

Targeted BMP Study for Shakopee Downtown Subwatershed

Prepared for
City of Shakopee

March 2022



Targeted BMP Study for Shakopee Downtown Subwatershed

March 2022

Contents

1	Introduction and Background.....	1
2	Water Quality Model Development	2
2.1	Review of Existing Hydraulic and Hydrologic Model	2
2.2	Model Development.....	3
2.3	Existing Conditions Model Results.....	3
2.4	Identification of Potential New or Enhanced Existing BMPs	0
3	Analysis of Potential BMPs.....	1
3.1	BMP E-07 (Figure 3).....	1
3.2	BMP E-09 (Figure 4).....	2
3.3	BMP G-01 (Figure 5).....	2
3.4	BMP I-01 (Figure 6).....	3
3.5	BMP N-03 (Figure 7).....	3
3.6	BMP Q-01 (Figure 8).....	4
3.7	BMP R-01 (Figure 9).....	4
3.8	BMP S-01 (Figure 10)	5
3.9	BMP S-02 (Figure 11)	6
3.10	BMP W-02 (Figure 12).....	6
3.11	BMP W-03 (Figure 13).....	7
3.12	BMP W-06 (Figure 14).....	7

List of Tables

Table 2-1	Existing BMPs in the Downtown Shakopee subwatershed	3
Table 2-2	Summary of Pipesheds and Existing Condition Water Quality Model Results.....	0
Table 3-1	Summary of Potential BMP Performance and Planning Level Costs.....	0

List of Appendices

Appendix A	BMP Concept Design Figures
Appendix B	Planning Level Opinions of Cost

1 Introduction and Background

In 2019, the Lower Minnesota River Watershed District (LMRWD) was awarded watershed-based grant funding to assess potential best management practices (BMPs) in the Downtown Shakopee area. LMRWD and the City of Shakopee entered into an agreement for passthrough funding for the City of Shakopee to perform this assessment. The work was scoped as analyzing the current stormwater system in downtown Shakopee and identifying opportunities to implement BMPs before the stormwater is discharged to the Minnesota River. Barr entered into an agreement with the City of Shakopee in March 2020 and performed this assessment as outlined the sections below.

2 Water Quality Model Development

The Geographic Information System Water Quality Model (GIS WQM) is a tool originally developed by Barr in 2018 for the City of Minneapolis. The GIS WQM allows for rapid evaluation of watershed pollutant loading and estimates pollutant reduction from a variety of structural and non-structural BMPs, including wet ponds, rain gardens, dry ponds, pervious pavement, green roofs, street sweeping, and others. Pollutant reduction methodology within the GIS WQM is based on methodology developed for the Minnesota Pollution Control Agency's (MPCA) Minimal Impact Design Standard (MIDS) Calculator (MPCA, 2017). The model uses simplified watershed and BMP inputs to estimate annualized pollutant loading and pollutant reduction at modeled BMPs. As opposed to the continuous, physically based P8 model, the GIS WQM is an annualized, empirically based model intended to be used as a planning-level tool for quickly evaluating and summarizing water quality performance of BMPs and pollutant loading results. Due to the speed of simulations in the GIS WQM, which are less than a minute for a typical city-wide model run, the GIS WQM can be used for quick evaluation of "what if" scenarios related to BMP implementation, cost-benefit evaluation of proposed BMPs, modifications to existing BMPs, and regional planning of BMP implementation to meet pollutant reduction goals such as municipal separate storm sewer system (MS4) waste load allocations (WLAs). The GIS WQM performs a mass balance of runoff and pollutant at every point within the storm sewer utility network, allowing for quantification of pollutant loading and pollutant removal at any point within the utility network (e.g., any manhole, outfall, BMP). The version of the GIS WQM model developed for the City of Shakopee is compatible with the Esri product ArcMap.

The GIS WQM developed for this project utilized a storm sewer utility network developed from the City of Shakopee's storm sewer GIS data in the downtown subwatershed to route runoff and associated pollutants through storm sewer, in and out of water quality BMPs, and ultimately to outfalls to the Minnesota River. The following subsections provide an overview of the GIS WQM model development process, the results of the existing conditions model, and the identified locations of potential new or enhanced BMPs.

2.1 Review of Existing Hydraulic and Hydrologic Model

Barr first reviewed the City of Shakopee's current hydraulic and hydrologic storm sewer model to determine if its underlying data could be used for this feasibility assessment of potential BMPs in the downtown Shakopee subwatershed. Upon review, the existing model data was found to lack the level of detail and positional accuracy needed to effectively evaluate the water quality loading and existing treatment for the downtown subwatershed. Many of the flow links in the model did not follow existing storm sewers and several outfalls to the Minnesota River were not included in the model. The reasons for these discrepancies are unknown but may be due to the lack of availability of data when the hydraulic and hydrologic model was originally developed. For development of a GIS WQM, it is critical that the flow network follows the actual storm sewer system to correctly account for the tributary watershed to each BMP as well as any upstream treatments. It is also critical when siting new BMPs that property ownership and topography at the site is known and can be evaluated.

2.2 Model Development

The existing hydraulic and hydrologic model lacked the level of detail needed to develop an appropriate GIS WQM for this feasibility assessment, so Barr obtained the City of Shakopee’s storm sewer GIS data, including storm sewer pipe alignments, catch basins locations, and outflow points for the downtown subwatershed, and updated the watersheds and flow network in the model. Barr also added ditches and conveyances through ponds to the drainage network to provide a continuous flow network to the Minnesota River. Barr identified the locations of these features using aerial photography and Scott County light detection and ranging (LiDAR) data developed by the State of Minnesota.

Once the storm sewer network was developed and inflow points identified, subwatersheds to the inflow points to the network were delineated using a process developed by Barr. This process utilizes LiDAR data, stormwater ponds, and identified network inflow points. Some corrections were made to the subwatersheds based on visual examination of the results of the process. No field verifications of subwatersheds were performed. The subwatershed to each outfall to the river is termed a ‘pipeshed’ in this report and a total of 24 outfalls and corresponding pipesheds were identified in the downtown Shakopee subwatershed.

Next, Barr identified existing BMPs using GIS data, record drawings provided by the City of Shakopee, lidar data, aerial photography, and the National Wetlands Inventory. Barr identified a total of 40 BMPs within the downtown subwatershed as summarized in **Table 2-1**. For each BMP, Barr determined the permanent pool volume (dead storage), water quality volume (flood storage), and surface area (where required). When available, Barr used plan sheets provided by the City of Shakopee to determine the parameters. Where record drawings or design drawings were not available, LiDAR or other data were used to estimate these parameters.

Table 2-1 Existing BMPs in the Downtown Shakopee subwatershed

BMP Type	Number of Instances
Bioretention Basin (without underdrain)	2
Dry Pond	20
Grit Chamber	1
Regional BMP at County Government Center Lot A	1
Tree Trench System (with underdrain)	1
Underground Infiltration	2
Wet Pond	13

2.3 Existing Conditions Model Results

Once all the model parameters were developed, Barr ran the existing conditions model to determine the estimated pollutant loadings and removals for total suspended solids (TSS) and total phosphorus (TP).

Figure 1 shows the pipesheds, the network of storm sewer and conveyances, and the areas of the downtown watershed where runoff is treated by existing BMPs. **Table 2-2** lists the estimated TSS and TP loadings and removals in each pipeshed based on the existing conditions GIS WQM model results.

Table 2-2 Summary of Pipesheds and Existing Condition Water Quality Model Results

Pipeshed ID	Area (acres)	Percent Impervious	Percent Directly Connected Impervious	TSS Loading (lbs/yr)	TSS Removal from Existing BMPs (lbs/yr)	TSS Removal from Existing BMPs (%)	TSS Loading to Outfall (lbs/yr)	TP Loading (lbs/yr)	TP Removal from Existing BMPs (lbs/year)	TP Removal from Existing BMPs (%)	TP Loading to Outfall (lbs/yr)
A	86.8	65%	63%	35,348	4,989	14%	30,359	115	10	8%	106
B	2.5	77%	75%	1,213	0	0%	1,213	4	0	0%	4
C	2.3	16%	15%	255	0	0%	255	1	0	0%	1
D	59.9	67%	64%	24,853	2,551	10%	22,302	81	2	3%	78
E	379.2	41%	31%	78,833	15,276	19%	63,557	261	27	10%	234
F	4.5	92%	90%	2,584	4	0%	2,580	8	0	0%	8
G	0.6	45%	31%	121	18	14%	103	0	0	14%	0
H	5.7	61%	60%	2,235	2,009	90%	226	7	4	60%	3
I	6.8	99%	97%	4,234	1	0%	4,233	14	0	0%	14
J	0.3	2%	1%	7	0	0%	7	0	0	0%	0
K	3.8	60%	55%	1,363	74	6%	1,289	4	0	4%	4
L	3.6	73%	65%	1,532	182	12%	1,350	5	0	5%	5
M	2.8	74%	61%	1,126	101	9%	1,025	4	0	8%	3
N	254.3	48%	33%	55,824	15,775	28%	40,049	184	36	20%	148
O	7.3	89%	74%	3,476	392	11%	3,084	11	1	5%	11
P	6.3	95%	85%	3,454	588	17%	2,866	11	1	5%	11
Q	53.4	55%	41%	14,592	8,651	59%	5,941	48	18	37%	30
R	9.2	16%	11%	769	645	84%	124	3	1	29%	2
S	249.7	45%	30%	51,448	11,655	23%	39,793	170	30	17%	141
T	7.2	51%	41%	1,980	162	8%	1,818	7	1	8%	6
U	2.6	30%	22%	395	38	10%	357	1	0	10%	1
V	8.5	63%	57%	3,189	2,885	91%	304	10	6	61%	4
W	200.7	56%	45%	59,168	8,945	15%	50,223	194	19	10%	175
X	0.8	11%	8%	53	48	90%	5	0	0	60%	0
TOTAL	1,359	50%	39%	348,052	74,989	22%	273,063	1,143	156	13%	989

2.4 Identification of Potential New or Enhanced Existing BMPs

Barr examined parcel data, storm sewer data, aerial photography, and topography to identify potential sites where additional stormwater treatment could be provided. Priority was given to untreated and undertreated areas. Barr initially identified 38 potential sites within the downtown Shakopee subwatershed and provided these sites to the City of Shakopee for review. After review, the city directed Barr to further evaluate 12 sites consisting of either new features or enhancements to existing features.

Figure 2 shows the locations of the potential new or enhanced BMPs identified for further analysis, as well as the tributary drainage areas to these BMPs.

3 Analysis of Potential BMPs

Barr assessed the feasibility and benefit of potential BMPs at the 12 locations recommended by the City of Shakopee. Potential BMP types included new or expanded wet ponds, filtration features, or infiltration features. At five of the sites, multiple types were considered and evaluated. As part of the analysis, Barr noted that additional data was needed for six of the 11 locations to confirm feasibility of a potential BMP. Barr provided these locations to the City of Shakopee and the city surveyed and/or took field measurements and provided the data back to Barr.

Barr typically designed the potential BMPs based on the existing storm sewer elevations, with the intent of capturing stormwater from the existing storm sewer, treating it, and then discharging it back into the existing storm sewer at a slightly downstream location. For surface features, Barr assumed a maximum grading side slope of 3 feet horizontal to 1 foot vertical (3H:1V) and for surface ponding features, a 10H:1V bench was provided below the normal water line for wet ponds, unless otherwise noted. Barr also generally assumed that surface BMPs that require excavations greater than 20 feet in order to daylight storm sewer infrastructure may not be feasible due to additional geotechnical considerations and excavation safety requirements.

Barr utilized the GIS WQM was used to evaluate the pollutant removal efficiency of each potential BMP. Barr also prepared planning-level cost estimates and annualized benefit-to-cost ratios using an interest rate of 4% and a life cycle of 20 years for each potential BMP. The pollutant removals, planning-level cost estimates, and annualized benefit-to-cost ratios for each potential BMP are summarized in **Table 3-1**.

3.1 BMP E-07 (Figure 3)

Project Description

BMP E-07 is a proposed wet pond south of 10th Avenue and west of Tyler Street that is designed to treat flow from the existing 10th Avenue storm sewer. The 10th Avenue storm sewer flows generally southwest to northeast to the northwest of the proposed BMP and collects runoff from a portion of pipeshed E, which is currently untreated. BMP E-07 would treat runoff from approximately 10 acres.

Design Considerations

The normal water level of the proposed wet pond was set at elevation 794, which is the invert elevation of the 10th Avenue storm sewer. Existing grades in this area are approximately elevation 804 and the pond was conceptually designed with a water depth of 5 feet, therefore the full excavation depth for BMP E-07 is approximately 15 feet. A portion of the BMP E-07 would be on private property; therefore, this work would require a permanent easement or purchase of a portion of the private property. This BMP could be coordinated or constructed with redevelopment of the mall area. As shown on Figure 3, BMP E-07 is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

3.2 BMP E-09 (Figure 4)

Project Description

BMP E-09 is a proposed wet pond north of West 3rd Avenue between Harrison Street and Adam Street designed to treat regional flows for runoff from a portion of pipeshed E. The existing storm sewer flows from West 3rd Avenue to the north along the west edge of the parcel on which the BMP E-09 is proposed. BMP E-09 would treat runoff from approximately 373 acres.

