Timber Creek Residential Development EAW

City of Carver, Carver County, Minnesota

December 12, 2019

Prepared By:

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Prepared For:

SUMMERGATE

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ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW)

Timber Creek Residential Development, Carver

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ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW)

Timber Creek Residential Development, Carver

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addressed collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

Project Title Timber Creek Residential Development EAW, Carver

Proposer	Summergate Development	**RGU**	City of Carver
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Reason for EAW Preparation
(check one)

Required:
☐ EIS Scoping ☑ Mandatory EAW

Discretionary:
☐ Citizen Petition ☐ RGU Discretion ☐ Proposer Volunteered

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s): Part 4410.4300 Subp. 19.D.- Residential Development

Project Location

County: Carver County, Minnesota
City/Township: Carver
PLS Location (¼, ¼, Section, Township, Range): parts of the SE¼ of the NW¼ and SW¼ of the NE¼ and NE ¼ of the SW ¼ and NW ¼ of the SE ¼ and SW¼ of the SW¼ and SE¼ of the SW¼ of S13,T115, R24 and part of the NE¼ of the NW¼ of S24, T115, R24,

Watershed (81 major watershed scale): Lower Minnesota River Watershed
GPS Coordinates: 44.767133,-93.641608 (Project Center)
Tax Parcel Numbers: 040130900, 040130700, and 040240200

At a minimum attach each of the following to the EAW:

- County map showing the general location of the project; **See Exhibit 1.**
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and **See Exhibit 2.**
- Site plans showing all significant project and natural features. Post-construction site plan (**Exhibit 3**) and Pre-construction site plans (**Exhibits 4-9**).

Project Description

a. Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

The Timber Creek residential development is proposed on approximately 161.4 acres of primarily agricultural land in the southeastern portion of Carver County. The project proposes 74 town homes and 270 single-family homes. Approximately 70.0 acres of open space is also planned, which will include parks, buffers, woodlands, wetlands, and stormwater basins.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

Summergate Development is proposing construction of a residential development comprised of town homes and single-family residences on approximately 161.4 acres of land. The three parcels that constitute the project are approximately 96.8, 61.4, and 3.2 acres in size, respectively. The proposed project is located in Sections 13 and 24 of T115, R24, Dahlgren Township, Carver County, Minnesota (Exhibits 1 & 2), and is generally located west of Jonathan Carver Parkway, south of US Highway 212, and north of Dahlgren Road. The Project is sited in close proximity to the City of Carver and will be annexed into the City once the Project is developed.

Project development will convert approximately 161.4 acres of agricultural fields, woodlands and wetlands to streets, homes, lawns, landscaping, parkland, trails, and stormwater ponding as shown on the Concept Site Plan (**Exhibit 3**). Land use within the site will include construction of up to 74 town homes and 270 single-family homes. A combination of public and private streets will service the development including the construction of a new east/west collector roadway extending from Monroe Drive. Each residential dwelling will be served by the City of Carver sanitary sewer and water systems. No on-site sewage systems and no private wells are proposed. Potential adverse effects on the environment will be mitigated by preserving and creating approximately 70 acres of open space in the form of public and private parks, buffers, woodlands, wetlands, and stormwater ponds. The project proposes landscaping, buffering, and constructing berms along adjacent roadways to offset possible visual and noise impacts, where appropriate.

It is anticipated that the project will be constructed in seven phases, with the first phase expected to begin in spring 2020. Full build-out is anticipated by 2027; however, construction timing will ultimately depend upon market conditions. It is anticipated that construction will entail moving approximately 300,000 cubic yards of soil, on approximately 123 acres of the site for streets, house pads, and stormwater features. The site earthwork will be graded to balance, no import or export of graded soil is anticipated. Construction dewatering is not anticipated, but would be conducted on an as-needed and permitted basis to install sanitary sewer, municipal water, and storm sewer. Best Management Practices will be implemented during and after construction to protect water quality and reduce the potential for soil erosion and sedimentation.

Public and private infrastructure improvements will need to be constructed in association with this development. These include but are not limited to: internal roadways, trails, stormwater systems, and utilities such as electrical lines, communication or telephone lines, natural gas, and extension of sanitary sewer and water supply systems.

The Wastewater and Comprehensive Sewer Plan in the City of Carver's Design Carver 2040 Comprehensive Plan (Comp. Plan) calls for municipal water facilities to be extended from the north to the south through the Project Area. Comments from City Officials and the Comp Plan state that a 15-inch sewer main is intended to serve the area, in addition to several 8-inch sewers (**Appendix A**). Municipal sewer service will be achieved through required trunk sewer improvements that will connect to existing infrastructure located east of the site.

The project will also include construction of a collector roadway oriented east to west through the northern portion of the site, as well as several local residential streets to access planned residential housing. The collector roadway (Monroe Drive extension) is planned east to west through the northern part of the site, which will be a public improvement project. In addition, Fulton Road will be extended north to Monroe Drive as a part of the development. Impacts related to public improvements directly associated with the proposed development project are discussed throughout this document.

A 6-acre community park is proposed for the eastern portion of the project area, adjacent to Carver Elementary School. The park is proposed as an active-use park for the public.

c. *Project Magnitude*

Table 6.1. Project Magnitude Table

Total Project Acreage	161.4
Linear project length	N/A
Number and type of residential units	270 Unattached/74 Attached
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	N/A
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	N/A
Structure height(s)	Up to 35 feet

d. *Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.*

The purpose of the Timber Creek project is to meet the demand for residential housing within the City of Carver and Carver County, Minnesota. The project will be developed by a private entity, Summergate Development.

e. *Are future stages of this development including development on any other property planned or likely to happen?* ☐ *Yes* ☑ *No.*
If yes, briefly describe future stages, relationship to the present project, timeline, and plans for environmental review.

There are currently no additional planned future stages of the Timber Creek project.

f. *Is the project a subsequent stage of an earlier project?* ☐ *Yes* ☑ *No.*
If yes, briefly describe the past development, timeline, and any past environmental review.

The Timber Creek development is not a subsequent stage of an earlier project.

Cover Types

Estimate the acreage of the site with each of the following cover types before and after development.

Pre-construction land cover acreages were estimated using National Land Cover Database (NLCD) cover percentages and known wetland acreages.

Table 7.1. Estimated Before and After Cover Types

Land Cover	Before (acres)	After (acres)
Wetland	0.9	0.0 [1]
Wooded/Forest	39.2	35.7 [2]
Hay/Pasture	40.0	0.0
Cropland	80.7	0.0
Lawn/landscaping: *private yard areas & street boulevards, excludes pond outlets and wetlands*	0.0	45.7
Impervious Surface/Developed: *houses, driveways, streets, sidewalks & trails*	0.0	45.7
Developed Open Space	3.6	0.0
Stormwater Pond	0.0	0.0 [1]
Parks and Open Space[1]	0.0	37.3
Totals	**161.4**	**161.4**

[1] Retained wetland, and stormwater ponding areas are represented in the category "Parks and Open Space". [2] Retained woodland, is primarily located in the undisturbed bluff zone.

If **Before** *and* **After** *totals are not equal, explain why:* Totals are equal and estimated from available land cover mapping.

Permits and Approvals Required

List all known local, state, and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans, and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing, and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Table 8.1. Permits and Approvals Required

Unit of Government	Type of Application	Status
City of Carver	Concept Plan Approval	In process
City of Carver	Preliminary Plat Application	In process
City of Carver	Final Plat Approval	To be applied for
City of Carver	EAW Negative Declaration	In process
City of Carver	Annexation	To be applied for
City of Carver	Building Permit	To be applied for
City of Carver	Electrical Permit	To be applied for
City of Carver	Permit for Installation of Utilities and Right of Way Management Permits	To be applied for (if needed)
City of Carver	30-day Watering Permit	To be applied for (if needed)
City of Carver	Plumbing Permit	To be applied for
City of Carver	Mechanical Permit	To be applied for
City of Carver	Wetland Delineation Confirmation	Approved
City of Carver	Wetland Conservation Act Permit	To be applied for (if needed)
Carver County	Residential/Access Permit	To be applied for (if needed)
Carver County	Utility Permit	To be applied for (if needed)
Carver County	Moving Transportation Permit	To be applied for (if needed)
Carver County	Excavating/Grading Permit	To be applied for (if needed)
Carver County	Obstruction Permit	To be applied for (if needed)
Metropolitan Council	Sanitary Sewer Connection Permit	To be applied for
Minnesota Department of Health	Water Main Extension Approval	To be applied for
Minnesota DNR Division of Waters	Appropriation/Dewatering Permit	To be applied for (if needed)
Minnesota Pollution Control Agency	Sanitary Sewer Extension Approval	To be applied for
MN Pollution Control Agency	NPDES/SDS General Permit	Covered under general permit; submit NOI prior to construction.
U. S. Army Corps of Engineers	Section 404 Clean Water Act Permit	To be applied for (if needed)

Carver County Watershed Management Organization	Watershed Review	To be applied for

Note: The project proposer will apply for and receive applicable permits prior to project construction.

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

Land Use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Existing land use within, and adjacent to, the project site is depicted on **Exhibit 4**. The present land use on the property is cultivated cropland and upland forest areas. Historical images reviewed from Google Earth and John R. Borchert on-line map library sources revealed that the project area has been used for agricultural purposes dating back to at least 1937. No significant land use changes were apparent on the site during the years reviewed. In 2014, construction was initiated to convert agricultural lands to Carver Elementary School east of the property, and in 2016, a single-family residential area was constructed immediately east of the property.

Existing land uses of abutting properties consist primarily of agricultural land with single-family residences to the north and west, rural residential and forested areas to the south, more densely developed single-family residential to the east, and Carver Elementary School to the east.

There are currently no designated parks or recreation areas within the project boundary as shown on the City's Existing and Planned Trails Map. A multi-purpose recreational trail is shown adjacent to the project boundary east of Jonathan Carver Parkway. A community park, located southeast of the project area, contains playground equipment, benches, skate park, baseball fields, volleyball court, hockey rink, and open space areas. Carver Elementary School and the adjacent residential development to the east both have parks with playground equipment.

Prime and Unique Farmlands

According to the Natural Resources Conservation Service (NRCS), 3 of the 16 soil types found on the site are classified as prime farmland (Table 10.1). These soils comprise 68.1 acres or approximately 42 percent of the site area.

Prime farmlands consist of land that has the best combination of physical and chemical characteristics for producing food, feed, forage, and oilseed crops. According to the NRCS, prime farmlands have "an adequate and dependable water supply from precipitation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content and few or no rocks." This does not mean all soils listed as prime farmland produce exceptionally high crop yields. No farmland preservation measures have been considered at this time.

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The Comp. Plan indicates that the project area falls within the City of Carver Ultimate Growth Boundary. The City of Carver and Dahlgren Township agreed to an orderly annexation agreement in 2009. The Project Area and adjacent lands are designated for Low Density Residential (2-5 units per acre) according to Figure L-5 of the Comp. Plan. City staff reviewed the sketch plan shown on Exhibit 3 and determined that it meets the proposed land use designation of *Low Density Residential*.

The Metropolitan Council has adopted the Thrive MSP 2040 Plan to ensure orderly, economic development of the Twin Cities Metropolitan Area in relation to regional infrastructure for transportation, water resources, and regional parks and open space. In 1996, the Metropolitan Council established a Metropolitan Regional Blueprint, which serves as the framework for development for the Twin Cities seven-county area. Only land designated by the Metropolitan Council as being within the Metropolitan Urban Service Area (MUSA) is currently scheduled to receive city sewer service.

The Carver Comp. Plan must address not only local issues but must also be consistent with regional benchmarks included as part of Thrive MSP 2040 for population, household and employment growth, transportation, housing and natural resources. The Thrive MSP 2040 Plan designates the City of Carver as an Emerging Suburban Edge Community. This designation is based on past residential development of the City, as it is considered to be in the early stages of transitioning into an urbanized area. Designation as an Emerging Suburban Edge Community means that the growth that has occurred in Carver starting in the 1970s will continue through the year 2040.

The project is subject to the Comp. Plan and Zoning Ordinance. The Comp. Plan includes the 2040 Future Land Use Map, which guides future land use on the subject parcels to include housing densities consistent with Low Density Residential development guidelines of 2-5 units per acre. The Comp. Plan also includes a map (W-1) indicating MUSA Expansion Areas consistent with the City of Carver Ultimate Growth Boundary. Carver has adopted sanitary sub district growth areas, identified on the MUSA map, which facilitates the extension of sanitary sewer in staged areas to manage growth for the City's Ultimate Growth Boundary. Extension of sewer and water infrastructure is planned in the area and discussed throughout this document.

As described in the Comp. Plan, the City anticipates significant growth with an estimated increase in the number of households from 1,182 in the year 2010, to a forecasted 2,120 households by the year 2020. The residential land use and housing goals for the City are to provide homes for all by developing high quality housing that is diverse in price, type, and style to meet the needs of future residents. Parallel land use goals with regard to residential development are to create a sustainable and lively community that meets the needs of individuals in all ages and stages of life. For instance, the project will provide 74 units of attached townhomes to provide a variety of style of housing types which are typically acquired at a lower cost to encourage a more inclusive community.

A large amount of land currently designated as Dahlgren Township is under the jurisdiction of the City, and once developed, will be annexed into the City. Much of the lands surrounding the project are anticipated to be developed into Low Density Residential housing. While no specific

concerns for these lands were discussed within the Comp. Plan, it is presumed that integration of housing, parks and open space, and transportation needs are of the utmost priority for this area. The proposed project is consistent with the goals of the Comp. Plan in that the proposed housing units across the site correspond to the location and extent of housing densities in the future land use plan. Low Density Residential housing units are proposed in this area to serve residents that desire a variety of price, type, and style of housing in conjunction with other housing needs such as access to transportation corridors and green space.

The project conforms to the future land use plan by providing residential development consistent with density guidelines and by incorporating objectives of the Comp. Plan, such as extending trail access along Ironwood Drive and future Monroe Drive. A portion of the project is proposed as a community park, which is consistent with acceptable land use for the area and the recommendations of the Parks and Trails chapter of the Comp. Plan.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The proposed site development is consistent with the Comp. Plan's future land use plans, which guide the area for residential development. The Future Land Use Map (Figure L-5) identifies the site as Low Density Residential, which corresponds to a typical R-1 Zoning District. The Carver Future Land Use Map is provided on **Exhibit 5**.

