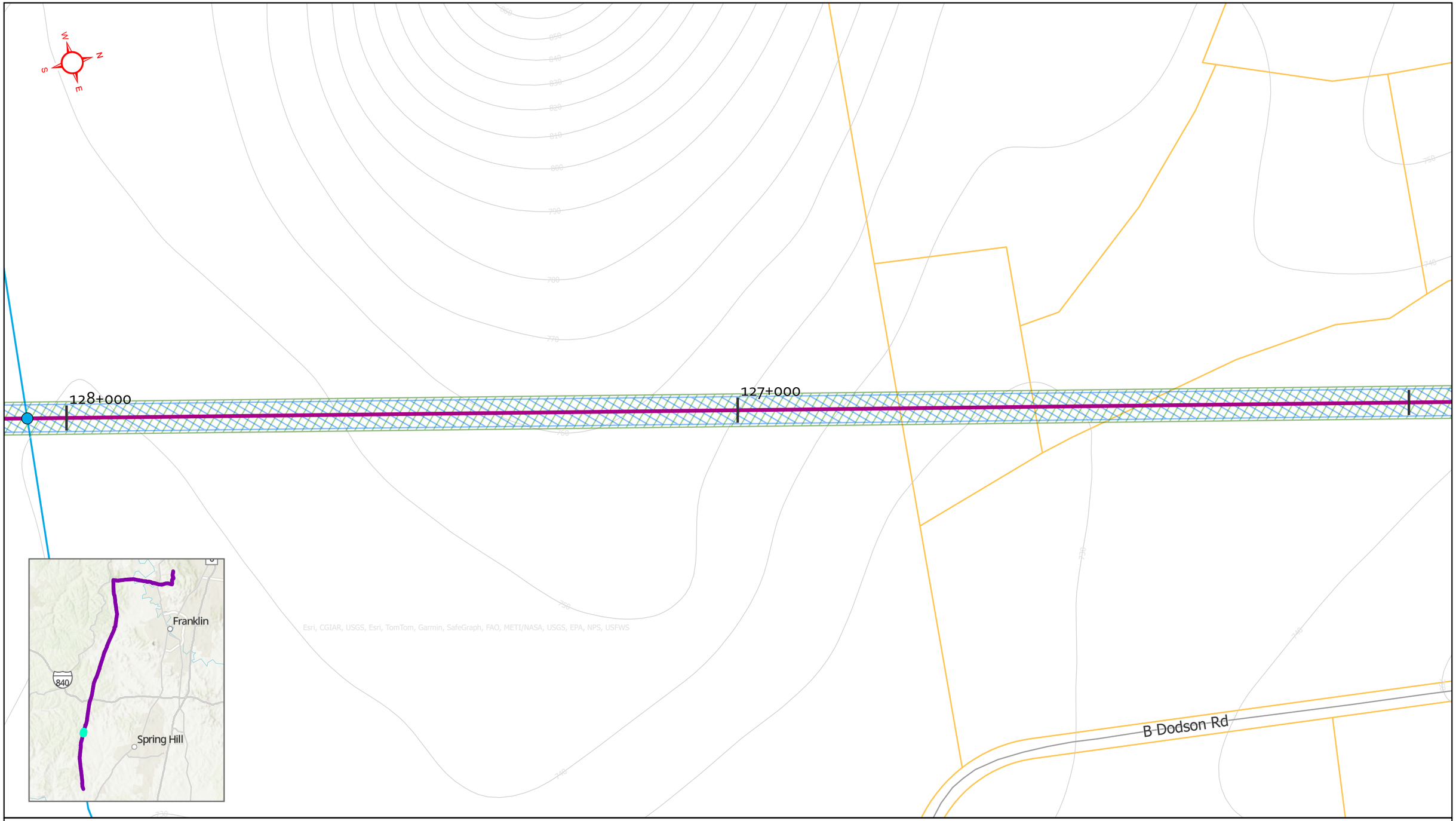
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

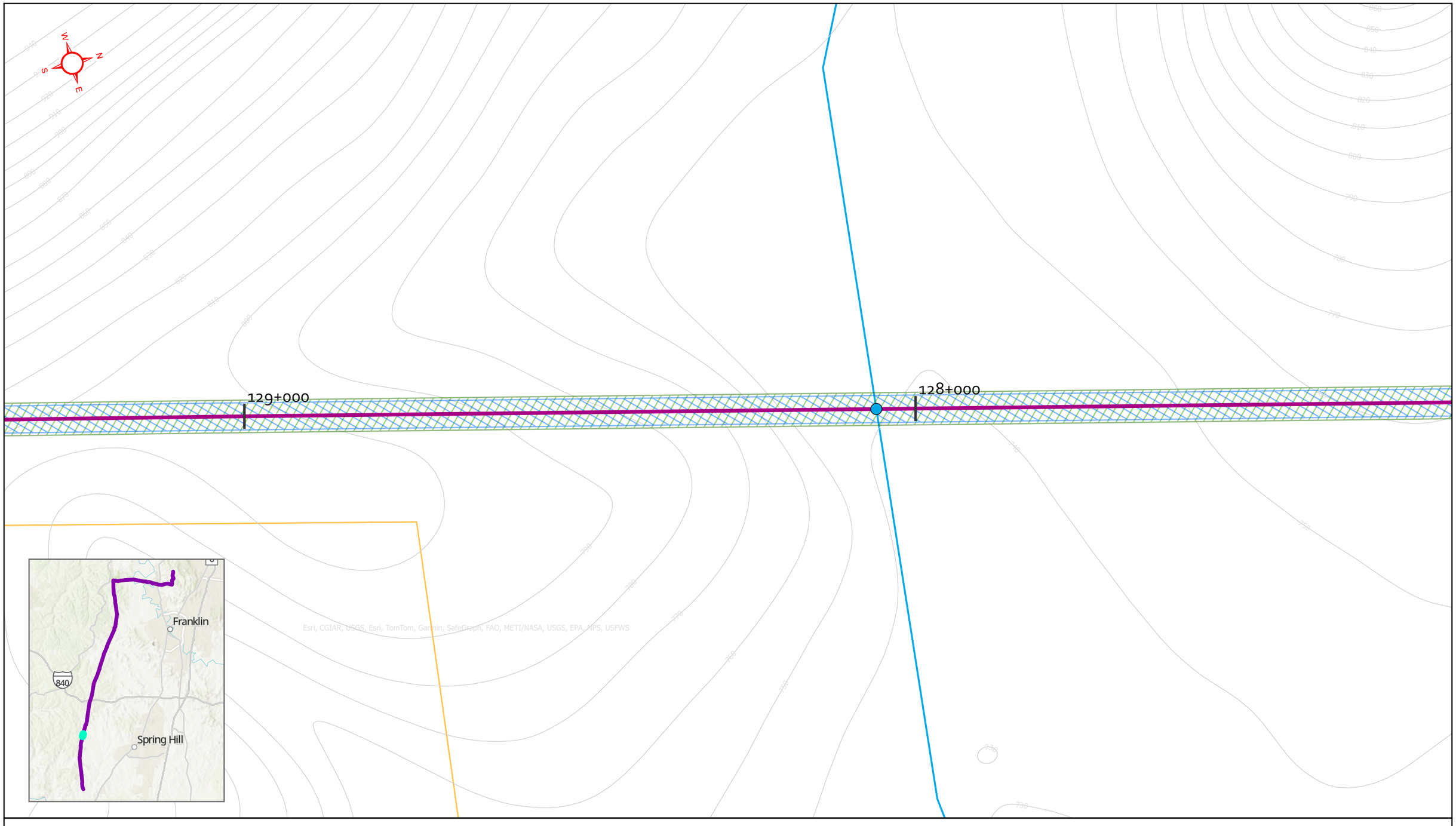
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

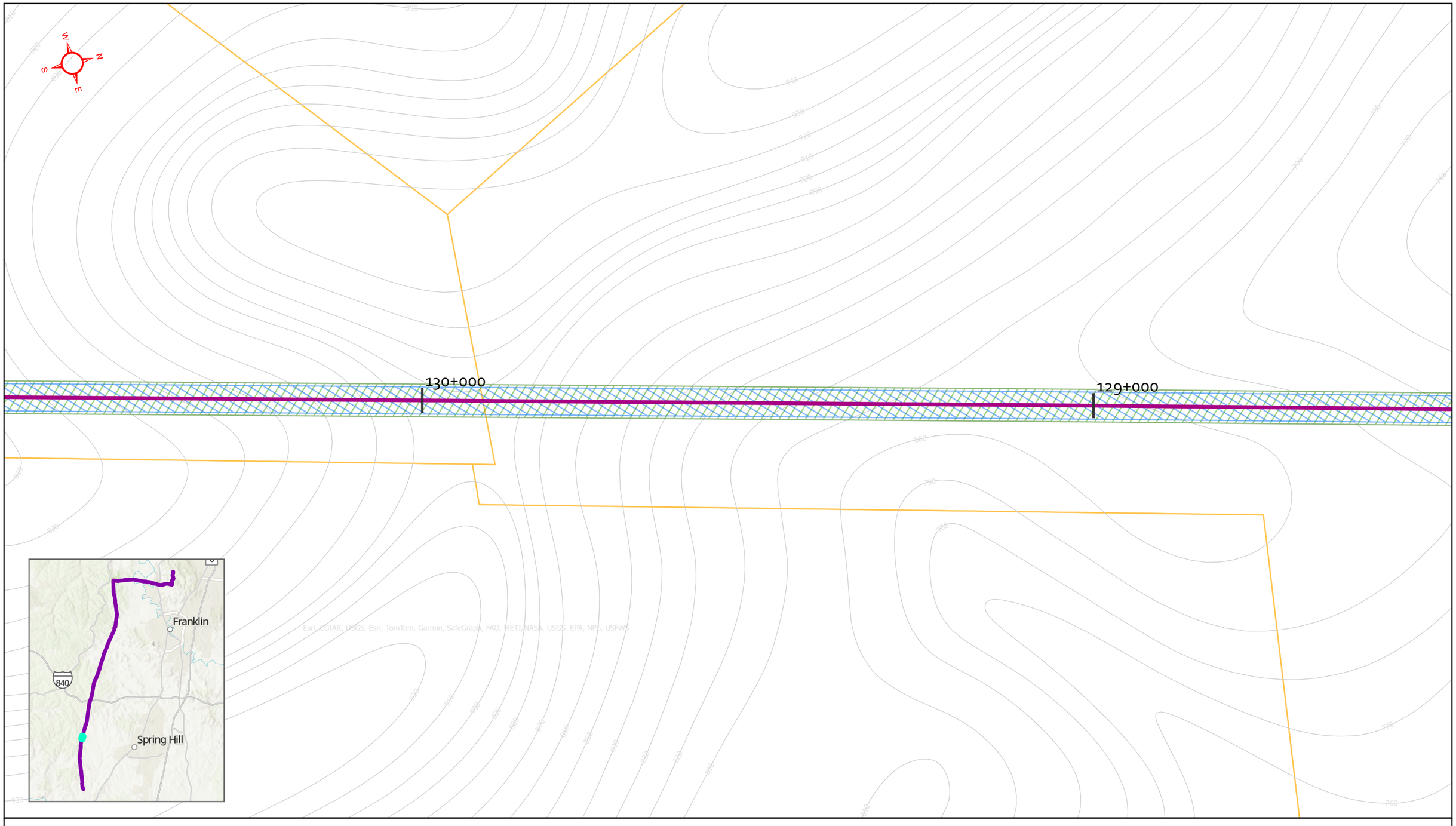
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

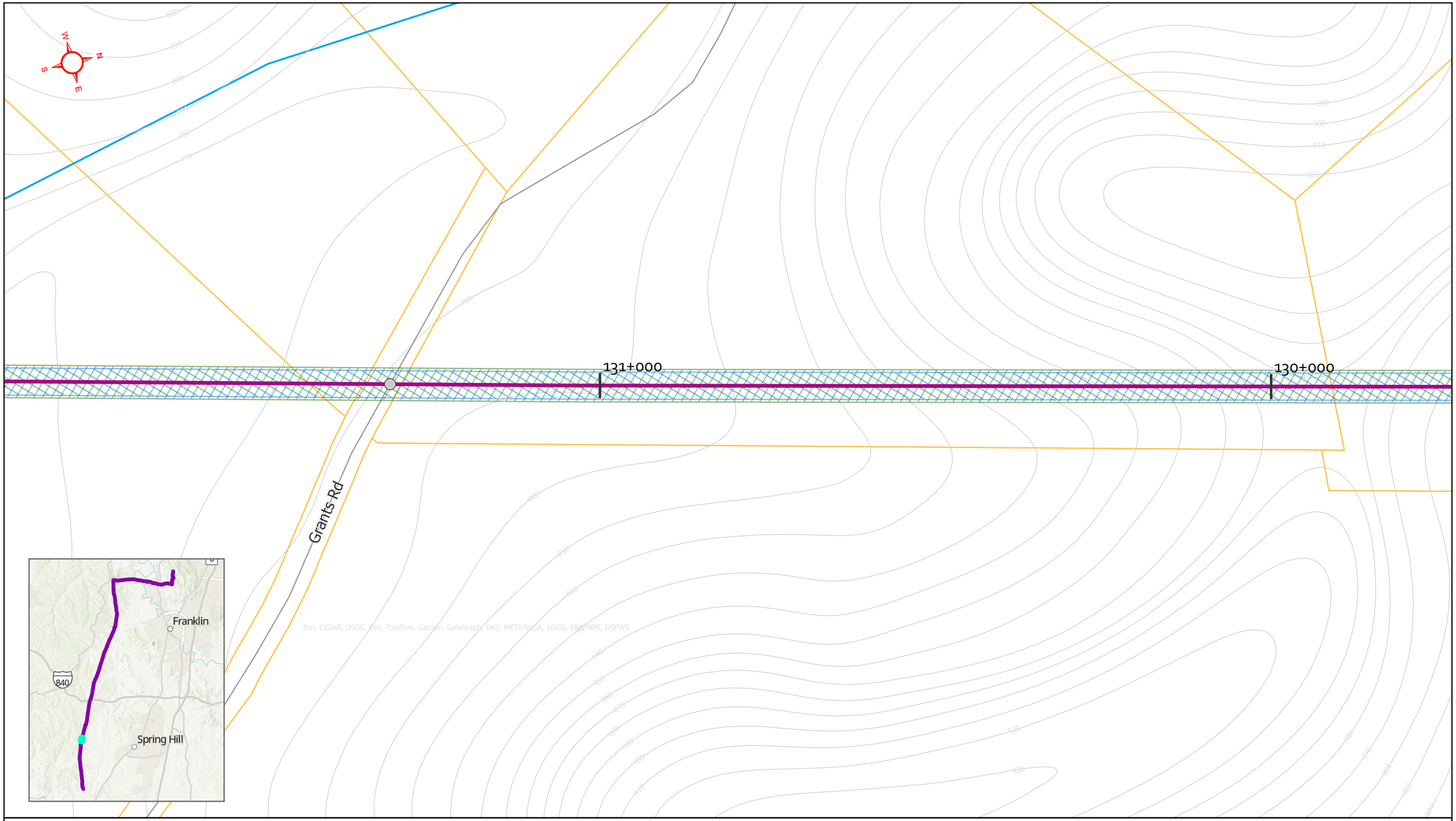
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