Design Considerations

The normal water level of the proposed BMP E-09 was set at elevation 725, which is the invert elevation of the adjacent storm sewer. Existing surface grades in this area are approximately elevation 750 and the minimum recommended depth of a stormwater pond is 3 feet, therefore the full excavation depth for this BMP is approximately 28 feet. Excavations greater than 20 feet may require additional geotechnical considerations and engineered excavations to meet safety regulations. Based on the unused space available on the parcel, a 10-foot safety bench below the normal water level does not appear to be feasible at this location, therefore the pond may need to be fenced. BMP E-09 would be on private property; therefore, this work would require a permanent easement or purchase of a portion of the private property. Record drawings for the profile of the existing storm sewer to the west of the BMP E-09 indicate that bedrock is present from elevation 725 to 745, therefore bedrock may be present at similar elevations in the vicinity of BMP E-09. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. Typical stormwater pond design guidance recommends a minimum dead storage volume equal to 0.5 inches times the tributary impervious surface. Based on the drainage area to BMP E-09, the minimum dead storage volume is approximately 205,700 cubic feet. Based on the unused space available on the parcel, calculated dead storage volume for BMP E-09 is approximately 5,500 cubic feet, which is less than 3% of the minimum requirement. There are many challenges and constraints for BMP E-09, which may make this option infeasible.

3.3 BMP G-01 (Figure 5)

Project Description

BMP G-01 is a proposed filtration basin north of 1st Avenue between Clay Street and Pierce Street to treat 0.6 acres of local runoff from the adjacent subwatershed Pipeshed G, which is currently untreated.

Design Considerations

BMP G-01 was sized to capture and treat a volume of approximately 743 cubic feet based on calculating a volume of 1.1 inches of runoff from the tributary impervious area. The recommended maximum depth of filtration basins with vegetation (rain gardens) is 1.5 feet. BMP G-01 would be on private property; therefore, this work would require a permanent easement or purchase of a portion of the private property. City staff provided notes that bedrock has been observed to the east and south of this proposed BMP at elevations 710 and 750, respectively, therefore bedrock may be present within this elevation range in the vicinity of BMP G-01. Additional geotechnical investigations are recommended for proposed BMPs

located in areas with shallow bedrock. For filtration or infiltration BMPs, a minimum separation of 3 feet is required from bedrock.

3.4 BMP I-01 (Figure 6)

Project Description

BMP I-01 is a proposed wet pond in the Minnesota River floodplain north of 1st Avenue between Clay Street and Pierce Street. BMP I-01 would treat runoff from 0.6 acres of Pipedshed G and 7.4 acres of runoff diverted from Pipedshed I. Both Pipedsheds I and G are currently untreated.

Design Considerations

For BMP I-01, storm sewer data was not available, therefore parameters are estimated based on assumptions for storm sewer location and elevation, however more accurate data would be required to completely evaluate the BMP. Existing grades in the area range from elevation 704-706. The normal water level was set at 701, which is a few feet below the existing grade. The pond was conceptually designed with a water depth of 5 feet, therefore the full excavation depth for BMP G-01 is approximately 8-10 feet. BMP I-01 would be on property not owned by the city; therefore, this work would require a permanent easement or purchase of a portion of the property. City staff provided notes that shallow bedrock could be present at this location. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. The proposed BMP may also require analysis for floodplain impacts due to its proximity to the Minnesota River. There could be archeological features in this area, which should be considered and accounted for if design and construction of this BMP moves forward. This BMP could potentially be constructed in coordination and partnership with the MnDNR and local watershed district. BMP I-01 is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

3.5 BMP N-03 (Figure 7)

Project Description

BMP N-03 is a proposed regional underground system in a city-owned parking lot south of East 2nd Avenue between Holmes Street and Lewis Street. The existing storm sewer flows from east to west through the parking lot and could be diverted into the proposed underground system and either infiltrated or filtered, based on the underlying soils. BMP N-03 would treat runoff from approximately 26 acres.

Design Considerations

An assumed treatment volume for BMP N-03 was calculated as approximately 33,000 cubic feet based on calculating a volume of 1.1 inches of runoff volume from the tributary impervious area. If filtration is proposed, filtered water may need to be routed to storm sewer in Lewis Street, which is lower than the storm sewer in Holmes Street. City staff provided notes that nearby soil borings indicate that bedrock may be present in the vicinity of BMP N-01 at elevations ranging from 740 to 745. Additional geotechnical

investigations are recommended for proposed BMPs located in areas with shallow bedrock. For filtration or infiltration BMPs, a minimum separation of 3 feet is required from bedrock. This proposed BMP could be constructed in coordination with reconstruction or repaving of the parking lot.

3.6 BMP Q-01 (Figure 8)

Project Description

BMP Q-01 is a proposed expansion of an existing wet pond near Huber Park. The existing pond treats runoff from approximately 55 acres of Pipeshed Q, which is mainly residential, with some commercial development. Two scenarios were evaluated for this BMP. The first scenario, BMP Q-01a, involves maximizing the pond footprint in the space available to provide additional treatment. The second scenario, BMP Q-01b, involves maximizing the BMP footprint and converting the BMP to a filtration device.

Design Considerations

Some existing park trails may need to be removed or relocated. The pond expansion for BMP Q-01a would utilize the same normal water level (elevation 705), overflow (elevation 708), and pond bottom (elevation 702), but expand the footprint to provide additional treatment. BMP Q-01b would similarly expand the footprint but also convert the BMP to a filtration basin with an assumed 2 feet of sand filtration media and 1 foot of storage between the filtration media and the overflow. The peak water levels of the river should be further evaluated to understand how they may impact these proposed BMPs. There could be archeological features in this area, which should be considered and accounted for if design and construction of this BMP moves forward.

3.7 BMP R-01 (Figure 9)

Project Description

Two scenarios were evaluated for BMP R-01. The first scenario, BMP R-01a, involves diverting stormwater from an existing storm sewer in Market Street to the existing marina north of Bluff Avenue between Market Street and Minnesota Street. The second scenario, BMP R-01b, involves constructing a wet pond in Huber Park in a low-lying area that appears to periodically flood, and diverting stormwater from the existing storm sewer in Market Street to this wet pond. BMP R-03 would treat runoff from approximately 257 acres from Pipesheds R and S, which includes primarily residential land use.

Design Considerations

Storm sewer data was not available for this location. BMP R-01 parameters are estimated based on assumptions for storm sewer location and elevation, however more accurate data would be required to completely evaluate the BMP. The approximated storm sewer invert is at elevation 700. There could be archeological features in this area, which should be considered and accounted for if design and construction of either BMP moves forward.

For BMP R-01a, the bottom of the marina was surveyed at elevation 692 and overflow elevation to the river was surveyed at 692.55. Since the marina is directly connected to the river, water levels may fluctuate

regularly. The volume of the existing marina was estimated using LiDAR data. The overflow from the marina to the river could be filled and an outlet structure could be constructed to provide a larger pond depth and more controlled outflow. The peak water levels of the river should be further evaluated to understand how they may impact these proposed BMPs. Maintenance or dredging of the marina was not considered as part of this analysis.

For BMP R-01b, the normal water level of the proposed wet pond was set at elevation 700 based on the estimated invert elevation of the existing storm sewer. Existing surface grades in this area are approximately elevation 708 and the pond was conceptually designed with a water depth of 5 feet, therefore the full excavation depth for BMP R-01b is approximately 13 feet. The existing park trails may need to be removed and relocated for BMP R-01b. The peak water levels of the river should be further evaluated to understand how they may impact these proposed BMPs. City staff noted that there may be shallow bedrock in the vicinity of BMP R-01b. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. BMP R-01b is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

3.8 BMP S-01 (Figure 10)

Project Description

Two scenarios were evaluated for BMP S-01. BMP S-01a is a proposed expansion of an existing wet pond north of East 7th Avenue and east of Dakota Street. The existing pond treats runoff from approximately 23 acres of Pipeshed S, which includes mainly residential land use with approximately 45% impervious area. The existing stormwater pond appears to be already maximized on the existing parcel, therefore BMP S-01a includes expanding the depth of the stormwater pond rather than expanding the footprint. The second scenario, BMP S-01b, involves converting the existing stormwater pond to a filtration device.

Design Considerations

The pond expansion for BMP S-01a would utilize the same normal water level (elevation 761) and overflow (elevation 765) but deepen the pond from elevation 758 to 756 to provide additional treatment. Based on the apparent limited space to expand this pond, BMP S-01a is effectively a proposed pond cleanout project and a 10-foot safety bench below the normal water level does not appear to be feasible at this location as it results in less ponding volume than existing conditions. For BMP S-01b, the filtration basin was assumed to fit within the same footprint as the existing BMP with an assumed 2 feet of sand filtration media and 1 foot of storage between the filtration media and an overflow. City staff noted that there may be shallow bedrock in the vicinity of BMP S-01 as nearby soil borings showed bedrock at elevations 748 to 752. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. BMP S-01 is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

3.9 BMP S-02 (Figure 11)

Project Description

BMP S-02 is a proposed expansion of an existing wet pond between Market Street and Dakota Street, north of Milwaukee Court. The existing pond treats runoff from approximately 80 acres of Pipeshed S, which is mainly residential. Two scenarios were evaluated for this BMP. The first scenario, BMP S-02a, involves maximizing the pond footprint in the space available to provide additional treatment. The second scenario, BMP S-02b, involves maximizing the BMP footprint and converting the BMP to a filtration device.

Design Considerations

The pond expansion for BMP S-02a would utilize the same normal water level (elevation 758), overflow (elevation 760), and pond bottom (elevation 753), but expand the footprint to provide additional treatment. BMP S-02b would similarly expand the footprint but also convert the BMP to a filtration basin with 2 feet of sand filtration media and 1 foot of storage between the filtration media and the overflow. Some tree removals and relocation of private sheds and fire pits may be required based on the aerial imagery. City staff noted that there may be shallow bedrock in the vicinity of BMP S-02 as nearby soil borings showed bedrock at elevation 756. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. BMP S-02 is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

3.10 BMP W-02 (Figure 12)

Project Description

BMP W-02 is a proposed wet pond in a currently undeveloped lot north of East 4th Street and east of Gorman Street. The BMP is designed to treat flow from the existing 4th Street storm sewer, which flows from west to east. BMP W-02 would treat runoff from approximately 56 acres in Pipeshed W, which includes primarily residential and commercial land use.

Design Considerations

The normal water level of the proposed wet pond was set at elevation 742, which is the invert elevation of the 4th Street storm sewer. Existing grades in this area are approximately elevation 748 and the pond was conceptually designed with a water depth of 5 feet, therefore the full excavation depth for BMP W-02 is approximately 11 feet. City staff noted that there may be shallow bedrock in the vicinity of BMP W-02 as soil borings at the north end of Gorman Street showed bedrock at elevation 748. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. BMP W-02 would be on private property; therefore, this work would require a permanent easement or purchase of the private property. The concept design assumes the majority of the parcel is available for the BMP. BMP W-02 is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

3.11 BMP W-03 (Figure 13)

Project Description

BMP W-03 is a proposed expansion of an existing wet pond north of Bluff Avenue East and north of Marshall Road. The existing pond treats runoff from approximately 201 acres of Pipedshed W, including both commercial and residential land uses.

Design Considerations

Detailed storm sewer elevation data was not available for site and would be required to further evaluate the feasibility of this option. The pond expansion for BMP W-03 would utilize the same assumed normal water level (elevation 698) and overflow (elevation 703), but the pond bottom was deepened from elevation 695 to elevation 693 and the footprint was expanded to provide additional treatment. Some tree removals may be required based on the aerial imagery. This BMP is also in the floodplain which could complicate the project. BMP W-03 would be on non-city-owned property; therefore, this work would require a permanent easement or purchase of the private property. There could be archeological features in this area, which should be considered and accounted for if design and construction of this BMP moves forward. Typical stormwater pond design guidance recommends a minimum dead storage volume equal to 0.5 inches times the tributary impervious surface. Based on the drainage area to BMP W-03, the minimum dead storage volume is approximately 163,000 cubic feet. Based on the unused space available on the parcel, calculated dead storage volume for BMP E-09 is approximately 38,000 cubic feet, which is approximately 6% of the minimum requirement. This may require BMP W-03 to be significantly upsized or may make BMP W-03 infeasible if additional space is not available.

3.12 BMP W-06 (Figure 14)

Project Description

BMP W-06 is a proposed expansion of an existing wet pond southwest of the intersection of East 4th Street and Gorman Street. The existing pond treats runoff from approximately 14 acres of Pipedshed W, primarily runoff from the Public Works Department property.

Design Considerations

The pond expansion for BMP W-06 would utilize the same assumed normal water level (elevation 742), overflow (elevation 752), and pond bottom (elevation 737), but expand the footprint to provide additional treatment. City staff noted that there may be shallow bedrock in the vicinity of BMP W-06 as soil borings at the north end of Gorman Street showed bedrock at elevation 748. Additional geotechnical investigations are recommended for proposed BMPs located in areas with shallow bedrock. Bedrock may act as a liner to help maintain a permeant pool, unless a fracture zone is present, then a constructed liner may be required. Some tree removals may be required based on the aerial imagery. BMP W-06 is oversized for the contributing drainage area, but this may allow for the addition of pretreatment forebays or slope steepness adjustments during the design process.