No MnDNR Public Watercourses are located within the project area. There are no shoreland overlays on the project area according to the most recent Carver County Zoning Map (December 21, 2018). The City of Carver has not enacted any shoreland regulations; however, the Comp. Plan notes that developing a shoreland ordinance is estimated to begin in 2019. Consequently, the project will not be subject to additional building standards or permitting requirements for shoreland construction activities.

According to FEMA Floodplain mapping (accessed September 2019), the project is located within Flood Panels 27019C0218D and 27029C0219D; HUC 07020012. The entire project is identified as being outside of either a 100 or 500-year flood zone (**Exhibit 6**). The site is also not in or immediately adjacent to state or federally-designated wild or scenic river land use zones or trout streams. The nearest designated trout stream is located approximately 4.3 miles northeast of the project boundary (Assumption Creek).

There are no wild and scenic rivers, critical areas, or agricultural preserves within the project area.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

Future land uses of surrounding properties are generally anticipated to be low density residential. Several parcels to the east are anticipated to be conservations areas, parks and open space, medium density residential, and public/institutional land uses. Lands to the south of the property are anticipated to be mixed use. Carver Elementary School is located immediately east the project area. These uses would be consistent with those currently proposed for the Timber Creek property.

The proposed project is compatible with existing and planned land uses in the area because it offers a range of housing options consistent with implementation of the Comp. Plan. Portions of

the project are also planned as public open space to include a community park, consistent with the Parks and Trails portion of the Comp. Plan.

c. *Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.*

Incompatibility of land uses is not anticipated as discussed in Section 9b.

Geology, Soils and Topography/Land Forms

a. *Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.*

Topographic mapping indicates that elevations on the site range from approximately 976 above mean sea level (amsl) in the northern portion of the site to 776 above mean sea level towards the southwestern corner of the site. Depth to groundwater was estimated by subtracting the anticipated elevation of groundwater shown on the Carver County Geologic Atlas (700 to 725 feet) from the lower and upper elevation ranges on the site (1,000 to 1,025). Based on this mapping resource, the depth range of groundwater at the site could be anticipated between 51 feet and 249 feet below grade.

The well logs from six nearby wells identified in the Minnesota Geological Survey's (MGS) County Well Index (CWI) identified static water levels between 127 feet and 235 feet below grade (**Appendix B**).

Depth to bedrock was estimated from The Geologic Atlas of Carver County, Minnesota (2009) C-21, Plate 5. The Geologic Atlas indicates that the distance to bedrock ranges between approximately 101 to 450 feet below grade.

Based on Minnesota Karst Lands Mapping (Alexander 2002), the project is not in an area of karst lands topography. If such features are encountered on the site during planned subsurface investigations, actions will be taken to mitigate potential effects such as stormwater routing, soil stabilization, and groundwater protection practices.

The Geologic Atlas of Carver County, Minnesota, C-21, Part B, Plate 9, Pollution Sensitivity of Near-Surface Materials (2014) indicates that the sensitivity of groundwater to pollution in the project area is Low to Moderate. Sensitivity of groundwater systems to pollution is defined as the approximate time it takes from the moment a contaminant infiltrates the land surface until it reaches an aquifer. It is anticipated that the travel time for water-borne contaminants to move from the surface to a depth of 10 feet will take at least one week, up to several months in the project area. Moderately permeable soils with finer textures will also slow or restrict the movement of water, which extends the time needed for chemicals to break down before reaching the water table.

Because development will be typical of residential uses, no unusual wastes or chemicals are anticipated to be spread or spilled that would cause significant groundwater contamination. The proposed project will offer continued groundwater protection and mitigation by providing adequate

stormwater treatment ponding, vegetated infiltration areas such as wetland buffers, and park areas to help capture runoff and filter pollutants. The project will adhere to the City of Carver and Carver County Watershed Management Organization infiltration requirements for stormwater to the degree practicable.

The residential development will offer a higher level of groundwater protection and mitigation than exists under current conditions. Chemical applications can be high in agriculturally-dominated landscapes. The conversion of the site to urban uses will ensure greater protection of groundwater by: (1) covering exposed soils with turf and landscape plants to reduce infiltration of nutrients and pesticides; (2) reducing hazardous materials on the property to include only household quantities; (3) providing or preserving more than 70 acres of park, woodland, wetlands, buffers and open space; (4) providing stormwater treatment systems; and (5) not drilling new wells or installing private septic systems.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

The Soil Survey Geographic (SSURGO) digital database for Carver County (USDA NRCS, Accessed 2019) indicates that soils within the project area (**Exhibit 7**) are classified as summarized in Table 10.1. Soils on the site are generally non-hydric loamy-textured soils.

Table 10.1. Soils Classification

Map Symbol	Soil Classification	Hydric[1] Percent of Map Unit	Hydric[1] Category	Prime Farmland[2]
CW	Cordova-Webster complex	100	All hydric	Prime farmland if drained
EB2	Estherville sandy loam, 2 to 6 percent slopes, eroded	5	Predominantly non-hydric	Farmland of statewide importance
GL	Glencoe clay loam, 0 to 1 percent slopes	100	All hydric	Prime farmland if drained
HD	Estherville-Hawick sandy loams, 12 to 18 percent slopes	0	Non-hydric	Not prime farmland
HM	Hamel loam, 0 to 2 percent slopes	90	Predominantly-hydric	Prime farmland if drained
KB	Kilkenny-Lester loams, 2 to 6 percent slopes	0	Non-hydric	All areas are prime farmland
KB2	Lester-Kilkenny loams, 2 to 6 percent slopes, eroded	0	Non-hydric	All areas are prime farmland

Table 10.1. Soils Classification

Map Symbol	Soil Classification	Hydric[1] Percent of Map Unit	Hydric[1] Category	Prime Farmland[2]
KC2	Lester-Kilkenny loams, 6 to 12 percent slopes, eroded	0	Non-hydric	Farmland of statewide importance
KD	Lester-Kilkenny loams, 12 to 18 percent slopes	0	Non-hydric	Not prime farmland
KD2	Lester-Kilkenny loams, 12 to 18 percent slopes, eroded	0	Non-hydric	Not prime farmland
KE2	Lester-Kilkenny loams, 18 to 25 percent slopes, eroded	0	Non-hydric	Not prime farmland
KF	Lester-Kilkenny loams, 25 to 40 percent slopes	0	Non-hydric	Not prime farmland
KM	Minneiska-Kalmarville complex, frequently flooded	40	Partially hydric	Not prime farmland
PD	Sparta loamy sand, 12 to 18 percent slopes	0	Non-hydric	Not prime farmland
PM	Klossner muck, 0 to 1 percent slopes	100	All hydric	Farmland of statewide importance
TB	Terril loam, 2 to 6 percent slopes	8	Predominantly non-hydric	All areas are prime farmland

[1] Based on the NRCS List of Hydric Soils of Minnesota (1995).
[2] Based on the USDA/NRCS Prime Farmland of Carver County, Minnesota (USDA NRCS WebSoilSurvey, accessed 2019).

The USDA NRCS Web Soil Survey (accessed September 2019) indicates there are no highly erodible soils within the subject property. Some soil units identified within the site are rated as having a slight risk for soil loss, meaning that erosion is unlikely under ordinary climatic conditions. Soil classification slope percentages range from 0-40 percent.

Contour mapping indicates that the overall surface topography generally slopes downward from north to southwest across the site. The highest elevation in the northern part of the site is approximately 976 feet above mean sea level and slopes down to approximately 776 feet above mean sea level in the southwestern part of the site. In general, there is a topographic divide that runs from roughly the central portion of the project boundary to the western boundary of the site. Consequently, current site runoff generally flows west/southwest along the natural divide into surrounding creeks and natural wetlands, eventually making its way into larger streams south of the property.

It is anticipated that construction will entail moving approximately 300,000 cubic yards of soil from approximately 123 acres. It will be graded for streets, house pads, and stormwater features. Because

the project will involve disturbance of more than one acre of land, application for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit will be submitted to the MPCA prior to initiating earthwork on the site. This permit is required for discharge of stormwater during construction activity and requires that Best Management Practices (BMPs) be implemented. Erosion and sedimentation control BMPs related to stormwater runoff are discussed in greater detail within Item 11.b.ii.

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 10.

Water Resources

a. *Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.*
   i. *Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.*

Westwood Professional Services conducted a wetland delineation in 2018 on the area of development on the subject property to identify jurisdictional lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Westwood delineated three wetlands on the site, labeled Wetlands 01 through 03 (**Exhibit 8**). Wetlands and watercourses within the bluff area were not delineated because no disturbance is proposed in this area.

Table 11.1 summarizes the water features currently identified on the site as of 2018. There are no known trout streams/lakes, wildlife lakes, migratory waterfowl feeding/resting lakes, or outstanding resource value waters within the project area. Identified wetlands have been historically farmed as observed from aerial photography from the late 1930s.

Table 11.1. Delineated Wetlands

Wetland ID	Size (Acres)	Type	Mapped Soils	Vegetation		Mapped NWI, PWI, NHD?
				Wetland	Upland	
WB-01	0.22	Type 1 (PEM1Af)	Lester-Kilkenny loams	Eastern cottonwood and pigweed	Bare ground	NWI
WB-02	0.04	Type 1 (PEM1Af)	Lester-Kilkenny complex	Stunted corn remnants	Bare ground	No
WB-03	0.61	Type 1 (PEM1Af)	Kilkenny-Lester loams, Hamel loams	Pigweed, yellow nutsedge, and remnants of corn.	Bare Ground	No
Total	0.87					

Prior to delineating wetlands on the site, the Lower Minnesota River Watershed Plan, the Carver County Watershed Management Organization Water Management Plan, the Minnesota Department of Natural Resources (MN DNR) Public Water Inventory Map (PWI), the Carver County Soil Survey Map, the latest version of the National Wetland Inventory (NWI) Map, and the National Hydrography Dataset (NHD) were reviewed. Westwood also reviewed aerial photos from two sources covering 11 different years between 1937 and 2012.

The MN DNR PWI and National Hydrography Dataset revealed one watercourse within the bluff area of the project which will not be disturbed. NWI mapping revealed one PEM1Af wetland in the area of development and two PFO1C wetlands mapped within wooded bluff land on the site. Soils that are predominantly hydric are mapped on the site, which corresponds to delineated wetland WB-03.

The subject property lies within the Lower Minnesota Watershed District; however, the Project is sited within Carver County Watershed Management Organization (CCWMO) jurisdiction. The latest update of the CCWMO Water Management Plan was released in January 2019. The CCWMO rules govern alterations in floodplains and wetlands, and require buffers adjacent to identified water features based on a functional classification system.

Impaired Waters

According to the 2018 Minnesota Impaired Waters List and the MPCA's impaired waters viewer (IWAV), no impaired waters are located within the project area. However, two impaired streams (Carver Creek) were identified within one-mile of the site according to the IWAV. Creek AUID: 07020012-806 is located approximately 0.18 miles south of the project area and is considered impaired for aquatic recreation and aquatic life according to IWAV. Creek AUID: 07020012-58 (unnamed creek) is located approximately 0.31 miles northeast of the project area and is considered impaired for aquatic recreation.

These impaired waters are part of the Lower Minnesota River Watershed District Capital Improvement Projects, specifically the Carver Creek Restoration Project and the Minnesota River Corridor Management Project. The Carver County Water Management Organization notes that the impaired Carver Creek is planned to have several restoration projects in the future (2022-2024), specifically floodplain reconnection and gully stabilization.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

As described in Section 10, static groundwater levels in the project area are likely between approximately 127 and 235 feet below grade based on water levels observed in six nearby County Well Index wells (Appendix B). Surficial groundwater is sometimes encountered in seasonally wet areas.

As shown in the Minnesota Department of Agriculture Source Water Protection Web Mapping Application, the project is located outside of all Minnesota Department of Health Wellhead Protection Areas and Drinking Water Supply Management Areas (DWSMA). In general, the project will be designed with wellhead protection in mind, by reducing overall threats to groundwater.

No new water wells are planned for the project. The Minnesota Department of Health County Well Index (CWI) indicates there is one registered well within the project site. Well Number 672321 is a private well, which will need to be decommissioned by an MDH licensed contractor. Other Unique Well numbers identified nearby, but outside the project area, include: 400785 – Private Well, 505918 – Private Well, 467140 – Private Well, 495529 – Private Well, and 718312 – Private Well. Well reports for the aforementioned wells are located in Appendix B.

b. *Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.*

i. *Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.*

1) *If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.*

Only normal domestic wastewater production is expected from the project. The types of wastewater produced will be typical of new residential developments. No on-site municipal or industrial wastewater treatment is anticipated or planned. Because wastewater is from domestic sources, pre-treatment measures have not been contemplated.

According to the City's Comprehensive Sanitary Sewer Plan (2008), the site is located within three Sewer Districts; all areas in the City of Carver Ultimate City Boundary are located within a MUSA expansion sometime before 2040. The project area is located in the Northwest, North Central, and Central Sanitary District. The entire City of Carver wastewater leads to Interceptor 8038-1, which will be the interceptor responsible for serving the Project.

According to mapping in the Sanitary Sewer Collection System Comprehensive Plan (2008), it is anticipated that flow through portions of the existing trunk sanitary sewer in the Sanitary Sewer Districts are prepared to handle a greater capacity of sewage and wastewater once the District is fully developed. In each sanitary district, additional pipes are proposed to provide capacity in anticipation more residential and commercial developments. The existing flow in Northwest District is approximately 0.803 million gallons/day (MGD). Future flow projects indicate that the Northwest District will be capable of managing 17.27 MGD by 2030. The existing flow in North Central District is approximately 0.367 MGD. Future flow projects indicate that the North Central District will be capable of managing 10.69 MGD by 2030. The existing flow in Central District is approximately 0.631 MGD. Future flow projects indicate that the Central District will be capable of managing 66.56 MGD by 2030. It is not anticipated that the development of the Project will negatively impact the waste loadings of the meter districts.

The Timber Creek Residential development is proposed to have less density than what is presented in the Comp. Plan (up to 5 units/acre), and will therefore generate less sanitary sewer flow to the critical trunk sewer sections than is anticipated by the City of Carver Sanitary Sewer Collection System Comprehensive Plan. Using the Metropolitan Council's 2019 Sewer Availability Charge Procedure Manual, maximum demand was calculated using the formula of 1 SAC unit = 274 gallons per day of capacity for residential units. Consequently, the project is anticipated to generate a maximum of 94,256 gallons per day (GPD) or 34.4 MGY (274 x 344 x 365). Interceptor 8038-1 will be transporting wastewater effluent to the Blue Lake Treatment Plant.