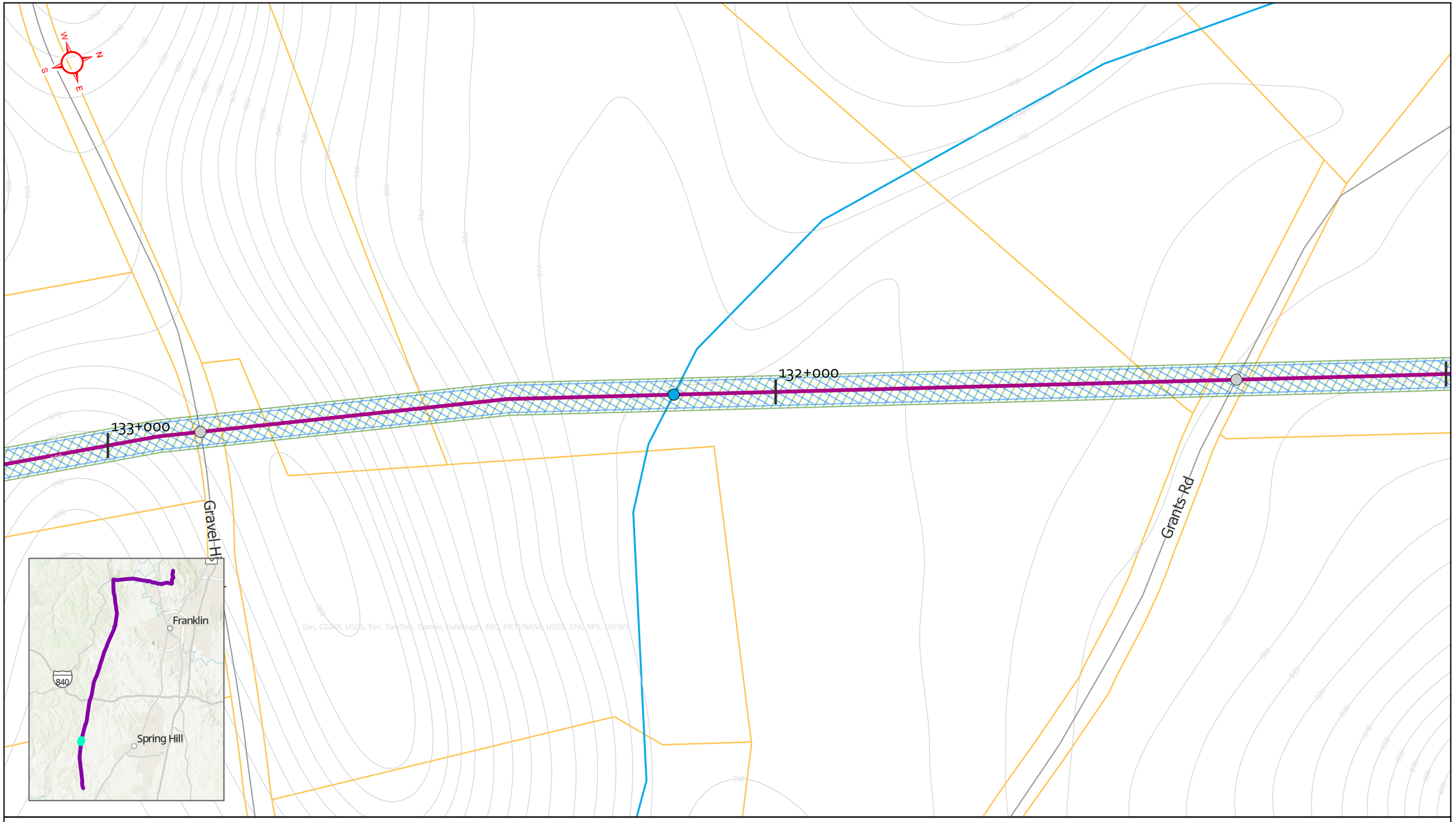
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

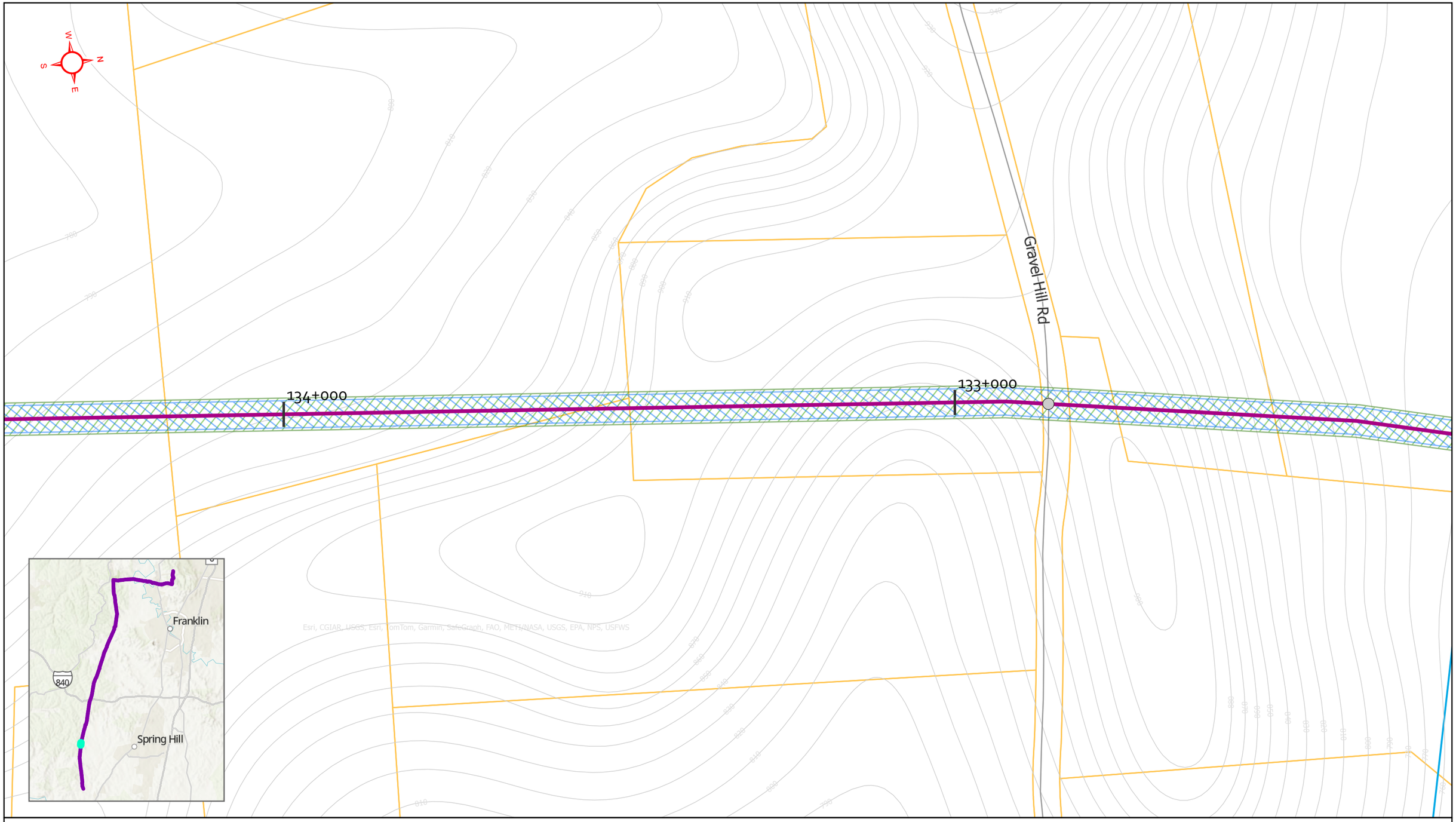


Proposed Water Transmission
Stream Crossing
Street Crossing
Single Transmission Line Easement
Double Transmission Line Easement
Streams
Parcels

Feet
0 200 400 600

MVUD Proposed Water Transmission

Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

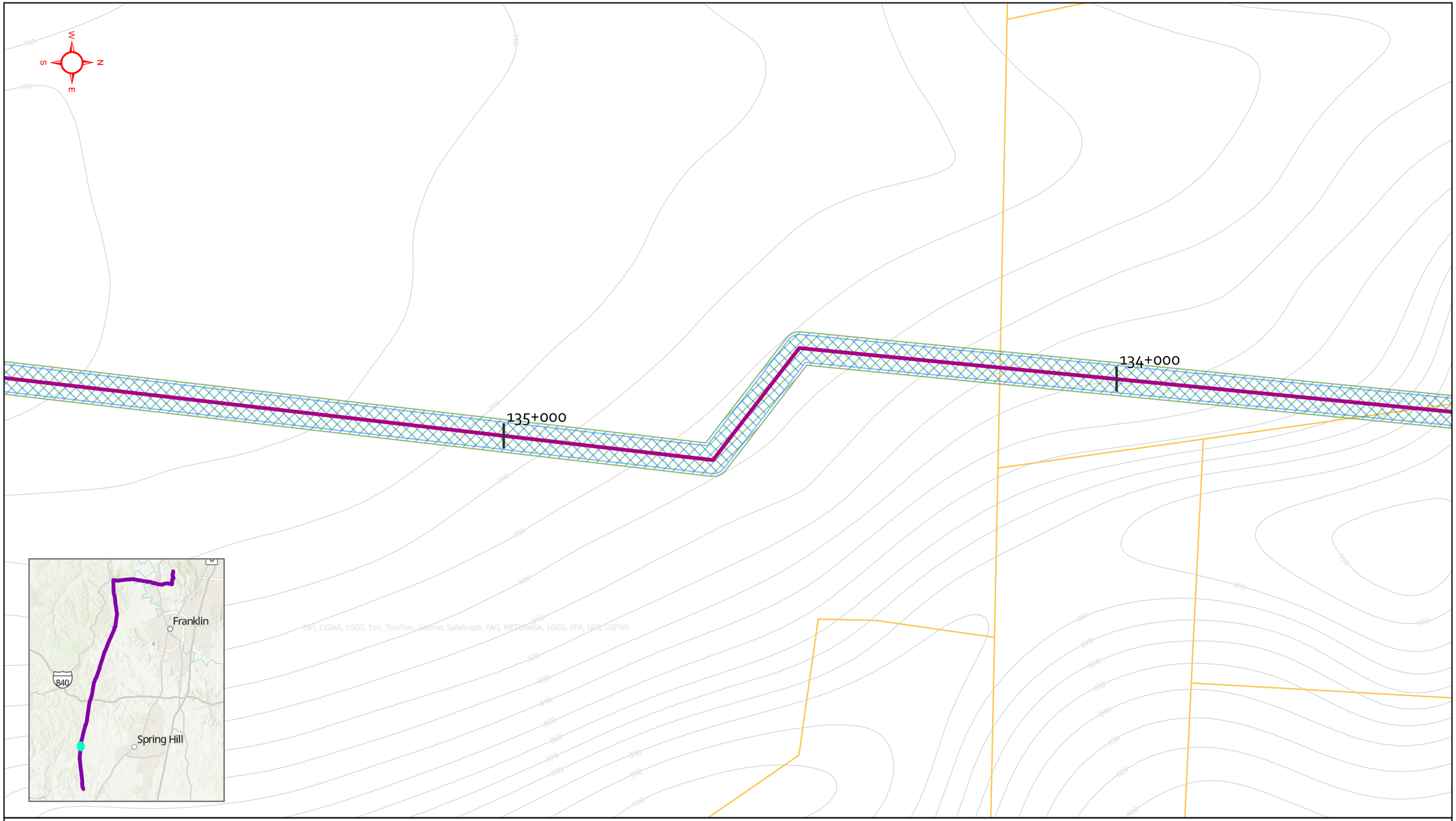
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

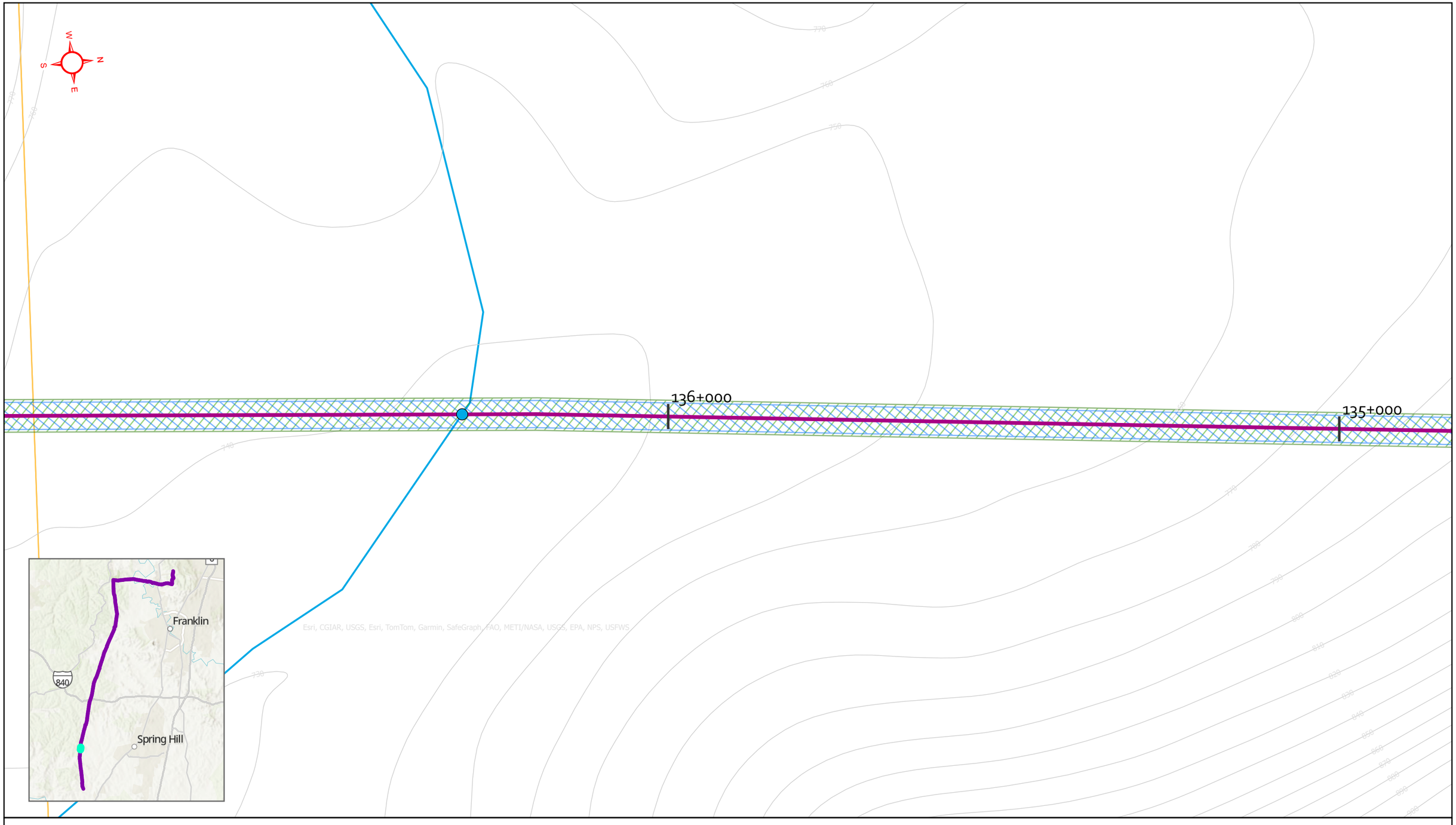
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