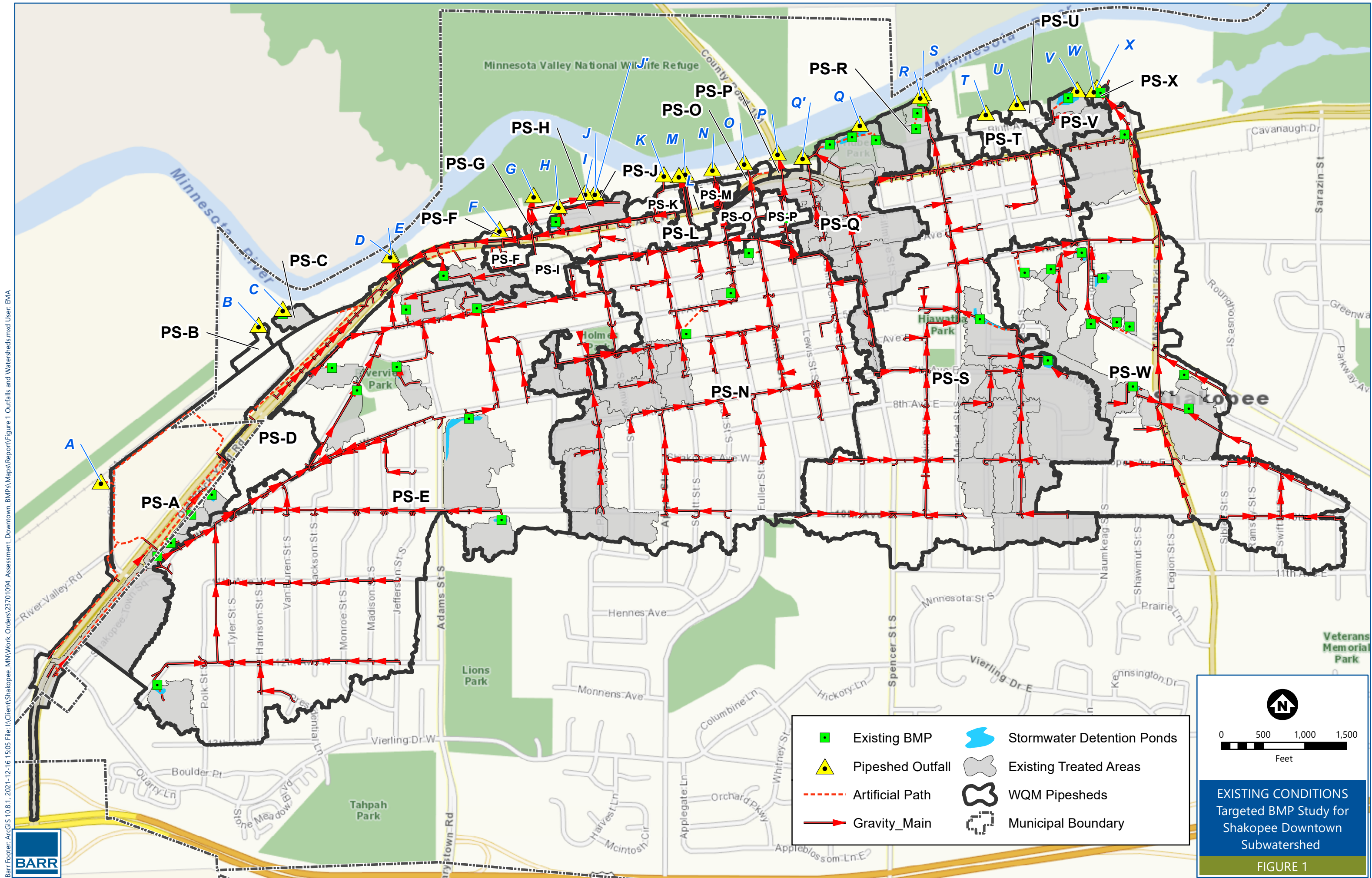
Table 3-1 Summary of Potential BMP Performance and Planning Level Costs

BMP ID	Drainage Area (acre)	TSS Loading (lbs/yr)	TSS Removal (lbs/yr)	TSS Removal (%)	TP Loading (lbs/yr)	TP Removal (lbs/yr)	TP Removal (%)	Planning Level Cost Estimate	Annualized Benefit-Cost (\$/lb-TSS/yr)	Annualized Benefit-Cost (\$/lb-TP/yr)
E-07	10.3	3,074	2,767	90%	10.3	6.2	60%	\$751,000	\$19.98	\$8,915
E-09	372.8	61,934	35,055	57%	228.2	72.1	32%	\$1,826,000	\$3.83	\$1,864
G-01	0.6	103	102	99%	0.3	0.3	100%	\$49,000	\$35.36	\$12,021
I-01	7.4	4,530	2,598	57%	14.7	4.8	33%	\$411,000	\$11.64	\$6,302
N-03a	26.4	4,656	2,793	60%	18.4	4.6	25%	\$2,014,000	\$53.07	\$32,224
N-03b	26.4	4,656	4,561	98%	18.4	18	98%	\$1,939,000	\$31.29	\$7,928
Q-01a ¹	54.8	12,283	5,145	42%	43.5	14.22	33%	\$416,000	\$5.95	\$2,153
Q-01b ¹	54.8	12,283	4,530	37%	43.5	8.62	20%	\$715,000	\$11.62	\$6,105
R-01a	257.3	40,489	22,163	55%	143.0	41.9	29%	\$184,000	\$0.61	\$323
R-01b	257.3	40,216	34,064	85%	142.2	73.4	52%	\$2,639,000	\$5.70	\$2,646
S-01a ¹	23.0	2,932	880	30%	10.0	2.58	26%	\$180,000	\$15.05	\$5,135
S-01b ¹	23.0	2,932	733	25%	10.0	1.29	13%	\$244,000	\$24.50	\$13,921
S-02a ¹	80.3	10,944	2,295	21%	39.5	4.38	11%	\$594,000	\$19.05	\$9,981
S-02b ¹	80.3	10,944	5,031	46%	39.5	6.28	16%	\$1,185,000	\$17.34	\$13,888
W-02	56.4	10,998	5,415	49%	47.6	14.1	30%	\$1,090,000	\$14.82	\$5,690
W-03 ¹	201.5	49,365	3,796	8%	180.2	7.99	4%	\$276,000	\$5.35	\$2,542
W-06 ¹	14.0	3,531	0	0%	11.7	3.9	33%	\$488,000	N/A	\$9,209

¹ For sites with existing BMPs, removals and annualized benefit-costs are reported as the difference between existing conditions and proposed conditions.

Appendix A

BMP Concept Design Figures

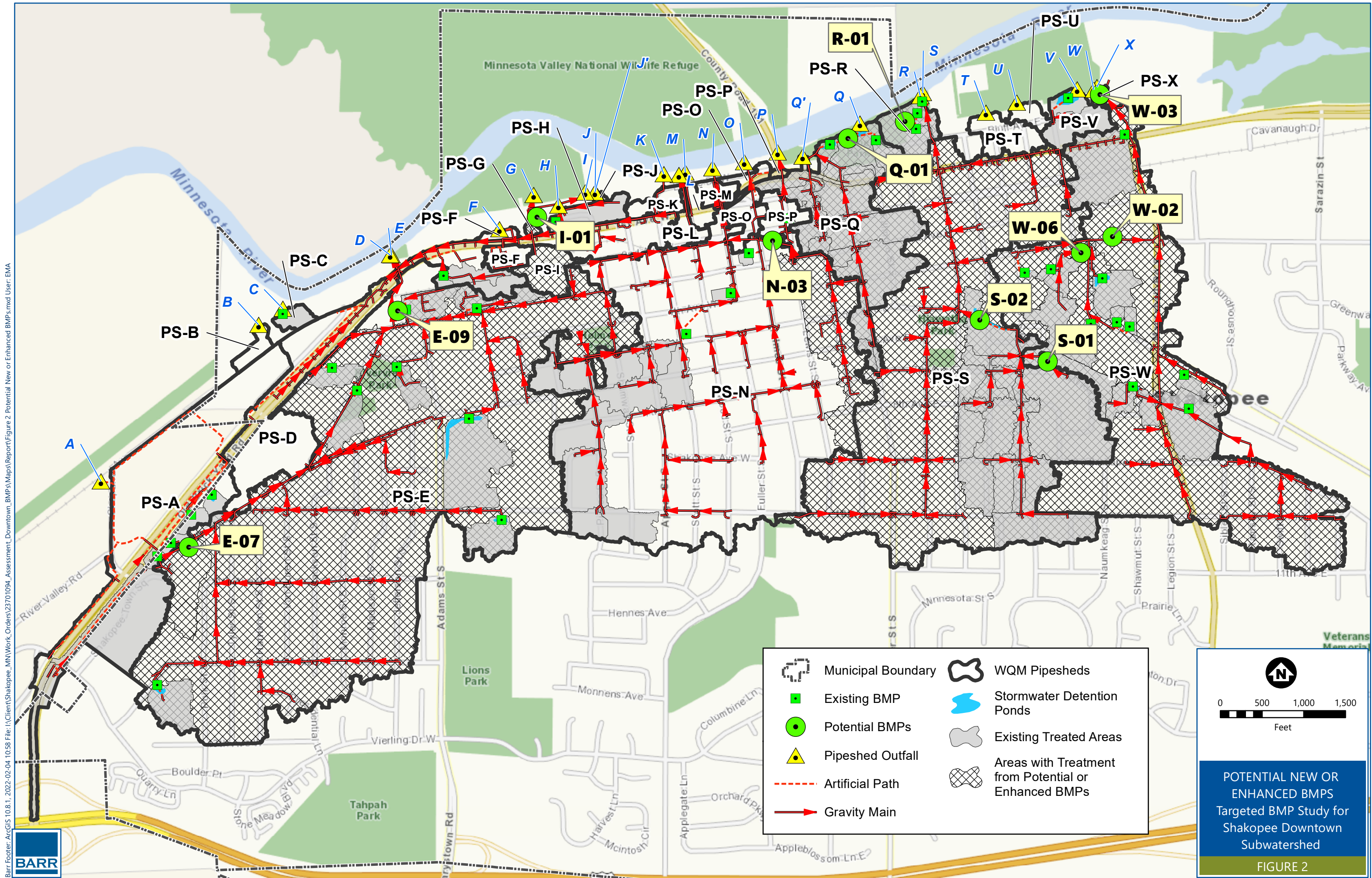


	Existing BMP		Stormwater Detention Ponds
	Pipeshed Outfall		Existing Treated Areas
	Artificial Path		WQM Pipesheds
	Gravity_Main		Municipal Boundary

0 500 1,000 1,500
 Feet

EXISTING CONDITIONS
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 1





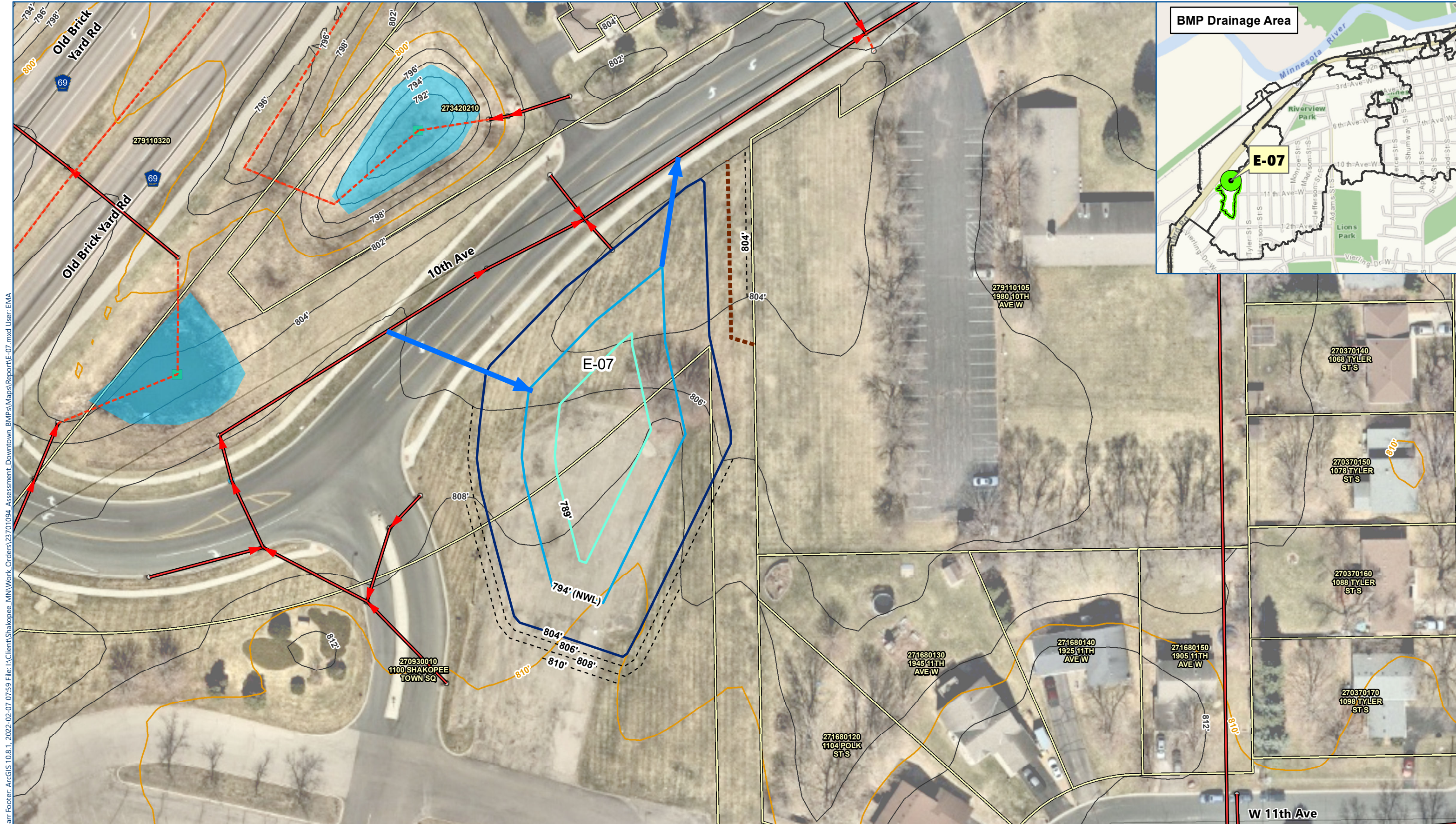
	Municipal Boundary		WQM Pipesheds
	Existing BMP		Stormwater Detention Ponds
	Potential BMPs		Existing Treated Areas
	Pipeshed Outfall		Areas with Treatment from Potential or Enhanced BMPs
	Artificial Path		
	Gravity Main		