The City of Carver is served by the Blue Lake Treatment Plant, located near Highway 101 and the Minnesota River in Section 02 of Shakopee. The Blue Lake Treatment Plant is an advanced secondary treatment plant utilizing chlorination/de-chlorination, and is capable of processing solids into reusable methane biogas. The plant has a current capacity of 32 MGD, serves twenty-seven communities, and approximately 285,000 residents. Once treated, effluent is discharged to the nearby Minnesota River.

The Metropolitan Council has recently studied the future of the Blue Lake Wastewater Treatment Plant through the Thrive Comp. Plan. There is one MCES interceptor that conveys wastewater flow to the Blue Lake Plant from the site in Carver, Interceptor 8038-1. The current capacity of the Blue Lake Treatment plant is 32 MGD. From 2010-2014, the plant received approximately 26 MGD. The Thrive 2040 Water Resources Policy Plan anticipates approximately 35.64 MGD of wastewater in the year 2040. Additional capacity is planned to be constructed at Blue Lake Treatment Facility before 2040; also, consideration has been made for a potential wastewater treatment facility in the City of Carver. It is therefore concluded that capacity will not be a concern for future wastewater treatment from the proposed project.

2) *If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.*

   Wastewater discharge will not be to a subsurface sewage treatment systems (SSTS).

3) *If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.*

   Wastewater discharge is not to surface water. No effects are anticipated to surface or groundwater as effluent will be directed to a publicly-owned treatment facility.

ii. *Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.*

The development must comply with stormwater management, wetland conservation, floodplain, shoreland, and public waters requirements administered by: the City of Carver, the Carver County Water Management Organization, the Board of Water and Soil Resources (Wetland Conservation Act), the Federal Emergency Management Agency (FEMA), the Department of Natural Resources (DNR), and the MPCA through the National Pollutant Discharge Elimination System (NPDES) General Construction Permit.

Carver is a mandatory small MS4 (Municipal Separate Storm Sewer System) city, and is required by federal and state law to obtain and implement a NPDES Stormwater permit administered by the MPCA. MS4s are required to develop and implement a stormwater pollution prevention plan program (SWPPP), and submit an annual report to the MPCA.

Pre-Construction Site Runoff

Existing site runoff from the project area likely contains pesticides, herbicides, and fertilizer residues due to the presence of agricultural fields. There is also likely a minor amount of runoff that flows to the site from Dahlgren Road and Ironwood Drive. Runoff primarily drains away from the site through the unnamed flowline in the southwestern forested area. It is expected that a portion of the runoff infiltrates into the site's soils, but the majority of runoff likely leaves the site via overland flow through existing drainage swales and ditches.

Post-Construction Site Runoff

The change in land use will decrease the amount of agricultural chemicals and suspended solids, and increase other components typical of urban runoff. It is expected that the volume of runoff will increase during significant storm events as a result of the increase in impervious surface area. It is anticipated that only extreme conditions such as those occurring in connection with 50- or 100-year storm events will result in measurable increases in runoff volume and associated pollutant transport. The preservation and creation of open space in the form of buffers, parks, woodlands, wetlands and ponds will help to mitigate potential adverse effects from the increase in impervious surface.

Runoff water quality will be typical of residential developments, and will likely be slightly degraded due to pollutants deposited on streets, roofs, private driveways and other impervious surfaces. Similar to current conditions, sediment, nutrient, and other pollutant removal will occur when much of the stormwater filters through upland vegetation, vegetated drainage swales, stormwater ponds, and other best management practices. Preserved and newly seeded vegetation will provide filter strips to help remove sediment and nutrients before runoff discharges to area wetlands and surface waters, mitigating potential effects on water quality.

Potential adverse effects of runoff volume and quality will be further mitigated by the construction of stormwater basins, which will be designed to reduce peak runoff rates and meet the requirements of the City of Carver and CCWMO. The design of ponding areas and the quality of stormwater discharging from the development will meet the requirements of the MPCA General Stormwater Permit for Construction Activity (Minnesota Stormwater Manual), and applicable local regulations. In a storm event, stormwater will be retained in the ponds and discharged at or below existing peak runoff rates.

BMPs will be employed during construction to reduce erosion and sediment loading of stormwater runoff. Inspection and maintenance of BMPs during construction will be consistent with NPDES/SDS General Permit requirements, including site inspection after rainfall events, perimeter sediment control maintenance, and sediment removal.

Volume Control (Infiltration)

Volume control standards for the CCWMO require Project stormwater management plans to have post-construction stormwater runoff volume retained onsite equivalent to 1-inch of runoff from impervious surfaces. Exceptions to the Volume Control standards are noted for areas where site conditions may render infiltration undesirable or impossible.

Rate Control

The CCWMO requires stormwater runoff rates from developments shall not increase from the existing conditions (runoff rates) for 2-year, 10-year, and 100-year 24-hour events using Atlas 14

nested distribution. Conveyance systems must at a minimum be designed for a ten-year, 24-hour storm event. Extended detention must be provided for runoff generated from the two-year event for sites with direct discharges to streams. The majority of rate control on the project will take place within constructed wetlands and stormwater ponds and will not discharge directly to any streams. Atlas-14 precipitation data will be used to model rate control on the site.

Water Quality Standards

CCWMO standards for water quality require removal of 90% of phosphorus generated from the site using on-site treatment areas. In addition, the CCWMO requires that the stormwater management plan account for treatment areas capable of removing 90% of total suspended solids generated by the Project. Project stormwater ponds will be designed to meet the water quality criteria noted in the CCWMO Watershed Management Plan.

Buffer Requirements

The CCWMO buffer standards are based upon a functional classification of wetlands. Buffer standards are 100' minimum width for "exceptional quality", 50' minimum width for "high quality" wetlands, and 25 feet and 20 feet for "moderate quality" and "low quality" wetlands, respectively. These buffers are maintained under the existing concept plan.

Receiving Waters

The goal of the project will be to maintain peak discharge rates at or below the existing condition. Post-construction drainage will follow similar pathways, with minor differences in drainage routes and increases in the volume of road ditches and swale flows. Post-development stormwater runoff will either travel overland into stormwater ponds, or through storm sewers prior to discharging to receiving waters. Carver Creek is the primary stream which receives water runoff from the Project. Other BMPs, such as natural swales and infiltration technologies, will be considered as project designs advance.

For the following reasons, it is anticipated that site development will have minimal effects on receiving water quality:

- Preservation and creation of approximately 70 acres of buffers, parks, woodlands, and ponds (43 percent of the site), and
- Hydraulic storage within sediment basins will be designed, and BMPs implemented, in accordance with the General NPDES/SDS Permit for Construction Activities to protect water quality and control erosion.

Stormwater and Erosion Control BMPs

Because the project will involve disturbance of more than one acre of land, application for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit will be submitted to the MPCA prior to initiating earthwork on the site. This permit is required for discharge of stormwater during construction activity and requires that Best Management Practices (BMPs) be used to control erosion, and that erosion controls be inspected after each rainfall exceeding 0.5 inches in 24 hours. Erosion control practices that will be implemented on the site include:

1. Construction of temporary sediment basins in the locations proposed for stormwater ponding, and development of these basins for permanent use following construction.

2. Silt fence and other erosion control features installed prior to initiation of earthwork and maintained until viable turf or ground cover is established on exposed areas.
3. Periodic street cleaning and installation of a rock construction entrance to reduce tracking of dirt onto public streets.
4. Stabilization of exposed soils, phased with grading, within 7 days due to proximity to impaired waters.
5. Energy dissipation, such as riprap, installed at storm sewer outfalls.
6. Use of cover crops, native seed mixes, sod, and landscaping to stabilize exposed surface soils after final grading.

Erosion control plans must be reviewed and accepted by the City of Carver and the CCWMO prior to project construction. Because the above BMPs will be implemented during and after construction, potential adverse effects from construction-related sediment and erosion on water quality will be minimized.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

Surface/Groundwater Appropriations and Dewatering

The project is not proposing new water wells, and no surface waters will be appropriated. According to the County Well Index (CWI) record, one well exists on the site. The well will be properly decommissioned by an MDH licensed contractor. If other active or inactive wells are discovered on the property, they will be field-located, abandoned, and sealed in accordance with MDH regulations prior to site development.

Construction dewatering is not anticipated at this time. However, dewatering would become necessary if surficial groundwater is encountered during utility installation. As indicated in Section 10, there may be areas of perched groundwater on the site. Perched groundwater areas may require some level of dewatering during construction.

The quantity and duration of potential construction dewatering is not known at this time, but it is expected that any such dewatering would be limited and temporary. If groundwater is encountered during utility installation, it would be discharged to temporary sediment basins located within the project site.

If construction dewatering and pumping from the proposed development exceeds the 10,000-gallon per day or 1,000,000 gallons per year thresholds, a DNR Water Appropriation Permit will be obtained. If it becomes apparent that construction dewatering will not exceed 50 million gallons in total and duration of one year from the start of pumping, the contractor or project proposer will apply to the DNR Division of Waters for coverage under the amended DNR General Permit 97-0005 for temporary water appropriations. It is not anticipated that construction dewatering or pumping from the proposed development will be extensive or

continue long enough to require a permit from the DNR, or impact nearby domestic or municipal wells.

Connection to a public water supply system

According to the 2017 Comprehensive Water System Plan, water in the city is supplied from four wells that draw from the Tunnel City-Wonewoc and Mt. Simon aquifers permitting through the DNR for water appropriations. The total operating capacity of the wells is 2.45 MGD, with a firm supply operating capacity of 1.73 MGD. Historically, daily water pumping in the city has averaged 0.36 MGD with a maximum daily water usage of 0.83 MGD in 2015. Per capita use in the city is estimated at approximately 82 gallons per day according to the Comp. Plan and U.S. Census Bureau population information.

The estimated peak water demand for the proposed development is 37.8 MGY (103,682 gallons per day) based on the assumption that consumption is approximately 110 percent of wastewater generation (see Item 11). Consequently, there are no water supply issues anticipated as a result of adding the development to the city's water supply system.

Water will be supplied to the development via the Carver municipal water supply system. Water facilities will be extended to the site from a future 12-inch trunk water line cutting through the project area. The water system will be looped with the existing residential development to the south.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

The project may involve minor physical alterations of wetlands within the subject property. Unavoidable wetland impacts will be less than 1 acre. It is anticipated that the majority of unavoidable impacts will be needed to extend roadways, and to accommodate stormwater ponding. Housing, ponding, and open space have been placed in a manner that avoids impacts to water resources to the degree practicable. Water resources within the project area will be regulated under:

- The Minnesota Wetland Conservation Act of 1991, as amended, administered in this area by the City of Carver,
- The Carver Creek Watershed Management Organization Wetland Alteration Rule, Buffer Rule, Stormwater Management Rule, and the Drainage Alteration Rule,
- Section 152.11, Shoreland Overlay District of the Carver County Zoning Ordinance as administered by Carver County, and

- Section 404 and 401 of the Federal Clean Water Act administered by the U.S. Army Corps of Engineers and the Minnesota Pollution Control Agency.

Impacts to wetlands to accommodate project features are anticipated to have only minor effects, if any, to the host watershed. The project proposer evaluated alternatives as the site was designed to avoid and minimized impacts to the extent practical, and will further analyze opportunities for reductions as required through the Wetland Conservation Act sequencing process. Compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor watershed, major watershed, or established Bank Service Area (BSA).

b) *Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.*

Anticipated physical effects and alterations to surface water features are discussed in 11 iv. As discussed, unavoidable impacts, as determined through the wetland permitting process, will be compensated via purchase of offsite wetland banking credits, or on-site replacement. The required wetland permitting process will fully evaluate opportunities to further avoid, minimize, and mitigate environmental effects to surface water features on the site.

In-water Best Management Practices to avoid or minimize turbidity/sedimentation while physically altering wetlands (such as silt fence, bio rolls and silt booms) will be described in the project SWPPP, and deployed as needed. The project site does not encompass surface waters, and therefore will not change the number or type of watercraft on any waterbody.

Contamination/Hazardous Materials/Wastes

a. *Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.*

A search for known environmental hazards and conditions was completed for the Timber Creek Residential Development. Database searches using the Minnesota Pollution Control Agency's (MPCA) *What's In My Neighborhood* and the U.S. Environmental Protection Agency's (EPA) *MyEnvironment* were conducted.

The MPCA *What's In My Neighborhood* online database indicated that no current or past environmental hazards were recorded in the project area. However, within ¼ mile of the project area, seven sites were identified. The sites were identified due to the following: construction stormwater permits, one hazardous waste permit, and two multiple activities sites (aboveground and underground tanks; construction stormwater, hazardous waste, and minimal quantity generator). The Timber Creek Residential Development is not anticipated to impact, nor exacerbate, any of the aforementioned environmental hazards.

The EPA, *MyEnvironment* online database revealed that no environmental hazards have been documented in the project area. One hazardous waste site, William Mueller & Sons, was identified within the ¼ mile buffer. The William Mueller & Sons site was also identified by the MPCA *What's In My Neighborhood* database. It is not anticipated that project development will impact, nor exacerbate, the hazardous waste conditions of William Mueller & Sons.

There are no abandoned dumps, closed landfills, abandoned storage tanks or hazardous liquid or gas pipelines known to exist within the project area. One water well has been identified within the Project area, and will be decommissioned properly by an MDH licensed well contractor. It is assumed that an individual septic system exists on the same homestead site as the private well. If an individual system is discovered, the individual septic system will be abandoned by a licensed professional in accordance with Minn. R. 7080.2450, subp. 6.

Given the lack of known hazards on site, or in close proximity to the site, supplemental measures to avoid, minimize, or mitigate effects from existing contamination have not been considered beyond the conditions of the acquired permits for project development. In the event that environmentally hazardous conditions are identified during site construction, measures will be taken to ensure that project development and operation does not exacerbate contamination or generate new environmental hazards.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Construction activities will generate wastes typical of residential development operations. No solid or hazardous wastes, including solid animal manure, sludge, and ash, will be produced during construction and/or operation. The contractor will dispose of wastes generated at the site in an approved method by using commercial dumpsters and disposing construction wastes at an MPCA-permitted landfill. The contractor will minimize and mitigate adverse effects from the generation and storage of solid waste by recycling construction waste that can be recycled, when feasible.

