

West End - Lower Bluff Lift Station & Trunk Sanitary Sewer Feasibility Report



SHAKOPEE

Shakopee, Minnesota



February 2021

AE2S Project #: P05475-2019-006

City of Shakopee, Minnesota

WEST END - LOWER BLUFF LIFT STATION & TRUNK SANITARY SEWER FEASIBILITY REPORT

February 2021

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



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1.0 INTRODUCTION

1.1 Project Background & Study Area

The City of Shakopee is experiencing a period of rapid growth and development pressure continues to build along the US Highway 169 corridor on the west end of the community. In 2020, MnDOT completed construction of a grade-separated interchange at the intersection of Highway 169 and Chestnut Boulevard (Trunk Highway 41/CSAH 78). Completion of this interchange is expected to increase the level of interest in development along the corridor and adjacent areas. Anticipated growth and the resulting impacts to the area were evaluated in an environmental scoping document entitled, “*Jackson Township Development Area Alternative Urban Areawide Review*” (*Jackson Township AUAR*), dated February 2020.

The City of Shakopee has entered into an orderly annexation agreement with Jackson Township. The agreement provides a mechanism to allow for annexation of property in the Township by the City in an orderly manner. Annexation can occur either by petition from the property owner or by a public notification and hearing process led by the City. The study area for this report lies largely within Jackson Township, with a small portion lying within Louisville Township. (see [Figure 1](#)). In 2020, the City annexed several properties in Jackson Township, including some that are within the study area. The area of annexation is shown on [Figure 9](#). The City does not yet have an orderly annexation agreement in place with Louisville Township.

The first phase of improvements for the Windermere development, adjacent to the study area and generally located in the southwest quadrant of the Highway 169/Marystown Road interchange, was completed in 2017. As part of the improvements, a 27-inch trunk sanitary sewer was connected to a Metropolitan Council Environmental Services (MCES) interceptor sewer (Shakopee/Chaska Interceptor) with the intention of ultimately serving the Lower Bluff study area and two 18-inch trunk sewers were extended from the 27-inch trunk sewer to the Windermere property limits in the Upper Bluff development area.

1.2 Purpose of Study

The City retained the services of AE2S to determine the feasibility of extending trunk sanitary sewer improvements into and through the study area. This study identifies existing and anticipated future conditions in the study area, proposed trunk sanitary sewer improvements necessary to serve the area for future conditions, an opinion of probable cost for various improvements, property and easements required to install proposed improvements, and conclusions and recommendations for City consideration.

2.0 EXISTING CONDITIONS

2.1 Study Area Characteristics

The study area (approximately 2700 acres in size) is generally bounded by the Minnesota River on the north and west, a gravel mining operation along the west side of Highway 169 and properties abutting the south side of Chestnut Boulevard on the south, and Old Brick Yard Road and an ancient river bluff on the east. Highway 169 generally bisects the study area and development along the corridor is expected to drive the need for future street and utility improvements (see [Figure 1](#)).

The area contains a mix of rural residential, mobile home communities, commercial, industrial, open space, and agricultural uses. The Jackson Township AUAR further documents existing and planned land uses, existing and future zoning, as well as soil conditions, degrees of disturbance, and the presence of lakes, wetlands and other significant environmental features in the study area.

With one notable exception, the bluff that forms part of the easterly boundary of the study area is a feature the City desires to preserve, as it has remained largely undisturbed by the agriculture activity in the area. *Envision Shakopee* land use documents identify the area as a Bluff Preservation Area, limiting use of the bluff. The area of exception is the LaTour property, where the bluff area has been previously disturbed by agricultural activity.

In 2020, the City annexed several properties in Jackson Township, including some that are within the study area. The area of annexation is shown on [Figure 9](#). The City intends to annex additional areas in Jackson Township in 2021, best described as the remainder of the area contained within a potential 10-year development scenario, as defined in Section 4.3 of this report and as shown on [Figure 9](#).

Highway 169 is a controlled-access freeway with grade-separated interchanges at Marystown Road, Old Brick Yard Road, and Chestnut Boulevard. Scott County has jurisdiction for Marystown Road (CSAH 15), Old Brick Yard Road (CSAH 69), and Chestnut Boulevard (CSAH 78) east of Highway 169.

The MCES Shakopee/Chaska Interceptor Sewer conveys sewer flows from a regional lift station in the City of Chaska to a large diameter gravity sewer extending westerly from the Blue Lake WWTF. The gravity sewer lies within the Highway 169 right of way for several miles and ultimately terminates in the southerly right of way of Highway 169 on the west side of Marystown Road. A force main connecting the Chaska lift station to the MCES gravity sewer terminus at Marystown Road enters the Highway 169 right of way west of the Old Brick Yard Road interchange and runs along the south side of the highway.

Xcel Energy owns and operates a 345kV high-voltage overhead power transmission line that parallels Highway 169 and the line is contained within a 240-ft-wide easement along its length. Xcel Energy also owns and operates a 115kV high-voltage overhead power transmission line that extends from its substation along Highway 169 southerly through the study area and the line is contained within a 100- or 200-ft-wide easement along its length.

Xcel Energy owns and operates a 16-inch high pressure gas main that extends southerly from Highway 169 between Marystown Road and Old Brick Yard Road that is contained within a 50-ft easement along its length.

Shakopee Public Utilities Commission (SPUC) and Minnesota Valley Electric Cooperative (MVEC) each own and operate overhead electrical distribution lines within the study area. Old Brick Yard Road south of Highway 169 generally serves as a service territory boundary between SPUC and MVEC for electrical service. SPUC is planning to build an electrical substation somewhere in the study area in the foreseeable future.

SPUC secured property for a future 0.75 MG water tower at a location near the study area and plans to have the tower constructed and ready for operation in 2021. In their 2040 Comprehensive Water System Plan, SPUC identified two water supply wells and several trunk water mains that will provide the backbone for municipal water service to the area as it develops in the future.

2.2 Metropolitan Urban Service Area

As part of its responsibility for overseeing regional planning efforts in the 7-county metropolitan region, MCES has established and maintains the Metropolitan Urban Service Area (MUSA) boundaries. The MUSA boundaries are used to guide the extension of municipal sanitary sewer service throughout the region, ensuring that the rate of growth and corresponding system expansion does not exceed the ability to effectively treat the wastewater generated by the region. According to *Envision Shakopee* documents, the study area lies outside the current MUSA boundaries for Shakopee and the expansion of the MUSA boundary into Louisville Township is not identified in the Metropolitan Council's *Thrive MSP 2040 Guide Plan*. Extension of sewer service into the study area will require an expansion of the MUSA boundary (see [Figure 2](#)).

2.3 Existing Sanitary Sewer

Sanitary sewer service in the area is decentralized, with occupied properties being served either by individual sewage treatment systems (ISTS) or community sewage treatment systems (CSTS). ISTS and CSTS design, construction, and use are regulated by Scott County.

The first phase of the Windermere development included connecting a 27-inch trunk sanitary sewer to the MCES Shakopee/Chaska Interceptor and extending it into the development. From

the 27-inch trunk sewer, an 18-inch trunk sewer was extended toward the northwesterly corner of the development. [Figure 2](#) shows the location of these improvements relative to the study area. While the 18-inch trunk sewer was sized to accommodate future sewer flows from the Lower Bluff area, a gravity extension of the trunk sewer into the study area is not feasible, as there is a significant elevation difference (50 - 60 ft) between the Upper Bluff area where the existing sewer is located and the Lower Bluff area where future sewer service is being considered.

3.0 FUTURE CONDITIONS

3.1 Envision Shakopee 2040 Comprehensive Plan

The City completed an update to its Comprehensive Plan in 2019. The updated plan, called “*Envision Shakopee*” identifies planned land uses for the City and adjacent areas in Jackson and Louisville Townships. [Figure 3](#) depicts the planned land uses in the study area. The Plan also identifies the anticipated timing of growth and development in the City through 2040.

3.2 Jackson Township Development Area AUAR

The *Jackson Township AUAR* documents existing and proposed land uses, existing and future zoning, existing soil conditions and degree of disturbance, as well as the presence of lakes, wetlands and other significant environmental features in the area. The AUAR defines several subdistricts within its area of study. For this report, all of Subdistricts B and D and the Mixed-Use Center and Mixed-Use Employment Center areas of Subdistrict A make up the majority of the study area (see [Figure 4](#)). The AUAR also provides an estimate of the developable acreage and of the timing of development within its study area. Table 1 below contains the developable acreage data for the applicable subdistricts in the AUAR. These estimates were used to guide the calculation of anticipated sewer flows generated for the area.

Table 1 - Jackson Township AUAR Developable Acreage

Subdistrict	Developable Area Less Right of Way (Ac)				Totals
	Mixed Residential	Mixed Use Center	Mixed Use Employment Center	Suburban Residential	
A	-	31	20	-	51
B	37	36	171	-	244
D	-	27	270	46	343
Totals	37	94	461	46	638

3.3 Sanitary Sewer Master Plan

As part of its 2040 Comprehensive Plan update, the City retained AE2S in 2018 to update its Sanitary Sewer Master Plan and to create a hydraulic model of existing and projected sewer flows correlating with future growth and development. This report builds upon the trunk sewer extension concepts spelled out in the Master Plan.

The study area encompasses the extent of the developable area in the West Louisville Jackson (WLJ) sewer district identified in the Master Plan. It also includes a small portion of the West Jackson (WJ) sewer district, specifically some properties abutting Chestnut Boulevard and a parcel that extends into the Upper Bluff area. [Figure 5](#) shows the relationship between the sewer districts and the study area.

3.4 Ultimate Service Area

As mentioned in Section 3.2, the *Jackson Township AUAR* study boundaries for Subdistricts B and D and approximately the northern 1/3 of Subdistrict A comprise much of the study area for this report. The ultimate service area also includes some properties that abut Chestnut Boulevard on the south side (between Highway 169 and Old Brick Yard Road), some properties abutting Highway 169 on the east side (south of Chestnut Boulevard) and some properties lying south of Chestnut Boulevard and west of Highway 169. Nearly all the referenced properties are in Louisville Township and are anticipated to develop post-2040.

4.0 PROPOSED IMPROVEMENTS

4.1 Design Parameters

Design of sanitary sewer facilities is typically done in conformance with *Recommended Standards for Wastewater Facilities*, also known as the *Ten State Standards*, and Minnesota is one of ten states that has adopted the standards. In the *Standards* manual, design standards are provided for gravity sewers, lift stations, and force main sewers and it is recommended these standards, along with City design standards, be used for the proposed improvements identified in this report.

4.2 Alignment & Siting Considerations

Since the service area for the proposed improvements is in a rural setting and is largely undeveloped, defining a preferred alignment for the trunk sewer system is driven initially by existing topography, where the placement of sewer lines tends to follow the lowest ground surface elevations in the area. For the study area, topography generally drains in a northeasterly direction and the relative low ground lies between Highway 169 and the bluff line to the east. Actual development of individual properties will further define right of way and easement

corridors where street and utility improvements are placed.

Connection of a force main to an existing sanitary sewer system typically implies that some portion of the force main will be constructed around or through other existing improvements (streets, utilities, etc.). In this instance, impacts to the Windermere development infrastructure can be minimized by connecting to the end of the 18-inch trunk sewer in the northwesterly corner of the development.

Siting of a lift station is generally done to satisfy three primary objectives: (1) maximizing the area that can be efficiently served by gravity sewer; (2) minimizing the length of force main required for connection to a downstream system; and (3) utilizing available land to reduce the need for property and easement acquisition. In this case, locating a main lift station in the northeasterly portion of the study area, along the south side of Highway 169 somewhere between Old Brick Yard Road and Marystown Road, will optimize both objectives. A smaller secondary lift station will eventually need to be located on the northwesterly end of the study area, generally southwest of the Bonnevista Terrace Mobile Home Park. Ultimately, development interests will drive selection of the final locations.