0 500 1,000 1,500
Feet

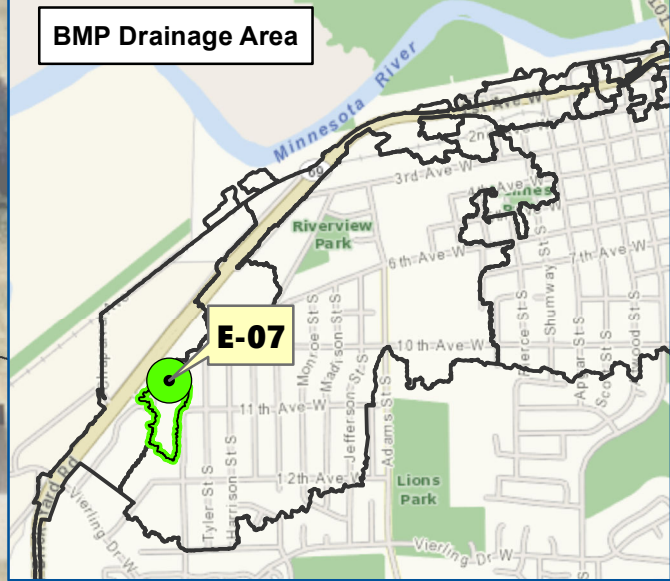
POTENTIAL NEW OR ENHANCED BMPs
Targeted BMP Study for Shakopee Downtown Subwatershed

FIGURE 2

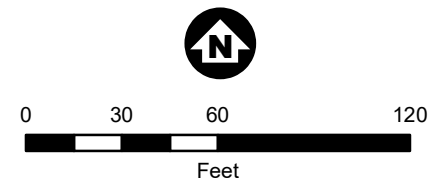




Barr Footer: ArcGIS 10.8.1, 2022-02-07 07:59 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Map\Report\E-07.mxd User: EMA















- | | | | |
|--------------------|-------------------------------------|-------------------------------|-----------------|
| BMP Bottom Contour | Proposed Berm | Assumed | 10-Foot Contour |
| BMP NWL Contour | Existing Stormwater Detention Ponds | Modeled Gravity Main | 2-Foot Contour |
| BMP Top Contour | Proposed Storm Sewer | Parcel | |
| Proposed Grading | | City of Shakopee Owned Parcel | |

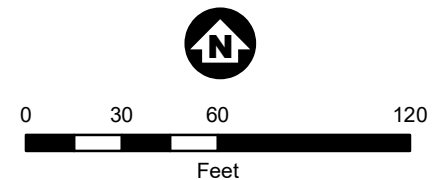


BMP E-07
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 3

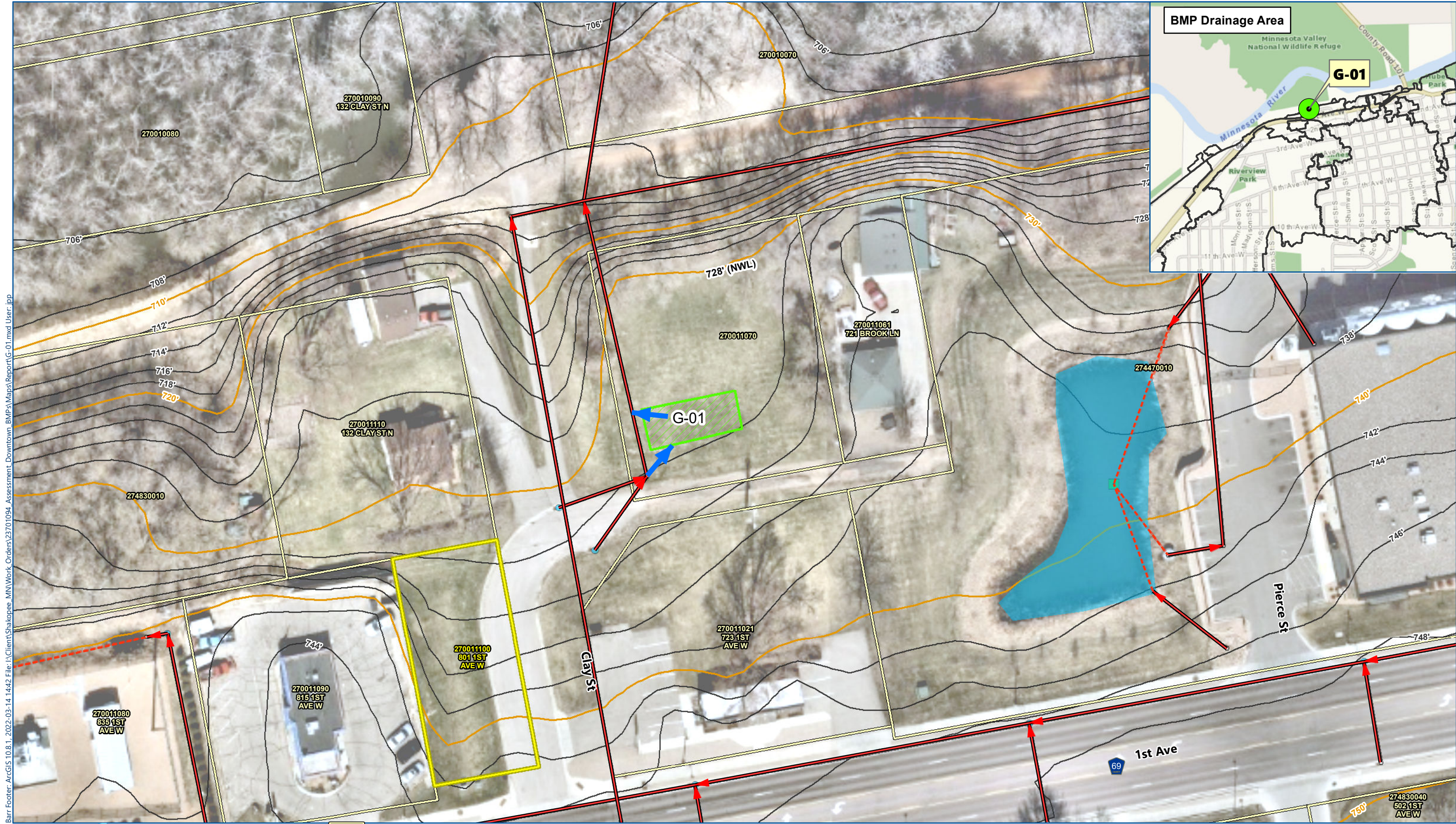


Barr Footer: ArcGIS 10.8.1, 2022-02-04 11:10 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Map\Report\E-09.mxd User: EMA










- | | | | |
|--|---|---|---|
|  BMP Bottom Contour |  Existing Stormwater Detention Ponds |  Parcel |  10-Foot Contour |
|  BMP NWL Contour |  Proposed Storm Sewer |  City of Shakopee Owned Parcel |  2-Foot Contour |
|  BMP Top Contour |  Assumed | | |
|  Proposed Grading |  Modeled Gravity Main | | |

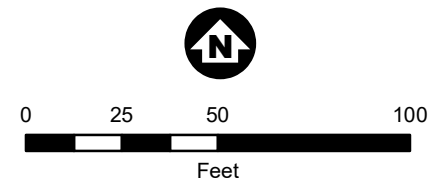


BMP E-09
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 4



Barr Footer: ArcGIS 10.8.1, 2022-03-14 14:42 File: I:\Client\Shakopee_MN\Work\Orders\23701094_Assessment_Downtown_BMPs\Map\Report\G-01.mxd User: jpb

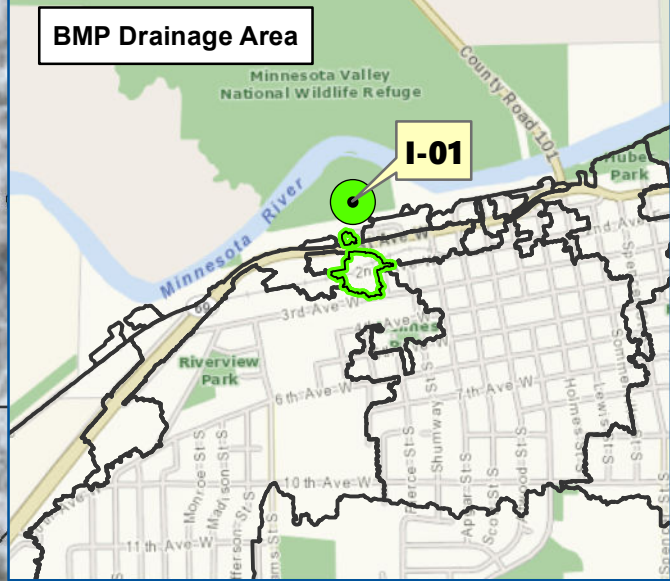
-  Existing Stormwater Detention Ponds
-  Proposed Storm Sewer Piping
-  Proposed Footprint
-  Assumed
-  Modeled Gravity Main
-  Parcel
-  City of Shakopee Owned Parcel
-  10-Foot Contour
-  2-Foot Contour



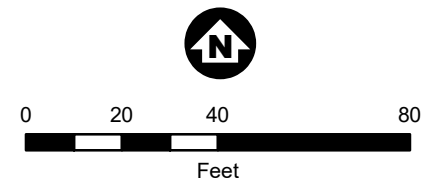
BMP G-01
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 5



Barr Footer: ArcGIS 10.8.1, 2022-03-14 14:31 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Maps\Report\I-01.mxd User: jpp

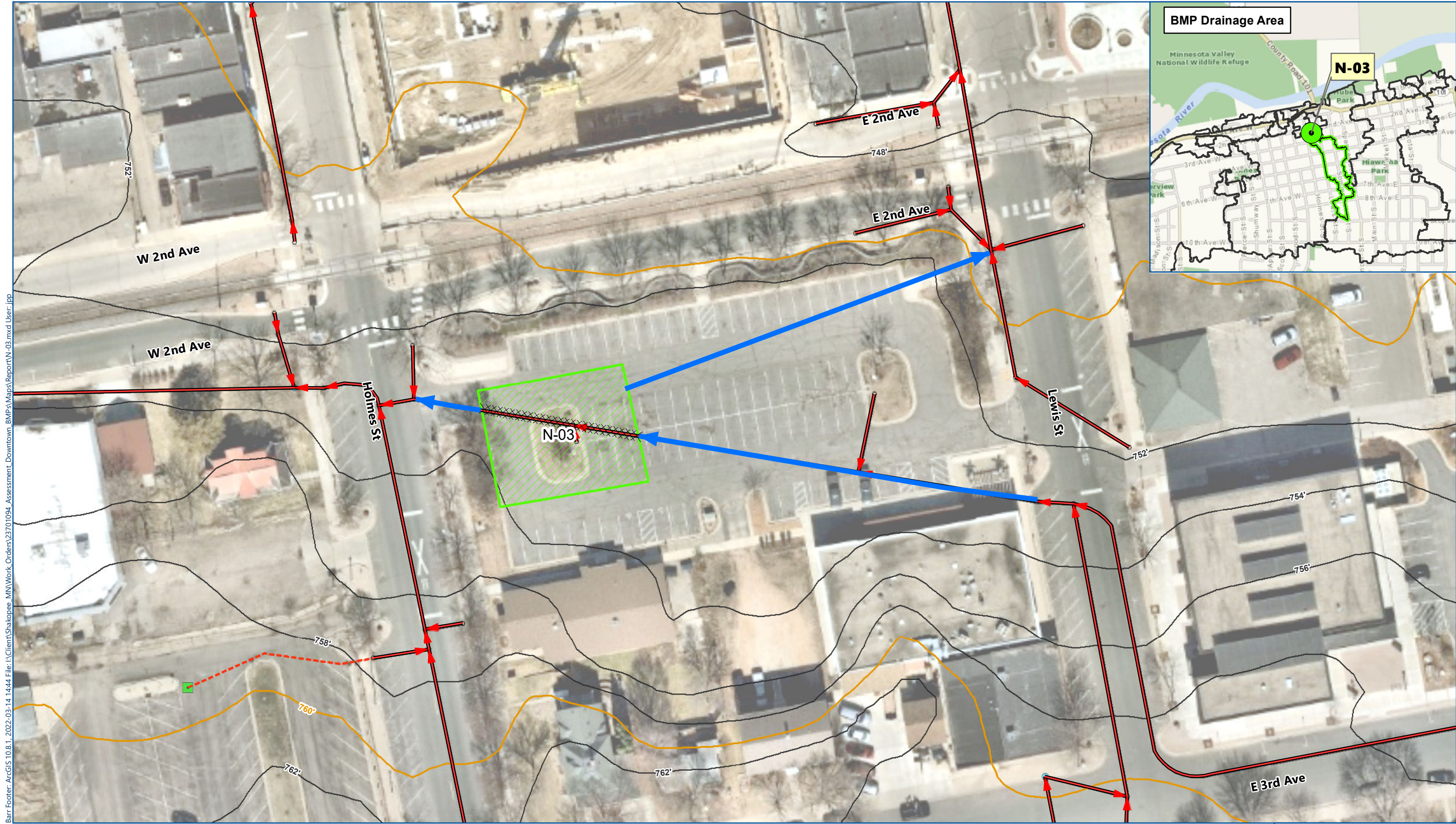


- | | | | |
|--------------------|----------------------|-------------------------------------|-----------------|
| BMP Bottom Contour | Proposed Berm | Existing Stormwater Detention Ponds | 10-Foot Contour |
| BMP NWL Contour | Proposed Storm Sewer | Parcel | 2-Foot Contour |
| BMP Top Contour | Assumed | City of Shakopee Owned Parcel | |
| Proposed Grading | Modeled Gravity Main | | |