Following project construction, solid waste generation will be typical of occupied residential developments of this size. The majority of the solid waste generated will include materials such as paper, organics (food wastes), yard waste, and inert solids. The remaining wastes will likely include plastics, metals, and glass.

According to the *Metropolitan Solid Waste Management Policy Plan 2016-2036* (MPCA, 2017), the Minnesota per capita rate for waste generation is approximately 1.13 tons per year. The following residential solid waste generation rates were based on Metropolitan Council Community Profile Average Household size data of 2.95 persons (2018). The household occupant number was then

multiplied by 1.13 tons per person per year, based on the MPCA estimate for Minnesota families. Using these conservative figures, the proposed development could generate as much as 1,147 tons (344 units X 2.95 people/unit X 1.13 tons/person/year) of residential municipal solid waste per year.

Residents within the new development can contract individually with waste haulers for solid waste collection and recycling services under the city's open trash and recycling collection system. According to the City's *New Resident Guide* (n.d.), there are currently three licensed residential waste haulers. Curbside recycling, including paper, plastics, glass, metals and compost, is available to Carver residents through their solid waste haulers. Participation in the recycling and composting programs by future residents of the project area is expected to reduce costs for solid waste trucking and disposal, and generally minimize and mitigate adverse effects from the generation and storage of solid waste.

c. *Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.*

It is not anticipated that the proposed project will generate, or require storage of, significant amounts of wastes that would be considered hazardous aside from typical household cleaners, paints, lubricants, and fuel storage for small power equipment. Toxic or hazardous materials such as fuel for construction equipment and materials used during the normal construction process of residential units (paint, adhesives, stains, acids, bases, herbicides, and pesticides) will likely be used in typical quantities during site preparation and unit construction. These materials will be properly stored during on-site use and according to state and federal regulations to prevent accidental spill or release of hazardous materials. Builders and contractors are responsible for proper management and disposal of wastes generated during construction, which is typically handled by using construction dumpsters and the appropriate certified landfills. The contractor will minimize and mitigate adverse effects from the generation and storage of hazardous wastes by recycling wastes that can be recycled, and by developing a spill prevention plan for the project.

Use of toxic or hazardous materials, outside of vehicle fuels, standard household cleaners, and lawn care chemicals, is not anticipated within the project area in conjunction with the proposed residential development.

d. *Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.*

Outside of the materials described above, the project is not anticipated to generate or require the storing, handling or disposal of hazardous wastes during construction or during operation. Consequently, potential environmental effects from hazardous wastes, and measures to avoid minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling, have not been considered.

Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources (rare features):

a) *Describe fish and wildlife resources as well as habitats and vegetation on or near the site.*

Fish and wildlife resources on and near the site are directly related to the composition, quality, size, and connectivity of natural communities including woodlands, wetlands, and grasslands. The project proposer used available NLCD land cover types and aerial photography to conduct off-site analysis of habitats (**Exhibit 9**). Based on this analysis, the site contains the following major habitat components: 80.7 acres of cultivated crop, 36.3 acres of deciduous forest, 33.2 acres of hay/pasture, 7.7 acres of shrub/scrub, and 3.6 acres of developed (open space) lands. These habitats are used by a variety of animals common to the Western Corn Belt Plains ecoregion of Minnesota. Wildlife that exist throughout the site likely include those species that have adapted to cropland and fragmented woodland and hay/pasture habitats such as pheasant, meadowlark, field sparrow, eastern cottontail, red fox, skunks, white-tailed deer, raccoon and small mammals such as mice and shrews. The open fields and woodland areas provide seasonal food and cover for these species.

*b) Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-**NA**) and/or correspondence number (ERDB- **20200001**) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.*

According to the Natural Communities and Rare Species of Carver County Map (Minnesota County Biological Survey, 1998), the project area contains two natural communities in the bluff land identified as an Oak Forest (mesic subtype) and Maple-Basswood Forest. Project design plans have avoided the natural communities within bluff land portions of the site.

The Minnesota DNR Natural Heritage Program conducted a database search of the Minnesota Natural Heritage Information System (NHIS) to determine if there were records of listed plants and animals; native plant communities; wildlife aggregations; geological features; or state rare features that known to occur within or near the project site.

The DNR Natural Heritage Review response letter is provided in **Appendix C**; correspondence number: ERDB 20200060. The DNR identified a Site of High Biodiversity Significance, Sugar Maple – Basswood (Bitternut Hickory) Forest and Red Oak – Sugar Maple – Basswood (Bitternut Hickory) Forest native plant communities, and a state listed plant species of special concern on the north facing slope of the ravine. In addition, the Listed Species, northern long-eared bat (Myotis lucifugus), have been documented in the vicinity of the proposed project, but outside of the one mile search radius.

Project design plans avoid the identified forest Site of High Biodiversity Significance, where northern long-eared bats could use, and the ravine area where the state listed plant species is documented. Therefore, no impact is proposed to these ecological features as a result of the project.

c) *Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.*

Project development is expected to convert approximately 91.4 acres of cultivated crop fields, hay/pasture, woodland, and vacant land to single-family homes, townhomes, and roads. Conversion of agricultural fields, woodlands, vacant, and hay/pasture to residential development may result in some local decline in wildlife abundance. Populations of species that depend primarily upon cropland, such as ring-necked pheasants, wild turkey, and meadowlarks, will likely be displaced. Migratory birds are expected to respond to the development by looking for alternative nesting sites upon their return from wintering habitats. However, given the significant acreage of upland forests, stormwater basins, wetlands and wetland buffers, and other open space planned for the project, migratory birds tolerant of urban areas, like Canadian geese and mallards, will likely continue to utilize the area. Some songbirds adapt to suburban habitats such as house finches, robins, and eastern bluebirds. Non-migratory species with small home ranges such as small mammals may experience more adverse effects. These species will compete with other individuals of the same or other species to claim territories in neighboring habitats or succumb to mortality during project construction. However, it is anticipated that some of these non-migratory species will re-introduce into the open space portions of the project as those become established.

Approximately 43 percent of the project area will be open space (i.e. preserved open space/park, parkland, wetland, wetland buffer, stormwater basins, right-of-ways, and woodland), which is expected to help mitigate adverse effects on wildlife. While cultivated croplands will be completely converted and removed as an available habitat type, it is anticipated that woodlands, wetlands, wetland buffers and stormwater basin areas will be enhanced from existing conditions. Consequently, the project is not expected to result in a regionally significant decline in wildlife abundance or species diversity. Measures expected to provide additional habitat for wildlife and help mitigate adverse effects include the preservation of forest lands in the bluff area, minimizing impacts to wetland areas, the creation and expansion of stormwater basins, open areas in parks, and maintaining connections between existing wetlands and woodlands in the development by retaining wetlands and enhancing wetland buffers. Such efforts will reduce habitat fragmentation and allow for wildlife movement on the property and from adjacent, off-site resource areas. For instance, the wetland in the central portion of the project area is proposed for avoidance in addition to creation of a nearby stormwater pond to connect with other stream and wetland habitats to the west, providing connectivity between resources areas for wildlife.

A review of the U.S. Fish and Wildlife Services' Information for Planning and Consultation (IPaC) revealed the potential for one federally-listed species, the northern long-eared bat (*Myotis septentrionalis*), to occur within the project area. The Minnesota DNR in conjunction with the U.S. Fish and Wildlife Service produced a Townships Containing Documented Northern Long-Eared Bat (NLEB) Maternity Roost Trees and/or Hibernacula Entrances in Minnesota document, which revealed that no known roost trees or hibernacula have been identified in close proximity to the Project Area. One instance of roost trees has been identified in Carver County, in the Townships of Jackson/Louisville, which are located greater than 1.4-miles from the proposed project. Project development is not expected to negatively impact NLEB communities as no known roost trees have been identified and existing trees on site will be preserved to the greatest extent possible for natural/open space areas.

No other state or federally-threatened and/or endangered species are known to utilize the project area as fully described in Section 13.

Invasive Species

The project proposer understands that the introduction and spread of invasive weed species from project construction and operation requires consideration. While there is the opportunity for invasive weed species to be introduced during project construction, it is unlikely that these species would persist in a meaningful way following construction. The Timber Creek project will be fully landscaped with turf grass and landscape trees and shrubs per a city-approved landscaping plan. Consequently, large areas of exposed soils where invasive weed species might appear is not anticipated, or expected. If present, large areas of invasive species will be controlled by the applicant in accordance with local and state invasive and noxious weed regulations.

Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

A database search request was made to the Minnesota State Historic Preservation Office (SHPO) who conducted a search of the Minnesota Archaeological Inventory and Historic Structure Inventory for the project area and surrounding areas (**Appendix D**). Based on their review, no previously recorded archaeological sites, historic structures, or traditional cultural properties were identified in the database for the project area. No National Register of Historic Places (NRHP) listed properties are within one mile of the project. Seventeen inventoried architectural resources and no archaeological sites are recorded within one mile of the project.

Two of the inventoried architectural resources have been certified eligible for the NRHP. The Haegerle Farmstead (SHPO #CR-DHL-009) is approximately 0.20 miles from the project and the Jacobs Farmstead (SHPO #CR-DHL-009) is approximately 0.45 miles from the project. Neither NRHP eligible resource will be directly impacted by the project. A review of current aerial photography shows that the structures at the Haegerle Farmstead have been removed or demolished. Additionally, background research was conducted online via the MN Office of the State Archaeologist Portal. No other previously recorded archaeological sites or historic properties were identified within or immediately adjacent to the project area. Direct physical effects to known historic properties during project construction and operation are not anticipated.

Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

There are no scenic views or vistas located on or near the property, and no non-routine impacts or visual nuisances are anticipated. The topographic relief existing on the site is obscured by forested land which will remain. The proposed residential land use is consistent with other established uses in the area, and therefore will not create a significant change in visual aesthetics. Measures to soften visual transitions

include providing buffers between existing and proposed homes, preservation of tree and wetland cover where possible, developing community parks, and providing berms and landscaping adjacent to proposed private streets and adjacent land uses where needed.

Air

a. *Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.*

   Because development of heavy industrial facilities is not proposed, no stationary source air emissions are anticipated as a result of this project.

b. *Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.*

   Increased traffic will generate a relatively small corresponding increase in carbon monoxide levels and other vehicle-related air emissions. The project is expected to have a negligible impact on air quality. Based on traffic impact study findings described further in Section 18, intersections within the study area will operate at an acceptable level of service (LOS) reducing the possibility of congestion and vehicle idling. Consequently, baseline air quality monitoring, or predictive air quality modeling, has not been scheduled at this time, and no measures to mitigate air quality impacts have been considered.

c. *Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.*

   Project development will not generate odors, noise or dust in excess of levels emitted during typical construction practices of suburban developments. Odors, noise, or dust produced during construction will meet the requirements of the MPCA and applicable local regulations.

   The project will not generate significant odors during construction or operation. Minor odors generated during construction will be typical of those associated with residential development processes, such as exhaust from diesel and gasoline powered construction equipment. The construction process is expected to generate some dust, but it is not anticipated that fugitive dust will be generated in objectionable quantities. The nearest receptors to the proposed project are the neighborhood residences located south and east of the project boundary, Carver Elementary School's parking lots and facilities, and several farmsteads located south and west of the Project.

Consideration will be given to suppression of airborne dust by application of water if significant fugitive dust generation occurs during site grading and equipment operation that is greater than routinely expected during normal construction practices.

Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

The project will be constructed in accordance with the city's established noise regulations as outlined in City Code Sections 50-86 (4), 32-5, 30-23 (b) (15), and 46-122. It is anticipated that noise levels will temporarily increase locally during project construction, but are expected to return to intensities consistent with existing levels and sources following project completion. Noise levels on and adjacent to the site will vary considerably during construction depending on the pieces of construction equipment being operated simultaneously, the percent of time in operation, and the distance from the equipment to the receptors. The nearest receptors to the proposed project are the neighborhood residences located south and east of the project boundary, Carver Elementary School's parking lots and facilities, and several farmsteads located south and west of the Project. In accordance with Minnesota Rules: 7030: Noise Pollution Control, construction equipment running during daytime hours (7:00 a.m. to 10:00 p.m.) will not exceed 65 decibels for more than 10 percent of the time and not more than 60 decibels for more than 50 percent of the time. Construction equipment is not anticipated to operate from 10:00 p.m. to 7:00 a.m. Planned berms and landscaping within and adjacent to project boundaries will help to minimize and mitigate the effects of the anticipated negligible noise generated from the project following construction.

Transportation

a. *Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.*

   The Timber Creek Residential Development site would generate traffic during construction of the residential dwelling units, as well as the open space development. Construction traffic would primarily use CSAH 11 (Jonathan Carver Parkway), Monroe Drive and Ironwood Drive as the main access points into and out of the site during construction.

   When the site is developed, a series of internal streets will be developed to accommodate residential access into and out of the development. Proposed Monroe Drive will become the primary east-west collector along the northern extent of the development. Ironwood Drive will remain the primary east-west local street access for residential development traffic at the central area of the development. Both Fulton Road and Boulder Way will serve as the primary north-south local streets connecting Monroe Drive with Ironwood Drive and the Copper Hills development to the south.

   Direct access onto CSAH 11 (Jonathan Carver Parkway) will be provided by full access intersections at Monroe Drive and at Ironwood Drive. Currently, the intersection of CSAH 11& Ironwood Drive is signalized, and the intersection of CSAH 11 & Monroe Drive is programmed for signalization.

1) *Existing parking spaces:* 0
   Proposed parking spaces: Approx. 2.0 off-street parking spaces per residential unit
   Therefore, proposed parking stalls = 344 x 2 = 688 stalls
   On-Street Parking for City Park = 12 stalls
   Off-Street Parking for Soccer Field = approx. 20 stalls
   Total Proposed Parking Spaces = 720 spaces

2) *Total average daily traffic generated:* 3,070 trips per day

Table 18.1. Generated Traffic Table

Land Use	ITE Code	Size		Weekday		AM peak		PM Peak	
				Enter	Exit	Enter	Exit	Enter	Exit
Single Family Housing	210	270	units	1,274	1,274	50	150	168	99
Multifamily Housing (Low-Rise)	220	74.0	units	259	259	8	28	28	17
Public Park	411	6.1	acres	2	2	0	0	0	0
				1,535	1,535	58	178	196	116
				3,070		236		312	

3) *Estimated maximum peak hour traffic generated*: 312 trips/hour during p.m. peak hour 5:00 p.m. – 6:00 p.m.)