Three alternate locations were identified for a potential lift station site. Site alternates and corresponding pipe alignments for each alternate are shown in [Figures 6-8](#) and are generally described as follows:

4.2.1 Alternate 1 (see [Figure 6](#))

The general location of Alternate 1 is on the south side of Highway 169 in the vicinity of the boundary between the NORCOR and Breeggemann properties. The force main (approximately 1700 linear feet) would be placed either in the Highway 169 right of way or along the northerly edge of the NORCOR property until it reaches the Windermere development, where the alignment would turn southerly to the connection point with an existing 18-inch trunk sewer. The two main advantages to this location are: (1) nearly the entire service area can flow by gravity sewer to the lift station; and (2) the length of force main needed to connect to the existing trunk sewer in Windermere is minimized. The two main disadvantages to this alternate are: (1) selection of an actual alignment and the associated easement corridor for the gravity trunk sewer through the Breeggemann property prior to development of the property is problematic and could impact the timing of other potential development west of Old Brick Yard Road; and (2) providing access to the lift station site prior to development of the Breeggemann and NORCOR properties would be a challenge, likely requiring either a shared access road with MCES within Highway 169 right of way or a dedicated access road along the northerly edge of the Breeggemann and NORCOR properties, until development of the property occurs. Electrical service for this alternate would be provided by SPUC.

4.2.2 Alternate 2A (see [Figure 7](#))

The general location of Alternate 2A is on the east side of Old Brick Yard Road at the intersection with Colburn Drive. The force main (approximately 5000 linear feet) would be placed along the easterly right of way line of Old Brick Yard Road and would run northerly to the boundary between Highway 169 right of way and the Breeggemann property and then run easterly to the connection point in Windermere. A future gravity sewer would be extended to serve the Breeggemann property if development of the property were to occur. Advantages to this alternate include a reduction in the length and associated cost of the gravity trunk sewer extension to Highway 169 and Chestnut Boulevard, elimination of the need for an access road to the lift station site (other than a short driveway off Old Brick Yard Road), and a potential reduction in the number of easements required for public improvements. It also would accommodate a scenario where development first occurs west of Old Brick Yard Road prior to development of the area east of Old Brick Yard Road. Electrical service for this alternate would likely be provided by SPUC.

4.2.3 Alternate 2B (see [Figure 8](#))

The general location of Alternate 2B is on the west side of Old Brick Yard Road at the intersection with Colburn Drive. Similar to Alternate 2A, after crossing Old Brick Yard Road, the force main (approximately 5200 linear feet) would be placed along the easterly right of way line of Old Brick Yard Road and would run northerly to the boundary between Highway 169 right of way and the Breeggemann property and then run easterly to the connection point in Windermere. A future gravity sewer would be extended to serve the Breeggemann property if development of the property were to occur, requiring installation of a casing pipe under Old Brick Yard Road. Advantages to this alternate include a reduction in the length and associated cost of the gravity trunk sewer extension to Highway 169 and Chestnut Boulevard, elimination of the need for an access road to the lift station site (other than a short driveway off Old Brick Yard Road), and a potential reduction in the number of easements required for public improvements. It also would accommodate a scenario where development first occurs west of Old Brick Yard Road prior to development of the area east of Old Brick Yard Road. A disadvantage to this alternate is it would eventually require installation of two casing pipes under Old Brick Yard Road to accommodate the force main and Breeggemann property sewer crossings. Electrical service for this alternate would likely be provided by SPUC.

A summary of advantages and disadvantages for each Alternate is found in Table 8. It may be possible to eliminate the Old Brick Yard Road / Colburn Drive intersection if another transportation outlet for Colburn Drive can be provided. Elimination of the existing intersection could then allow the lift station to be fully or partially located within the existing right of way. Further discussions with Scott County and additional transportation system analysis are required before this option can be considered viable.

4.3 Ultimate Buildout Considerations

Sizing of a lift station and associated force main is directly related to the amount of sewer flow generated in the lift station service area and the flow generated, in turn, is dependent on the timing of development. Since the study area is largely undeveloped, predicting the rate of development for the area and the timing of an ultimate buildout is highly speculative. Mechanical equipment (pumps, floats, meters, etc.) and electrical equipment (panels, controls, switches, etc.) used in a lift station generally have an expected service life of about 20 years. The expected service life of the equipment can be used as a guide in sizing the lift station components for the initial phase (low flow), intermediate phase (medium flow), and ultimate buildout (full flow) conditions.

As stated in Section 4.2, the timing of development and the resulting need for infrastructure improvements in the study area is speculative, given its rural nature. To mitigate against prematurely installing too large of a facility (wet well, pumps, force main, etc.), thereby resulting in excessive front-end costs and operational inefficiencies, three scenarios were considered to aid in sizing of the lift station components and the associated force main, as well as to analyze the timing of building a structure for the facility and of installing a permanent generator at the site. [Figure 9](#) shows a potential phasing plan for the service area.

4.3.1 Initial Period (10-Year Development Scenario)

During the initial period, the sewer flows generated by anticipated development that occurs within the first ten years of installation were used to size the wet well, pumps, and force main required to convey the estimated flows.

4.3.2 Intermediate Period (20-Year Development Scenario)

For the intermediate period, the sewer flows generated by development that is anticipated to occur by 2040, as defined in *Envision Shakopee* and *Jackson Township AUAR* land use documents, were used to size the wet well, pumps, and force main required to efficiently convey the estimated flows. A 20-year period also correlates well with the end of the expected service life of mechanical and electrical components in the lift station.

4.3.3 Ultimate Buildout (Post-20-Year Development Scenario)

For the ultimate buildout scenario, the sewer flows generated by development of the entire study area post-2040 were used to determine the ultimate size of the wet well, pumps, and force main required to efficiently convey the generated flows. This scenario also was used to determine the ultimate footprint of the lift station site, ensuring that enough area is secured in the near term to accommodate long-term needs.

Sizing of trunk gravity sewer is typically done for the ultimate buildout condition only, as the expected service life for the pipe is 75 – 100 years, replacement of an existing sewer main before it is absolutely necessary is expensive, and placement of a parallel line to convey larger flows at some future time is rarely cost-effective.

4.4 Flow Projections

Using population, household, and employment projections from the *Envision Shakopee* Land Use Plan and from the *Jackson Township AUAR*, in conjunction with development phasing identified in the same documents, future sanitary sewer flows were predicted and then allocated to the proposed trunk sewer system, to aid in routing and sizing of the system improvements. Peaking factors, in accordance with MCES Design Standards, were applied to account for anticipated flows during periods of peak activity or during wet weather periods. Flow projections were also compared to predicted flows contained in the City's Sanitary Sewer Master Plan hydraulic model for validation purposes. Flow projections for an initial 10-year development timeframe, a 20-year intermediate timeframe, and an ultimate buildout scenario are shown in Table 2.

Table 2 - Sanitary Sewer Flow Projections

Land Use Category	Projected Average Design Flows					
	10-Year		20-Year		Ultimate	
	Developed Acreage (Ac)	Projected Average Flows (gpm)	Developed Acreage (Ac)	Projected Average Flows (gpm)	Developed Acreage (Ac)	Projected Average Flows (gpm)
MUC ⁽¹⁾	83	46	83	46	94	52
MUEC ⁽²⁾	191	118	461	249	938	544
MR ⁽³⁾	37	26	37	26	37	26
SR ⁽⁴⁾	0	0	46	29	85	54
Totals	311	190	627	350	1154	676

Table Notes: (1) Mixed Use Center; (2) Mixed Use Employment Center;
(3) Mixed Residential; (4) Suburban Residential.

It should be noted that a projected average flow of 676 gpm equates to an average daily flow of 0.97 MGD, which is just below the 1.0 MGD threshold for completing a mandatory Environmental Assessment Worksheet (EAW), as defined in Minnesota Rules, Part 4410.4300.

4.5 Lift Station & Force Main

Proposed lift station improvements typically include the following primary components:

1. Wet well vault.
2. Submersible pumps and float controls.
3. Process piping and valving.
4. Valve vault.
5. Flow metering.
6. Electrical equipment and control panel.
7. Electrical transformer pad (power to be provided by others).
8. Cloud-based SCADA system.
9. Concrete pad to support a portable or permanent back-up generator.
10. Space for vehicle parking (up to two vehicles).
11. Driveway access.
12. Building and/or screening.

As sewer flows through a lift station increase, the size and complexity of the station also tends to increase. With a larger lift station, the corresponding risk of failure is increased and this increased risk can be mitigated by installing additional pump(s) for back-up purposes, integrating a SCADA system to enable remote monitoring of the facility, providing a back-up generator to furnish more reliable power to the facility in extreme weather events, enclosing the facility within a building to protect mechanical and electrical equipment, and installing redundant piping to accommodate bypass pumping.

Sizing of a lift station and associated force main is directly related to the amount of sewer flow generated in the lift station service area and the flow generated, in turn, is dependent on the timing of development. Since the study area is largely undeveloped, predicting the rate of development for the area and the timing of an ultimate buildout is highly speculative. Mechanical equipment (pumps, floats, meters, etc.) and electrical equipment (panels, controls, switches, etc.) used in a lift station generally have an expected service life of about 20 years. The expected service life of the equipment can be used as a guide in sizing the lift station components for the initial phase (low flow), intermediate phase (medium flow), and ultimate buildout (full flow) conditions.

As stated in Section 4.2, the timing of development and the resulting need for infrastructure improvements in the study area is speculative, given the largely rural nature of the study area. To mitigate against prematurely installing too large of a facility (wet well, pumps, force main, etc.), thereby resulting in excessive front-end costs and operational inefficiencies, three scenarios were considered to aid in sizing of the lift station components and the associated force main, as well as to analyze the timing of building a structure for the facility and of installing a permanent generator at the site. [Figure 9](#) shows a potential phasing plan for the service area.

From the three scenarios described in Section 4.3, projected average daily and peak hourly flows and the corresponding wet well, pump, and force main sizes for each scenario are summarized in Table 3 below:

Table 3 – General Lift Station Sizing for Three Development Scenarios

Development Scenario	Projected Average Flow (gpm)	Projected Peak Flow (gpm)	General Wet Well Size (Dia)	General Pump Size (hp)	General Force Main Diameter (in)
Initial (10-Year)	190	703	6 ft ⁽¹⁾	15-25 ⁽²⁾	6-8
Intermediate (20-Year)	350	1190	8 ft ⁽¹⁾	15-25 ⁽²⁾	10-12
Ultimate Buildout	676	2163	8 ft ⁽¹⁾	25 ⁽³⁾	12

Table Notes: (1) Operating range of 5 ft.
(2) Duplex Station (2 pump configuration).
(3) Triplex Station (3 pump configuration).

Sizing a wet well is typically done by selecting the size required to serve the ultimate buildout condition, eliminating the need for future excavations to increase wet well size. In some situations, multiple wet wells can be installed to meet both the initial and ultimate buildout conditions. Selection of a pump size should be made based on the anticipated flows during the expected life of the pump(s), allowing pump efficiency to be maximized. Selection of a force main size is directly dependent on wet well size and on pump size and configuration. In some cases, installation of parallel force mains can allow for a better match with initial and ultimate buildout conditions. Selection of these elements is typically done during final design, when a specific flow regime and resulting system hydraulics can be better identified.

4.6 Trunk Sanitary Sewer

For the ultimate buildout scenario, a 21-inch trunk sewer with a minimum pipe slope of 0.10% is recommended for the pipe segment between the proposed lift station and the vicinity of Highway 169 and Chestnut Boulevard. Total length of this segment is approximately 8100 linear feet for Alternate 1 and approximately 5400 linear feet for Alternates 2A and 2B. Depth of this line varies between 12 and 25 feet from existing ground elevations. While actual depths are expected to differ once future development and grading occurs, the maximum allowable depth is 30 feet and the amount of pipe placed at maximum depth should be minimized, based on worst-case need. At the upstream terminus point of the 21-inch trunk sewer, a 21-inch trunk sewer with a minimum pipe slope of 0.10% is recommended for the pipe segment crossing of Highway 169 in the vicinity of Chestnut Boulevard. Conceptual alignments are shown in [Figures 6-8](#).

4.7 Permitting Considerations

Extension of sanitary sewer improvements will require that numerous permits be secured prior to construction of the improvements. Table 4 summarizes the agencies and permit types required.