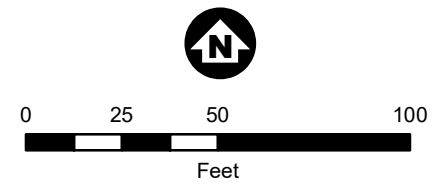
BMP I-01
Targeted BMP Study for
Shakopee Downtown
Subwatershed

FIGURE 6



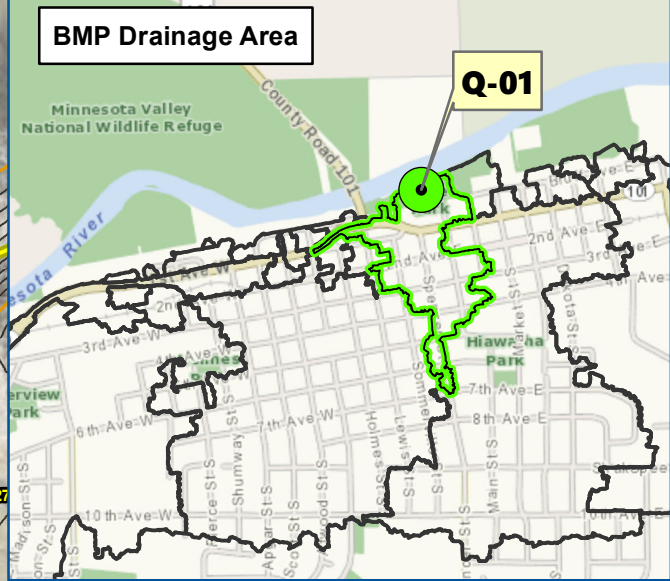
Barr Footer: ArcGIS 10.8.1, 2022-03-14 14:44 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Map\Report\N-03.mxd User: jpp

- ➔ Proposed Storm Sewer
- Assumed
- ~ 10-Foot Contour
- Modeled Gravity Main
- 2-Foot Contour
- Pipe Removal
- Proposed Footprint
- ☁ Existing Stormwater Detention Ponds

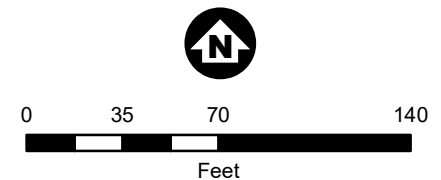


BMP N-03
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 7

Barr Footer: ArcGIS 10.8.1, 2022-02-05 10:37 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Maps\Report\Q-01.mxd User: EMA



- ~ BMP Bottom Contour
- ~ BMP NWL Contour
- ~ BMP Top Contour
- - - Proposed Grading
- ~ Existing Stormwater Detention Ponds
- Proposed Storm Sewer
- - - Assumed
- Modeled Gravity Main
- ▭ Parcel
- ▭ City of Shakopee Owned Parcel
- ~ 10-Foot Contour
- ~ 2-Foot Contour

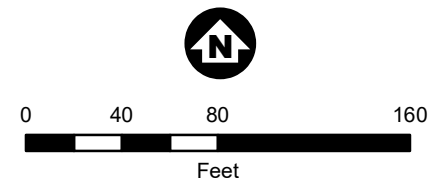


BMP Q-01
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 8

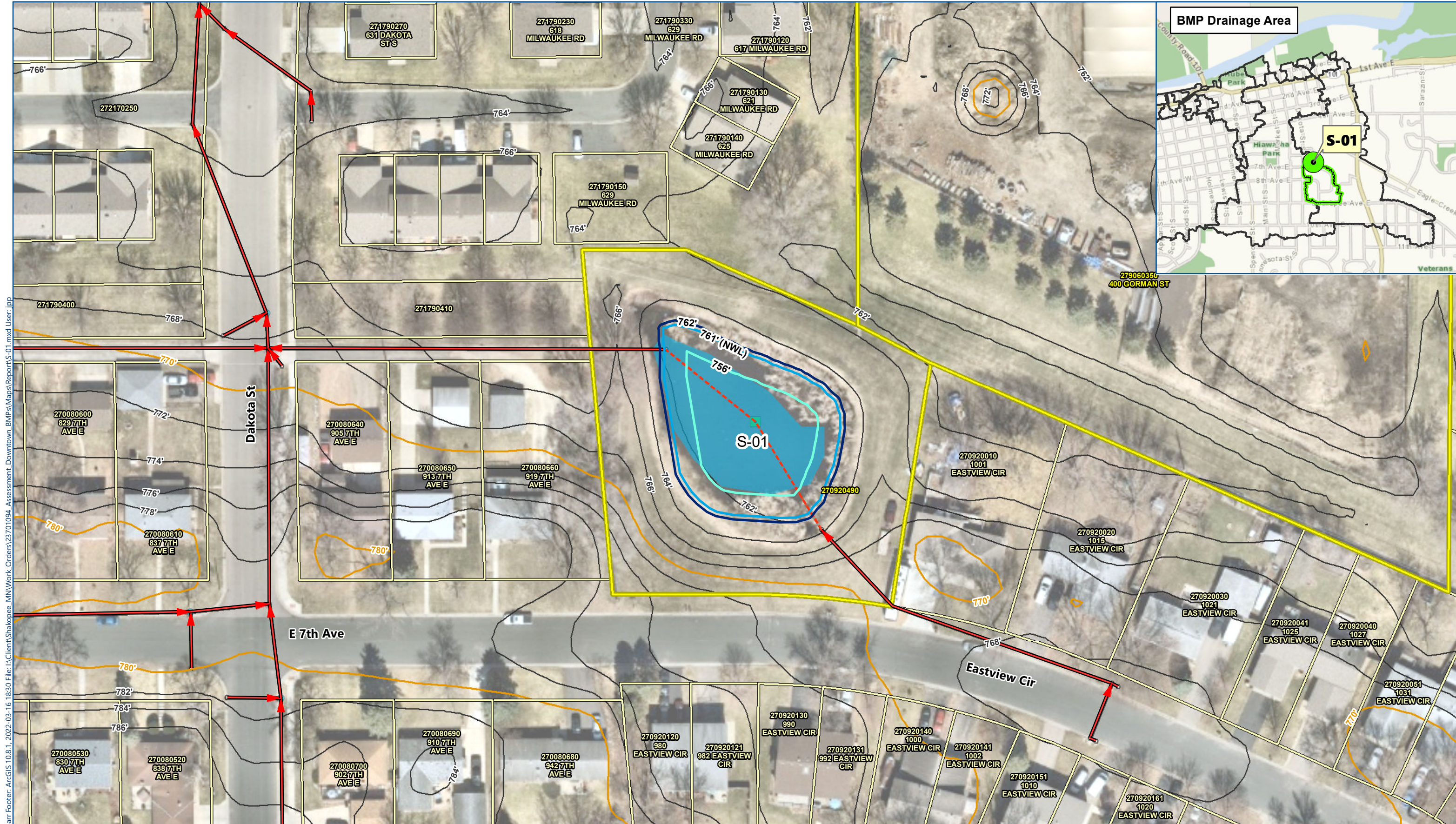
Barr Footer: ArcGIS 10.8.1, 2022-02-04 10:47 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Maps\Report\R-01.mxd User: EMA















- | | | | | | | | |
|--|--------------------|--|-------------------------------------|--|-------------------------------|--|-----------------|
| | BMP Bottom Contour | | Existing Stormwater Detention Ponds | | Parcel | | 10-Foot Contour |
| | BMP NWL Contour | | Proposed Storm Sewer | | City of Shakopee Owned Parcel | | 2-Foot Contour |
| | BMP Top Contour | | Assumed | | | | |
| | Proposed Grading | | Modeled Gravity Main | | | | |

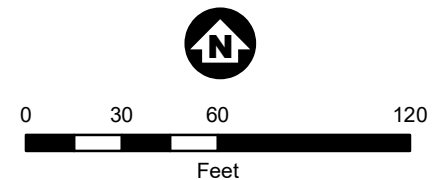


BMP R-01
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 9



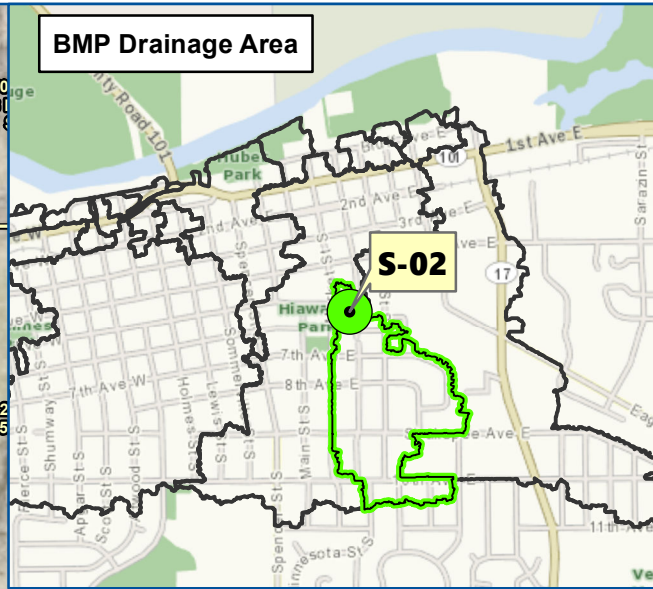
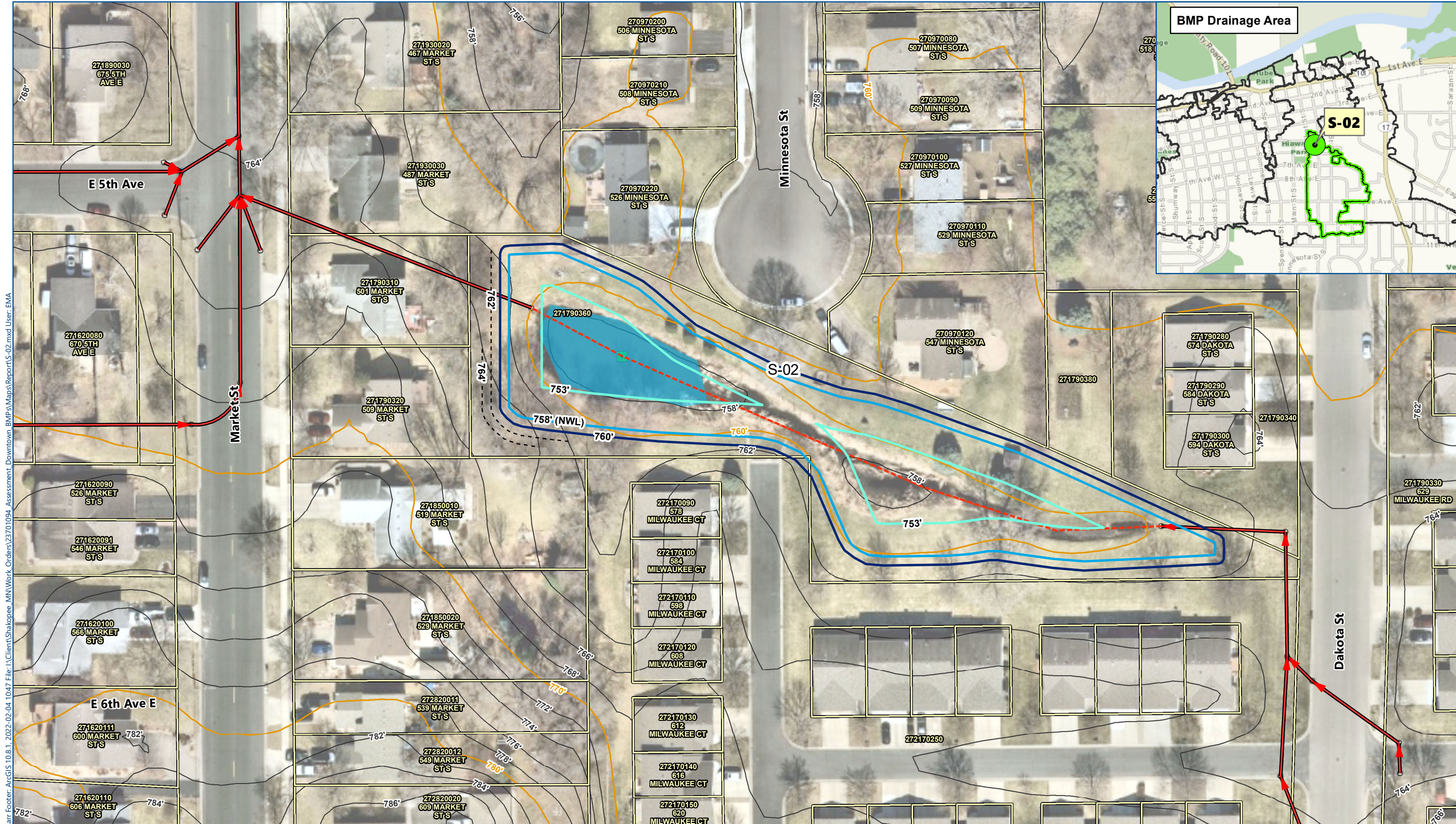
Barr Footer: ArcGIS 10.8.1, 2022-03-16 18:30 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Map\Report\S-01.mxd User: jpb