4) *Source of trip generation rates:* ITE Trip Generation Manual, Tenth Edition (2017)

5) *Availability of Transit and/or other alternative transportation modes*: Built in 2015 and having space for 400 vehicles, the Carver Station Park-and-Ride was built with the intention of spurring nearby residential development. Within walking distance of Timber Creek Residential Development, Carver Station is served by two SouthWest Transit routes. Route 697 operates a total of 10 trips during weekdays (five trips eastbound in the morning between 6:01 and 7:31 a.m.; and five trips in the afternoon arriving between 4:34 and 6:17 p.m.). Route 698 operates a total of 6 westbound (arrival only) trips during weekdays (arriving between 3:02 p.m. and 7:09 p.m.).

   In the first two years of operation, Carver Station saw about 5% utilization but this is expected to grow as more development continues near the Park-and-Ride. So far, both single-family homes and multi-family homes have been built near Carver Station.

   SouthWest Transit also operates a transit service called SW Prime. SW Prime is a transit service throughout Eden Prairie, Chaska, Chanhassen, Carver, and Victoria (daily except Sundays). SW Prime also offers Southdale service on Saturdays.

   SW Prime is an on-demand ride service. As a modern local service, a rider may request a ride through SouthWest Transit's smartphone app or phone, and then indicate the pick-up and drop off locations. A shared ride will be sent to pick up the rider.

   SW Prime vehicles are also ADA compliant and can accommodate a wheelchair, walker, or bike when a rider requests a ride. The SW Prime service operates from 6:30 a.m. to 7:00 p.m. Monday through Friday, and then 10:00 a.m. through 4:00 p.m. on Saturdays.

b. *Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 (available at: http://www.dot.state.mn.us/accessmanagement/resources.html) or a similar local guidance,*

A complete traffic analysis of existing and future volumes is included in **Appendix E** of this document.

c. *Identify measures that will be taken to minimize or mitigate project related transportation effects.*

A corridor study is being completed along Jonathan Carver Parkway by the City of Carver and Carver County. The purpose of the study has been to identify short-, mid- and long-term improvement needs along the Jonathan Carver Parkway corridor that will meet the needs of the community and region within the next twenty years. While many intersections along the corridor currently record acceptable levels of service, nine of the twelve intersections studied show failing levels of service by 2040 with no improvements.

The agencies recognize this area is a rapidly growing part of the county, and that Jonathan Carver Parkway is crucial for connectivity between TH 212 and points south. The study has identified the near-term need for corridor improvements, and recommends reconstruction to a four-lane divided section with turn lanes from Levi Griffin Road to 4th Street. This first phase of reconstruction is recommended within 0-5 years. Future phases (up to 20 years hence, and beyond) may include widening segments to six-lane divided alignments and possible interchange reconstruction at TH 212.

The assumed build-out year of the Timber Creek Residential Development is 2027, which may coincide with (or be just after) the recommended build-out year for the first phase of the Jonathan Carver Parkway widening and reconstruction. Therefore, the traffic impacts of the development were tested with Jonathan Carver Parkway remaining a two-lane facility and with the parkway being widened to a four-lane facility with turn lanes at major intersections. Intersection of Jonathan Carver Parkway will experience unacceptable operations assuming Jonathan Carver Parkway remains a two-lane facility. However, when widened to a four-lane facility with turn lanes, traffic operations along Jonathan Carver Parkway will improve to acceptable levels for the near term. These improvements will minimize and mitigate any project related transportation effects.

Cumulative Potential Effects

(Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a. *Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.*

It is anticipated that the project will be constructed in seven phases, with the first phase expected to begin in spring 2020. Full build-out is anticipated by 2027; however, construction timing will ultimately depend upon market conditions.

The changes in regional land use in the Carver area from open space, rural and agricultural land uses to more urbanized uses is expected to have a cumulative impact on the area. Cumulative effects of

this and future projects on natural resources and infrastructure are expected to be roughly proportional to the impacts discussed in this EAW, or somewhat greater if future projects are developed at a higher density. The City of Carver has planned for future growth and development in this particular area as part of its Comp. Plan, Surface Water Management Plan, Drinking Water Consumer Confidence Report, Comprehensive Sanitary Sewer Plan, Water Supply Plan, and Jonathan Carver Parkway Corridor Study. These efforts will ensure that the cumulative impacts of future growth and development to the environment, and to the City's service capacity, are anticipated and mitigated.

b. *Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.*

The project proposer does not currently own or have options on adjacent or nearby lands. The City of Carver maintains a list of residential development projects, which revealed that seven residential developments (including the Timber Creek Residential Development) are currently planned within the City of Carver (as of September 3, 2019). Other residential construction projects include the Carver County CDA, Carver Ridge, Hawthorne Ridge, The Meadows at Spring Creek (Trinity Development), Meridian Fields, and Oak Tree.

Because many of the above projects and available lots develop based on market drivers and conditions, the timing of future development can, and likely will, fluctuate. However, land adjacent to the project site is eventually expected to develop additional residential areas and be annexed into the City, per the City of Carver Comp. Plan, thereby converting existing open space and agricultural lands to residential and commercial uses. The Comp. Plan anticipates and guides the intensity of development within the city and planned annexed areas, and directs necessary infrastructure improvements to support the planned development.

Parcels to the west and north of the proposed project area are currently undeveloped and are anticipated to be annexed into the City as low density residential areas as noted on the Future Land Use Map (Figure L-5) of the Comp. Plan. Parcels to the south are currently composed of rural homesteads, vacant lands, and extractive land uses, which are planned to be converted to low density residential areas and mixed uses according to the City of Carver Comp. Plan. Undeveloped parcels immediately surrounding the proposed development site contain similar land uses and land features as the project site. Existing land cover on these properties is primarily agricultural with wooded areas, drainages, and wetlands interspersed. The proposed project aligns with the City of Carver's Land Use guidelines for future residential development in the 2040 MUSA Areas which are planned to become a part of the City of Carver.

c. *Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.*

The proposed project will result in conversion of agricultural lands to non-agricultural uses. Consequently, cumulative impacts to natural resources are anticipated to be minimal, and have been purposefully concentrated in this portion of the city. Development of surrounding parcels will also result in cumulative impacts to city infrastructure such as roads, sewer, and water. These cumulative impacts have been thoughtfully contemplated and addressed in the city's Comp. Plan, Surface Water Management Plan, Comprehensive Sanitary Sewer Plan, Water Supply Plan, Drinking Water Consumer Confidence Report, and Jonathan Carver Parkway Corridor Study. In addition, as

surrounding properties develop, they will be evaluated under the Minnesota Environmental Policy Act (MEPA) rules, and will need to adhere to guidelines presented in the city's approved zoning and comprehensive plans.

Mitigation for anticipated minor cumulative impacts in the area will include providing approximately 70 acres of open space (43 percent of the site) of which 35.7 acres is upland forests, providing buffers from surrounding developments, a 6.1-acre Community Park, protecting woodlands and wetlands to the extent practicable, pretreating stormwater and controlling stormwater rates, and providing adequate municipal facilities such as potable water and wastewater treatment. These provisions will help minimize potential cumulative effects of past developments and future developments within the region. Given the nature of cumulative potential effects, the evaluation of available and relevant information, and mitigation efforts proposed, the potential for significant environmental effects due to these cumulative effects appears minor.

Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

No other additional environmental effects are anticipated as a result of this project. Potential environmental effects have been addressed in Items 1 through 19.

RGU Certification

*(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature Erin Smith Date 1/27/2020

Title: Erin Smith, City Planner, City of Carver

Exhibits 1 – 9

Timber Creek Residential Development EAW, Carver
Carver County, Minnesota

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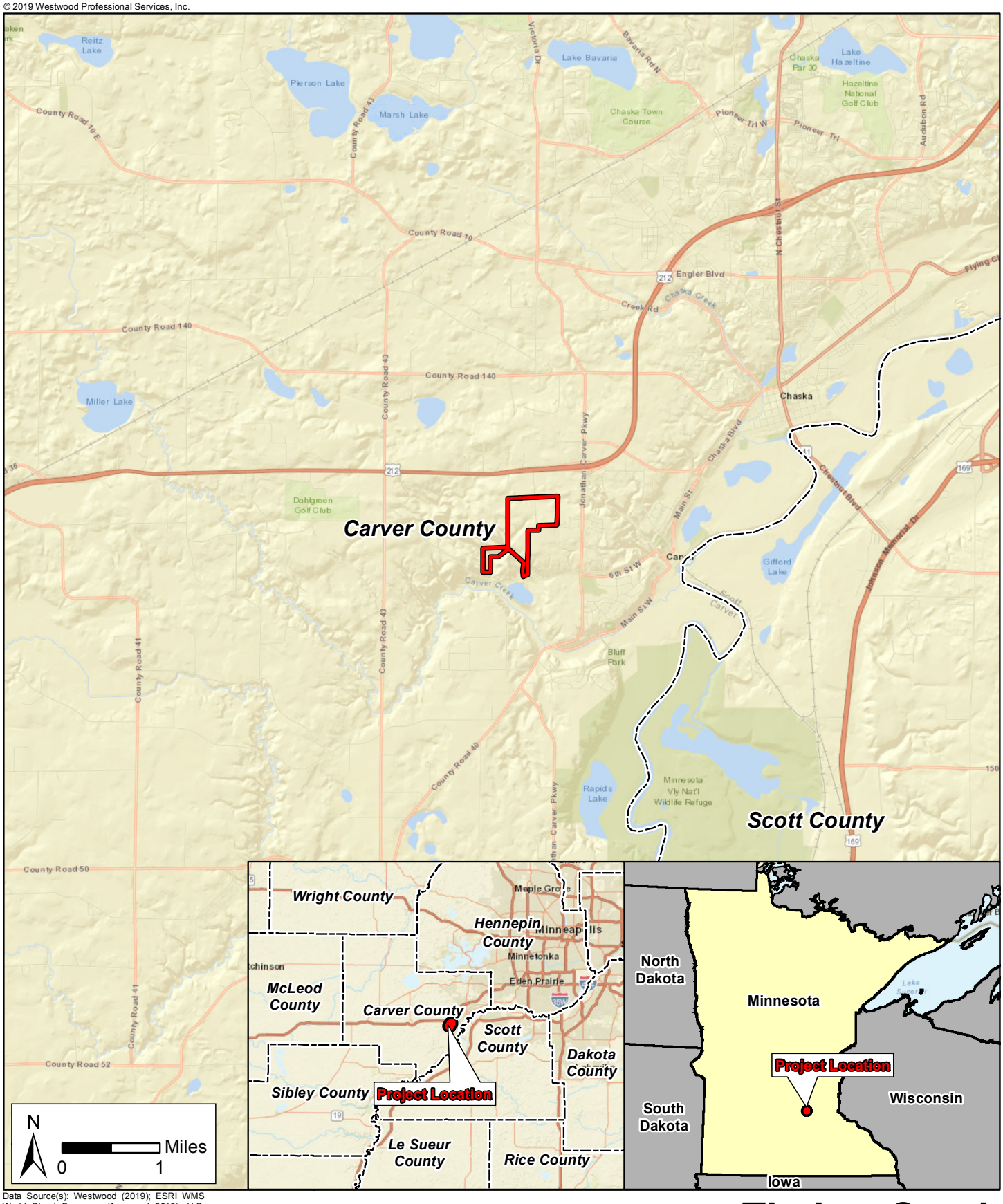

Data Source(s): Westwood (2019); ESRI WMS World Street Basemap (Accessed 2019); U.S. Census Bureau (2017).

Legend

- Project Boundary
- County Boundary

Timber Creek Residential EAW

Carver, Carver County, Minnesota

Site Location

EXHIBIT 1

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Map Document: N:\0022250.00\GIS\EAW Exhibits\Song_Ex1_ProjectLocation_190903.mxd 9/9/2019 7:05:53 AM JRSchaffer

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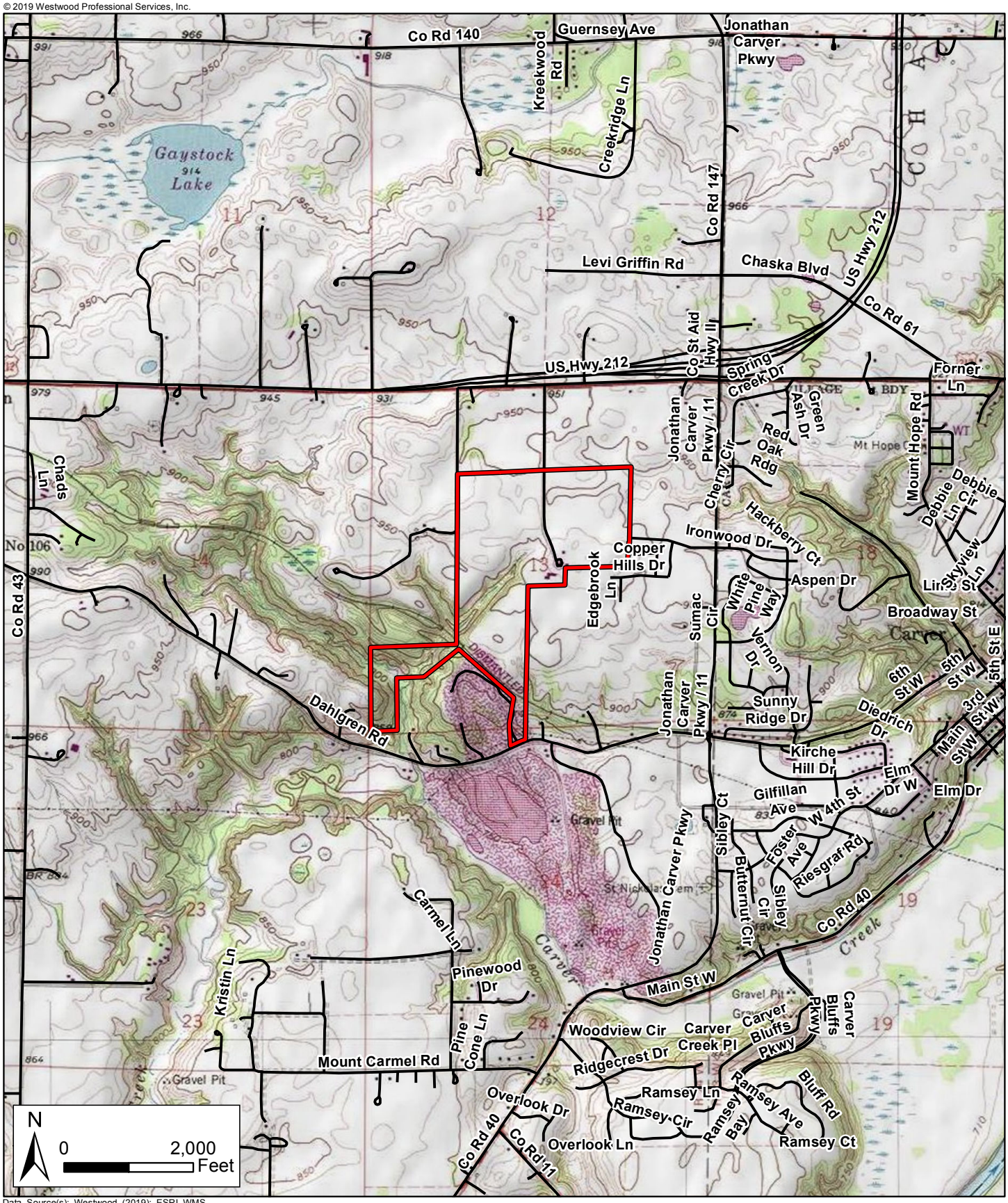

Data Source(s): Westwood (2019); ESRI WMS USA Topo (Accessed 2019); U.S. Census Bureau (2017).