Table 4 - Agency Permits and Approvals

Agency	Permit /Approval Required	Purpose of Permit /Approval
MPCA	Sanitary Sewer Extension Permit	Extension of sanitary sewer
MPCA	NPDES Permit	Pollution prevention during project construction
Metropolitan Council	Comprehensive Plan Amendment	Change of MUSA boundary
MCES	Sanitary Sewer Extension Concurrence	Extension of sanitary sewer
MnDOT	Utility Accommodation Permit	Force main construction in Highway 169 right of way will require an exception to MnDOT policy
MnDOT	Utility Accommodation Permit	Use of shared access road in Highway 169 right of way
MnDOT	Utility Accommodation Permit	Trunk sewer crossing of Highway 169
Scott County	Right of Way Permit	Lift station driveway to CR 69
Scott County	Right of Way Permit	Pipeline crossings of CR 69 and CSAH 78
Scott County	Right of Way Permit	Force main construction in CR 69 right of way (if needed)
Jackson Township	Property Annexation	City annexation for lift station site
Xcel Energy	Encroachment Permit	Crossing of transmission line or gas main easement(s)
City of Shakopee	Building Permit	Lift station building construction

4.8 Property & Easement Requirements

A lift station site typically requires 0.25 – 0.5 acre of property to accommodate the lift station facility, generator pad, electrical transformer pad, parking for one or two vehicles, and a driveway. If the City desires to use the site for other purposes (material/equipment storage, staging area for others, miscellaneous purposes, etc.), a larger footprint will be required.

For the proposed force main, a 20-ft wide utility easement will be needed to access, operate and maintain the pipeline, since it will be limited to 7 – 8 ft in depth. For the trunk sanitary sewer, a 50-ft to 75-ft wide utility easement will be required, depending on the expected depth of the pipeline. The easement could be replaced by dedicated right of way when it becomes available through future development.

The Jackson Township AUAR identifies several properties in the study area that may have some

degree of contamination. Prior to acquiring any property for this project, the City should consider conducting a Phase 1 environmental site assessment for the subject property.

5.0 OPINION OF PROBABLE CONSTRUCTION COST

5.1 Cost Basis for Improvements

Estimating the cost of future public improvements tends to be speculative, primarily due to several factors (economic uncertainty, the construction bidding climate, unknown soil conditions, etc.) that can influence the actual cost of constructing planned improvements. An opinion of probable construction cost was prepared for that portion of Alternate 1 and Alternate 2A between Old Brick Yard Road (including roadway crossings) and the point of connection in Windermere, as identified in Section 4.2, as well as for each development scenario described in Section 4.3. Under each development scenario, the incremental cost between Alternate 2A and Alternate 2B is nominal. The opinion includes estimated construction costs (in 2019 dollars), a 10% construction contingency, and a 25% contingency for legal, engineering, and administration costs. It excludes the cost of street construction and street restoration, extensive trench dewatering, and engineered fill for soil corrections. Estimated property acquisition costs were determined separately (see Section 5.2). The opinion shown for each alternate assumes a single standalone project for each scenario and does not include incremental costs for other scenarios. Table 5 provides a comparison of the opinion of probable construction cost for each alternate and scenario described.

Table 5 - Comparison of Probable Construction Costs

Site Alternate	Element	Probable Construction Costs - Development Scenario		
		10-Year	20-Year	Ultimate
Alternate #1	Trunk Sewer	\$818,100	\$818,100	\$818,100
	Lift Station	\$303,800	\$472,500	\$742,500
	Force Main	\$124,000	\$169,100	\$169,100
	Totals	\$1,245,900	\$1,459,700	\$1,729,700
Alternate #2A	Trunk Sewer	\$317,200	\$317,200	\$317,200
	Lift Station	\$303,800	\$472,500	\$742,500
	Force Main	\$369,800	\$504,300	\$504,300
	Totals	\$990,800	\$1,294,000	\$1,564,000

5.2 Property & Easement Acquisition Costs

The City requested an estimate of potential costs associated with the acquisition of property and easements to accommodate construction of proposed improvements. Land acquisition costs are highly speculative and subject to wide fluctuations in perceived value. For example, recent property acquisitions or appraisals in or near the study area for parcels with similar

characteristics have ranged in cost from \$45,000 - \$115,000 per acre. In some cases, the cost of property acquisition for easement purposes, where the underlying property owner retains some property rights, can be 10% - 20% less than an outright acquisition. The potential costs, if any, of environmental cleanup for contaminated soils or groundwater should be identified prior to acquisition of property.

Potential property acquisition costs for the trunk gravity sewer, lift station, and force main improvements shown in Alternates 1 and 2A between Old Brick Yard Road and the point of connection in Windermere are shown in Table 6, with acquisition costs assumed to be \$100,000 per acre. Potential acquisition costs for the sanitary sewer force main assume that shared right-of-way with other agencies (i.e., Scott County or MnDOT) is not an option, which is considered a worst-case scenario. Property acquisition costs can be eliminated altogether if the property and easements required for improvements are secured in conjunction with platting or subdivision of property. Environmental cleanup costs for acquired properties are excluded.

Table 6 – Potential Property Acquisition Costs

Site Alternate	Element	Potential Acquisition Area (Ac)		Estimated Cost
		Property	Easement	
Alternate #1 (see Figure 6)	Trunk Sewer ⁽¹⁾		4.7	\$470,000
	Lift Station	0.5		\$50,000
	Force Main ⁽²⁾		0.7	\$70,000
	Totals	0.5	5.4	\$590,000
Alternate #2A (see Figure 7)	Trunk Sewer ⁽¹⁾			
	Lift Station	0.5		\$50,000
	Force Main ⁽²⁾		2.2	\$220,000
	Totals	0.5	2.2	\$270,000

Table Notes: (1) 75-ft wide easement; (2) 20-ft wide easement.

5.3 MCES Shakopee-Chaska Interceptor Charges

MCES owns and operates the Shakopee-Chaska Interceptor through the City. The City currently has an allocated flow rate to the interceptor of 1.0 cubic feet per second (cfs) (peak flow). Once the cumulative City flow to the interceptor exceeds 1.0 cfs, the City will be required to pay MCES for a deferred lateral charge of \$124,667.68. In a similar manner, the City will be required to pay MCES for a deferred lateral charge of \$141,132.73 once cumulative City flows exceed 2 cfs and an additional charge of \$57,501.30 once cumulative City flows exceed 3 cfs. The City is keeping a line item in its Capital Improvements Program (CIP) to cover these costs. A summary of projected average and peak flows for the development scenarios identified in Section 4.3 is shown in Table 7 below.

Table 7 – Projected Average and Peak Flows for Three Development Scenarios

Development Scenario	Projected Average Flow (gpm)	Projected Average Flow (cfs)	Projected Peak Flow (gpm)	Projected Peak Flow (cfs)
Initial (10-Year)	190	0.42	703	1.57
Intermediate (20-Year)	350	0.78	1190	2.65
Ultimate Buildout	676	1.50	2163	4.82

A review of MCES flow meter data for the City in the 12-month period from September 1, 2019, to August 31, 2020, indicates the average daily flow for the entire City was 2.65 MGD (4.1 cfs). The peak daily flow for the same period was recorded at 3.85 MG (5.95 cfs) on August 10, 2020. The portion of flow allocated to the Shakopee-Chaska Interceptor in the City's sanitary sewer model is about 45% of the total flow, which equates to 1.2 MGD (1.85 cfs) for an average daily flow and to 1.75 MG (2.7 cfs) for the peak daily flow at the junction with the Prior Lake Interceptor.

6.0 PROJECT FUNDING

Initial financing for the project is expected to come from the Sanitary Sewer Fund. As installation and extension of proposed improvements occur, there are several funding mechanisms available to the City to assist with paying for the improvements. Funding mechanisms include lateral sanitary sewer connection charges, trunk sanitary sewer charges, Sewer Availability Charges (SAC), sewer service charges, utility fees, and developer-led construction. Each funding mechanism is explained further below.

6.1 Lateral Sanitary Sewer Connection Charge

The City has a policy in place for determining special assessments to be levied for public improvements projects. Per the policy, lateral benefit is assessed on an area basis, where the assessable area is defined as total area less the area used for rights of way, natural waterways, swamps, lakes, or DNR-designated wetlands. In determining the lateral benefit costs, the City is responsible for the incremental costs of a sewer main greater than 8 inches in diameter (oversizing) and for the incremental costs of installation depths exceeding 12 feet (overdepth) and the incremental costs are to be paid from the Trunk Sanitary Sewer Fund. The City's *Special Assessment Policies and Procedures for Public Improvements* can be applied to this project.

A lateral sanitary sewer connection charge is determined when the City pays for the initial cost of extending sanitary sewer improvements through an area or property. The benefitting area for the sewer improvements is determined and the benefitting area is assigned the cost of the improvements on an area basis. For this project, it is proposed to assign a lateral benefit to the portion of sanitary sewer extending from the existing sewer in the Windermere development to the lift station site. The lateral benefit is the equivalent estimated cost of extending an 8-inch

gravity sewer at a maximum depth of 12 feet along the proposed force main alignment(s). From Table 2, it is estimated there are a total of 1154 net developable acres. Lateral sanitary sewer connection charges are proposed to be collected by the SAC unit at the time of development.

6.2 Trunk Sanitary Sewer Charge

The City has a policy in place for determining charges to be levied for trunk sanitary sewer improvements. Per the policy, the current charge is \$2982 per developable acre, where a developable acre is defined as total acreage less acreage contained in outlots, rights of way, lakes, wetlands, easements encompassing 100-year high water levels of storm ponds, conservation easements, and parks. Trunk sanitary sewer charges for rural residential property (R1-A zoning) that doesn't subdivide are based on a land area of 0.30 acre, which is the minimum lot size for that zoning classification. A trunk sewer is defined as a gravity sewer that exceeds the minimum pipe size required to serve a development. The City's *Trunk Sanitary Sewer Charge Policy* applies to this project. The trunk sanitary sewer charge is applied to all properties within City limits lying south of US Highway 169 and to all property annexed into the City. The charge is collected on the developable acreage of the property and is used to fund the construction and maintenance of City-owned trunk sanitary sewers greater than 8-inch diameter.

6.3 City Sewer Availability Charge (SAC)

The City sewer availability charge is determined from the number of SAC units assigned by MCES to a specific development and is collected through building permits issued by the City. This is the "sewer access charge" and it covers the long-term depreciation and replacement of the sanitary sewer system. The SAC unit charge is currently set at \$515 per SAC unit. For the study area, it is estimated there are 3650 SAC units that could be created, using the land use guidance provided by *Envision Shakopee* and the *Jackson Township AUAR*.

6.4 Sewer Service Charge

This charge is collected through monthly utility billing and is based on the water and sewer usage for each property. This charge covers the MCES sewer service charge, as well as the cost of routine operation and maintenance of the sanitary sewer system.

6.5 Utility Fees

The utility fee is charged to developers that decide to construct public improvements themselves rather than requesting the City to do so. The utility fee covers City expenses related to processing the developer's application, administering the project, reviewing and approving developer plans, inspecting the construction and maintaining the improvements.

6.6 Developer-Led Construction

When development occurs, the developer is required to construct sanitary sewer throughout the development and to extend the system to the property lines, allowing for more efficient future extensions and connections. For this funding mechanism, the developer is solely responsible for the cost of the sewer improvements and the system is turned over to the City for operation and maintenance.

6.7 Project Funding Summary

For construction of this project, funding is expected to come from a combination of sources, including lateral sanitary sewer connection charges, trunk sanitary sewer charges, and sewer availability charges. The lift station, trunk sewer oversizing, and force main oversizing costs would be paid for through trunk sanitary sewer charges collected at the time subdivision plats are recorded. For Alternate 1, the base cost of the trunk gravity sewer would be determined by assigning an equivalent cost per linear foot value to the length of gravity sewer installed through the Breeggemann property (extending an 8-inch gravity sewer at a maximum depth of 12 feet along the proposed alignment) and this base cost would be paid for through lateral sanitary sewer connection charges. The base cost of the force main would be determined in a similar manner for the length of force main and would be paid for through lateral sanitary sewer connection charges to the lift station service area. Appendix B contains several tables that summarize the funding sources and fees collected for various scenarios, if the lift station and force main are installed for the ultimate buildout condition.