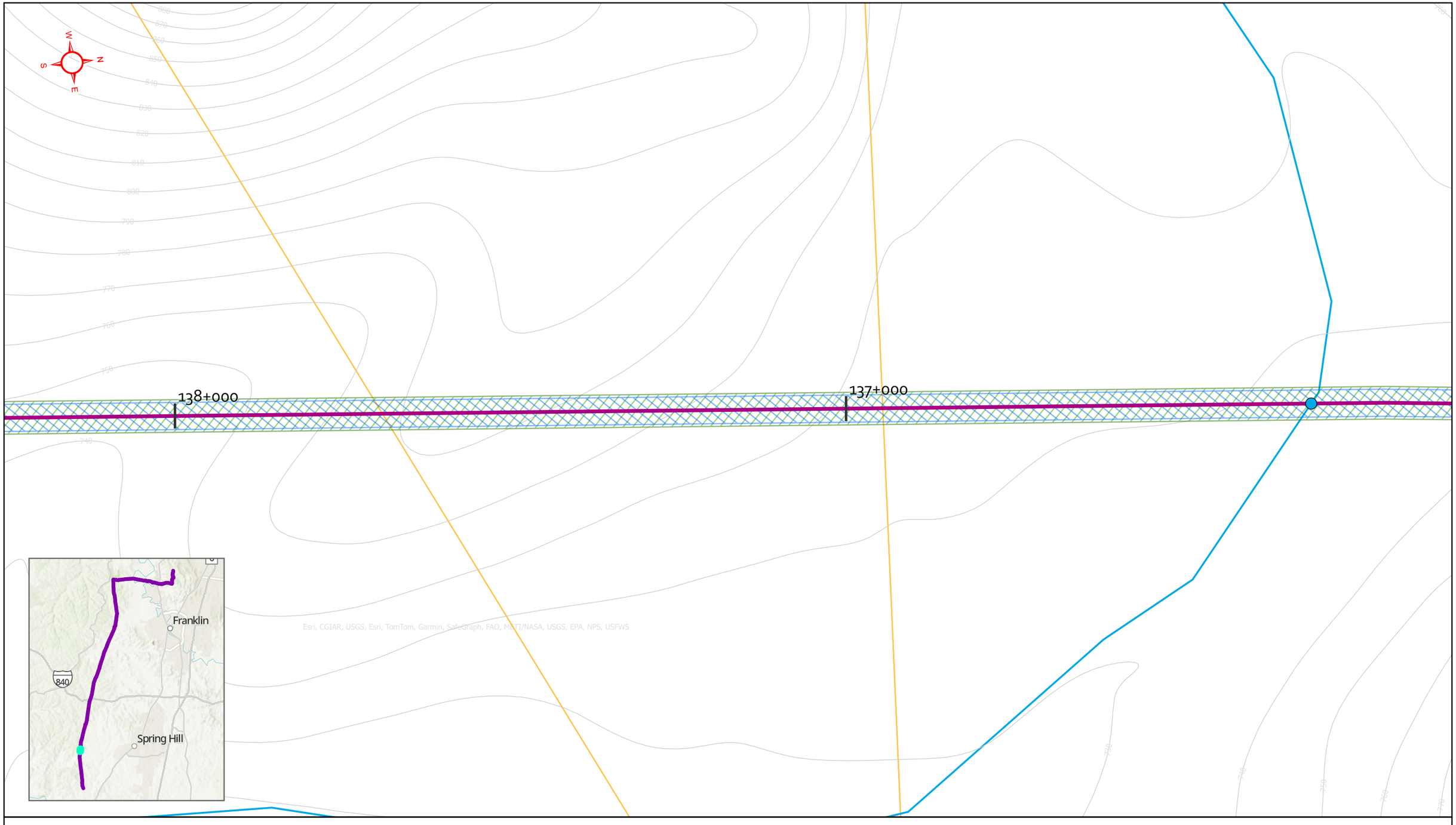
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

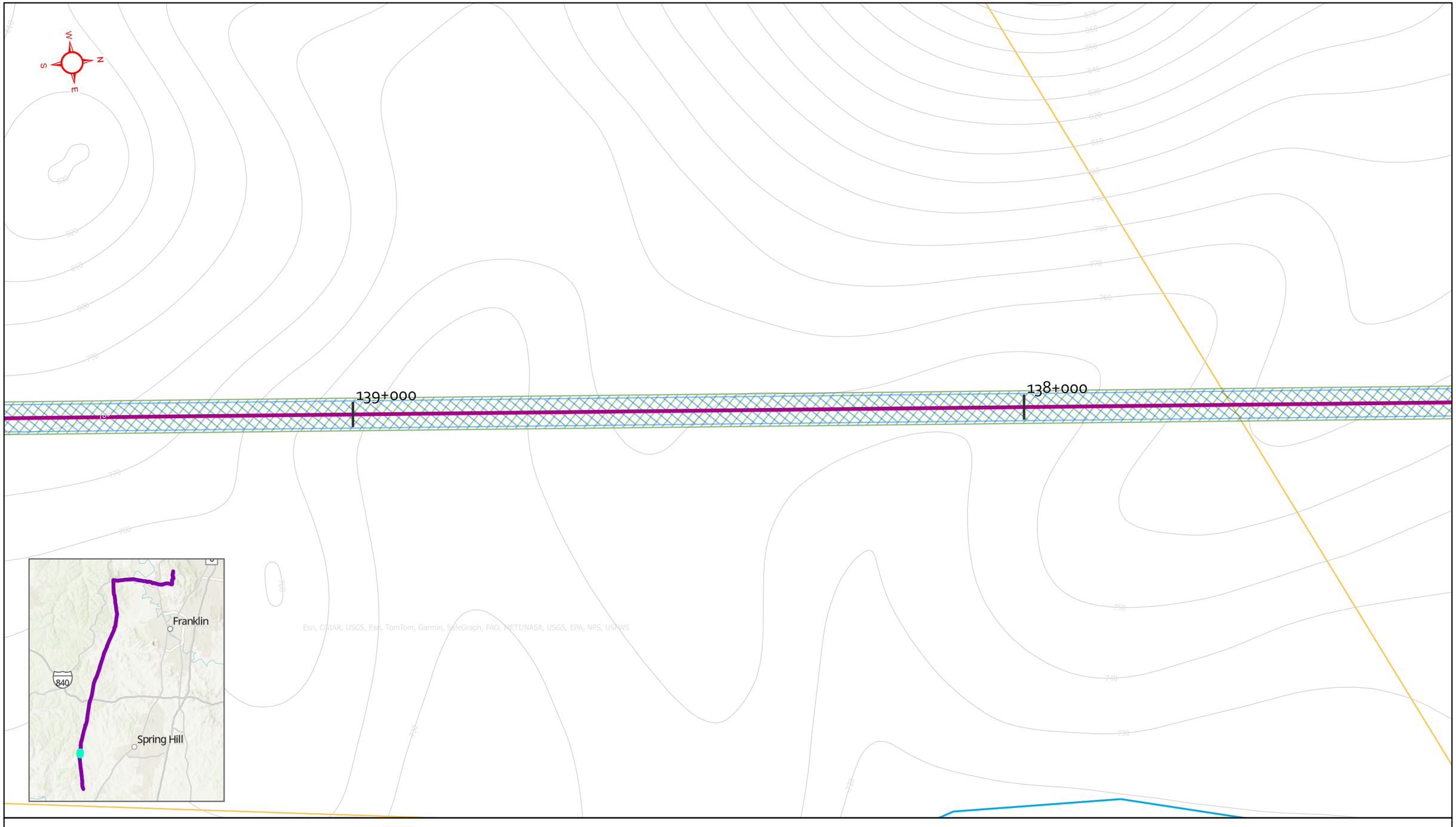
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

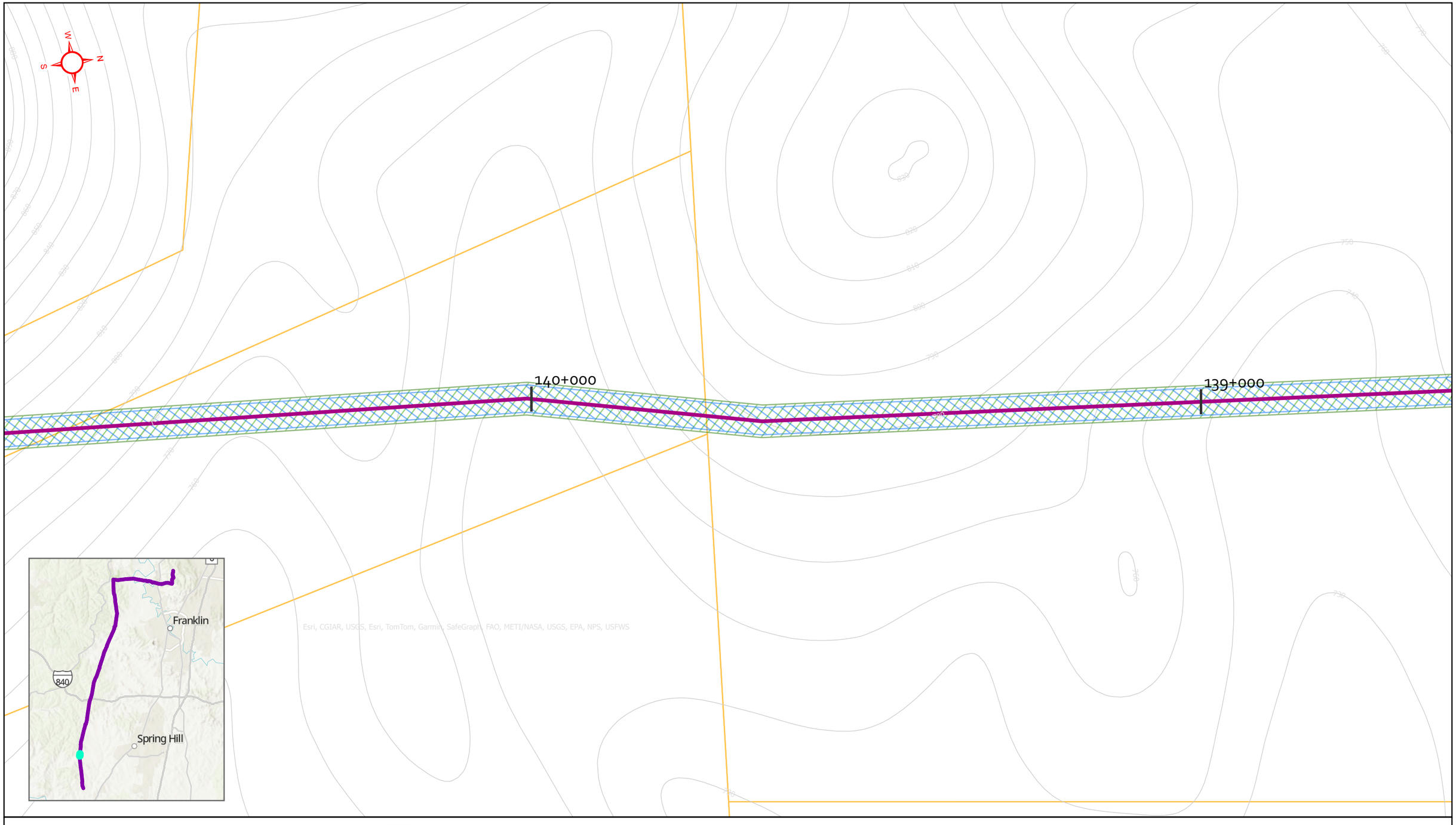
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

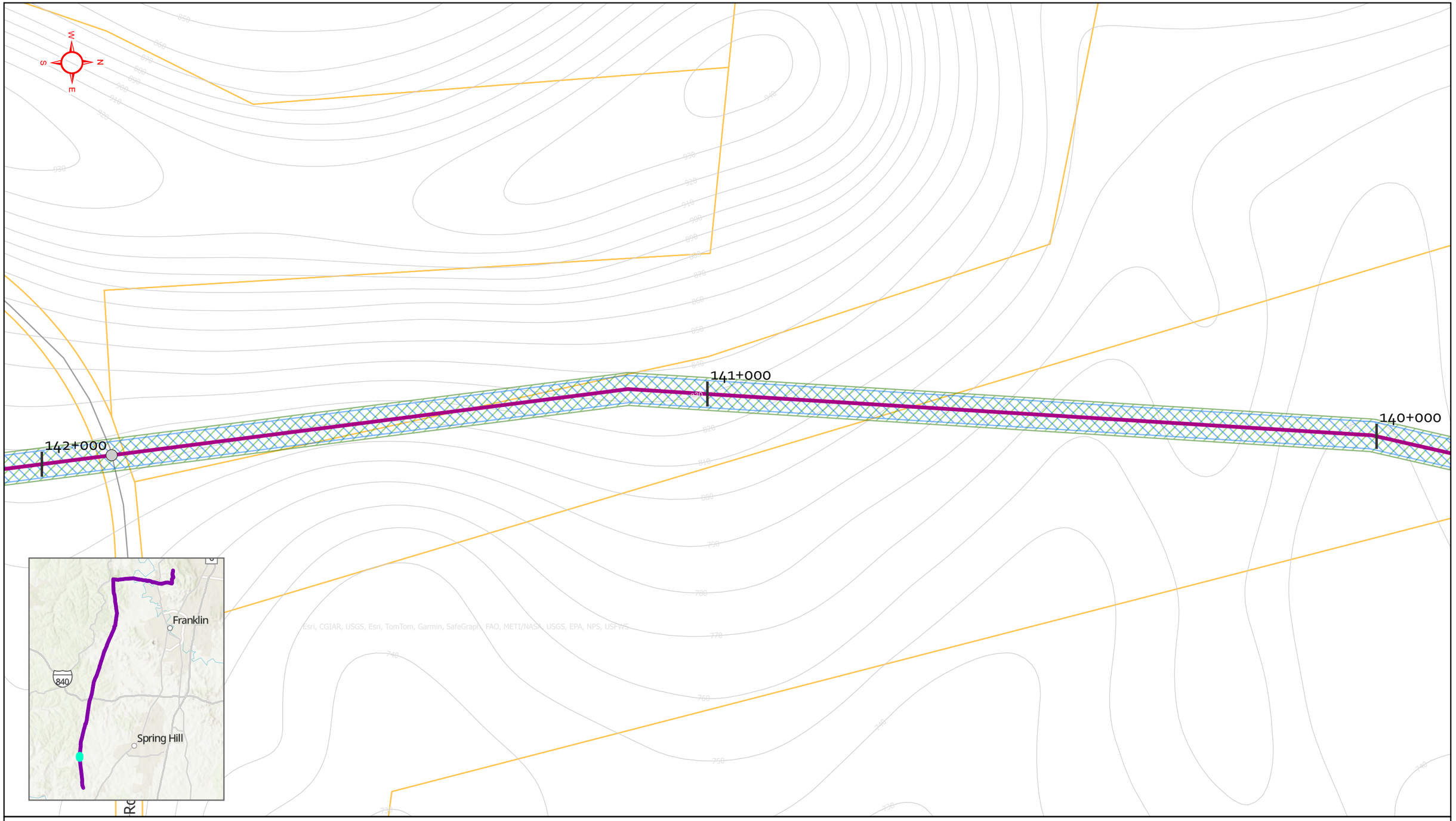
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Street Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