- | | | | |
|--|---|---|---|
|  BMP Bottom Contour |  Existing Stormwater Detention Ponds |  Parcel |  10-Foot Contour |
|  BMP NWL Contour |  Proposed Storm Sewer |  City of Shakopee Owned Parcel |  2-Foot Contour |
|  BMP Top Contour |  Assumed | | |
|  Proposed Grading |  Modeled Gravity Main | | |



BMP S-01
Targeted BMP Study for
Shakopee Downtown
Subwatershed

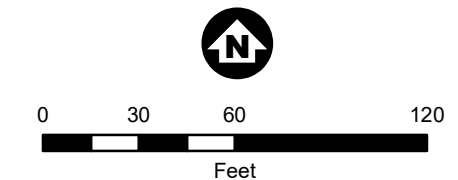
FIGURE 10



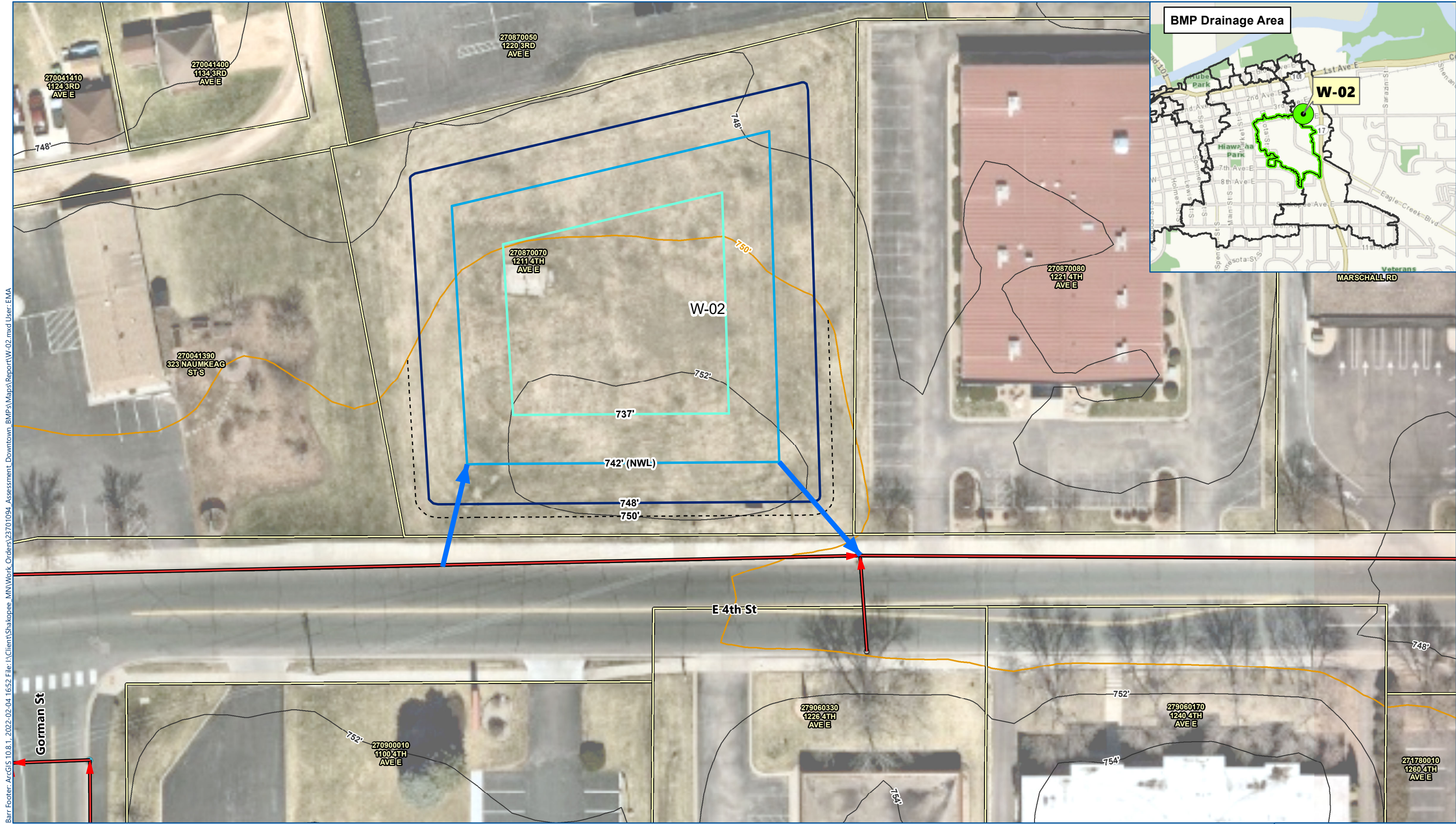
Barr Footer: ArcGIS 10.8.1, 2022-02-04 10:47 File: I:\Clients\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Maps\Report\S-02.mxd User: EMA



- | | | | | | | | |
|--|--------------------|--|-------------------------------------|--|-------------------------------|--|-----------------|
| | BMP Bottom Contour | | Existing Stormwater Detention Ponds | | Parcel | | 10-Foot Contour |
| | BMP NWL Contour | | Proposed Storm Sewer | | City of Shakopee Owned Parcel | | 2-Foot Contour |
| | BMP Top Contour | | Assumed | | | | |
| | Proposed Grading | | Modeled Gravity Main | | | | |

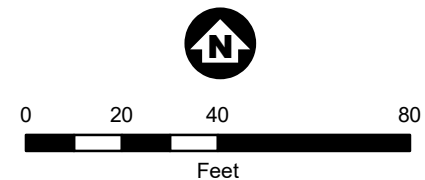


BMP S-02
Targeted BMP Study for
Shakopee Downtown
Subwatershed
FIGURE 11

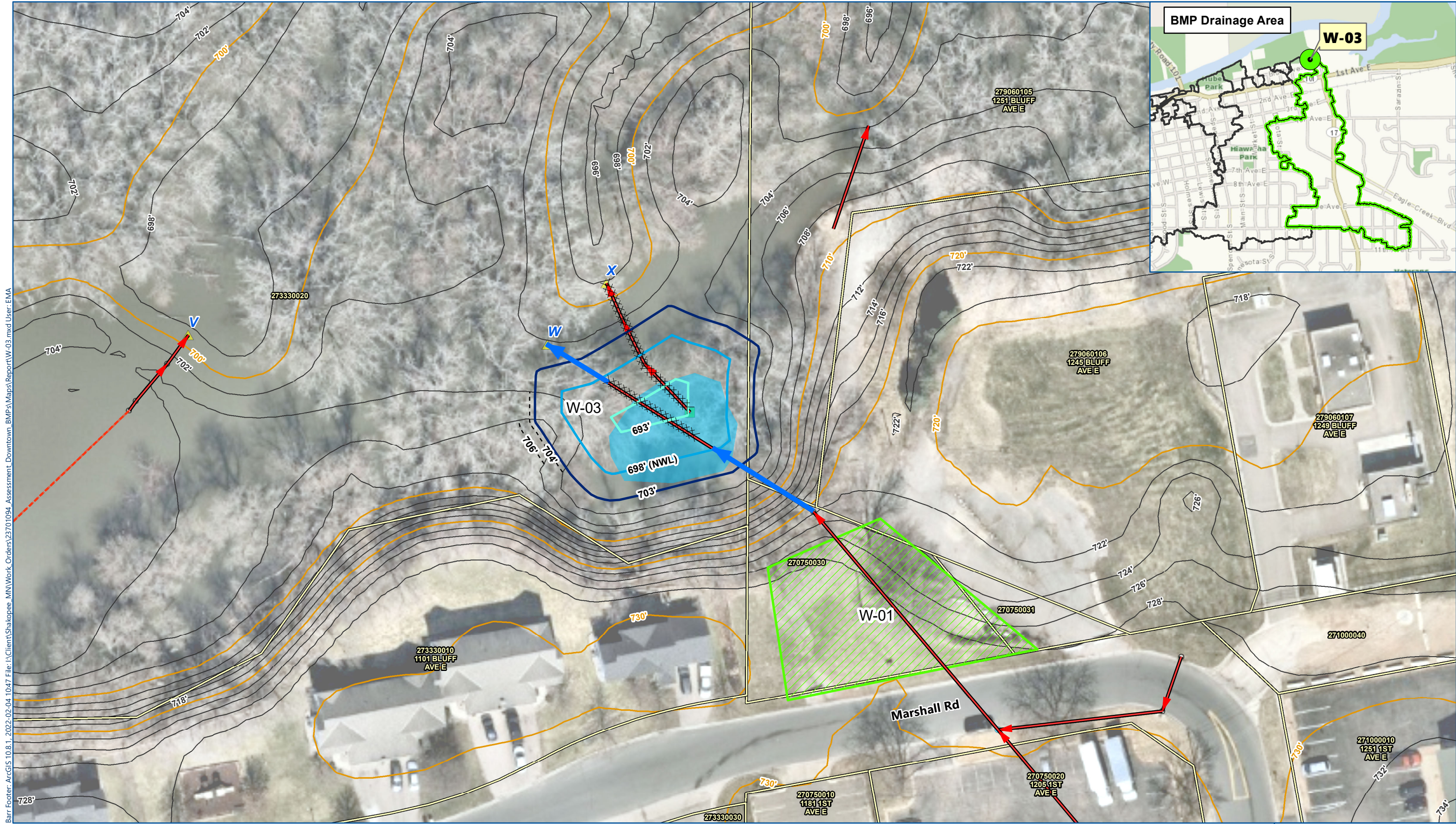


Barr Footer: ArcGIS 10.8.1, 2022-02-04 16:52 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Map\Report\W-02.mxd User: EMA

- | | | | | | | | |
|--|--------------------|--|-------------------------------------|--|-------------------------------|--|-----------------|
| | BMP Bottom Contour | | Proposed Storm Sewer | | Parcel | | 10-Foot Contour |
| | BMP NWL Contour | | Existing Stormwater Detention Ponds | | City of Shakopee Owned Parcel | | 2-Foot Contour |
| | BMP Top Contour | | Assumed | | | | |
| | Proposed Grading | | Modeled Gravity Main | | | | |

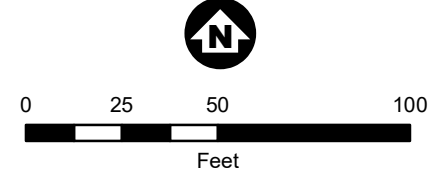


BMP W-02
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 12



Barr Footer: ArcGIS 10.8.1, 2022-02-04 10:47 File: I:\Client\Shakopee_MN\Work_Orders\23701094_Assessment_Downtown_BMPs\Maps\Report\W-03.mxd User: EMA













- | | | | | | | | |
|--|--------------------|--|-------------------------------------|--|-------------------------------|--|-----------------|
| | BMP Bottom Contour | | Proposed Storm Sewer | | Assumed | | 10-Foot Contour |
| | BMP NWL Contour | | Pipe Removal | | Modeled Gravity Main | | 2-Foot Contour |
| | BMP Top Contour | | Proposed Footprint | | Parcel | | |
| | Proposed Grading | | Existing Stormwater Detention Ponds | | City of Shakopee Owned Parcel | | |

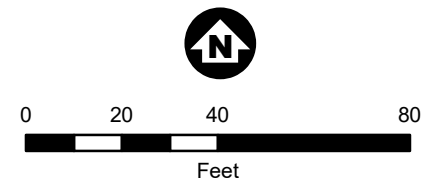


BMP W-03
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 13



Barr Footer: ArcGIS 10.8.1, 2022-02-04 16:56 File: I:\Client\Shakopee_MN\Work\Orders\23701094_Assessment_Downtown_BMPs\Maps\Report\W-06.mxd User: EMA

- | | | | |
|--|---|---|---|
|  BMP Bottom Contour |  Proposed Storm Sewer |  Parcel |  10-Foot Contour |
|  BMP NWL Contour |  Existing Stormwater Detention Ponds |  City of Shakopee Owned Parcel |  2-Foot Contour |
|  BMP Top Contour |  Assumed | | |
|  Proposed Grading |  Modeled Gravity Main | | |