7.0 CONCLUSIONS & RECOMMENDATIONS

Development of property within the study area for the planned land uses and development densities identified in *Envision Shakopee* and in the *Jackson Township AUAR* requires a centralized municipal sanitary sewer collection system. The proposed improvements outlined in this report are necessary to support planned development in the study area, are cost-effective to provide a safe and reliable sanitary sewer collection system and are feasible from an engineering perspective.

Before the City proceeds with acquisition of any property or easements for sanitary sewer improvements described in this report, completion of a Phase 1 environmental site assessment for each affected property is recommended, to determine the presence of contaminated soils or groundwater, if any, and to determine the extent (and associated costs) of any required cleanup of contaminated material.

Selection of Alternates 1, 2A, or 2B for a lift station site and related trunk sewer and force main routing will be dependent on timing of proposed development(s), property owner interest, and other factors outside City control. Each alternate is considered feasible. The willingness of landowners and/or developers to dedicate or negotiate the easements required to construct the

sanitary sewer improvements will have a direct bearing on the final site selection for the lift station and on the routing of the trunk sewer and force main.

A comparison of advantages, disadvantages, and estimated total project costs for each alternate is summarized in Table 8 below.

Table 8 – Comparison of Advantages & Disadvantages of Alternates

Alternate	Advantages	Disadvantages	Estimated Total Cost (1)
1	○ Minimizes force main length ○ Maximizes area served by gravity sewer	○ Limited lift station site access ○ Greatest potential easement acquisition cost ○ Most expensive ○ Likely dependent on Breeggemann property development	\$2,049,700
2A	○ Eliminates need for access road to lift station ○ Minimizes length and cost of gravity trunk sewer ○ Provides flexibility in responding to development	○ Requires acquisition of more Breeggemann property than Alternate 2B	\$1,564,000
2B	○ Eliminates need for access road to lift station ○ Minimizes length and cost of gravity trunk sewer ○ Provides flexibility in responding to development	○ Requires two casing pipes for Old Brick Yard Road force main and gravity sewer crossings	\$1,568,400

Table Note: (1) Includes cost associated with 20-year development scenario and potential easement costs.

For installation of force main improvements within US Highway 169 right-of-way (shown in all three alternates), the City should pursue an agreement with Mn/DOT to allow for the installation. By doing so, the cost of easement acquisition would likely be reduced. Mn/DOT staff has indicated the City will likely need to prove a hardship in order to share the right-of-way.

If the City decides to proceed with either Alternate 2A or 2B, it should work with Scott County to secure a corridor for force main improvements in Old Brick Yard Road (CSAH 69). By doing so, the cost of easement acquisition would likely be reduced.

The City should work with property owners and developers in the study area to finalize an alignment for the trunk sewer main, lift station site, and force main alignment. By doing so, a final design for the improvements can be successfully completed.

Unless there is an indication that significant development is expected to occur in the study area within the next ten years, planning and designing lift station improvements for an initial 10-year development scenario is recommended.

LIST OF FIGURES

Figure 1 – Area of Study

Figure 2 – Existing Sanitary Sewer in Study Area

Figure 3 – *Envision Shakopee* Future Land Use Plan

Figure 4 – Study Area Relative to Future Land Use

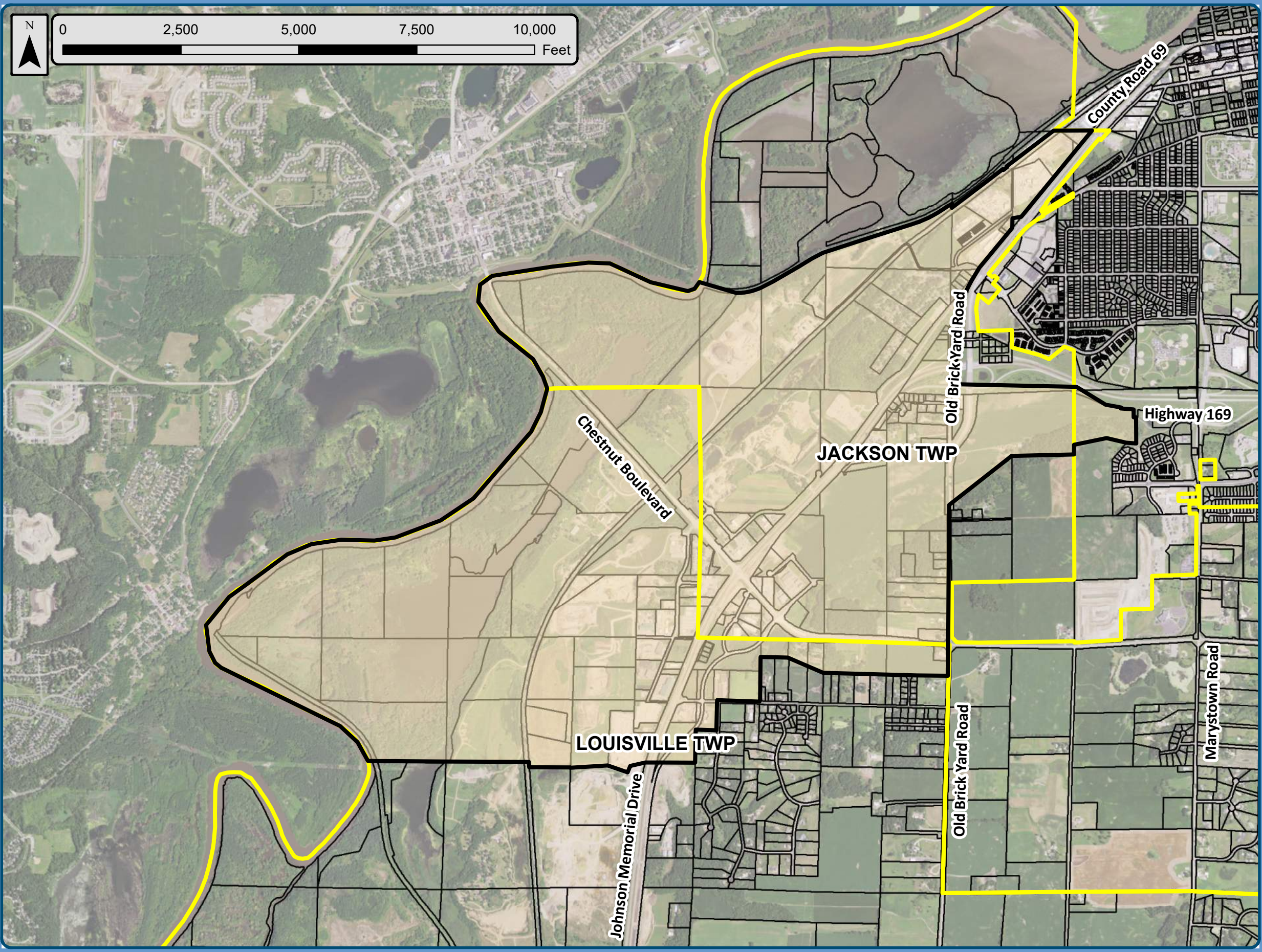
Figure 5 – Future Trunk Sewer in Study Area

Figure 6 – Alternate No. 1 Overview

Figure 7 – Alternate No. 2a Overview

Figure 8 – Alternate No. 2b Overview

Figure 9 – Potential Development Scenarios

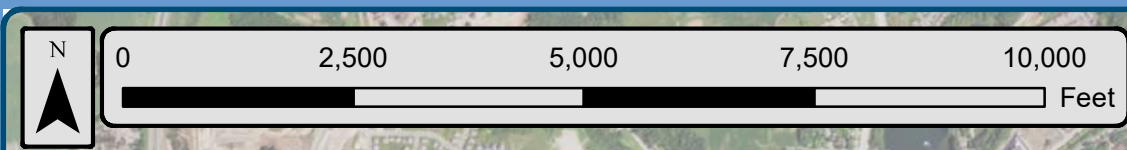


- Township Boundaries
- Study Area

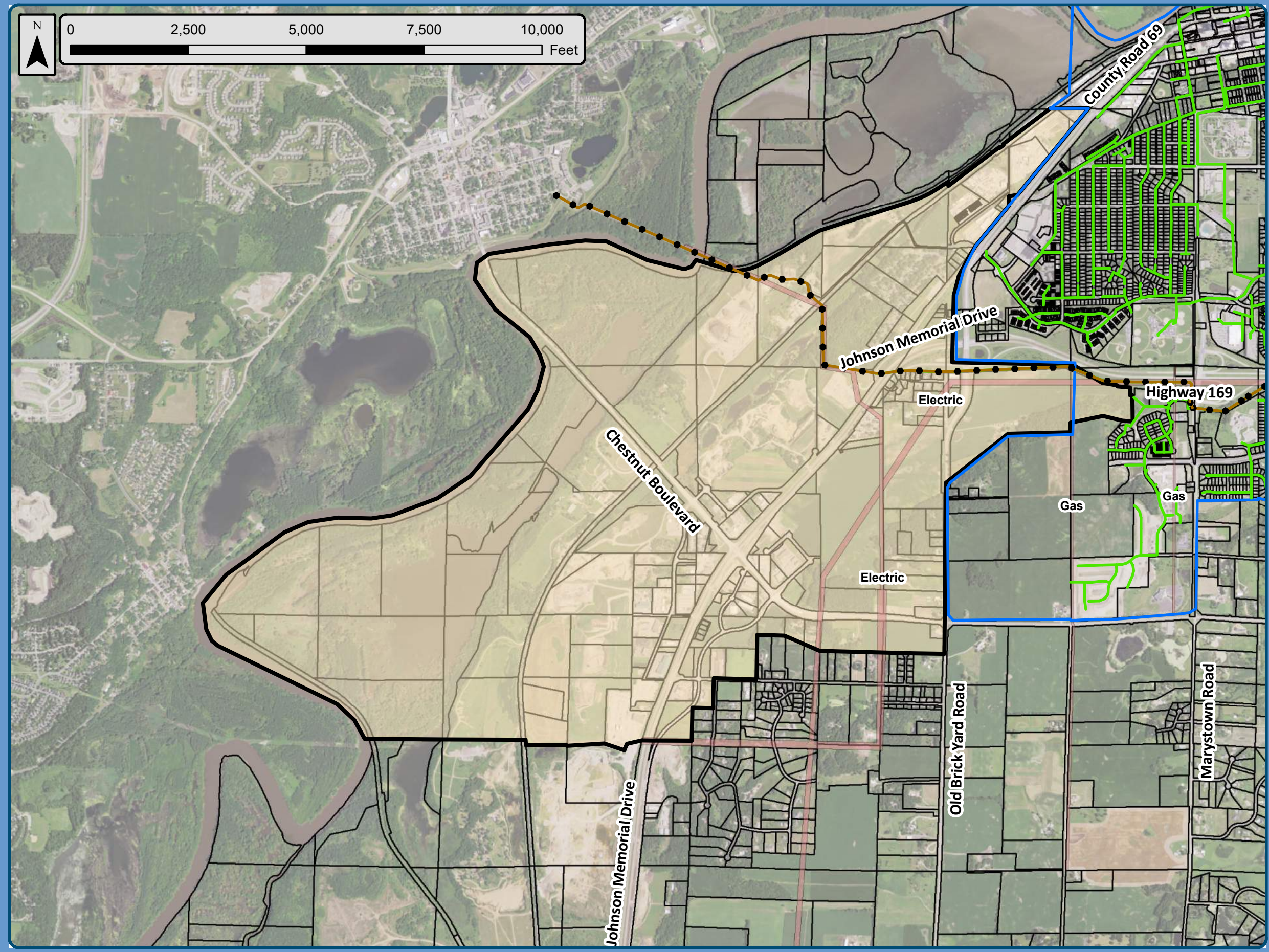
**City of
Shakopee
West End
Lower Bluff
Lift Station**

**Area of
Study**

Figure 1



- Existing Gravity Main
- Existing MCES Interceptor
- Study Area
- 2020 MUSA Boundary
- Xcel Easement