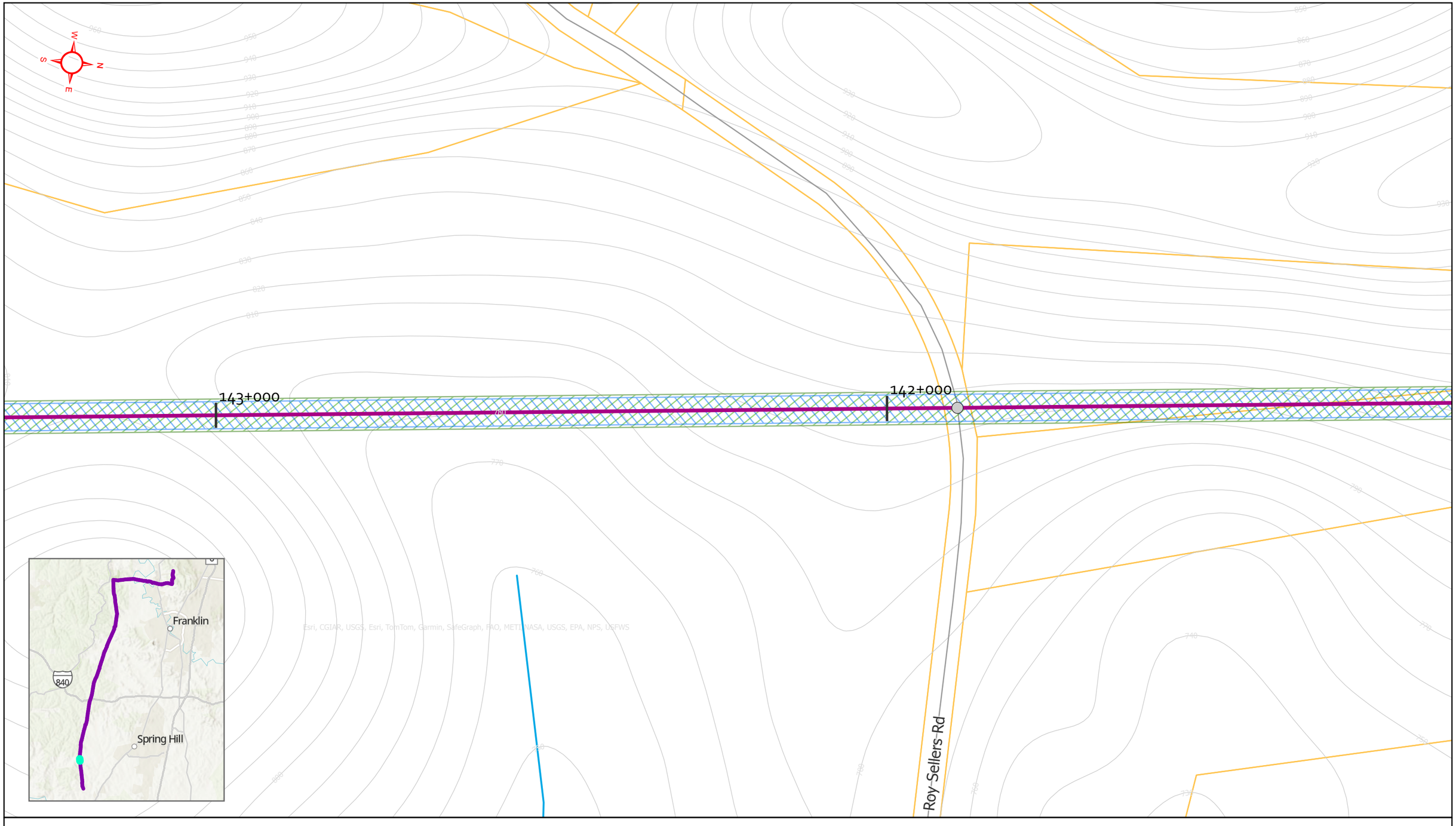
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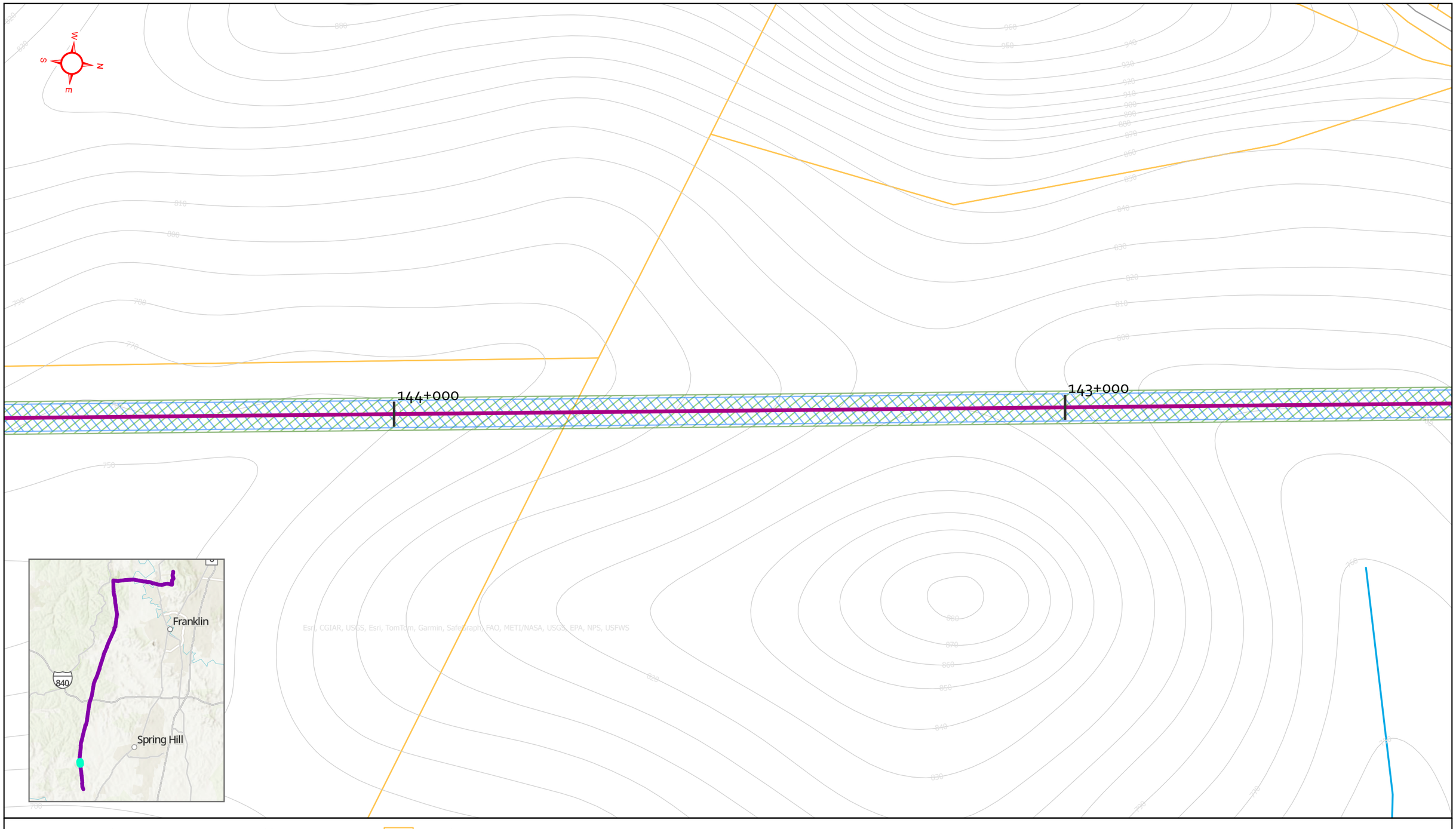
0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT


143+000
142+000
Roy Sellers Rd
Franklin
Spring Hill
840
Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS
Proposed Water Transmission
Street Crossing
Single Transmission Line Easment
Double Transmission Line Easment
Streams
Parcels
Feet
0
200
400
600
MVUD Proposed Water Transmission
Hazen
MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

Feet

0 200 400 600

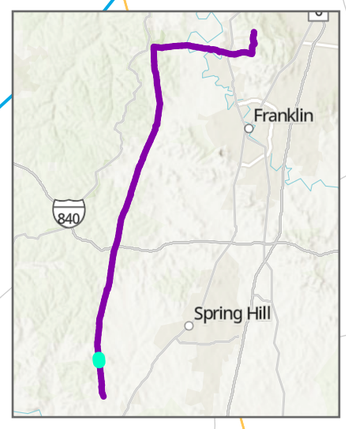
MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

147+000

146+000



Esri, CGIAR, USGS, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS, USFWS

Proposed Water Transmission

Stream Crossing

Single Transmission Line Easement

Double Transmission Line Easment

Streams

Parcels

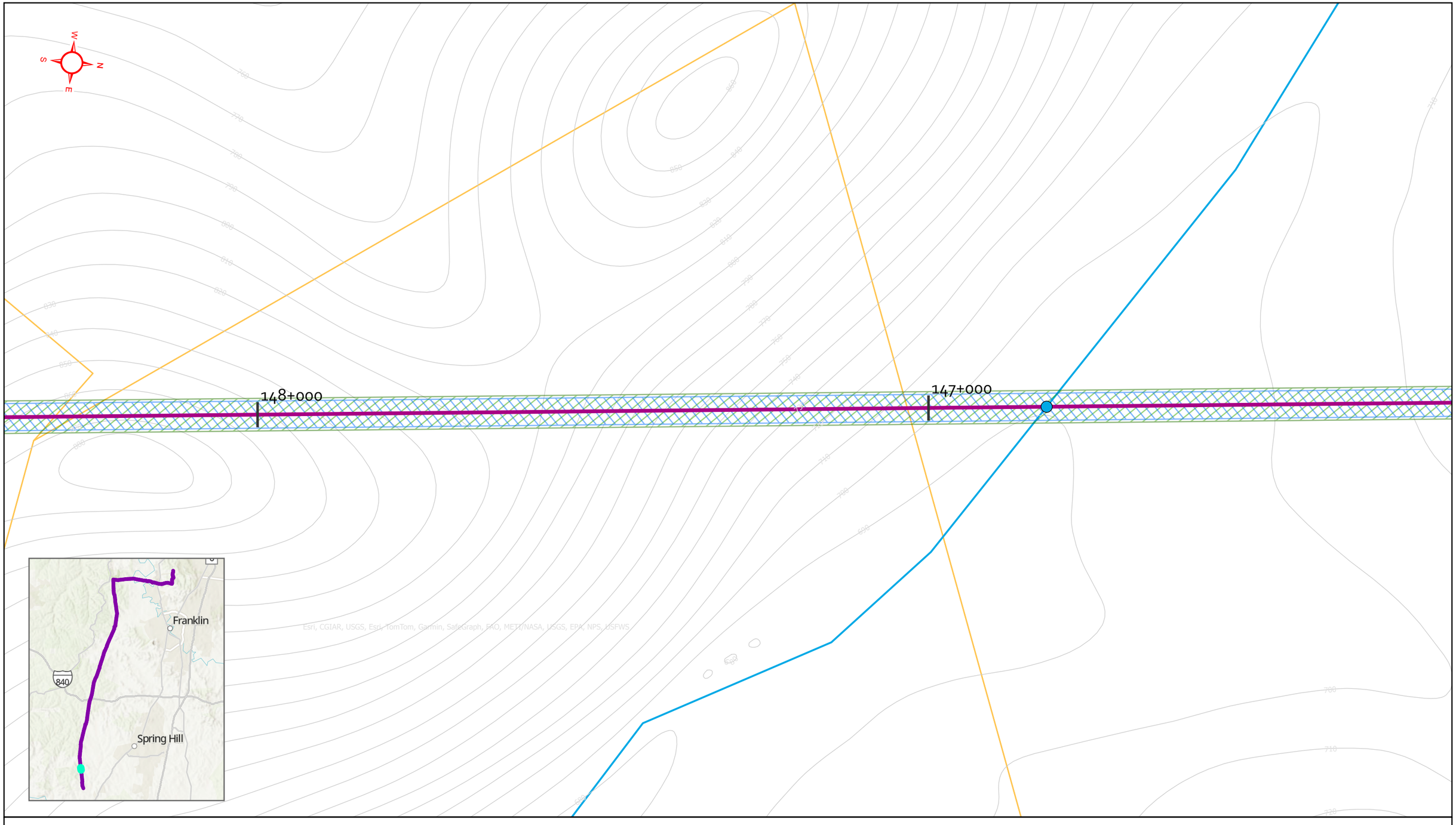
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

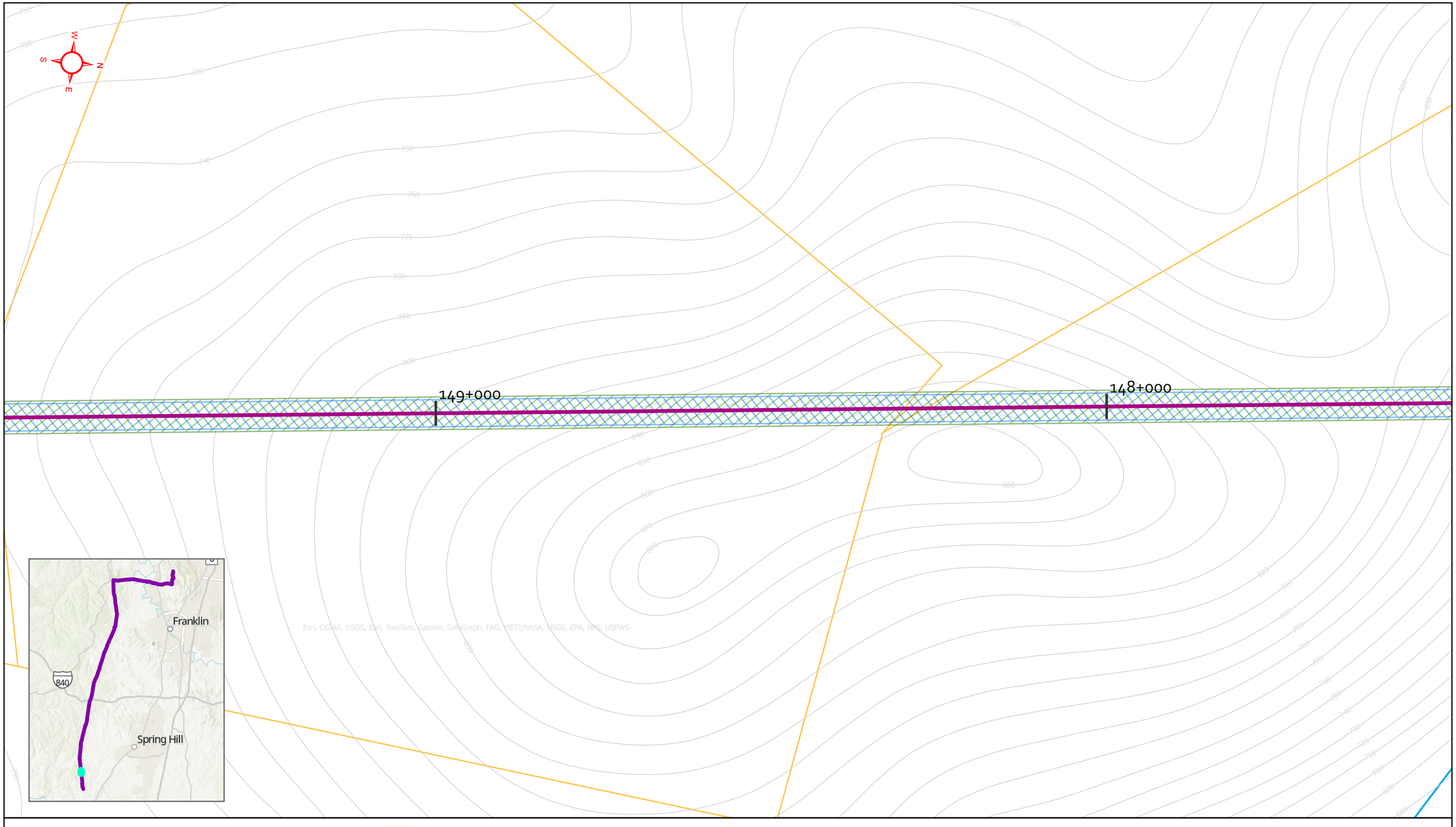
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