Legend

Project Boundary

Road

Timber Creek Residential EAW

Carver, Carver County, Minnesota

USGS Topography

EXHIBIT 2

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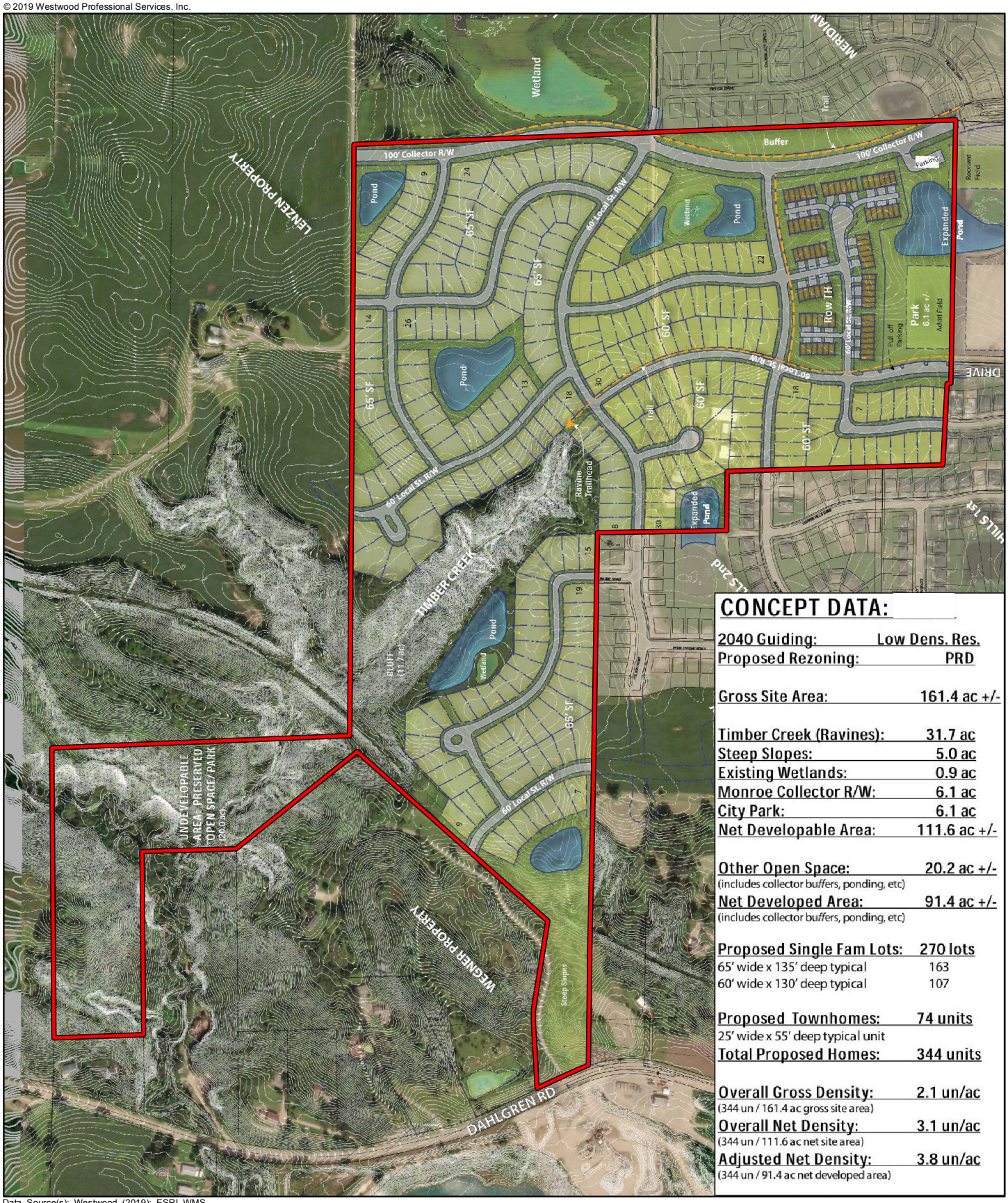

CONCEPT DATA:

2040 Guiding:	Low Dens. Res.
Proposed Rezoning:	PRD
Gross Site Area:	161.4 ac +/-
Timber Creek (Ravines):	31.7 ac
Steep Slopes:	5.0 ac
Existing Wetlands:	0.9 ac
Monroe Collector R/W:	6.1 ac
City Park:	6.1 ac
Net Developable Area:	111.6 ac +/-
Other Open Space: (includes collector buffers, ponding, etc)	20.2 ac +/-
Net Developed Area: (includes collector buffers, ponding, etc)	91.4 ac +/-
Proposed Single Fam Lots:	270 lots
65' wide x 135' deep typical	163
60' wide x 130' deep typical	107
Proposed Townhomes:	74 units
25' wide x 55' deep typical unit	
Total Proposed Homes:	344 units
Overall Gross Density: (344 un / 161.4 ac gross site area)	2.1 un/ac
Overall Net Density: (344 un / 111.6 ac net site area)	3.1 un/ac
Adjusted Net Density: (344 un / 91.4 ac net developed area)	3.8 un/ac

Data Source(s): Westwood (2019); ESRI WMS World Imagery Basemap (Accessed 2019); MnTOPO (Accessed 2019); MnDNR (2017).

Legend

Project Boundary

Contour

N

0 375 750 Feet

Timber Creek Residential EAW

Carver, Carver County, Minnesota

Concept Site Plan

EXHIBIT 3

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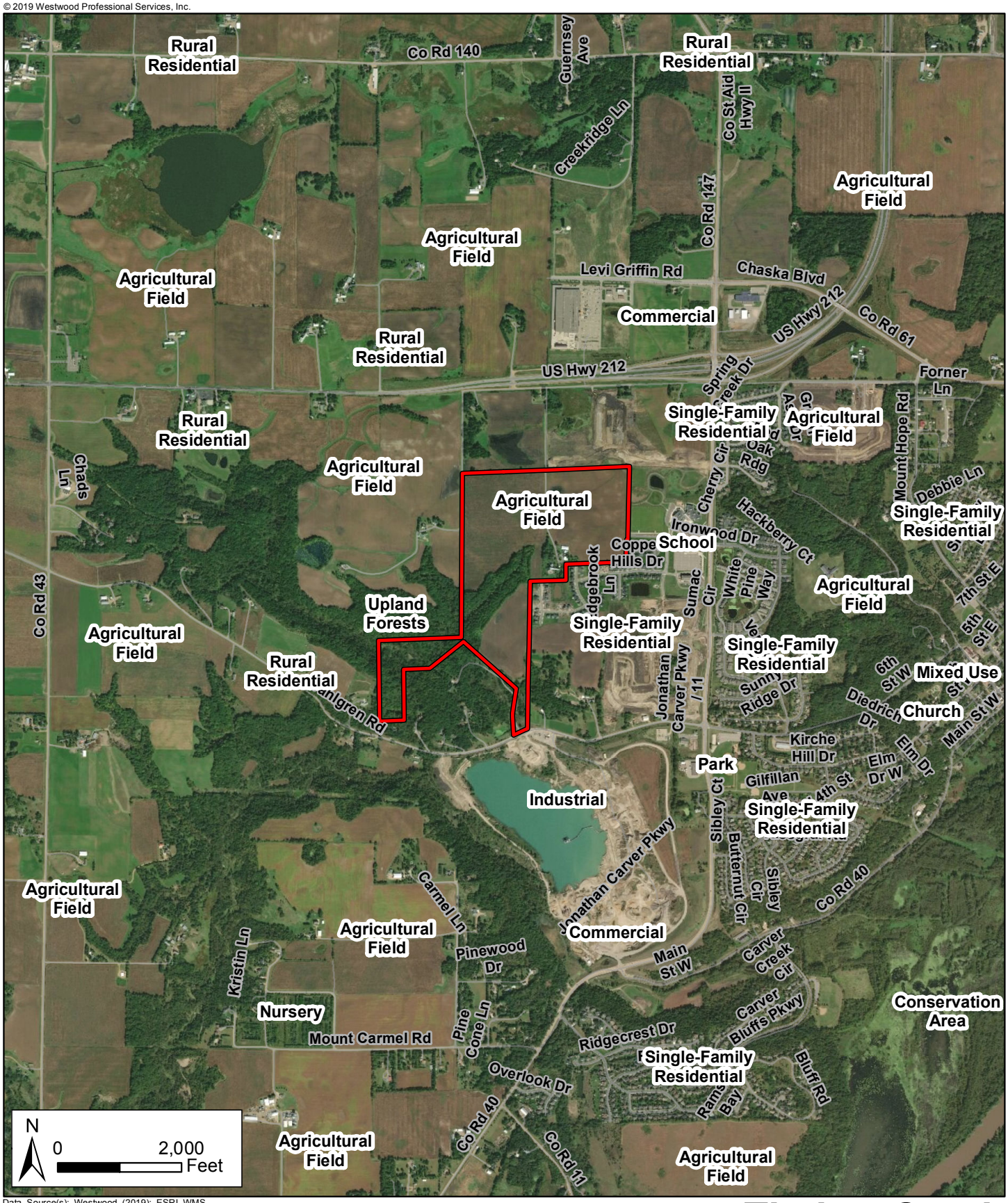

Data Source(s): Westwood (2019); ESRI WMS World Imagery Basemap (Accessed 2019); U.S. Census Bureau (2017).

Legend

Project Boundary

Road

Timber Creek Residential EAW

Carver, Carver County, Minnesota

Adjacent Land Use

EXHIBIT 4

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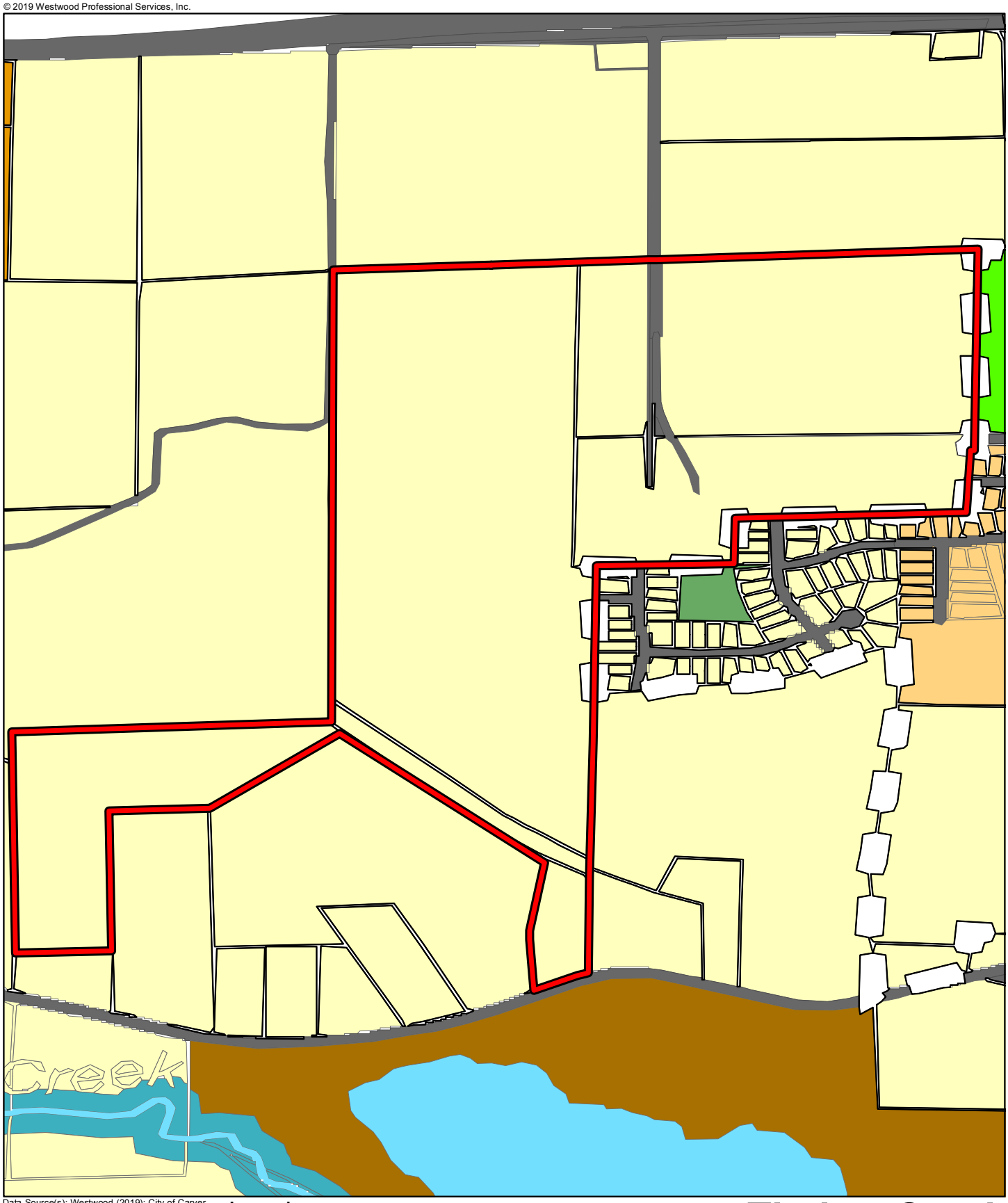

Data Source(s): Westwood (2019); City of Carver Future Land Use Map (Accessed 2019).