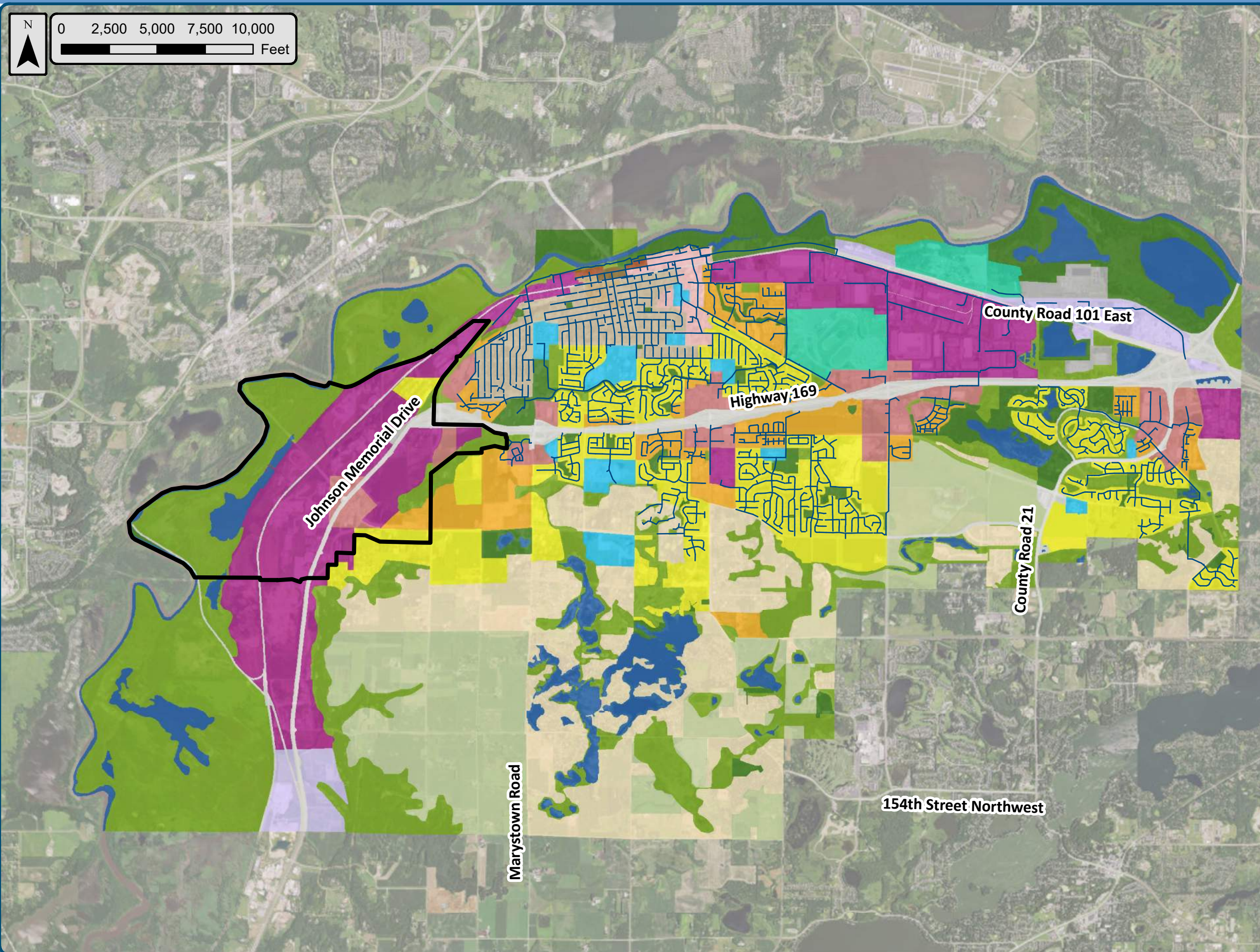


Approximate easement location shown for reference only

City of Shakopee West End Lower Bluff Lift Station

Existing Sanitary
Sewer Near
Study Area

Figure 2

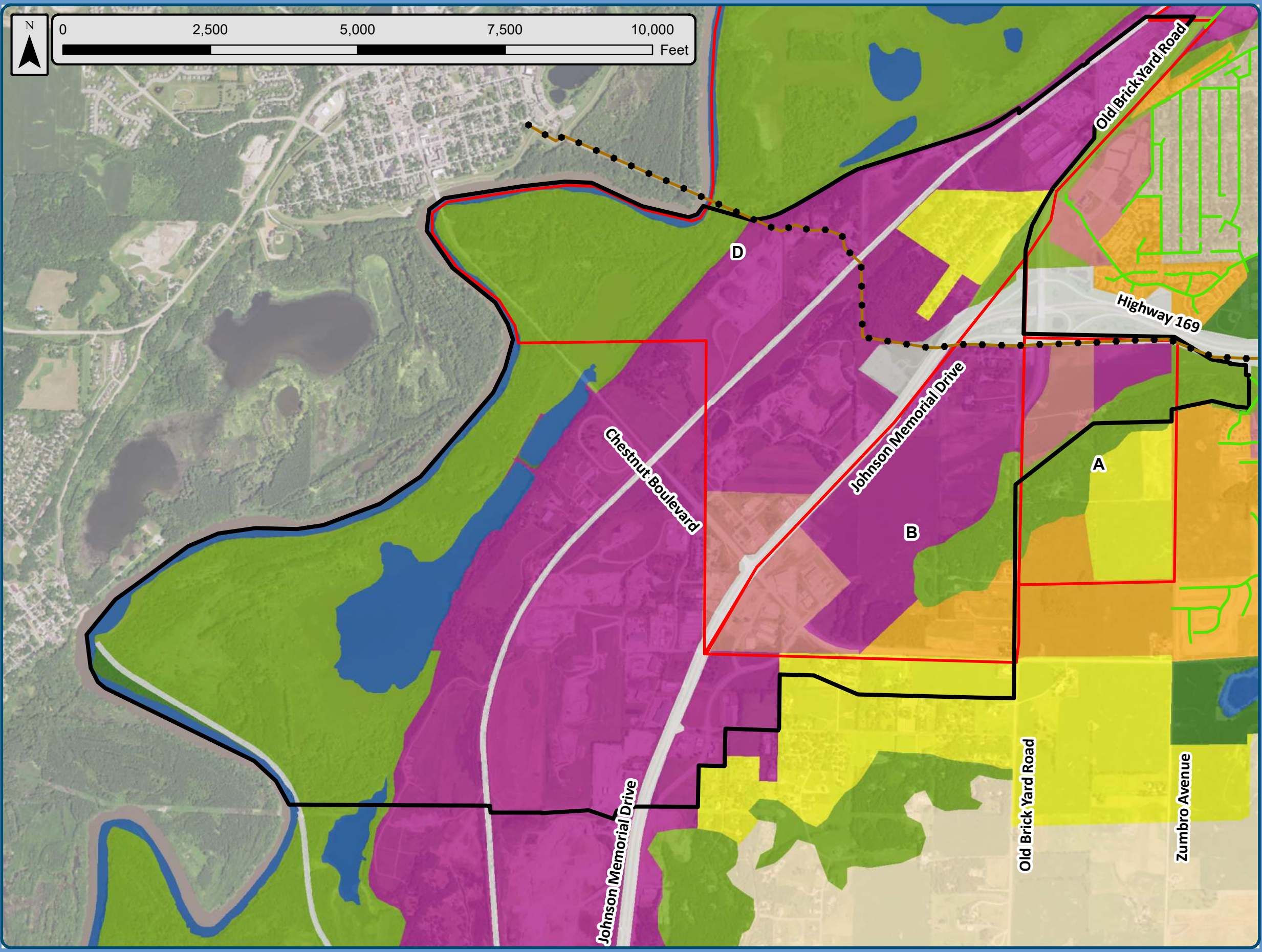
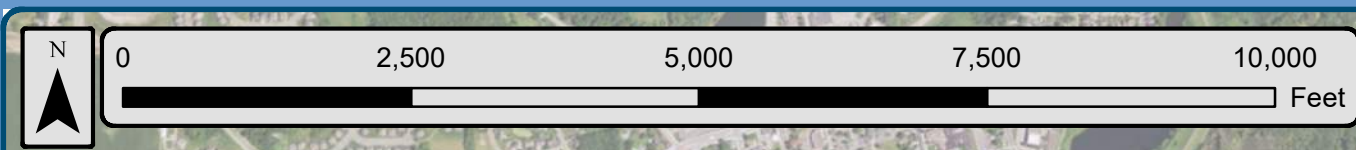


- Study Area**
- Future Land Use**
- Downtown Riverfront
 - Downtown Business District
 - Downtown Transition
 - Old Shakopee Neighborhood
 - Mixed Use Commercial Corridor
 - Mixed Use Commercial Center
 - Mixed Employment Center
 - Industrial
 - Public Institution
 - Mixed Residential
 - Suburban Residential
 - Suburban Edge Residential
 - Rural Transition
 - Entertainment
 - Utilities
 - Park
 - Open Space
 - Transportation
 - Major Water Features

City of Shakopee West End Lower Bluff Lift Station

Envision Shakopee
Future Land
Use Plan

Figure 3

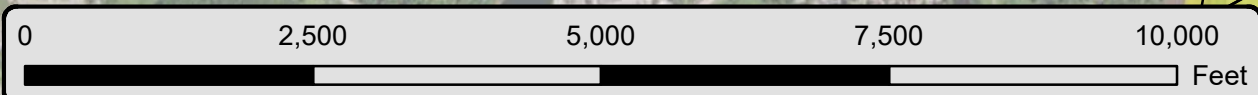
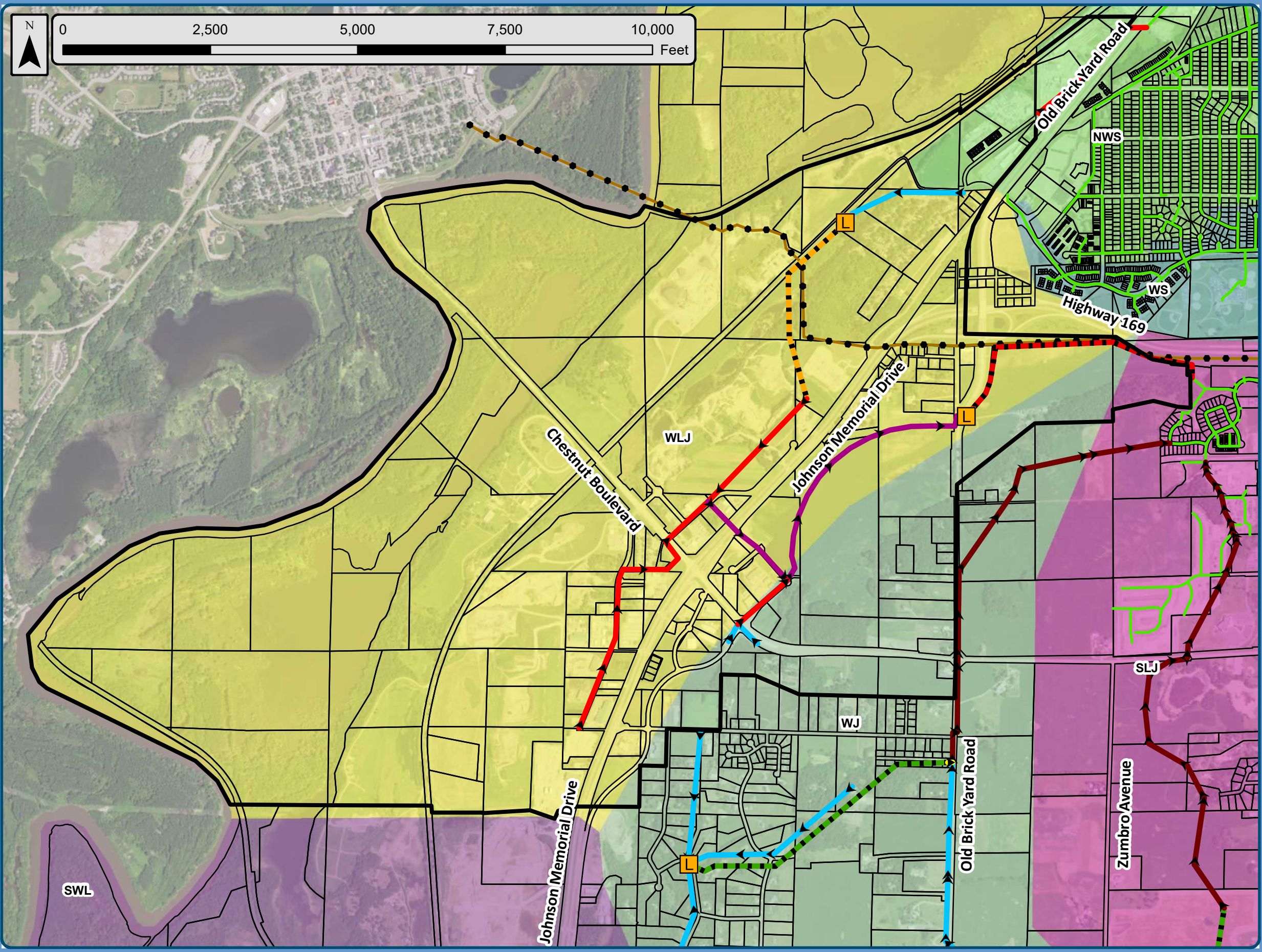