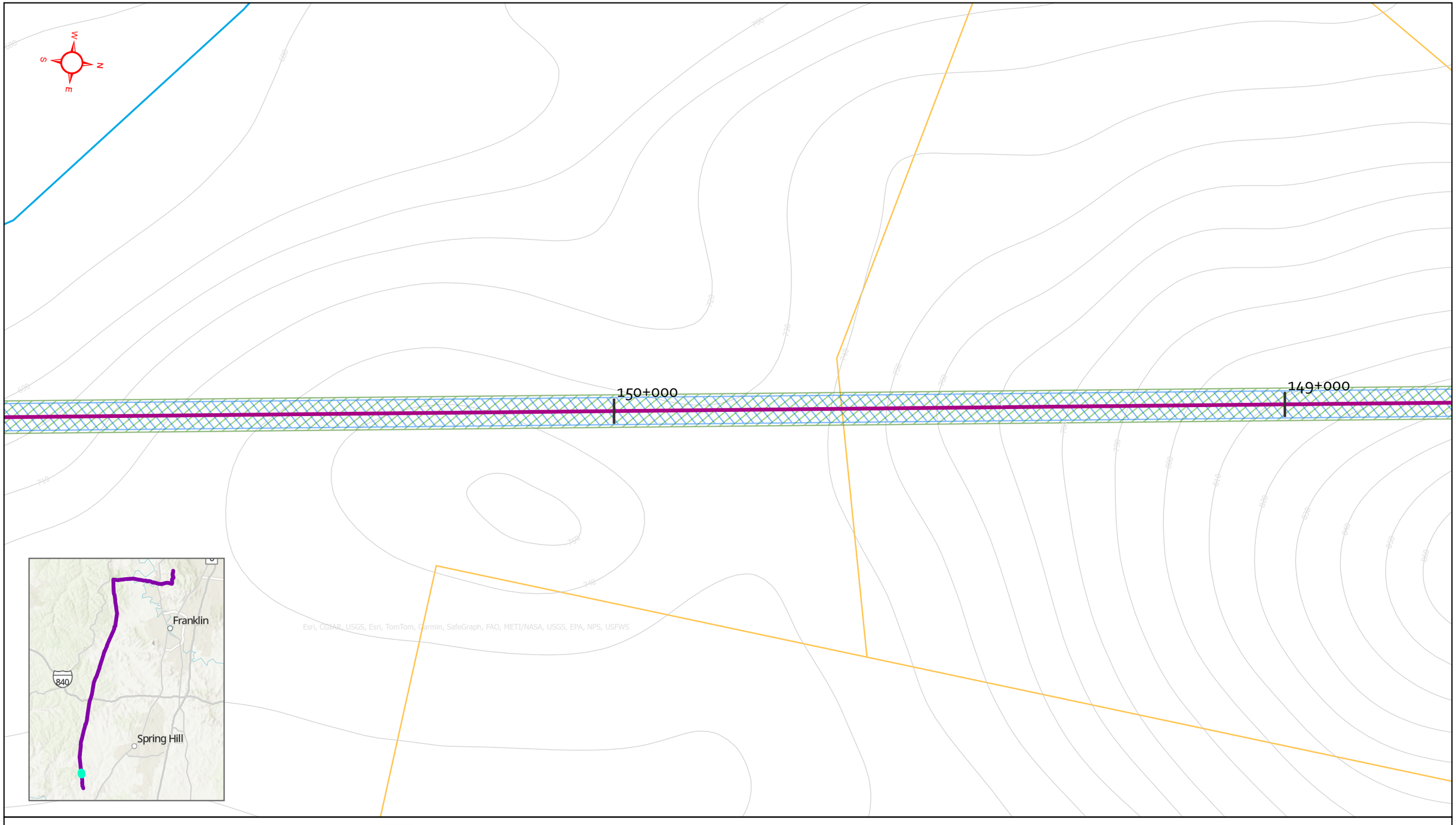
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0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

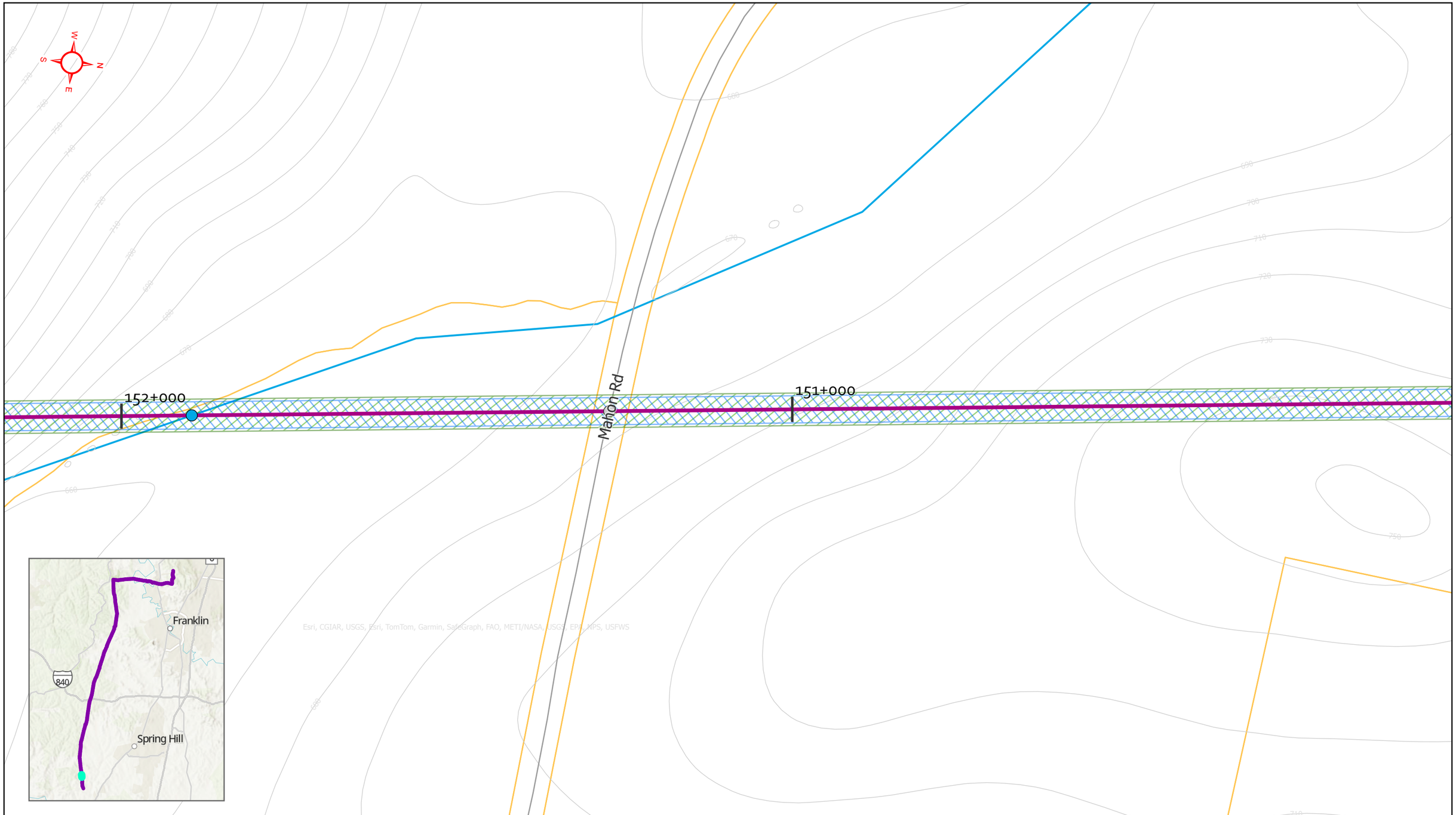
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Street Crossing

Single Transmission Line Easement

Double Transmission Line Easement

Streams

Parcels

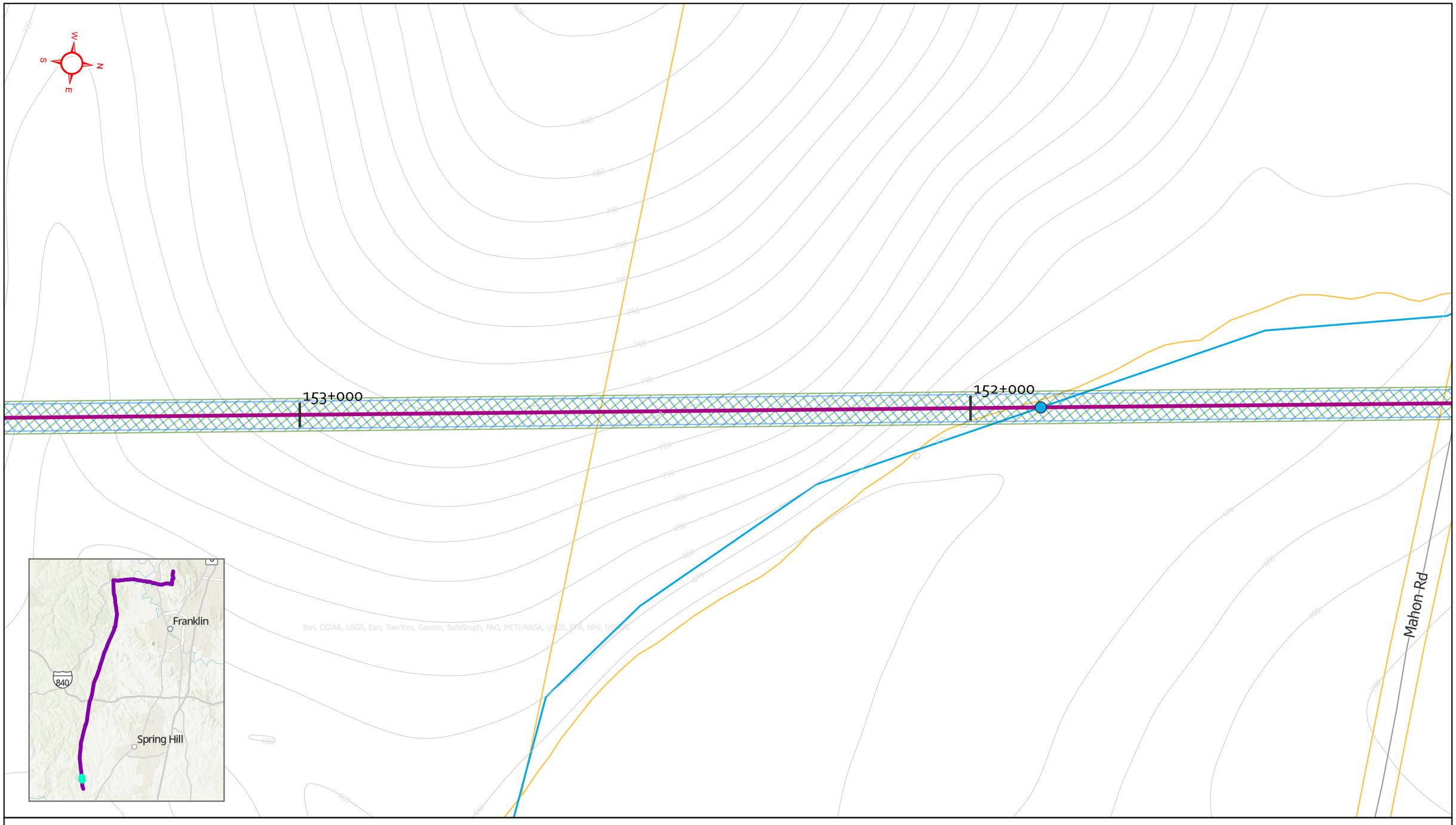
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Stream Crossing