Legend

- Project Boundary
- City Limits
- Conservation
- High Density Residential
- Low Density Residential
- Medium Density Residential
- Mixed Use
- Park
- Rivers & Streams
- Road
- Special Resources

Timber Creek Residential EAW

Carver, Carver County, Minnesota

Zoning Map

EXHIBIT 5

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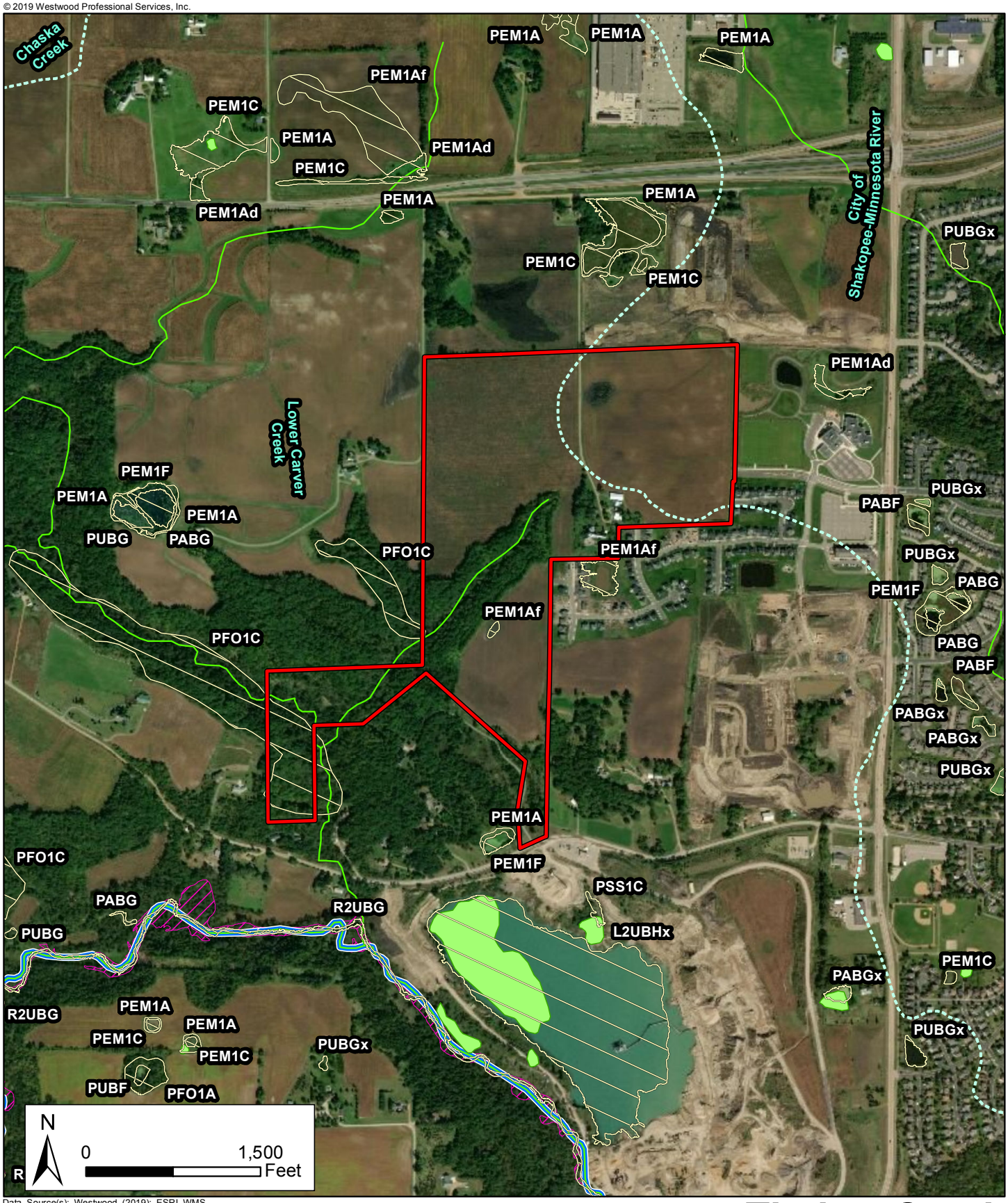

Data Source(s): Westwood (2019); ESRI WMS World Imagery (Accessed 2019); USGS NHD Dataset (2013); Minnesota Department of Natural Resources, Ducks Unlimited, and St. Mary's University of Minnesota (2015); MnDNR (2008); FEMA (2016); Geospatial Data Gateway (2016).

Legend

- Project Boundary
- Watershed Boundary
- NWI Wetland
- NHD Flowline
- NHD Waterbody
- PWI Watercourse
- PWI Water Basin
- 100-Year Floodplain

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Timber Creek Residential EAW

Carver, Carver County, Minnesota

Water Resources

EXHIBIT 6

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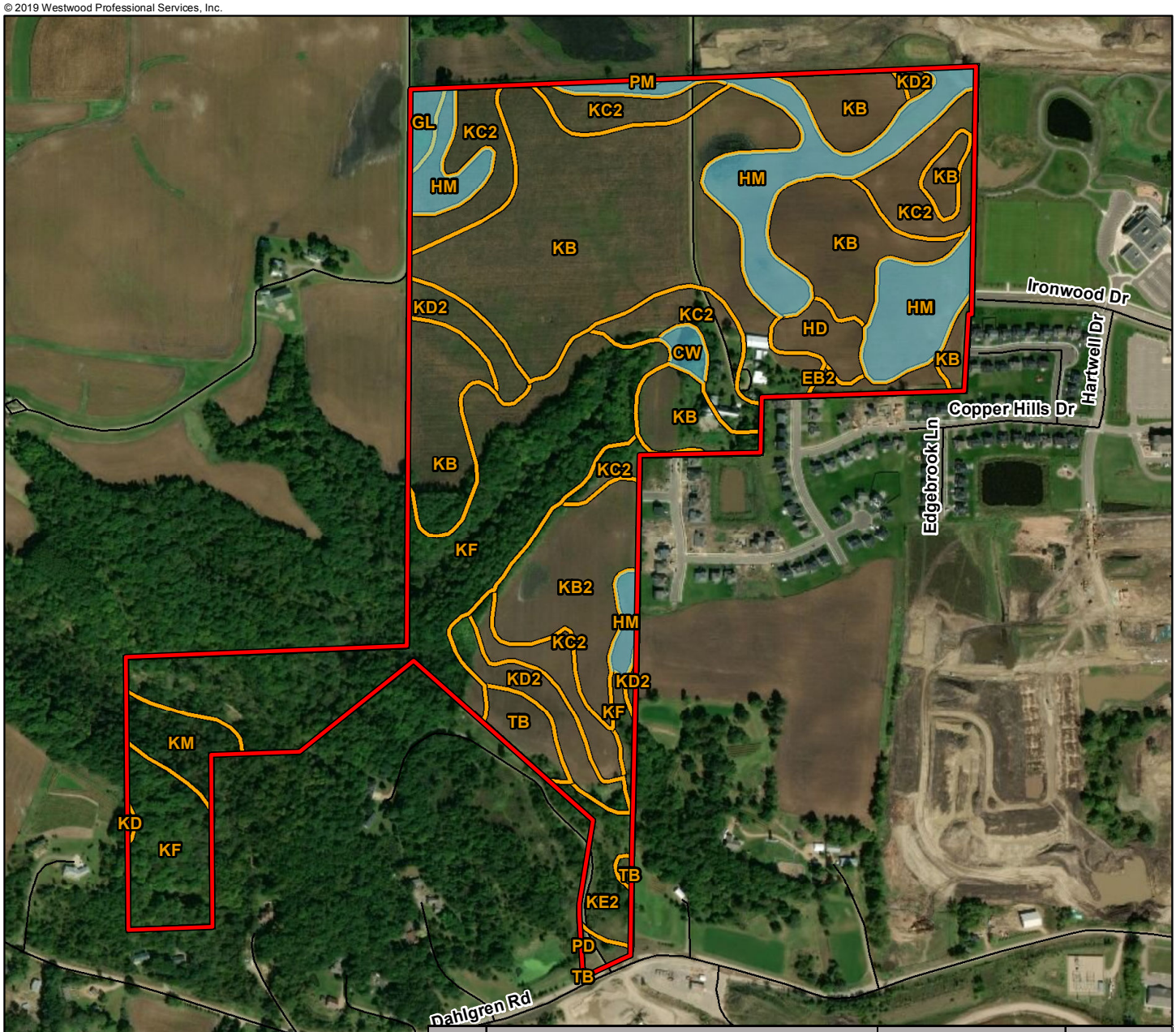

Symbol	Map Unit Name	Hydric Rating	Percent Hydric
CW	Cordova-Webster complex	All hydric	100
EB2	Estherville sandy loam, 2 to 6 percent slopes, eroded	Predominantly non-hydric	5
GL	Glencoe clay loam, 0 to 1 percent slopes	All hydric	100
HD	Estherville-Hawick sandy loams, 12 to 18 percent slopes	Non-hydric	0
HM	Hamel loam, 0 to 2 percent slopes	Predominantly hydric	90
KB	Kilkenny-Lester loams, 2 to 6 percent slopes	Non-hydric	0
KB2	Lester-Kilkenny loams, 2 to 6 percent slopes, eroded	Non-hydric	0
KC2	Lester-Kilkenny loams, 6 to 12 percent slopes, eroded	Non-hydric	0
KD	Lester-Kilkenny loams, 12 to 18 percent slopes	Non-hydric	0
KD2	Lester-Kilkenny loams, 12 to 18 percent slopes, eroded	Non-hydric	0
KE2	Lester-Kilkenny loams, 18 to 25 percent slopes, eroded	Non-hydric	0
KF	Lester-Kilkenny loams, 25 to 40 percent slopes	Non-hydric	0
KM	Minneiska-Kalmarville complex, frequently flooded	Partially hydric	40
PD	Sparta loamy sand, 12 to 18 percent slopes	Non-hydric	0
PM	Klossner muck, 0 to 1 percent slopes	All hydric	100
TB	Terril loam, 2 to 6 percent slopes	Predominantly non-hydric	8

Data Source(s): Westwood (2019); ESRI WMS World Imagery Basemap (Accessed 2019); U.S. Census Bureau (2017); U.S. Department of Agriculture, Natural Resources Conservation Service (2018).

Timber Creek Residential EAW

Carver, Carver County, Minnesota

NRCS Soils

Legend

- Project Boundary
- Soil Unit Boundary
- Road
- All Hydric; Predominantly Hydric Soils

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EXHIBIT 7

Map Document: N:\0022250.00\GIS\EAW Exhibits\Song_Ex7_Soils_190903.mxd 9/9/2019 7:24:20 AM JRSchaffer

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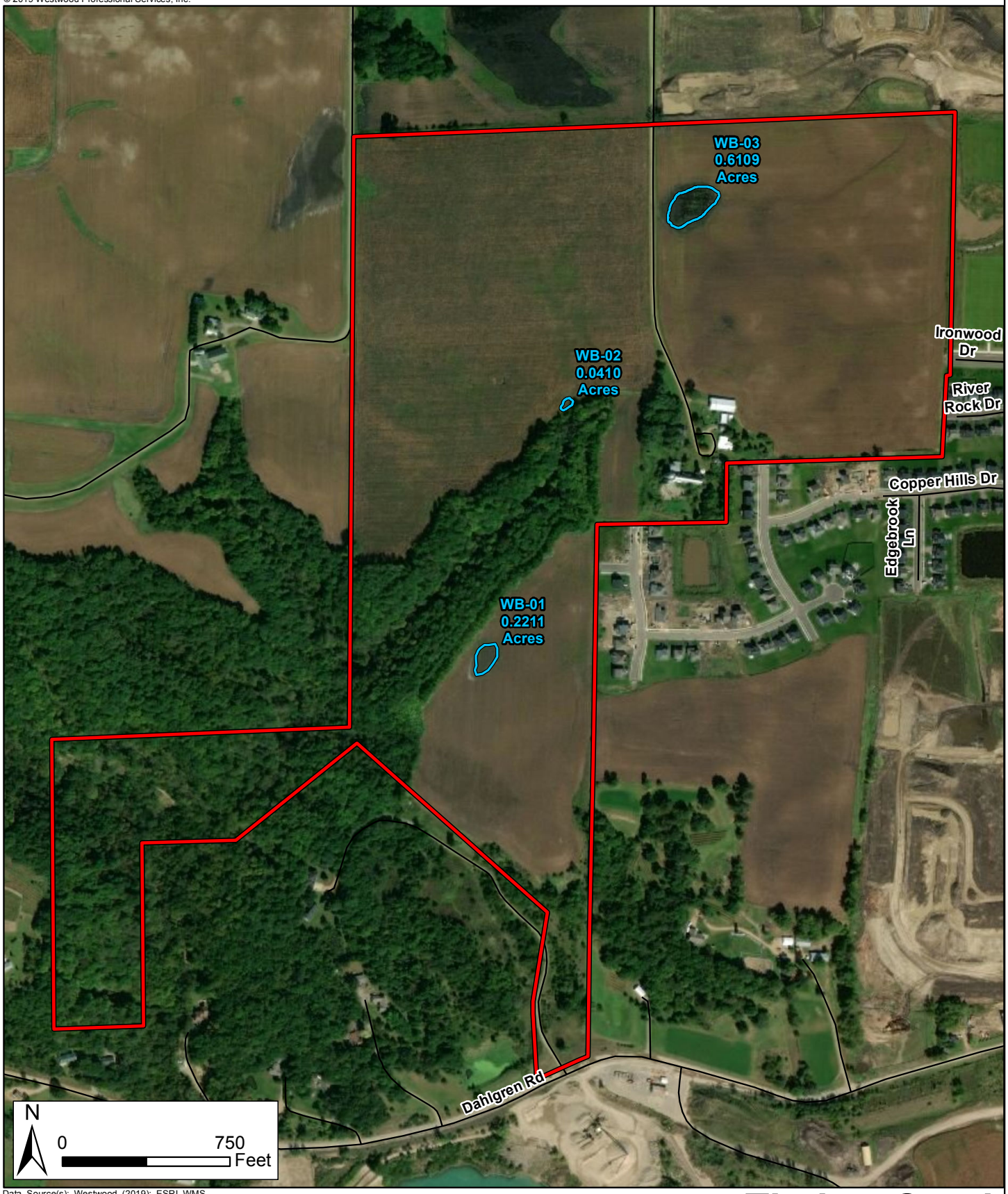

Data Source(s): Westwood (2019); ESRI WMS World Imagery Basemap (Accessed 2019); U.S. Census Bureau (2017).