- Existing Gravity Main
- Existing MCES Interceptor
- Study Area
- AUAR Subdistricts
- Future Land Use**
- Downtown Riverfront
- Downtown Business District
- Downtown Transition
- Old Shakopee Neighborhood
- Mixed Use Corridor
- Mixed Use Center
- Mixed Employment Center
- Industrial
- Public Institution
- Mixed Residential
- Suburban Residential
- Suburban Edge Residential
- Rural Transition
- Entertainment
- Utilities
- Park
- Open Space
- Transportation
- Major Water Features

**City of Shakopee
West End
Lower Bluff
Lift Station**

**Study Area
Relative to
Future Land Use**

Figure 4



Future Lift Station

Study Area

Existing Gravity Main

Existing MCES Interceptor

Future Gravity Main

10-inch Gravity

12-inch Gravity

15-inch Gravity

18-inch Gravity

21-inch Gravity

Future Forcemain

6-inch FM

8-inch FM

12-inch FM

Sewer Districts

(CS) Central Shakopee

(ES) East Shakopee

(JS) Jackson/Shakopee

(NCS) North Central Shakopee

(NES) Northeast Shakopee

(NS) North Shakopee

(NWS) Northwest Shakopee

(SES) Southeast Shakopee

(SLJ) South Louisville Jackson

(SS) South Shakopee

(SWL) Southwest Louisville

(WJ) West Jackson

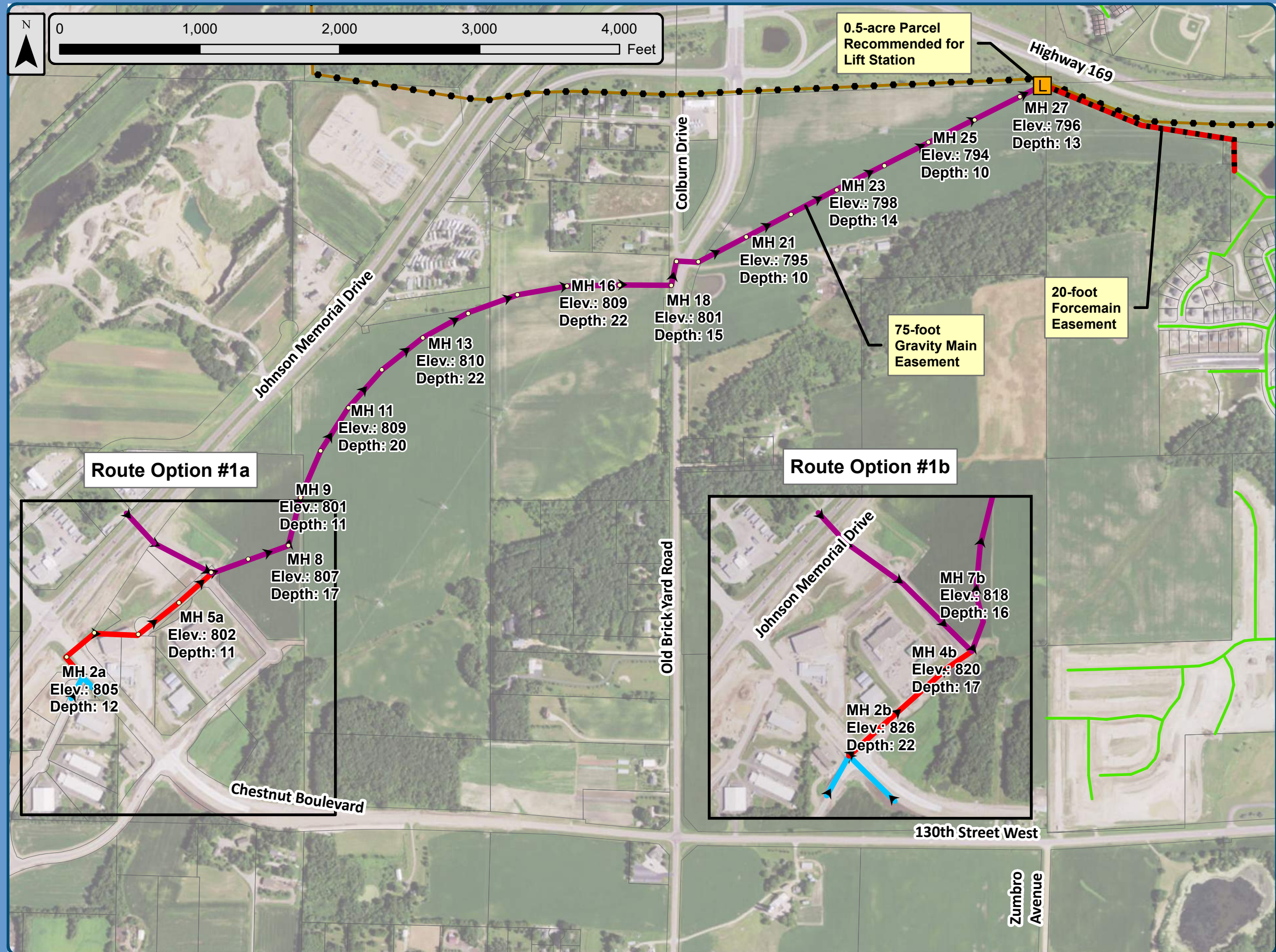
(WLJ) West Louisville Jackson

(WS) West Shakopee

**City of Shakopee
West End
Lower Bluff
Lift Station**

**Future Trunk Sewer
in Study Area**

Figure 5

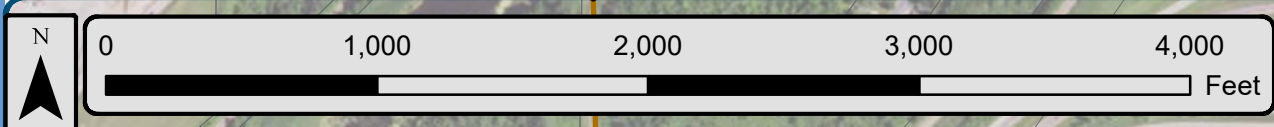


- Future Lift Station
- Existing Gravity Main
- Existing MCES Interceptor
- Future Gravity Main**
 - 10-inch Gravity
 - 12-inch Gravity
 - 15-inch Gravity
 - 18-inch Gravity
 - 21-inch Gravity
- Future Forcemain**
 - 6-inch FM
 - 8-inch FM
 - 12-inch FM

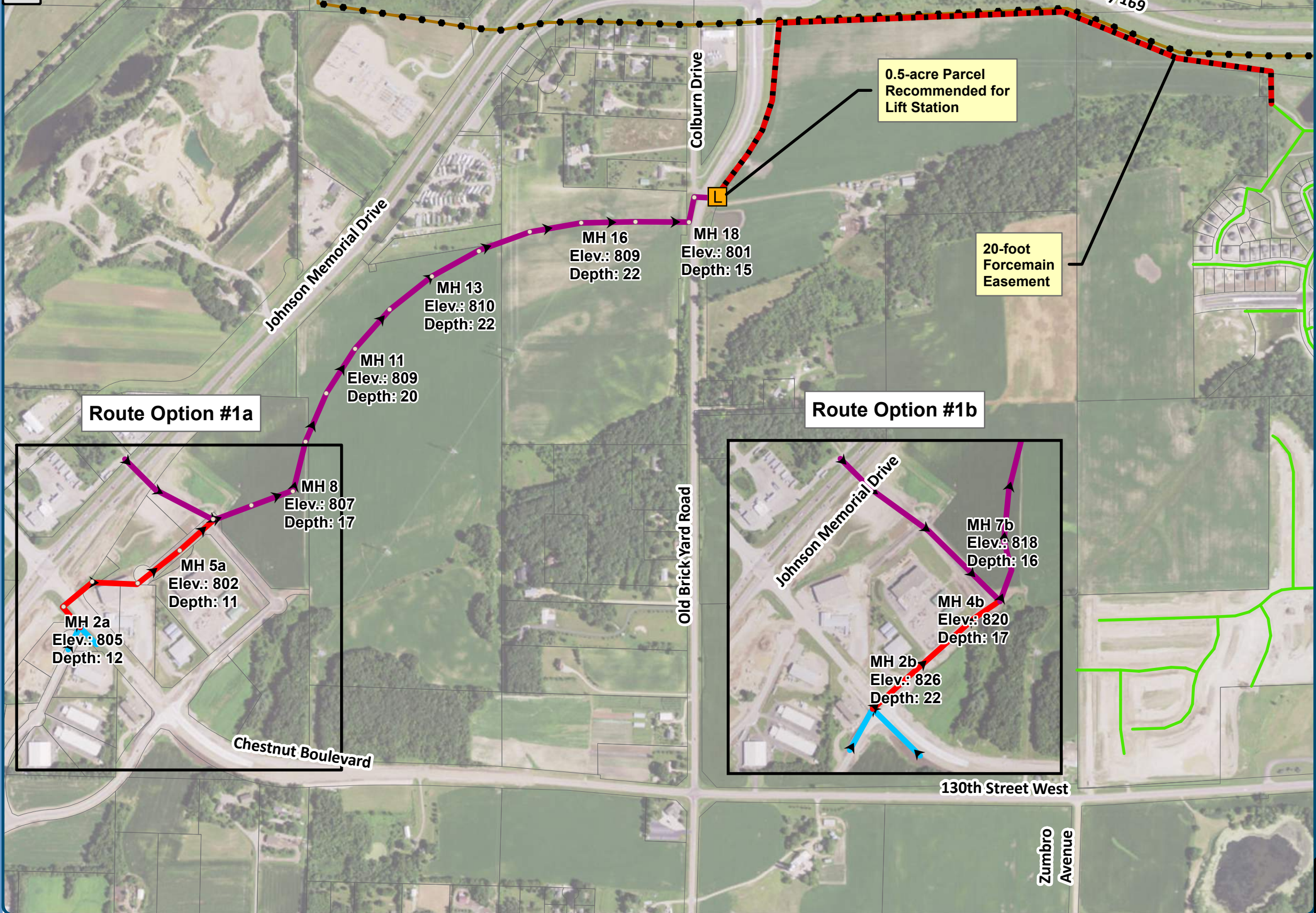
City of Shakopee West End Lower Bluff Lift Station