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

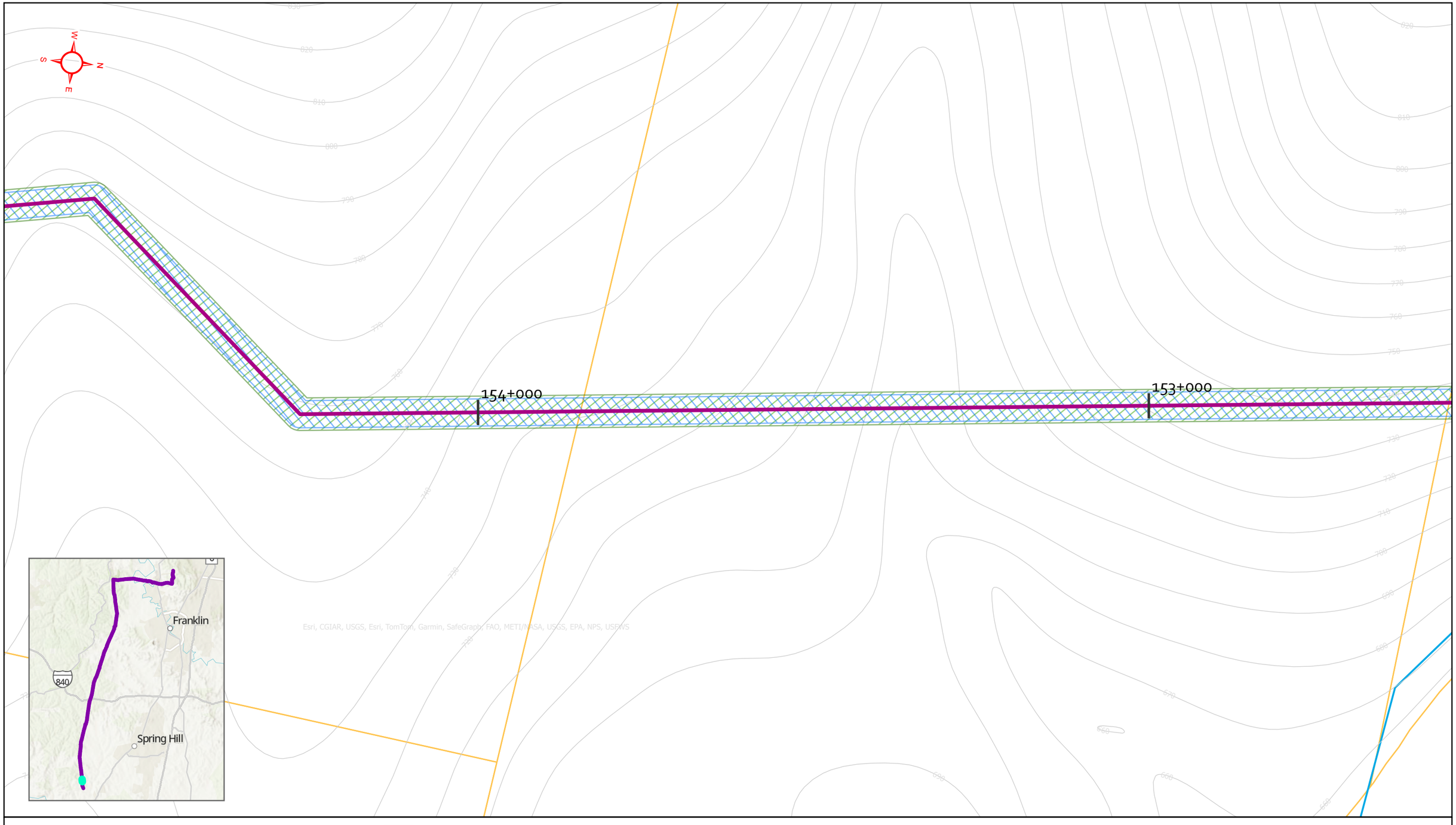
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

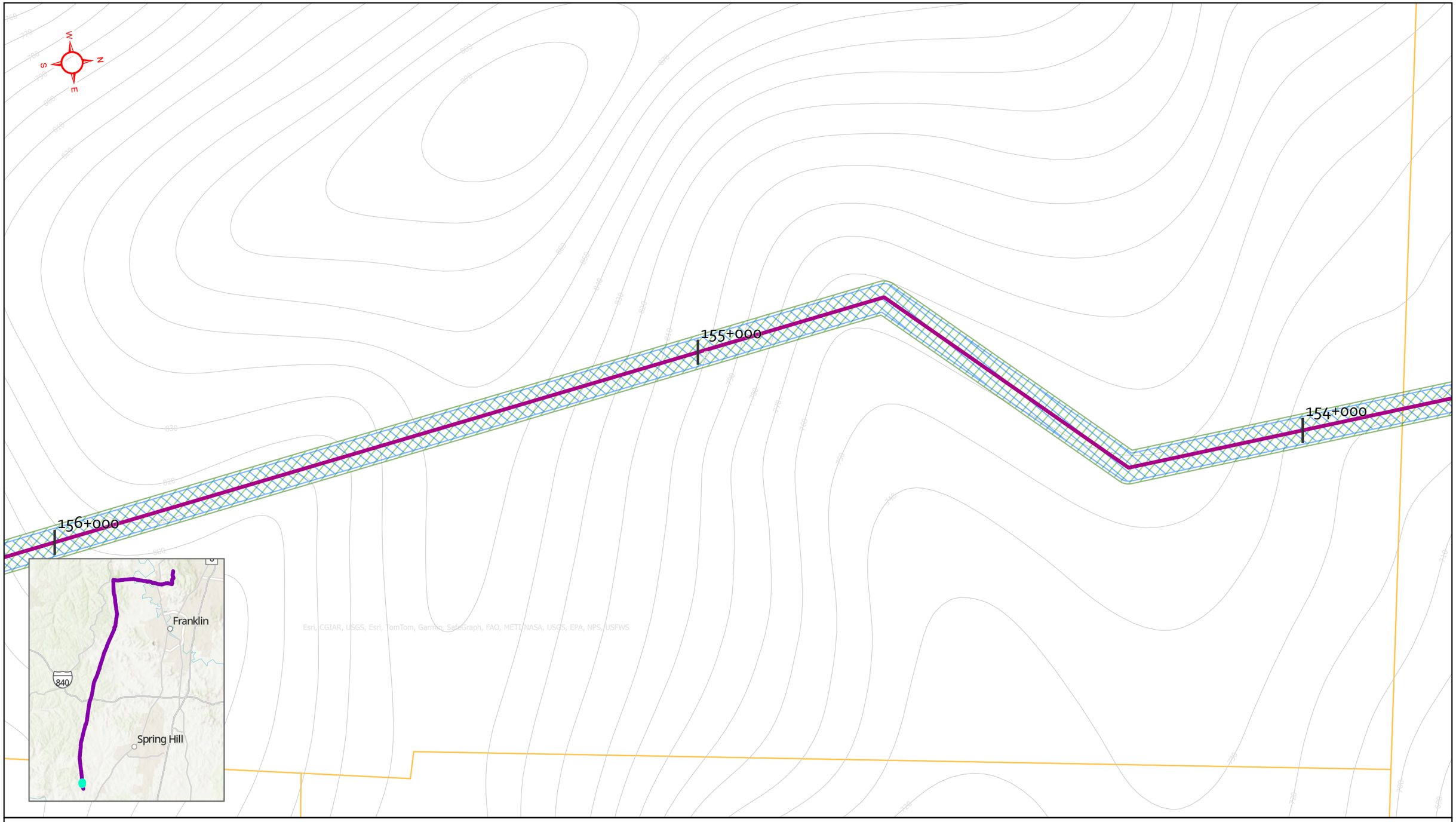
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

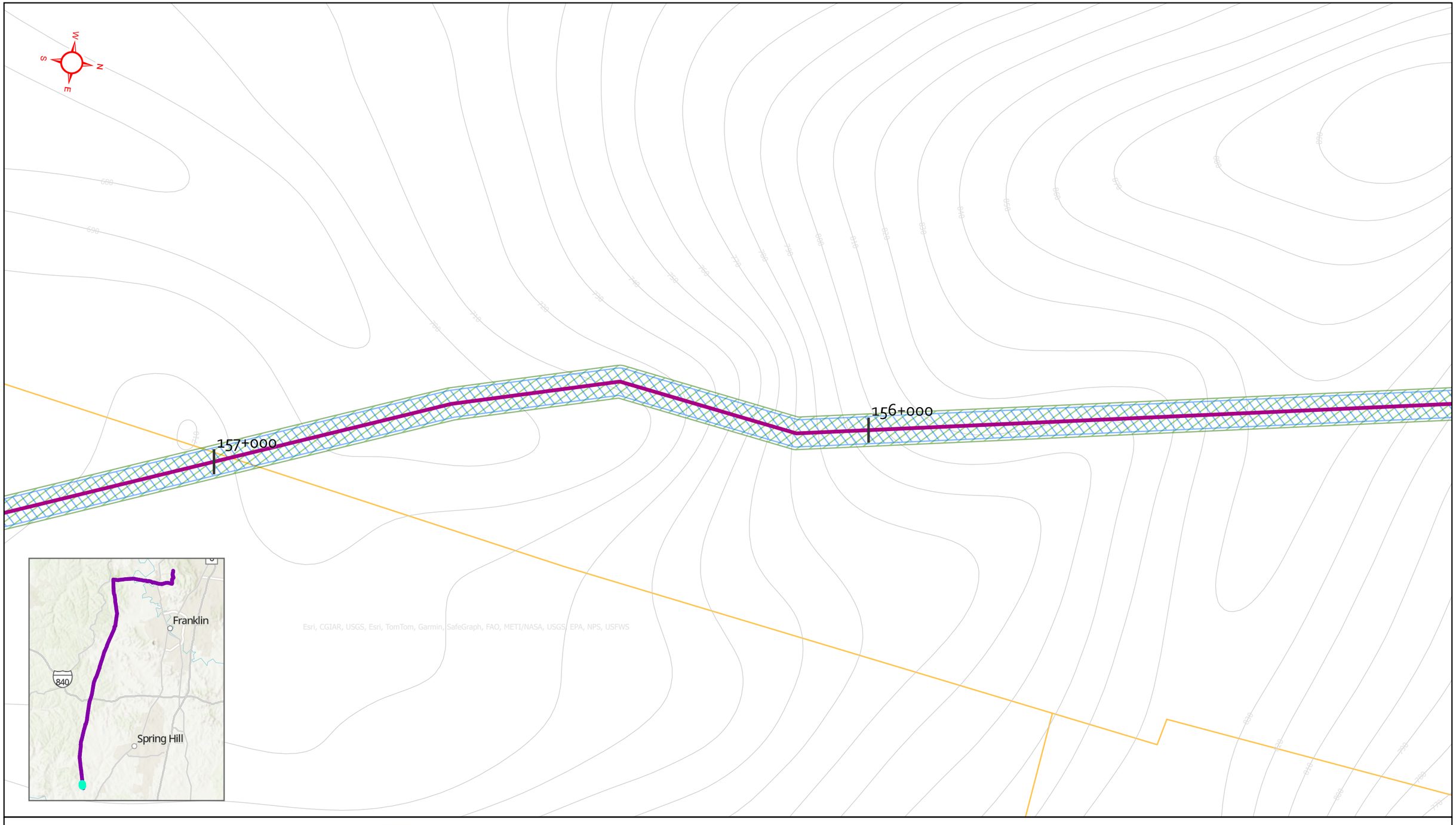
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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Single Transmission Line Easment

Double Transmission Line Easment

Streams

Parcels

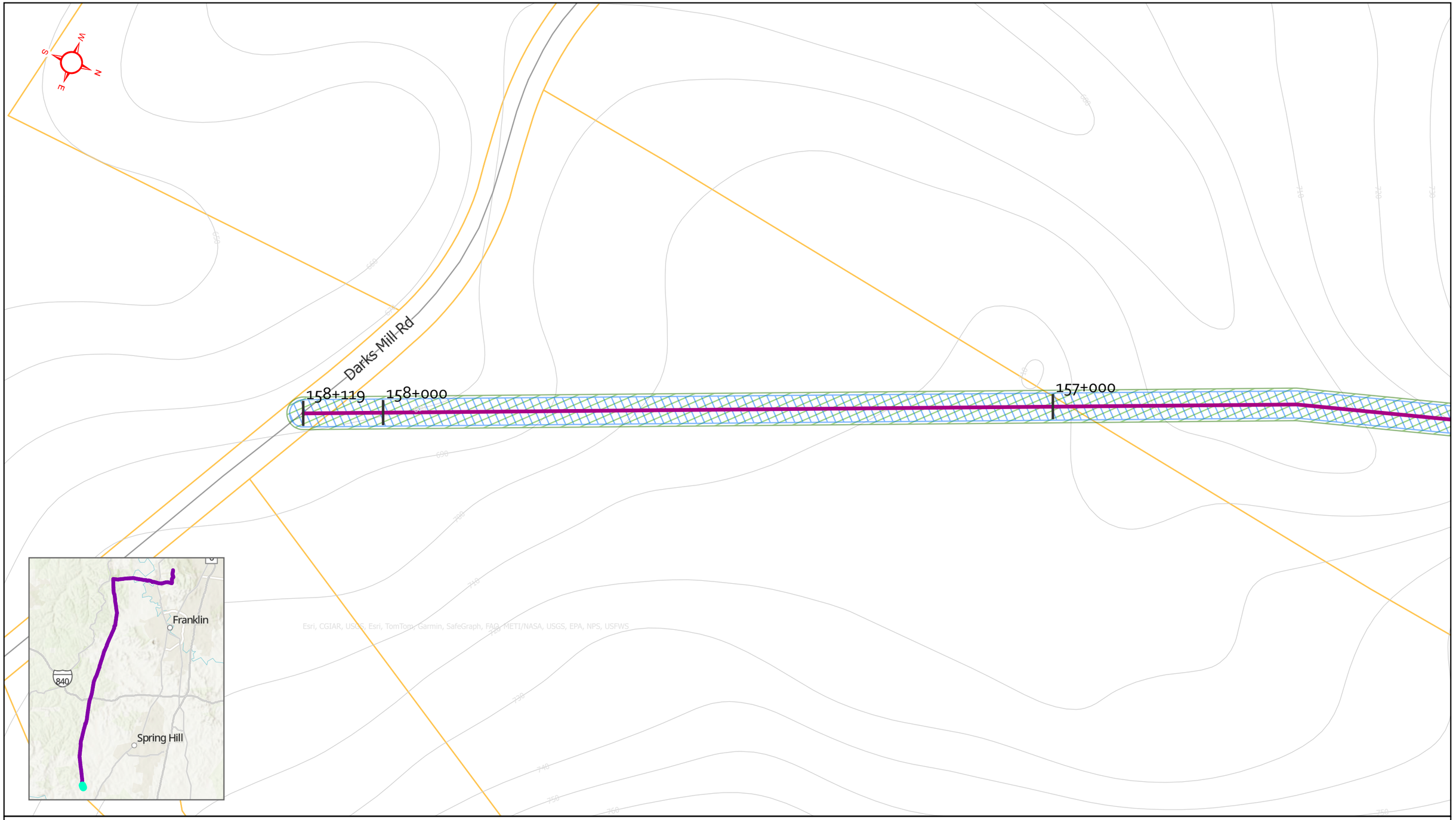
Feet

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MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT



Proposed Water Transmission

Double Transmission Line Easment

Parcels

Single Transmission Line Easment

Streams

Feet

0 200 400 600

MVUD Proposed Water Transmission

Hazen

MALLORY VALLEY UTILITY DISTRICT

Appendix B: Permitting Matrix

Hazen

Permitting Matrix for MVUD Water Transmission Main

Regulatory Agency	Permits Required	Permit Trigger	Required Documents	Notes
TVA	Easement Agreement	Required to allow utility to use TVA right-of-way for pipeline installation	Online application Project Plans	$2,500 Application Fee Large or linear projects (pipelines, fiber or cable attachments, grading, developments, etc.) that affect multiple spans of a TVA Transmission Line right of way (>3 spans of right of way). Reviews may take 45 days or longer.
	26a Permit	Required before any shoreline construction activities can be completed Required prior to construction of any obstruction affecting navigation or flood control along or in the TN River or any of its tributaries.	Joint Application Project Plans Location Map Site Photographs	6-9 month application prep Timeframes can extend to 120 days to process your application 60 day permit issuance Potential $1,000 Application Fee
TDEC	NPDES Construction Stormwater Permit	Required when one or more acres of land are cleared, graded, or excavated for construction	Online application SWPPP Report Project Erosion Control Plans	Allow 3 to 6 months to prepare the SWPPP for a project of this size 30-Day Review Period Project equal to or greater than 20 acres and less than 50 acres$3,000 Project equal to or greater than 5 acres and less than 20 acres$1,000 Project equal to or greater than 1 acres and less than 5 acres$250
	ARAP	Required when construction activities cross a water source, such as river or stream and alteration to a stream, river, lake, or wetland is necessary	Complete Form CN-1091 Site Photographs Project Plans	Individual ARAP Permit Allow 3 to 6 months to prepare the application for a project of this size Application Review period (for completeness) to be between 30 and 60 days Permit issuance 6 - 12 months Projects with five or more points of impact, and compensatory mitigation required $5,000 Projects with any number of points of impact, and compensatory mitigation not required $2,500
	Engineering Plans Review	Approval of plans, specifications, and all necessary documents required prior to construction	Online Application Project Plans & Specifications Owner Approval Letter Hydraulic Calculations Engineering Report (if applicable)	60-Day Review Period Water Lines: 1,000 feet or less - $100 Water Lines: Over 1,000 feet - $100 + (.01) * (Amount of feet over 100)
	Inter-Basin Transfer	Required when proposing to transfer water out of a major river basin for the benefit of (or to supply) a public water system	A Report must be submitted including the required information listed on TDEC's Inter-Basin Transfer Permit website. To include: •The volume of the proposed withdrawal and the proposed transfer ••Purpose and justification for the proposed transfer •Volume of the proposed withdrawal/transfer •Location of withdrawal, return, and transfer points; •Volume of water returned to the basin of origin •Peak capacity of withdrawal and transfer facilities; •Engineering / economic justification for proposed withdrawal/transfer •Assessment of hydraulic/environmental impacts on losing river •Evaluation of feasible alternatives •Receiving system's conservation programs/practices •Proposed start date of the water transfer	3-6 months application preparation 30-60-Day Review Period 3-6 months to issue permit Above 500,000 GPD, the fee shall be $1,000 for each 500,000 GPD or fraction thereof. ($40,000 for 20MGD, $120,000 for 60MGD)
USACE	Section 404 of the Clean Water Act Permit	Required for discharging dredged or fill material into waters of the United States.	ENG 4345 for General or Standard Permit or ENG 6082 for Nationwide Permit	60 to 180-Day Review Period Most permits issued by USACE Regulatory, such as Letters of Permission, Nationwide Permits, and General Permits, do not have a permit fee. Standard Permits have fees of $10 for non-commercial activities and $100 for commercial or industrial projects.
	Environmental Assessment	Required for 404 permitting.33 CFR § 230.7(a) and 10	includes a brief discussion of project need, potential environmental effects, appropriate alternatives, and any unresolved conflicts	Same review period as 404; will either result in a FONSI or require an EIS

Permitting Matrix for MVUD Water Transmission Main

Regulatory Agency	Permits Required	Permit Trigger	Required Documents	Notes
USACE	Consultation under Section 106 of the National Historic Preservation Act - TN Historical Commission	Required when cultural resources are found from cultural site surveys May be required in conjunction with 404/401 permitting	SHPO Concurrence as Non-Eligible, Concurrence with Implementation plan, Concurrence with Avoidance	30-Day Agency Review Period; Approx. 90 days for issuance of Concurrence letter
	Section 7 Consultation - USFWS, TN Ecological Services	Required when a protected species or designated critical habitat is present and may be impacted by the project May be required in conjunction with Section 404/401 permitting	Documentation of habitat availability, species survey results, proposed modification of habitat, avoidance and minimization measures, and proposed mitigative measures	30-Day Informal Consultation 135-Day Formal Consultation Process
	Authorization under Section 10 of the Rivers and Harbors Act	Required if the project involves obstruction or alteration of navigable waters of the United States	Joint application with Section 404 permit application	Issued in conjunction with Section 404 permit
TDOT	TDOT Permit	Required when crossing state roads	Color Coded Project Plans Pipeline Encroachment Form Environmental Agreement Form Traffic Control Letter	45-Day Review Period No Fee
Other Permits & Approvals	Natural Gas	Atmos Energy Gas Line Crossing	Call 811	30-Day Period to Mark Existing Utilities No Fee
		TC Energy Gas Line Crossing	Call 811	30-Day Period to Mark Existing Utilities No Fee
	Communications (Google, AT&T, etc.)	TBD	TBD	TBD
	Electric - Middle TN Electric	Electric Line Crossing	Call 811	30-Day Period to Mark Existing Utilities No Fee
	Williamson County	Land Disturbance Permit	Stormwater Management Plan Grading Plan	30-Day Review Period
	Maury County	Construction Permit for Roads & Right-of-Way	Construction Permit Form Plat or sketch of the work	3 days prior to construction
	Columbia Power and Water Systems	Utility Coordination	Call 811	30-Day Period to Mark Existing Utilities No Fee

Appendix C: Permitting Timelines

Hazen

Permitting Schedule for MVUD Water Transmission Main

Date Last Revised: 6/5/2025

Permits	Months																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Easement Agreement	60 Days for TVA		365 Days for Private Properties																	
26a Permit	6 to 9 Months Prepare Application									2 to 6 Months Review Period										
NPDES Construction Stormwater Permit	90 to 180 Days to Prepare SWPPP						30-Day Review													
ARAP	90 to 180 Days to Prepare Documents						60-Day Review		Permit Issuance 6 to 12 Months											
Engineering Plans Review	60 Days																			
Inter-Basin Transfer	3 to 6 Months Prepare Application						60-Day Review		Permit Issuance 3 to 6 Months											
Section 404 of the Clean Water Act	6 to 9 Months Prepare Application									2 to 6 Months Review Period										
Consultation under Section 106 of the National Historic Preservation Act - TN Historical Commission	6 to 9 Months Prepare Application									30-Day Review	Concurrence Letter Issuance 90 Days									
Section 7 Consultation - USFWS, TN Ecological Services	6 to 9 Months Prepare Application									30-Day	135-Day Formal Consultation Process									
Authorization under Section 10 of the Rivers and Harbors Act	Joint Application with Section 404 Permit Application, 6 to 9 Months Prepare Application									2 to 6 Months Review Period										
Nationwide	60 Days																			
TDOT Permit	45 Days																			
Natural Gas (Atmos)	30 Days																			
Natural Gas (TC Energy)	30 Days																			
Communications (Google, AT&T, etc.)	30 Days																			
Electric (Middle Tennessee Electric)	30 Days																			

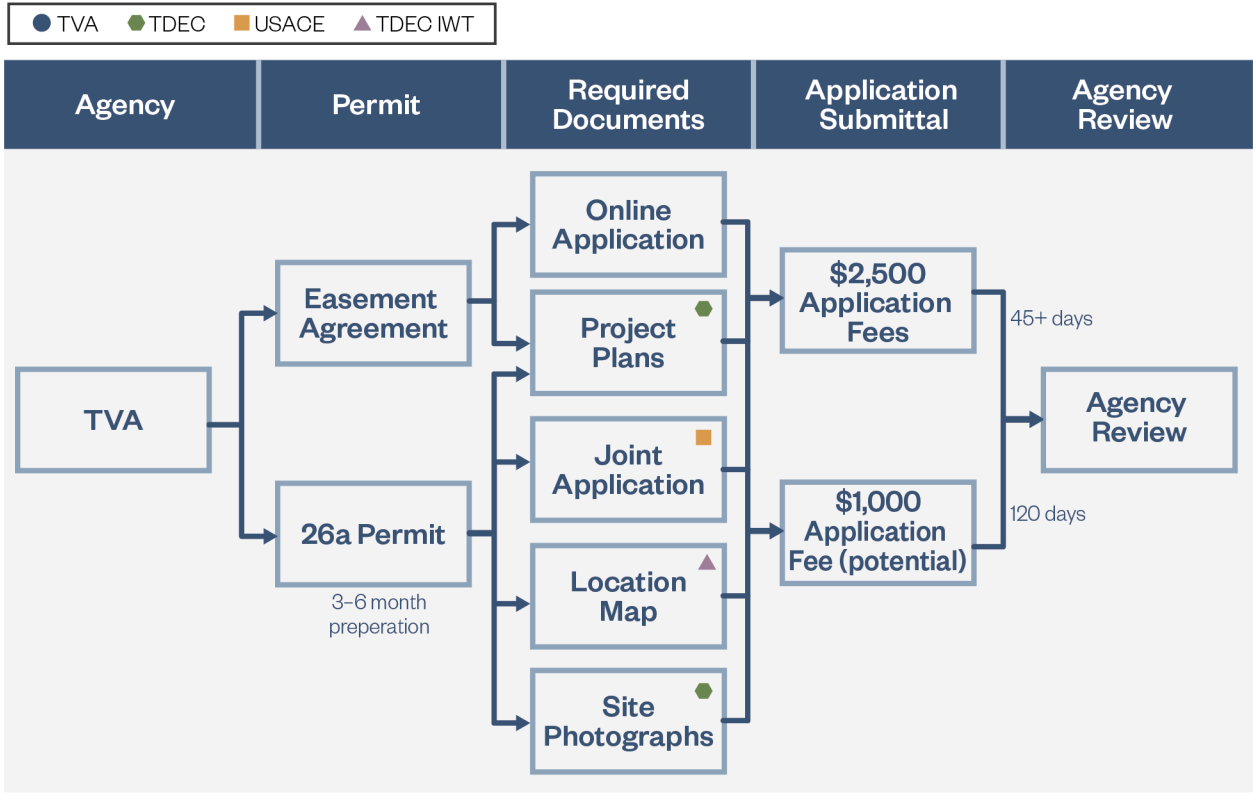
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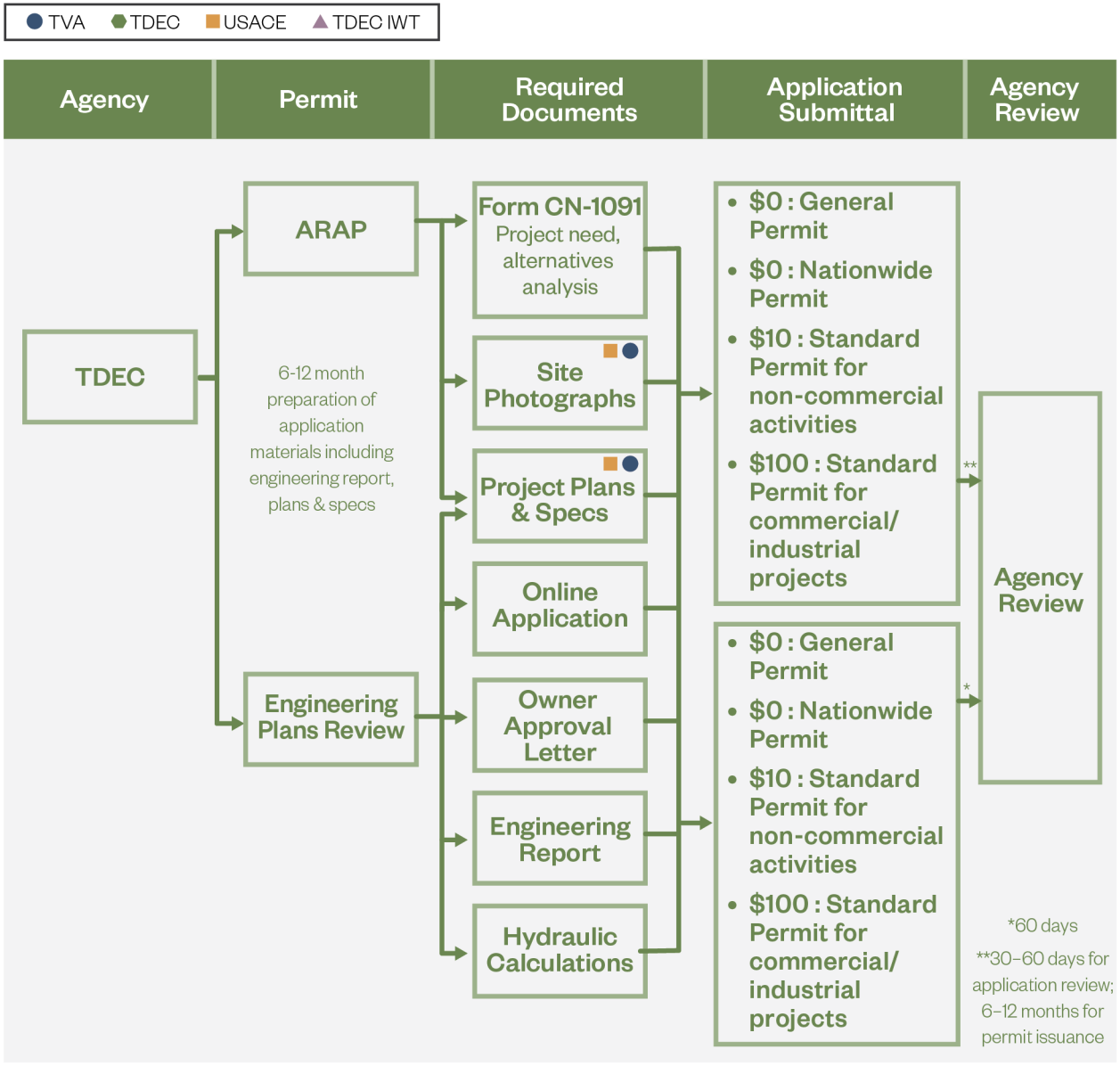
Permitting Schedule for MVUD Water Transmission Main

Date Last Revised: 6/5/2025

Permits	Months																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Williamson County - Land Disturbance Permit	90 to 180 Days to Prepare SWPPP						30 Days													
Maury County	3 Days																			
Columbia Power & Water Systems	30 Days																			