BMP W-06
 Targeted BMP Study for
 Shakopee Downtown
 Subwatershed
FIGURE 14

Appendix B

Planning Level Opinions of Cost

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP E-07 - Regional Wet Pond						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$39,100	\$39,100	1 - 10
B	Erosion and Sediment Control	LS	1	\$11,700	\$11,700	1 - 10
C	Traffic Control	LS	1	\$19,600	\$19,600	1 - 10
D	Tree Removal	Ea	1	\$400	\$400	1 - 10
E	Storm Sewer Diversion Structure	Ea	1	\$15,000	\$15,000	1 - 10
F	Storm Sewer Tie-in Structure	Ea	1	\$10,000	\$10,000	1 - 10
G	Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 10
H	Storm Sewer	LF	180	\$100	\$18,000	1 - 10
I	Excavation and Disposal	CY	11,100	\$25	\$277,500	1 - 10
J	Grading	SY	4,000	\$6	\$24,000	1 - 10
K	Restoration and Plantings	SY	3,200	\$2	\$6,400	1 - 10
L	Paving	LS	1	\$20,000	\$20,000	1 - 10
CONSTRUCTION SUBTOTAL					\$462,000	1 - 10
CONSTRUCTION CONTINGENCY (30%)					\$139,000	1 - 10
ESTIMATED CONSTRUCTION COST					\$601,000	1 - 10
PLANNING, ENGINEERING & DESIGN (25%)					\$150,000	1 - 10
ESTIMATED TOTAL PROJECT COST					\$751,000	1 - 10
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$55,274	1 - 10

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.
- ¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP E-09 - Regional Wet Pond						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$163,500	\$163,500	1-9
B	Erosion and Sediment Control	LS	1	\$20,400	\$20,400	1-9
C	Traffic Control	LS	1	\$20,400	\$20,400	1-9
D	Tree Removal	Ea	15	\$400	\$6,000	1-9
E	Storm Sewer Diversion Structure	Ea	1	\$15,000	\$15,000	1-9
F	Storm Sewer Tie-in Structure	Ea	1	\$10,000	\$10,000	1-9
G	Outlet Structure	Ea	1	\$20,000	\$20,000	1-9
H	Storm Sewer	LF	250	\$100	\$25,000	1-9
I	Excavation and Disposal (70%)	CY	14,100	\$25	\$352,500	1-9
J	Bedrock Excavation and Disposal (30%)	CY	6,100	\$75	\$457,500	1-9
K	Grading	SY	4,900	\$6	\$29,400	1-9
L	Restoration and Plantings	SY	4,000	\$1	\$4,000	1-9
CONSTRUCTION SUBTOTAL					\$1,124,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$337,000	1-9
ESTIMATED CONSTRUCTION COST					\$1,461,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$365,000	1-9
ESTIMATED TOTAL PROJECT COST					\$1,826,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$134,394	1-9

Notes

¹ Limited Design Work Completed (10-15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Soil Boring and Field Investigation Information Available.

⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.

⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.

⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.

⁸ Estimate costs are reported to nearest thousand dollars.

⁹ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: G-01 - Local Filtration Basin (Rain Garden)						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$2,500	\$2,500	1 - 10
B	Erosion and Sediment Control	LS	1	\$800	\$800	1 - 10
C	Storm Sewer Diverison Structure	Ea	1	\$10,000	\$10,000	1 - 10
D	Storm Sewer Outlet Structure and Tie-in	Ea	1	\$5,000	\$5,000	1 - 10
E	Storm Sewer	LF	80	\$100	\$8,000	1 - 10
F	Excavation and Disposal	CY	30	\$40	\$1,200	1 - 10
G	Grading	SY	90	\$10	\$900	1 - 10
H	Restoration and Plantings	SY	80	\$20	\$1,600	1 - 10
CONSTRUCTION SUBTOTAL					\$30,000	1 - 10
CONSTRUCTION CONTINGENCY (30%)					\$9,000	1 - 10
ESTIMATED CONSTRUCTION COST					\$39,000	1 - 10
PLANNING, ENGINEERING & DESIGN (25%)					\$10,000	1 - 10
ESTIMATED TOTAL PROJECT COST					\$49,000	1 - 10
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$3,606	1 - 10

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.
- ¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: I-01 - Regional Wet Pond						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$22,000	\$22,000	1 - 10
B	Erosion and Sediment Control	LS	1	\$6,600	\$6,600	1 - 10
C	Traffic Control	LS	1	\$4,400	\$4,400	1 - 10
D	Tree Removal	Ea	2	\$400	\$800	1 - 10
E	Diversion Structure	Ea	1	\$15,000	\$15,000	1 - 10
G	Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 10
F	Storm Sewer	LF	230	\$60	\$13,800	1 - 10
H	Excavation and Disposal	CY	7,400	\$20	\$148,000	1 - 10
I	Grading	SY	3,200	\$6	\$19,200	1 - 10
J	Restoration and Plantings	SY	3,500	\$1	\$3,500	1 - 10
CONSTRUCTION SUBTOTAL					\$253,000	1 - 10
CONSTRUCTION CONTINGENCY (30%)					\$76,000	1 - 10
ESTIMATED CONSTRUCTION COST					\$329,000	1 - 10
PLANNING, ENGINEERING & DESIGN (25%)					\$82,000	1 - 10
ESTIMATED TOTAL PROJECT COST					\$411,000	1 - 10
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$30,250	1 - 10

Notes

¹ Limited Design Work Completed (10-15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Soil Boring and Field Investigation Information Available.

⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.

⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.


⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.

⁸ Estimate costs are reported to nearest thousand dollars.

⁹ Estimate assumes that project will not required bedrock excavation.

¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

 PREPARED BY: BARR ENGINEERING COMPANY						
ENGINEER'S OPINION OF PROBABLE PROJECT COST PROJECT: Assessment of Downtown BMPs LOCATION: Shakopee, Minnesota PROJECT #: 23701094 OPINION OF COST - SUMMARY			ISSUED:		DATE:	
			ISSUED:		DATE:	
			ISSUED:		DATE:	
			ISSUED:		DATE:	
Engineer's Opinion of Probable Project Cost Description: BMP N-03a - Underground Filtration System						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$57,400	\$57,400	1-9
B	Erosion and Sediment Control	LS	1	\$22,900	\$22,900	1-9
C	Traffic Control	LS	1	\$11,500	\$11,500	1-9
D	Tree Removal	Ea	2	\$400	\$800	1-9
E	Pavement Removal	SY	2,800	\$4	\$11,200	1-9
F	Storm Sewer Removal	LF	250	\$15	\$3,750	1-9
G	Storm Sewer Tie-in	Ea	2	\$3,000	\$6,000	1-9
H	Pretreatment Structure	Ea	1	\$15,000	\$15,000	1-9
I	Storm Sewer	LF	485	\$100	\$48,500	1-9
J	Draintile System	LS	1	\$20,000	\$20,000	1-9
K	Underground Filtration System	CF	33,000	\$30	\$990,000	1-9
L	Outlet Structure	Ea	1	\$10,000	\$10,000	1-9
M	Paving and Restoration	SY	2,800	\$15	\$42,000	1-9
CONSTRUCTION SUBTOTAL					\$1,239,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$372,000	1-9
ESTIMATED CONSTRUCTION COST					\$1,611,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$403,000	1-9
ESTIMATED TOTAL PROJECT COST					\$2,014,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$148,230	1-9

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
<p>Engineer's Opinion of Probable Project Cost Description: BMP N-03b - Underground Infiltration System</p>						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$55,200	\$55,200	1-9
B	Erosion and Sediment Control	LS	1	\$22,100	\$22,100	1-9
C	Traffic Control	LS	1	\$11,000	\$11,000	1-9
D	Tree Removal	Ea	2	\$400	\$800	1-9
E	Pavement Removal	SY	2,800	\$4	\$11,200	1-9
F	Storm Sewer Removal	LF	250	\$15	\$3,750	1-9
G	Storm Sewer Tie-in	Ea	2	\$3,000	\$6,000	1-9
H	Pretreatment Structure	Ea	1	\$15,000	\$15,000	1-9
I	Storm Sewer	LF	260	\$100	\$26,000	1-9
J	Underground Infiltration System	CF	33,000	\$30	\$990,000	1-9
K	Outlet Structure	Ea	1	\$10,000	\$10,000	1-9
L	Paving and Restoration	SY	2,800	\$15	\$42,000	1-9
CONSTRUCTION SUBTOTAL					\$1,193,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$358,000	1-9
ESTIMATED CONSTRUCTION COST					\$1,551,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$388,000	1-9
ESTIMATED TOTAL PROJECT COST					\$1,939,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$142,710	1-9

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP Q-01a - Regional Wet Pond Expansion						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$22,300	\$22,300	1-9
B	Erosion and Sediment Control	LS	1	\$6,700	\$6,700	1-9
C	Traffic Control	LS	1	\$4,500	\$4,500	1-9
D	Tree Removal	Ea	6	\$400	\$2,400	1-9
E	Trail Removal	SY	100	\$4	\$400	1-9
F	New Outlet Structure	Ea	1	\$20,000	\$20,000	1-9
G	Excavation and Disposal (70%)	CY	3,700	\$25	\$92,500	1-9
H	Muck Excavation and Disposal (30%)	CY	1,600	\$45	\$72,000	1-9
I	Grading	SY	5,200	\$6	\$31,200	1-9
I	Restoration and Plantings	SY	4,200	\$1	\$4,200	1-9
CONSTRUCTION SUBTOTAL					\$256,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$77,000	1-9
ESTIMATED CONSTRUCTION COST					\$333,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$83,000	1-9
ESTIMATED TOTAL PROJECT COST					\$416,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$30,618	1-9

Notes

¹ Limited Design Work Completed (10-15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Soil Boring and Field Investigation Information Available.

⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.

⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.

⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.

⁸ Estimate costs are reported to nearest thousand dollars.

⁹ Estimate assumes that project will not required bedrock excavation.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
<p>Engineer's Opinion of Probable Project Cost Description: BMP Q-01b - Footprint Expansion and Conversion to Sand Filter</p>						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$37,900	\$37,900	1-9
B	Erosion and Sediment Control	LS	1	\$11,400	\$11,400	1-9
C	Traffic Control	LS	1	\$11,400	\$11,400	1-9
D	Tree Removal	Ea	6	\$400	\$2,400	1-9
E	Trail Removal	SY	100	\$4	\$400	1-9
F	New Outlet Structure	Ea	1	\$20,000	\$20,000	1-9
G	Excavation and Disposal (70%)	CY	3,700	\$25	\$92,500	1-9
H	Muck Excavation and Disposal (30%)	CY	1,600	\$45	\$72,000	1-9
I	Grading	SY	5,200	\$6	\$31,200	1-9
J	Sand Filtration Media	CY	2,700	\$50	\$135,000	1-9
K	Draintile System	LS	1	\$20,000	\$20,000	1-9
L	Restoration and Plantings	SY	5,800	\$1	\$5,800	1-9
CONSTRUCTION SUBTOTAL					\$440,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$132,000	1-9
ESTIMATED CONSTRUCTION COST					\$572,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$143,000	1-9
ESTIMATED TOTAL PROJECT COST					\$715,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$52,624	1-9

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST			CREATED BY: JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs			CHECKED BY: JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		ISSUED:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP R-01a - Storm Sewer Diversion to Existing Marina						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$9,600	\$9,600	1-9
B	Erosion and Sediment Control	LS	1	\$2,900	\$2,900	1-9
C	Traffic Control	LS	1	\$2,000	\$2,000	1-9
D	Tree Removal	Ea	5	\$400	\$2,000	1-9
E	Trail and Road Removal and Replacement	SY	390	\$20	\$7,800	1-9
F	Storm Sewer Diversion Structure	Ea	1	\$15,000	\$15,000	1-9
G	Outlet Control Structure	Ea	1	\$20,000	\$20,000	1-9
H	Storm Sewer	LF	260	\$100	\$26,000	1-9
I	Construct Clay Berm at Marina Inlet	LS	1	\$25,000	\$25,000	1-9
J	Restoration and Plantings	LS	1	\$2,500	\$2,500	1-9
CONSTRUCTION SUBTOTAL					\$113,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$34,000	1-9
ESTIMATED CONSTRUCTION COST					\$147,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$37,000	1-9
ESTIMATED TOTAL PROJECT COST					\$184,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$13,542	1-9

Notes

¹ Limited Design Work Completed (10-15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Soil Boring and Field Investigation Information Available.

⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.


⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.

⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.

⁸ Estimate costs are reported to nearest thousand dollars.

⁹ Estimate assumes that project will not required bedrock excavation and no dredging of the marina.