Alternate No. 1
Overview

Figure 6



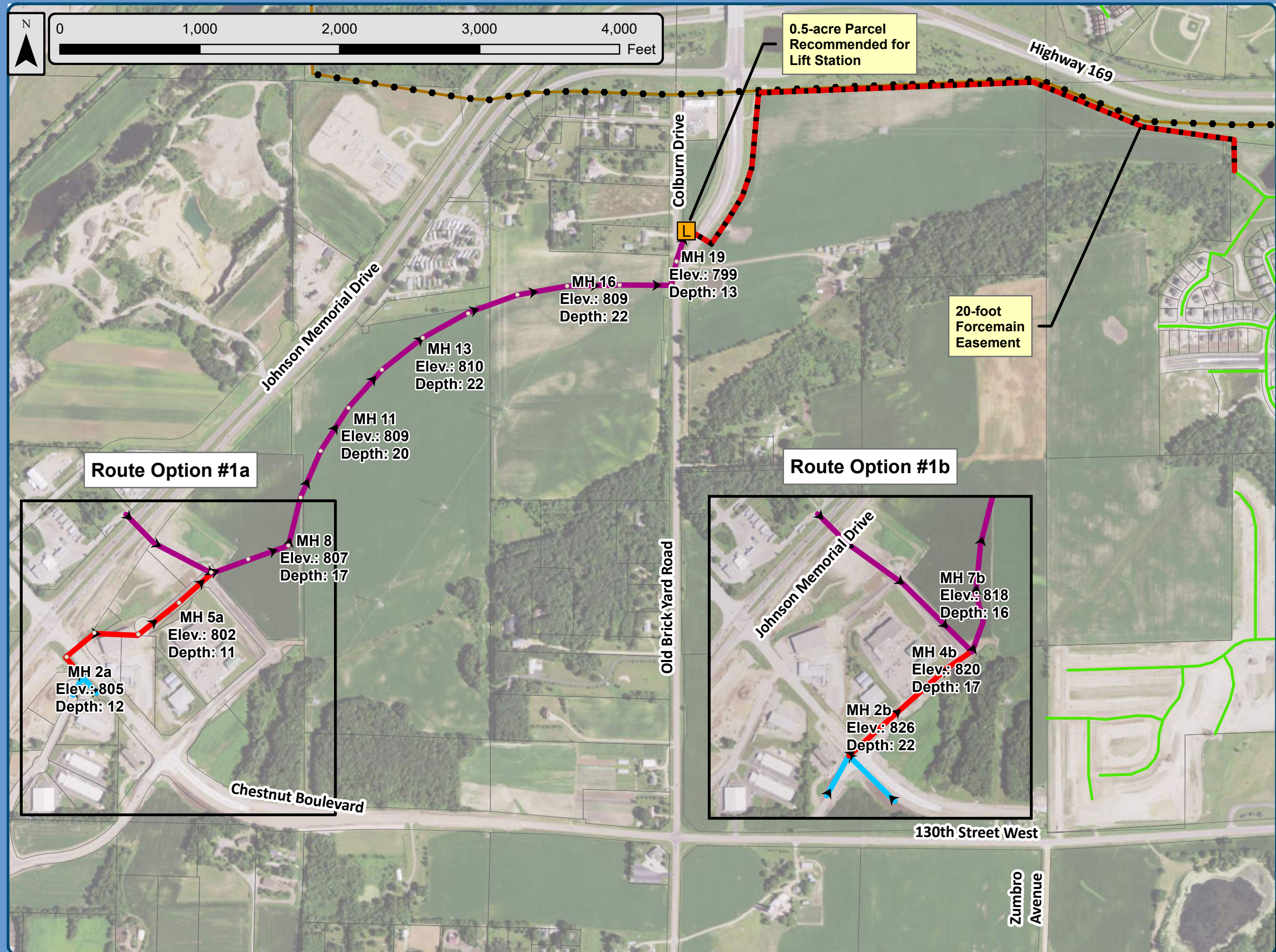
- Future Lift Station
- Existing Gravity Main
- Existing MCEIS Interceptor
- Future Gravity Main**
- 10-inch Gravity
- 12-inch Gravity
- 15-inch Gravity
- 18-inch Gravity
- 21-inch Gravity
- Future Forcemain**
- 6-inch FM
- 8-inch FM
- 12-inch FM



City of Shakopee Lower Bluff Lift Station

Alternate No. 2a
Overview

Figure 7

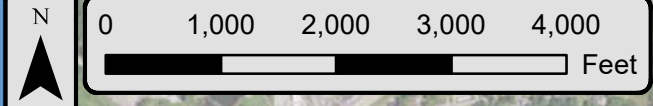
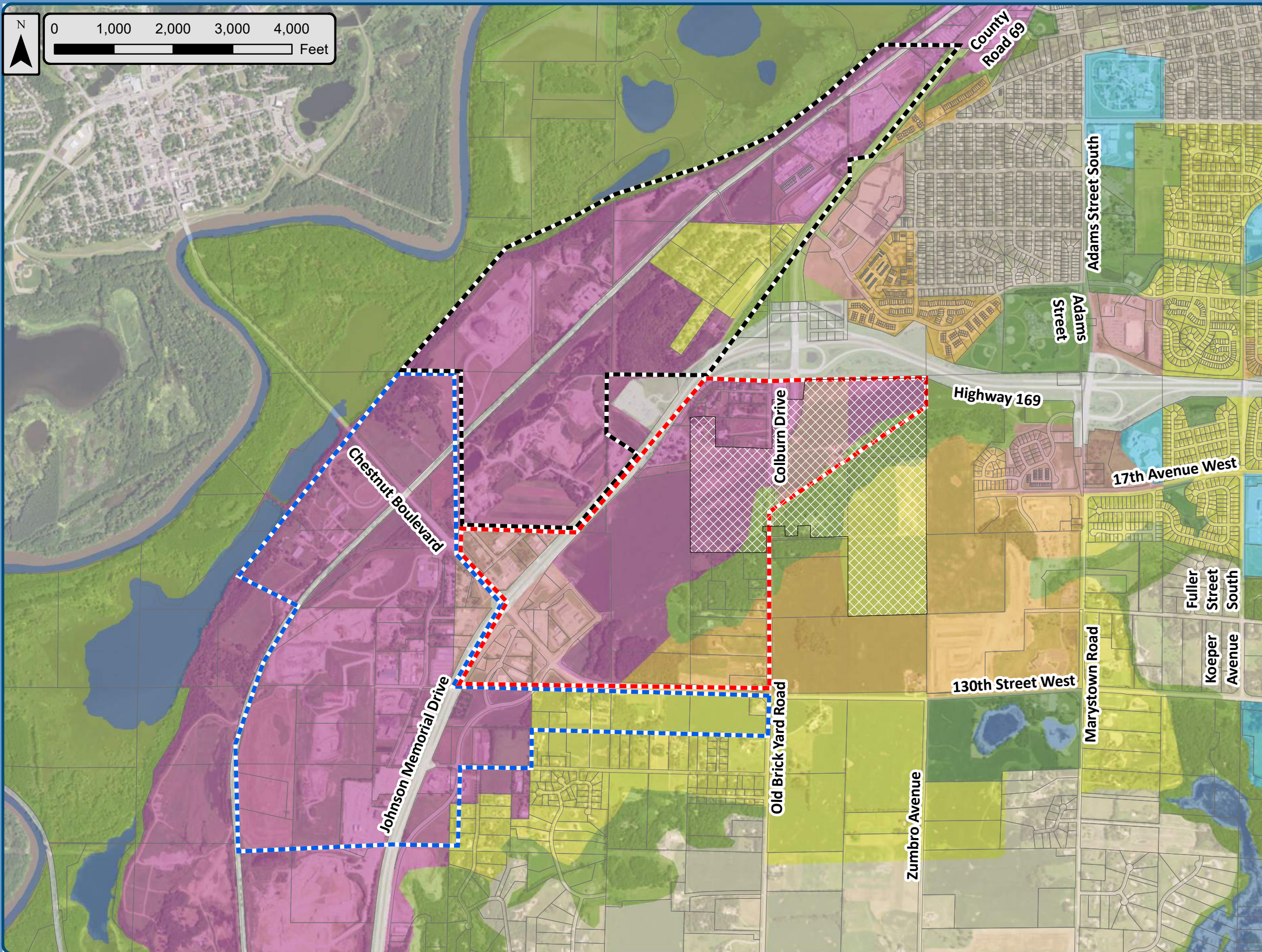


- Future Lift Station
- Existing Gravity Main
- Existing MCEIS Interceptor
- Future Gravity Main**
 - 10-inch Gravity
 - 12-inch Gravity
 - 15-inch Gravity
 - 18-inch Gravity
 - 21-inch Gravity
- Future Forcemain**
 - 6-inch FM
 - 8-inch FM
 - 12-inch FM

City of Shakopee Lower Bluff Lift Station

Alternate No. 2b Overview

Figure 8



Potential Development Scenarios

- 2020 Annexation
- 10-Year Development
- 20-Year Development
- Ultimate Buildout

Future Land Use

- Downtown Riverfront
- Downtown Business District
- Downtown Transition
- Old Shakopee Neighborhood
- Mixed Use Corridor
- Mixed Use Center
- Mixed Employment Center
- Industrial
- Public Institution
- Mixed Residential
- Suburban Residential
- Suburban Edge Residential
- Rural Transition
- Entertainment
- Utilities
- Park
- Open Space
- Transportation
- Major Water Features

**City of Shakopee
Lower Bluff
Lift Station**

**Potential
Development
Scenarios**

Figure 9

Appendix A

Opinion of Probable Construction Cost

West End Lower Bluff Trunk Sewer & Lift Station**Opinions of Probable Construction Cost****West Side of CR 69 to Windermere**

Feb-21

Alternate #1

			10-Year Scenario		20-Year Scenario		Ultimate Buildout	
Item	Unit	Unit Price	Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
21-inch PVC Sewer	LF	\$140.00	2900	\$406,000.00	2900	\$406,000.00	2900	\$406,000.00
Jack & Bore 36-inch Steel Casing*	LF	\$1,000.00	200	\$200,000.00	200	\$200,000.00	200	\$200,000.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	1670	\$91,850.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	1670	\$125,250.00	1670	\$125,250.00
Totals				\$922,850.00		\$1,081,250.00		\$1,281,250.00
Plus 10% Construction Contingency				\$92,285.00		\$108,125.00		\$128,125.00
Plus 25% for ELA				\$230,712.50		\$270,312.50		\$320,312.50
Grand Totals				\$1,245,847.50		\$1,459,687.50		\$1,729,687.50

* Trunk Sewer Crossing of CR 69

Alternate #2a

			10-Year Scenario		20-Year Scenario		Ultimate Buildout	
Item	Unit	Unit Price	Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
21-inch PVC Sewer	LF	\$140.00	250	\$35,000.00	250	\$35,000.00	250	\$35,000.00
Jack & Bore 36-inch Steel Casing*	LF	\$1,000.00	200	\$200,000.00	200	\$200,000.00	200	\$200,000.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	4980	\$273,900.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	4980	\$373,500.00	4980	\$373,500.00
Totals				\$733,900.00		\$958,500.00		\$1,158,500.00
Plus 10% Construction Contingency				\$73,390.00		\$95,850.00		\$115,850.00
Plus 25% for ELA				\$183,475.00		\$239,625.00		\$289,625.00
Grand Totals				\$990,765.00		\$1,293,975.00		\$1,563,975.00

* Trunk Sewer Crossing of CR 69

West End Lower Bluff Trunk Sewer & Lift Station

Opinions of Probable Construction Cost

West Side of CR 69 to Windermere

Feb-21

Alternate #2b

Item	Unit	Unit Price	10-Year Scenario		20-Year Scenario		Ultimate Buildout	
			Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
21-inch PVC Sewer	LF	\$140.00	50	\$7,000.00	50	\$7,000.00	50	\$7,000.00
Jack & Bore 20-inch Steel Casing*	LF	\$500.00	200	\$100,000.00		\$0.00		\$0.00
Jack & Bore 24-inch Steel Casing**	LF	\$600.00		\$0.00	200	\$120,000.00	200	\$120,000.00
Jack & Bore 20-inch Steel Casing***	LF	\$500.00	200	\$100,000.00	200	\$100,000.00	200	\$100,000.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	5130	\$282,150.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	5130	\$384,750.00	5130	\$384,750.00
Totals				\$714,150.00		\$961,750.00		\$1,161,750.00
Plus 10% Construction Contingency				\$71,415.00		\$96,175.00		\$116,175.00
Plus 25% for ELA				\$178,537.50		\$240,437.50		\$290,437.50
Grand Totals				\$964,102.50		\$1,298,362.50		\$1,568,362.50