Appendix D: Permit Flow Charts

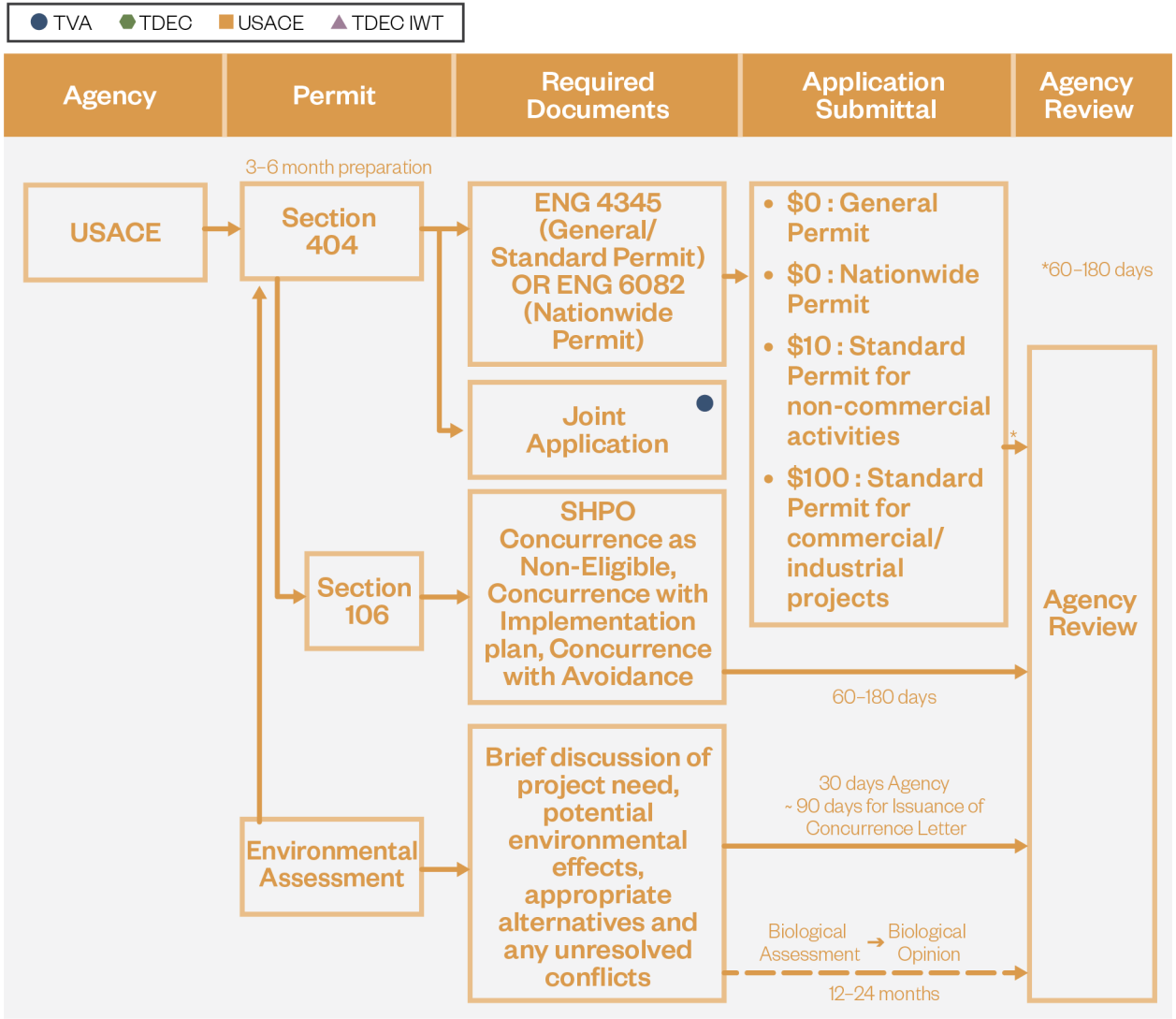

TVA
TDEC
USACE
TDEC IWT
Agency
Permit
Required Documents
Application Submittal
Agency Review
TVA
Easement Agreement
26a Permit
3–6 month preperation
Online Application
Project Plans
Joint Application
Location Map
Site Photographs
$2,500 Application Fees
$1,000 Application Fee (potential)
45+ days
120 days
Agency Review

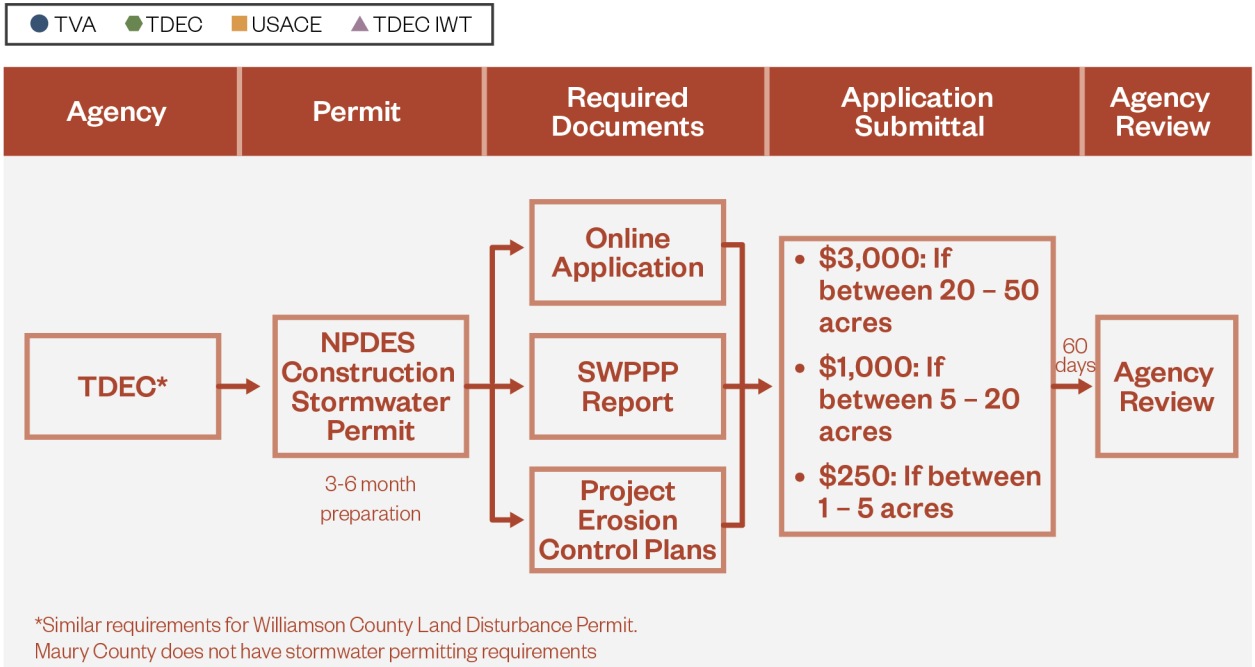

TVA
TDEC
USACE
TDEC IWT
Agency
Permit
Required Documents
Application Submittal
Agency Review
TDEC
ARAP
6-12 month preparation of application materials including engineering report, plans & specs
Engineering Plans Review
Form CN-1091
Project need, alternatives analysis
Site Photographs
Project Plans & Specs
Online Application
Owner Approval Letter
Engineering Report
Hydraulic Calculations
• $0 : General Permit
• $0 : Nationwide Permit
• $10 : Standard Permit for non-commercial activities
• $100 : Standard Permit for commercial/ industrial projects
• $0 : General Permit
• $0 : Nationwide Permit
• $10 : Standard Permit for non-commercial activities
• $100 : Standard Permit for commercial/ industrial projects
**
*
Agency Review
*60 days
**30–60 days for application review; 6–12 months for permit issuance

● TVA ⬣ TDEC ■ USACE ▲ TDEC IWT

Agency	Permit	Required Documents	Application Submittal	Agency Review
TDEC	Inter-Basin Transfer 3–6 months preparation	Report including: • Volume of proposed withdrawal and proposed transfer • Propose and justification for ⬣ proposed transfer • Location of withdrawal, return ● and transfer points • Volume of water returned of the basin of origin • Peak capacity of withdrawal and transfer facilities • Engineering/economic justification for proposed ⬣ withdrawal/transfer • Assessment of hydraulic/environmental impacts on losing river • Evaluation of feasible ⬣ alternatives • Receiving system's conservative programs/practices • Proposed start date of water transfer	Above 500,000 GPD, the fee shall be $1,000 for each 500,000 GPD or fraction thereof ($40,000 for 20MGD; $120,000 for 60MGD)	** Agency Review

**30 Day Review; 3-6 months for permit issuance


TVA
TDEC
USACE
TDEC IWT
Agency
Permit
Required Documents
Application Submittal
Agency Review
3–6 month preparation
USACE
Section 404
ENG 4345 (General/ Standard Permit) OR ENG 6082 (Nationwide Permit)
Joint Application
$0 : General Permit
$0 : Nationwide Permit
$10 : Standard Permit for non-commercial activities
$100 : Standard Permit for commercial/ industrial projects
*60–180 days
Section 106
SHPO Concurrence as Non-Eligible, Concurrence with Implementation plan, Concurrence with Avoidance
60–180 days
Agency Review
Environmental Assessment
Brief discussion of project need, potential environmental effects, appropriate alternatives and any unresolved conflicts
30 days Agency
~ 90 days for Issuance of Concurrence Letter
Biological Assessment
Biological Opinion
12–24 months


TVA
TDEC
USACE
TDEC IWT
Agency
Permit
Required Documents
Application Submittal
Agency Review
TDEC*
NPDES Construction Stormwater Permit
3-6 month preparation
Online Application
SWPPP Report
Project Erosion Control Plans
• $3,000: If between 20 – 50 acres
• $1,000: If between 5 – 20 acres
• $250: If between 1 – 5 acres
60 days
Agency Review
*Similar requirements for Williamson County Land Disturbance Permit.
Maury County does not have stormwater permitting requirements

Appendix E: USACE Statement and HVUD Letter

We've been informed that USACE is conducting a system study of the Cumberland River, with an anticipated completion at the end of 2026. This study is crucial for determining the availability of water from the Cumberland River for municipal and industrial water supply for the Middle Tennessee region. This proposed withdrawal aims to shift reliance from the Duck River watershed to the Cumberland River.

The USACE study will help assess the available volumes from the Cumberland River in relation to the requests received from our partner utilities. It will also be vital in identifying any constraints or associated fees concerning Cumberland River withdrawals while considering existing withdrawals by current users.

Once the USACE study is complete, we'll provide this information to the partnering utilities to help determine the full feasibility of withdrawing water from the Cumberland River.

Statement reviewed and approved by Valerie McCormack, PhD and Ryan Wigner of the USACE, Nashville district 6.10.2025

HVUD
HARPETH VALLEY
UTILITIES DISTRICT

June 12, 2025

Jenny Clarke
General Manager
Mallory Valley Utility District
PO Box 936
Franklin, TN 37065

Re: Water Request for Maury County

Mallory Valley Utility District (MVUD) requested Harpeth Valley Utilities District (HVUD) provide capital improvement costs, water rates, and minimum bill requirements to deliver 20, 35, and 50 million gallons of treated water per day (MGD) for MVUD to serve potential customers in Maury County. HVUD engaged contractors to provide rough order of magnitude estimates for capital improvements. As reported during January 15th, 2025, Duck River Alternatives Discussion Meeting, the estimates are $501, $688, and $875 million in 2025 dollars for the 20, 35, and 50 MGD capacity scenarios, respectively. These estimates include the construction cost for the physical assets required to withdraw, treat, and deliver water to MVUD near Old Natchez Trace at the HVUD service area boundary.

After the January meeting, HVUD learned that the U.S. Army Corps of Engineers (USACE) will not consider any new withdrawal requests from the Cumberland River, HVUD's water source, until late 2026 when a system study of the basin is complete. Additionally, it is HVUD's understanding that the study will identify the quantity of water available to existing and future municipal and industrial users and the fixed and variable cost for that water.

HVUD does not believe it is prudent to provide a water rate estimate or assume a minimum bill contractual arrangement until the USACE study has been published and HVUD receives details regarding the proposed funding sources and contractual arrangements for a project of this magnitude. A concern in providing rate estimates at this time is the implication that HVUD has or will have the capacity to be able to supply this quantity of water at that cost and by a certain date, regardless of disclaimers included with those estimates. HVUD understands that estimated water rates may factor into MVUD and its stakeholders' decisions and is therefore uncomfortable submitting incomplete information.

If the USACE study shows available excess capacity in the Cumberland Basin and MVUD's request is still open, HVUD will update the capital cost estimates and coordinate with MVUD to determine estimated

future water rates with an appropriate level of analysis. HVUD's first obligation is to serve current municipal contracts and direct customers while evaluating future expansions.

Respectfully,

John Brown
General Manager

Jay Tant
Assistant General Manager

Copy: April Grippo – TDEC
Valarie McCormack – USACE
Sam Harrison – HVUD
Bobby Nutt - MVUD

Appendix F: Project Schedule

Activity ID	Activity Name	Duration	Start	Finish	Total Float
Mallory Valley Feasiblity Project Schedule - MASTER					
Contracts					
CONT1100	USACE Cumberland River Study	0		31-Dec-26*	0
CONT1110	Stakeholders Obtain & Analyze Findings / Funding	252	04-Jan-27	30-Dec-27	0
CONT1130	Limited Notice to Proceed	0	30-Dec-27		3
CONT1120	Procure Contractor / Designer	126	01-Jul-27	30-Dec-27	0
Design					
30% Design					
DES3120	Model Evaluation	64	03-Jan-28	31-Mar-28	0
DES3110	SUE Investigation	128	03-Jan-28	30-Jun-28	0
DES3130	Route Development	64	03-Apr-28	30-Jun-28	0
60% Design					
DES6120	Finalize Model	123	03-Apr-28	26-Sep-28	126
DES6130	Finalize Route	123	05-Jul-28	29-Dec-28	126
DES6140	Pump Stations	64	27-Sep-28	29-Dec-28	126
DES6150	Tank	64	27-Sep-28	29-Dec-28	126
DES6160	Pipeline	123	05-Jul-28	29-Dec-28	126
90% Design					
DES9120	Hardscape Remediation	84	02-Jan-29	30-Apr-29	126
DES9130	Final Design	84	02-Jan-29	30-Apr-29	126
100% Design					
DES1110	100% Design	43	01-May-29	29-Jun-29	374
Easements					
EAS1110	Document Preparation	123	05-Jul-28	29-Dec-28	250
EAS1120	Easement Negotiation	127	02-Jan-29	29-Jun-29	250
EAS1130	Condemnation	124	02-Jul-29	28-Dec-29	250
Permitting					
PERM1170	TDOT (6 Months)	123	05-Jul-28	29-Dec-28	377
PERM1180	Other (6 Months)	123	05-Jul-28	29-Dec-28	377
PERM1140	TDEC (NPDES & Engineering) Preparation, Review, & Issuance (8 Months)	167	01-May-29	28-Dec-29	126
PERM1120	TVA (26a, Easements) Preparation, Review, & Issuance (2 Years)	500	05-Jul-28	28-Jun-30	0
PERM1130	TDEC (ARAP, Inter-Basin) Preparation, Review, & Issuance (2 Years)	500	05-Jul-28	28-Jun-30	0
PERM1150	USACE (401, 404, Rivers, & Harbors) Preparation, Review, & Issuance (2 Years)	500	05-Jul-28	28-Jun-30	0
PERM1160	USACE (Historic, USFWS, Nationwide) Preparation, Review, & Issuance (1.5 Years)	377	02-Jan-29	28-Jun-30	0
Funding					
FUND1120	Governmental Grant Process (6 Months)	126	01-Jul-27	30-Dec-27	628
FUND1130	Evaluation of Public/Private/Partnership (P3) (6 Months)	126	01-Jul-27	30-Dec-27	628
FUND1160	Bonds (1 Year)	251	03-Jan-28	29-Dec-28	284
FUND1140	Federal Funding (WIFIA) (2.5 Years)	628	03-Jan-28	28-Jun-30	0
FUND1150	State Revolving Fund (SRF) (2.5 Years)	628	03-Jan-28	28-Jun-30	0
Procurement					
MOB1150	Develop GMP (Pre-Qual, Package Develop, Final GMP)	124	01-Jul-30	30-Dec-30	0
Construction					
MOB1110	Construction NTP	0	30-Dec-30		2
MOB1140	Tank (1.5 Years)	379	02-Jan-31	30-Jun-32	126
MOB1120	Pipeline (2 Years)	505	02-Jan-31	30-Dec-32	0
MOB1130	Pump Stations (2 Years)	505	02-Jan-31	30-Dec-32	0
MOB1160	Startup (6 Months)	125	03-Jan-33	28-Jun-33	0