Table: Engineer's Opinion of Probable Project Cost

 PREPARED BY: BARR ENGINEERING COMPANY						
ENGINEER'S OPINION OF PROBABLE PROJECT COST PROJECT: Assessment of Downtown BMPs LOCATION: Shakopee, Minnesota PROJECT #: 23701094 OPINION OF COST - SUMMARY			ISSUED:		DATE:	
			ISSUED:		DATE:	
			ISSUED:		DATE:	
			ISSUED:		DATE:	
Engineer's Opinion of Probable Project Cost Description: BMP R-01b - Regional Wet Pond						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$75,200	\$75,200	1-9
B	Erosion and Sediment Control	LS	1	\$30,100	\$30,100	1-9
C	Traffic Control	LS	1	\$15,000	\$15,000	1-9
D	Tree Removal	Ea	40	\$400	\$16,000	1-9
E	Trail Removal	SY	240	\$4	\$960	1-9
F	Storm Sewer Diversion Structure	Ea	1	\$15,000	\$15,000	1-9
G	Storm Sewer Tie-in Structure	Ea	1	\$10,000	\$10,000	1-9
H	Storm Sewer Outlet Structure	Ea	1	\$20,000	\$20,000	1-9
I	Storm Sewer	LF	220	\$100	\$22,000	1-9
J	Excavation and Disposal	CY	52,500	\$25	\$1,312,500	1-9
K	Grading	SY	15,800	\$6	\$94,800	1-9
L	Restoration and Plantings	SY	12,700	\$1	\$12,700	1-9
CONSTRUCTION SUBTOTAL					\$1,624,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$487,000	1-9
ESTIMATED CONSTRUCTION COST					\$2,111,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$528,000	1-9
ESTIMATED TOTAL PROJECT COST					\$2,639,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$194,230	1-9

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.

Table: Engineer's Opinion of Probable Project Cost

 PREPARED BY: BARR ENGINEERING COMPANY ENGINEER'S OPINION OF PROBABLE PROJECT COST PROJECT: Assessment of Downtown BMPs LOCATION: Shakopee, Minnesota PROJECT #: 23701094 OPINION OF COST - SUMMARY	CREATED BY:	JPP	DATE:	3/11/2021
	CHECKED BY:	JJG3	DATE:	3/15/2022
	APPROVED BY:		DATE:	
	ISSUED:		DATE:	
	ISSUED:		DATE:	

Engineer's Opinion of Probable Project Cost
Description: BMP S-01a - Regional Wet Pond Expansion

Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$7,900	\$7,900	1 - 10
B	Erosion and Sediment Control	LS	1	\$2,400	\$2,400	1 - 10
C	Traffic Control	LS	1	\$1,600	\$1,600	1 - 10
D	New Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 10
E	Muck Excavation and Disposal	CY	1,520	\$45	\$68,400	1 - 10
F	Grading	SY	1,570	\$6	\$9,420	1 - 10
G	Restoration and Plantings	SY	1,260	\$1	\$1,260	1 - 10
	CONSTRUCTION SUBTOTAL				\$111,000	1 - 10
	CONSTRUCTION CONTINGENCY (30%)				\$33,000	1 - 10
	ESTIMATED CONSTRUCTION COST				\$144,000	1 - 10
	PLANNING, ENGINEERING & DESIGN (25%)				\$36,000	1 - 10
	ESTIMATED TOTAL PROJECT COST				\$180,000	1 - 10
	ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST				\$13,248	1 - 10

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.
- ¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP S-01b - Footprint Expansion and Conversion to Sand Filter						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobilization/Demobilization	LS	1	\$4,500	\$4,500	1 - 10
B	Erosion and Sediment Control	LS	1	\$1,400	\$1,400	1 - 10
C	Traffic Control	LS	1	\$900	\$900	1 - 10
D	New Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 10
E	Muck Excavation and Disposal	CY	1,520	\$45	\$68,400	1 - 10
F	Grading	SY	1,570	\$6	\$9,420	1 - 10
F	Sand Filtration Media	CY	670	\$50	\$33,500	1 - 10
G	Draintile System	LS	1	\$10,000	\$10,000	1 - 10
H	Restoration and Plantings	SY	1,890	\$1	\$1,890	1 - 10
CONSTRUCTION SUBTOTAL					\$150,000	1 - 10
CONSTRUCTION CONTINGENCY (30%)					\$45,000	1 - 10
ESTIMATED CONSTRUCTION COST					\$195,000	1 - 10
PLANNING, ENGINEERING & DESIGN (25%)					\$49,000	1 - 10
ESTIMATED TOTAL PROJECT COST					\$244,000	1 - 10
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$17,958	1 - 10

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.
- ¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST			CREATED BY: JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs			CHECKED BY: JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		ISSUED:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
<p>Engineer's Opinion of Probable Project Cost Description: BMP S-02a - Regional Wet Pond Expansion</p>						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$31,700	\$31,700	1 - 10
B	Erosion and Sediment Control	LS	1	\$9,500	\$9,500	1 - 10
C	Traffic Control	LS	1	\$6,300	\$6,300	1 - 10
D	Tree Removal	Ea	4	\$400	\$1,600	1 - 10
E	New Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 10
F	Excavation and Disposal (70%)	CY	5,900	\$25	\$147,500	1 - 10
G	Muck Excavation and Disposal (30%)	CY	2,600	\$45	\$117,000	1 - 10
H	Grading	SY	4,600	\$6	\$27,600	1 - 10
I	Restoration and Plantings	SY	3,700	\$1	\$3,700	1 - 10
	CONSTRUCTION SUBTOTAL				\$365,000	1 - 10
	CONSTRUCTION CONTINGENCY (30%)				\$110,000	1 - 10
	ESTIMATED CONSTRUCTION COST				\$475,000	1 - 10
	PLANNING, ENGINEERING & DESIGN (25%)				\$119,000	1 - 10
	ESTIMATED TOTAL PROJECT COST				\$594,000	1 - 10
	ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST				\$43,718	1 - 10

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.
- ¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP S-02b - Footprint Expansion and Conversion to Sand Filter						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$63,400	\$63,400	1 - 10
B	Erosion and Sediment Control	LS	1	\$19,000	\$19,000	1 - 10
C	Traffic Control	LS	1	\$12,700	\$12,700	1 - 10
D	Tree Removal	Ea	4	\$400	\$1,600	1 - 10
E	New Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 10
F	Excavation and Disposal (70%)	CY	5,900	\$25	\$147,500	1 - 10
G	Muck Excavation and Disposal (30%)	CY	2,600	\$45	\$117,000	1 - 10
H	Grading	SY	4,600	\$6	\$27,600	1 - 10
H	Sand Filtration Media	CY	6,000	\$50	\$300,000	1 - 10
I	Drain tile System	LS	1	\$15,000	\$15,000	1 - 10
J	Restoration and Plantings	SY	5,060	\$1	\$5,060	1 - 10
CONSTRUCTION SUBTOTAL					\$729,000	1 - 10
CONSTRUCTION CONTINGENCY (30%)					\$219,000	1 - 10
ESTIMATED CONSTRUCTION COST					\$948,000	1 - 10
PLANNING, ENGINEERING & DESIGN (25%)					\$237,000	1 - 10
ESTIMATED TOTAL PROJECT COST					\$1,185,000	1 - 10
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$87,216	1 - 10

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.
- ¹⁰ Project is located on private property. The estimate costs do not include acquisition or easement costs.

Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP W-02 - Regional Wet Pond						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$58,300	\$58,300	1-9
B	Erosion and Sediment Control	LS	1	\$17,500	\$17,500	1-9
C	Traffic Control	LS	1	\$11,700	\$11,700	1-9
D	Storm Sewer Diversion Structure	Ea	1	\$15,000	\$15,000	1-9
E	Storm Sewer Tie-in Structure	Ea	1	\$10,000	\$10,000	1-9
F	Outlet Structure	Ea	1	\$20,000	\$20,000	1-9
H	Storm Sewer	LF	110	\$100	\$11,000	1-9
J	Excavation and Disposal (20%)	CY	1,600	\$25	\$40,000	1-9
K	Bedrock Excavation and Disposal (80%)	CY	6,200	\$75	\$465,000	1-9
L	Grading	SY	3,300	\$6	\$19,800	1-9
M	Restoration and Plantings	SY	2,600	\$1	\$2,600	1-9
CONSTRUCTION SUBTOTAL					\$671,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$201,000	1-9
ESTIMATED CONSTRUCTION COST					\$872,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$218,000	1-9
ESTIMATED TOTAL PROJECT COST					\$1,090,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$80,224	1-9

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Project is located on private property. The estimate costs do not include acquisition or easement costs.


Table: Engineer's Opinion of Probable Project Cost

BARR		PREPARED BY: BARR ENGINEERING COMPANY				
ENGINEER'S OPINION OF PROBABLE PROJECT COST		CREATED BY:	JPP	DATE:	3/11/2021	
PROJECT: Assessment of Downtown BMPs		CHECKED BY:	JJG3	DATE:	3/15/2022	
LOCATION: Shakopee, Minnesota		APPROVED BY:		DATE:		
PROJECT #: 23701094		ISSUED:		DATE:		
OPINION OF COST - SUMMARY		ISSUED:		DATE:		
Engineer's Opinion of Probable Project Cost						
Description: BMP W-03 - Regional Wet Pond Expansion						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$14,800	\$14,800	1-9
B	Erosion and Sediment Control	LS	1	\$4,400	\$4,400	1-9
C	Traffic Control	LS	1	\$3,000	\$3,000	1-9
D	Tree Removal	Ea	5	\$400	\$2,000	1-9
E	Storm Sewer	LF	110	\$100	\$11,000	1-9
F	Outlet Structure	LS	1	\$20,000	\$20,000	1-9
F	Muck Excavation and Disposal	CY	1,100	\$45	\$49,500	1-9
G	Grading	SY	9,600	\$6	\$57,600	1-9
H	Restoration and Plantings	SY	7,700	\$1	\$7,700	1-9
CONSTRUCTION SUBTOTAL					\$170,000	1-9
CONSTRUCTION CONTINGENCY (30%)					\$51,000	1-9
ESTIMATED CONSTRUCTION COST					\$221,000	1-9
PLANNING, ENGINEERING & DESIGN (25%)					\$55,000	1-9
ESTIMATED TOTAL PROJECT COST					\$276,000	1-9
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$20,314	1-9

Notes

- ¹ Limited Design Work Completed (10-15%).
- ² Quantities Based on Design Work Completed.
- ³ Unit Prices Based on Information Available at This Time.
- ⁴ Limited Soil Boring and Field Investigation Information Available.
- ⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.
- ⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.
- ⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.
- ⁸ Estimate costs are reported to nearest thousand dollars.
- ⁹ Estimate assumes that project will not required bedrock excavation.

Table: Engineer's Opinion of Probable Project Cost

 PREPARED BY: BARR ENGINEERING COMPANY						
ENGINEER'S OPINION OF PROBABLE PROJECT COST PROJECT: Assessment of Downtown BMPs LOCATION: Shakopee, Minnesota PROJECT #: 23701094 OPINION OF COST - SUMMARY			ISSUED:		DATE:	
			ISSUED:		DATE:	
			ISSUED:		DATE:	
			ISSUED:		DATE:	
Engineer's Opinion of Probable Project Cost Description: BMP W-06 - Regional Wet Pond Expansion						
Cat. No.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	ITEM COST	NOTES
A	Mobalization/Demobilization	LS	1	\$26,100	\$26,100	1 - 8
B	Erosion and Sediment Control	LS	1	\$7,800	\$7,800	1 - 8
C	Traffic Control	LS	1	\$5,200	\$5,200	1 - 8
D	Tree Removal	Ea	8	\$400	\$3,200	1 - 8
E	New Outlet Structure	Ea	1	\$20,000	\$20,000	1 - 8
F	Excavation and Disposal (40%)	CY	1,900	\$25	\$47,500	1 - 8
G	Muck Excavation and Disposal (30%)	CY	1,400	\$45	\$63,000	1 - 8
H	Bedrock Excavation and Disposal (30%)	CY	1,400	\$75	\$105,000	1 - 8
I	Grading	SY	3,200	\$6	\$19,200	1 - 8
J	Restoration and Plantings	SY	2,600	\$1	\$2,600	1 - 8
CONSTRUCTION SUBTOTAL					\$300,000	1 - 8
CONSTRUCTION CONTINGENCY (30%)					\$90,000	1 - 8
ESTIMATED CONSTRUCTION COST					\$390,000	1 - 8
PLANNING, ENGINEERING & DESIGN (25%)					\$98,000	1 - 8
ESTIMATED TOTAL PROJECT COST					\$488,000	1 - 8
ESTIMATED 20-YEAR LIFE CYCLE COST AT 4% INTEREST					\$35,917	1 - 8

Notes

¹ Limited Design Work Completed (10-15%).

² Quantities Based on Design Work Completed.

³ Unit Prices Based on Information Available at This Time.

⁴ Limited Soil Boring and Field Investigation Information Available.

⁵ This feasibility-level (Class 4, 1-15% design completion per ASTM E 2516-11) cost estimate is based on feasibility-level designs, alignments, quantities and unit prices. Costs will change with further design. Time value-of-money escalation costs are not included. A construction schedule is not available at this time. Contingency is an allowance for the net sum of costs that will be in the Final Total Project Cost at the time of the completion of design, but are not included at this level of project definition. The anticipated accuracy range for the Total Project Cost is -30% to +50% per ASTM E2516-11, but is not specifically included in the table above. Project contingencies and accuracy ranges are based on professional judgement considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped. Project contingencies and accuracy ranges are not intended to include costs for future scope changes that are not part of the project as currently scoped or costs for risk contingency.

⁶ Estimate assumes that projects will not be located on contaminated soil and does not require any archeological work.

⁷ Estimate costs are to design, construct, and permit each alternative. The estimated costs do not include operations, maintenance, monitoring, or additional tasks following construction.

⁸ Estimate costs are reported to nearest thousand dollars.