* 8-inch Force Main Crossing of CR 69

** 12-inch Force Main Crossing of CR 69

*** 8-inch Gravity Sewer Crossing of CR 69

West End Lower Bluff Trunk Sewer & Lift Station
Opinion of Probable Construction Cost
Includes Trunk Sewer to US 169 / TH 41

Feb-21

Alternate #1a (westerly route at Chestnut Blvd)

Item	Unit	Unit Price	10-Year Scenario		20-Year Scenario		Ultimate Buildout	
			Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
12-inch PVC Sewer	LF	\$75.00	1270	\$95,250.00	1270	\$95,250.00	1270	\$95,250.00
21-inch PVC Sewer	LF	\$140.00	8089	\$1,132,460.00	8089	\$1,132,460.00	8089	\$1,132,460.00
Jack & Bore 20-inch Steel Casing	LF	\$500.00	0	\$0.00	0	\$0.00	0	\$0.00
Jack & Bore 24-inch Steel Casing	LF	\$600.00	200	\$120,000.00	200	\$120,000.00	200	\$120,000.00
Jack & Bore 30-inch Steel Casing	LF	\$750.00	300	\$225,000.00	300	\$225,000.00	300	\$225,000.00
Jack & Bore 36-inch Steel Casing	LF	\$1,000.00	200	\$200,000.00	200	\$200,000.00	200	\$200,000.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	1670	\$91,850.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	1670	\$125,250.00	1670	\$125,250.00
Totals				\$2,089,560.00		\$2,247,960.00		\$2,447,960.00
Plus 10% Construction Contingency				\$208,956.00		\$224,796.00		\$244,796.00
Plus 25% for ELA				\$522,390.00		\$561,990.00		\$611,990.00
Grand Totals				\$2,820,906.00		\$3,034,746.00		\$3,304,746.00

Alternate #1b (easterly route at Chestnut Blvd)

Item	Unit	Unit Price	10-Year Scenario		20-Year Scenario		Ultimate Buildout	
			Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
12-inch PVC Sewer	LF	\$75.00	1150	\$86,250.00	1150	\$86,250.00	1150	\$86,250.00
21-inch PVC Sewer	LF	\$140.00	9047	\$1,266,580.00	9047	\$1,266,580.00	9047	\$1,266,580.00
Jack & Bore 20-inch Steel Casing	LF	\$500.00	0	\$0.00	0	\$0.00	0	\$0.00
Jack & Bore 24-inch Steel Casing	LF	\$600.00	200	\$120,000.00	200	\$120,000.00	200	\$120,000.00
Jack & Bore 30-inch Steel Casing	LF	\$750.00	300	\$225,000.00	300	\$225,000.00	300	\$225,000.00
Jack & Bore 36-inch Steel Casing	LF	\$1,000.00	200	\$200,000.00	200	\$200,000.00	200	\$200,000.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	1670	\$91,850.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	1670	\$125,250.00	1670	\$125,250.00
Totals				\$2,214,680.00		\$2,373,080.00		\$2,573,080.00
Plus 10% Construction Contingency				\$221,468.00		\$237,308.00		\$257,308.00
Plus 25% for ELA				\$553,670.00		\$593,270.00		\$643,270.00
Grand Totals				\$2,989,818.00		\$3,203,658.00		\$3,473,658.00

West End Lower Bluff Trunk Sewer & Lift Station
Opinion of Probable Construction Cost
Includes Trunk Sewer to US 169 / TH 41

Feb-21

Alternate #2a

Item	Unit	Unit Price	10-Year Scenario		20-Year Scenario		Ultimate Buildout	
			Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
12-inch PVC Sewer	LF	\$75.00	1270	\$95,250.00	1270	\$95,250.00	1270	\$95,250.00
21-inch PVC Sewer	LF	\$140.00	5348	\$748,720.00	5348	\$748,720.00	5348	\$748,720.00
Jack & Bore 24-inch Steel Casing	LF	\$600.00	200	\$120,000.00	200	\$120,000.00	200	\$120,000.00
Jack & Bore 30-inch Steel Casing	LF	\$750.00	300	\$225,000.00	300	\$225,000.00	300	\$225,000.00
Jack & Bore 36-inch Steel Casing	LF	\$1,000.00	200	\$200,000.00	200	\$200,000.00	200	\$200,000.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	4974	\$273,570.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	4974	\$373,050.00	4974	\$373,050.00
Totals				\$1,887,540.00		\$2,112,020.00		\$2,312,020.00
Plus 10% Construction Contingency				\$188,754.00		\$211,202.00		\$231,202.00
Plus 25% for ELA				\$471,885.00		\$528,005.00		\$578,005.00
Grand Totals				\$2,548,179.00		\$2,851,227.00		\$3,121,227.00

Alternate #2b

Item	Unit	Unit Price	10-Year Scenario		20-Year Scenario		Ultimate Buildout	
			Quantity	Total Cost	Quantity	Total Cost	Quantity	Total Cost
12-inch PVC Sewer	LF	\$75.00	1270	\$95,250.00	1270	\$95,250.00	1270	\$95,250.00
21-inch PVC Sewer	LF	\$140.00	5378	\$752,920.00	5378	\$752,920.00	5378	\$752,920.00
Jack & Bore 20-inch Steel Casing	LF	\$500.00	200	\$100,000.00	200	\$100,000.00	200	\$100,000.00
Jack & Bore 24-inch Steel Casing	LF	\$600.00	200	\$120,000.00	200	\$120,000.00	200	\$120,000.00
Jack & Bore 30-inch Steel Casing	LF	\$750.00	300	\$225,000.00	300	\$225,000.00	300	\$225,000.00
Jack & Bore 36-inch Steel Casing	LF	\$1,000.00	0	\$0.00	0	\$0.00	0	\$0.00
Lift Station	LS	\$225,000.00	1	\$225,000.00	1.555556	\$350,000.00	2.444444	\$550,000.00
8-inch PVC Forcemain	LF	\$55.00	5128	\$282,040.00	0	\$0.00	0	\$0.00
12-inch PVC Forcemain	LF	\$75.00	0	\$0.00	5128	\$384,600.00	5128	\$384,600.00
Totals				\$1,800,210.00		\$2,027,770.00		\$2,227,770.00
Plus 10% Construction Contingency				\$180,021.00		\$202,777.00		\$222,777.00
Plus 25% for ELA				\$450,052.50		\$506,942.50		\$556,942.50
Grand Totals				\$2,430,283.50		\$2,737,489.50		\$3,007,489.50

Appendix B

Potential Funding and Fees Collected Tables

Funding for Alternative 1A - Trunk Sewer Required to Bypass Breeggemann Property (Ultimate Buildout)

	Sanitary Sewer (Trunk Oversizing) ¹	Sanitary Sewer (8" equivalent) ²	Sanitary Sewer (Lift Station) ¹	Sanitary Sewer (Forcemain Oversizing) ¹	Sanitary Sewer (8" Equivalent length of FM) ³	Estimated Total
Estimated Expenditures						
Estimated Construction Cost	\$490,000.00	\$116,000.00	\$550,000.00	\$58,450.00	\$66,800.00	\$1,281,250.00
Contingencies (10%)	\$49,000.00	\$11,600.00	\$55,000.00	\$5,845.00	\$6,680.00	\$128,125.00
Administration, Engineering, Legal (25%)	\$122,500.00	\$29,000.00	\$137,500.00	\$14,612.50	\$16,700.00	\$320,312.50
Total Estimated Project Costs (Feasibility)	\$661,500.00	\$156,600.00	\$742,500.00	\$78,907.50	\$90,180.00	\$1,729,687.50
Estimated Revenue						
Sanitary Sewer Fund	\$661,500.00	\$156,600.00	\$742,500.00	\$78,907.50	\$90,180.00	\$1,729,687.50
Total Estimated Revenue						\$1,729,687.50

Notes:

1. Paid for by the Trunk Sanitary Sewer Charge, which is collected prior to releasing the plat for recording.
2. Paid for by Lateral Sanitary Sewer Connection Charge. This fee will be shown in the City's fee schedule and will apply to the Breeggemann property only.
3. Paid for by Lateral Sanitary Sewer Connection Charge. This fee will be shown in the City's fee schedule and will apply to all developments that are served by the lift station.

Funding for Alternative 1B - Trunk Sewer not Required to Bypass Breeggemann Property (Property develops first)

	Sanitary Sewer (Lift Station) ¹	Sanitary Sewer (Forcemain Oversizing) ¹	Sanitary Sewer (8" Equivalent length of FM) ²	Estimated Total
Estimated Expenditures				
Estimated Construction Cost	\$550,000.00	\$58,450.00	\$66,800.00	\$675,250.00
Contingencies (10%)	\$55,000.00	\$5,845.00	\$6,680.00	\$67,525.00
Administration, Engineering, Legal (25%)	\$137,500.00	\$14,612.50	\$16,700.00	\$168,812.50
Total Estimated Project Costs (Feasibility)	\$742,500.00	\$78,907.50	\$90,180.00	\$911,587.50
Estimated Revenue				
Sanitary Sewer Fund	\$742,500.00	\$78,907.50	\$90,180.00	\$911,587.50
Total Estimated Revenue				\$911,587.50

Notes:

1. Paid for by the Trunk Sanitary Sewer Charge, which is collected prior to releasing the plat for recording.
2. Paid for by Lateral Sanitary Sewer Connection Charge. This fee will be shown in the City's fee schedule and will apply to all developments that are served by the lift station.

Funding for Alternative 2 using Ultimate Buildout Scenario

	Sanitary Sewer (Lift Station) ¹	Sanitary Sewer (Forcemain Oversizing) ¹	Sanitary Sewer (8" Equivalent length of FM) ²	Estimated Total
Estimated Expenditures				
Estimated Construction Cost	\$550,000.00	\$174,300.00	\$199,200.00	\$923,500.00
Contingencies (10%)	\$55,000.00	\$17,430.00	\$19,920.00	\$92,350.00
Administration, Engineering, Legal (25%)	\$137,500.00	\$43,575.00	\$49,800.00	\$230,875.00
Total Estimated Project Costs (Feasibility)	\$742,500.00	\$235,305.00	\$268,920.00	\$1,246,725.00
Estimated Revenue				
Sanitary Sewer Fund	\$742,500.00	\$235,305.00	\$268,920.00	\$1,246,725.00
Total Estimated Revenue				\$1,246,725.00

Notes:

1. Paid for by the Trunk Sanitary Sewer Charge, which is collected prior to releasing the plat for recording.
2. Paid for by Lateral Sanitary Sewer Connection Charge. This fee will be shown in the City's fee schedule and will apply to all developments that are served by the lift station.

Alternative 1A - Fees Collected For this Project			
Lateral Sanitary Sewer Connection Charge	Served by LS	\$78.15	Developable Acre
	Served by Trunk	\$2,796.43	Developable Acre
Trunk Sanitary Sewer Charge		\$2,982.00	Developable Acre
City Sewer Availability Charge		\$515.00	SAC Unit

Revenue Generated from Fees		
Lateral Sanitary Sewer Connection Charge	Served by LS	\$90,180.00
	Served by Trunk	\$156,600.00
Trunk Sanitary Sewer Charge		\$3,441,228.00
City Sewer Availability Charge		\$1,879,750.00

Alternative 1B - Fees Collected For this Project		
Lateral Sanitary Sewer Connection Charge (served by Lift Station)	\$78.15	Developable Acre
Trunk Sanitary Sewer Charge	\$2,982.00	Developable Acre
City Sewer Availability Charge	\$515.00	SAC Unit

Revenue Generated from Fees	
Lateral Sanitary Sewer Connection Charge	\$90,180.00
Trunk Sanitary Sewer Charge	\$3,441,228.00
City Sewer Availability Charge	\$1,879,750.00

Alternative 2 - Fees Collected For this Project		
Lateral Sanitary Sewer Connection Charge (served by Lift Station)	\$78.15	Developable Acre
Trunk Sanitary Sewer Charge	\$2,982.00	Developable Acre
City Sewer Availability Charge	\$515.00	SAC Unit

Revenue Generated from Fees	
Lateral Sanitary Sewer Connection Charge	\$90,180.00
Trunk Sanitary Sewer Charge	\$3,441,228.00
City Sewer Availability Charge	\$1,879,750.00