Legend

- Project Boundary
- Delineated Wetland Boundary
- Road

Timber Creek Residential EAW

Carver, Carver County, Minnesota

Approved Delineated Wetland Boundaries

EXHIBIT 8

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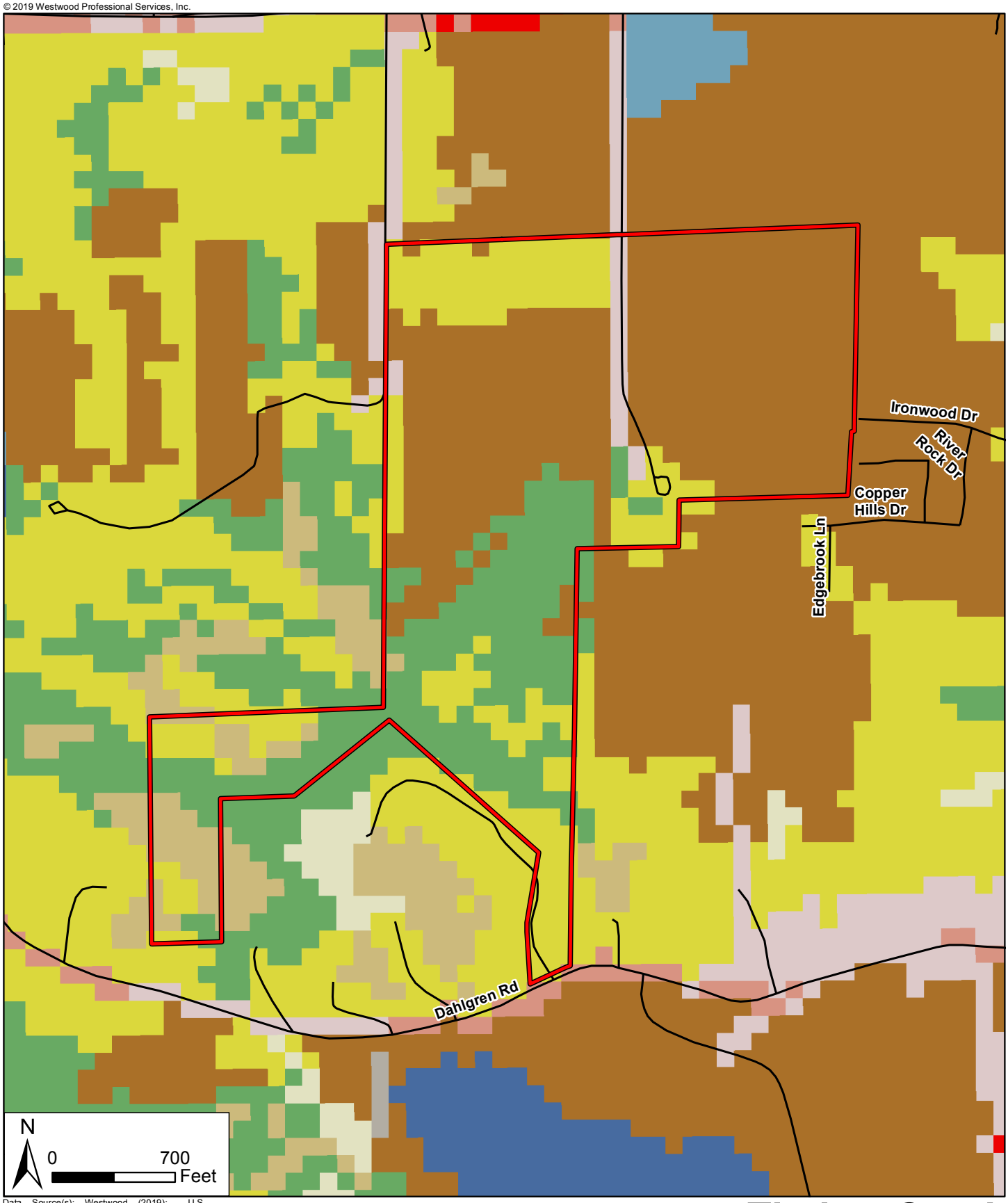

Data Source(s): Westwood (2019); U.S. Geological Survey (2011).

Legend

- Project Boundary
- Road
- Cultivated Crops (50.00%)
- Deciduous Forest (22.47%)
- Developed, Open Space (2.23%)
- Hay/Pasture (20.55%)
- Shrub/Scrub (4.75%)

Timber Creek Residential EAW

Carver, Carver County, Minnesota

NLCD Land Cover Types

EXHIBIT 9

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Map Document: N:\0022250.00\GIS\EAW Exhibits\Song_Ex9_LandCover_190909.mxd 9/12/2019 7:45:34 AM JRSchaffer

Appendix A

City of Carver 2040 Comprehensive Plan

Timber Creek Residential Development EAW, Carver
Carver County, Minnesota

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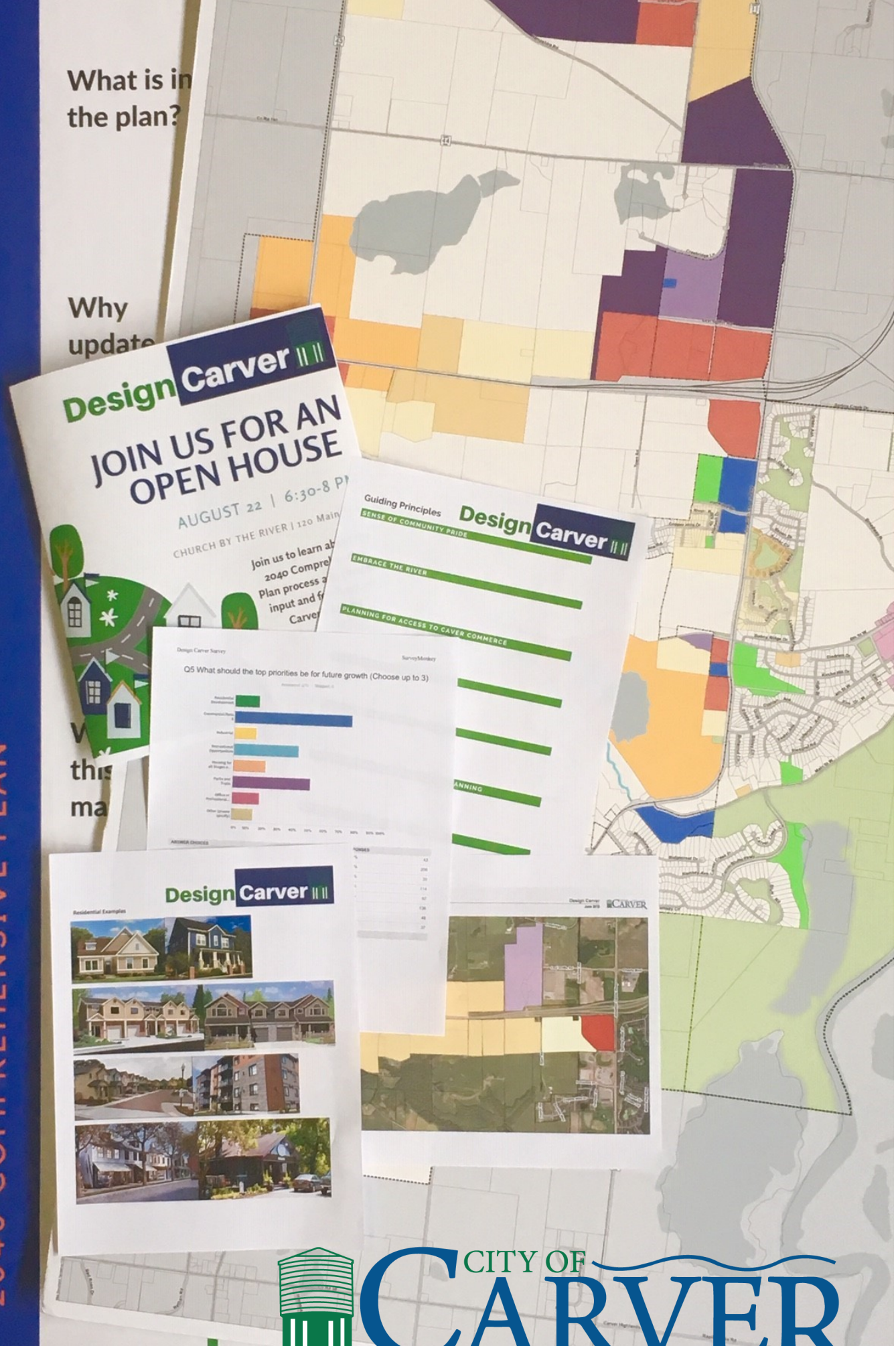
Design Carver.

2040 COMPREHENSIVE PLAN



CITY OF CARVER

City Council

Mayor Mike Webb

Cindy Monroe

Courtney Johnson

Glen Henry

Kristy Mock

Planning Commission

Jennifer Lane, Chair

Dana Hardie

Greg Riggs

Jim Weygand

JoAnne Armstrong

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Laurie Sayre

City Staff

Brent Mareck, City Manager

Erin Smith, City Planner

Mark Pistulka, Building Official

Brian Skok, Public Services Director

Vicky Sons-Eiden, City Clerk

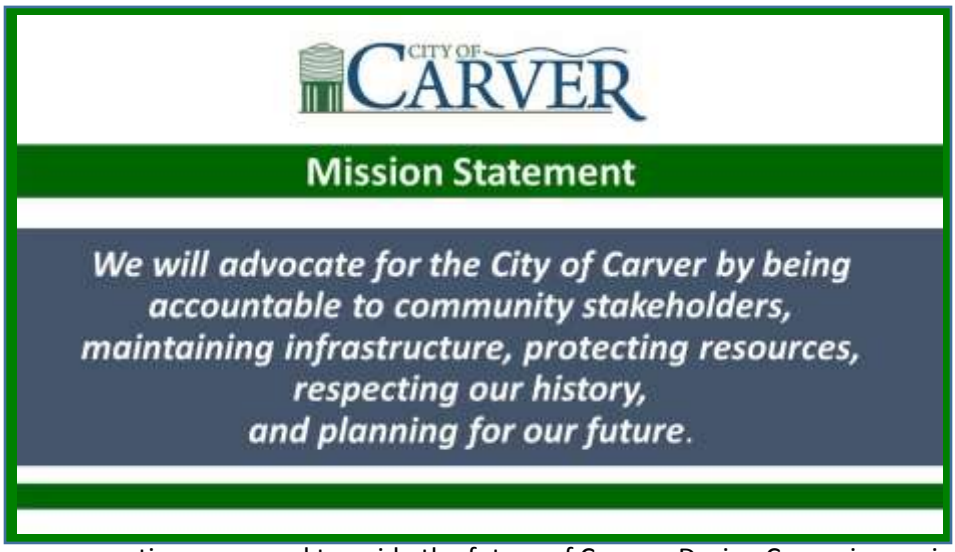
Larry Harris, City Attorney | Melchert Hubert Sjodin

Dan Lonnes, City Engineer | Bolton and Menk

Design Carver

SETTING THE STAGE

Mission Statement



Development of the Design Carver Plan has allowed the community members and stake holders to create and begin to embody the vision for the City of Carver for both today and through 2040. Through the planning process, new growth areas have been contemplated, land uses have been respectfully debated and challenging conversations occurred to guide the future of Carver. Design Carver is cognizant both of the rich history in City as well as allowing space for creative planning techniques that are to come. Carver's mission statement is included throughout this plan as we continue to protect resources, respect our history and plan for our future.

Planning Process

The City Council and Planning Commission served as the steering committee for the Design Carver process. The steering committee set guiding principles that set the stage for the Design Carver plan. A community survey was conducted and 261 residents provided input and guidance for the direction of the plan. Survey results are available as an appendix to this plan.

Open houses were held both in August and October of 2018 to gather additional information, input and feedback from residents and community members. Collectively, the steering committee, survey results and open houses have guided this plan and the policies outlined throughout the document.

Minnesota State Statute 462.353 Subdivision 1 gives municipalities the ability to carry on comprehensive planning and the preparation, adoption and amendment of a comprehensive plan. The Metropolitan Planning Act of 1976 requires an update of the comprehensive plan as well as partnership with adjacent government agencies and jurisdictions. Design Carver is an update to the adopted 2030 Comprehensive Plan that was drafted in 2008/2009.

Comprehensive Approach

The Design Carver plan provides broad strokes for planning policy decisions for the community. A goal of the Design Carver plan is to be flexible for changing development trends and techniques. With significant areas for growth, Design Carver is cognizant of market changes that may occur and impact

development patterns. This plan is to be used as a guide and framework for future projects and development in the City.

Thank you!

Thank you to the Planning Commission, the City Council and residents of both Carver and Dahlgren Township for your contributions to this plan.

LAND USE

Introduction

The City of Carver's land use plan defines and creates future development and redevelopment potential within Carver. This section outlines goals and policies that will guide the location, type and intensity of development both within the existing City limits and looks forward into areas anticipated for annexation within this plan. The Land Use section of the plan also identifies the types of development that are anticipated within each land use included throughout the Design Carver Plan.

The goal of the land use plan is to create a diverse and self-sustaining plan with nimble language to allow for creative and innovative planning and development that is cognizant of unique natural and historic resources.

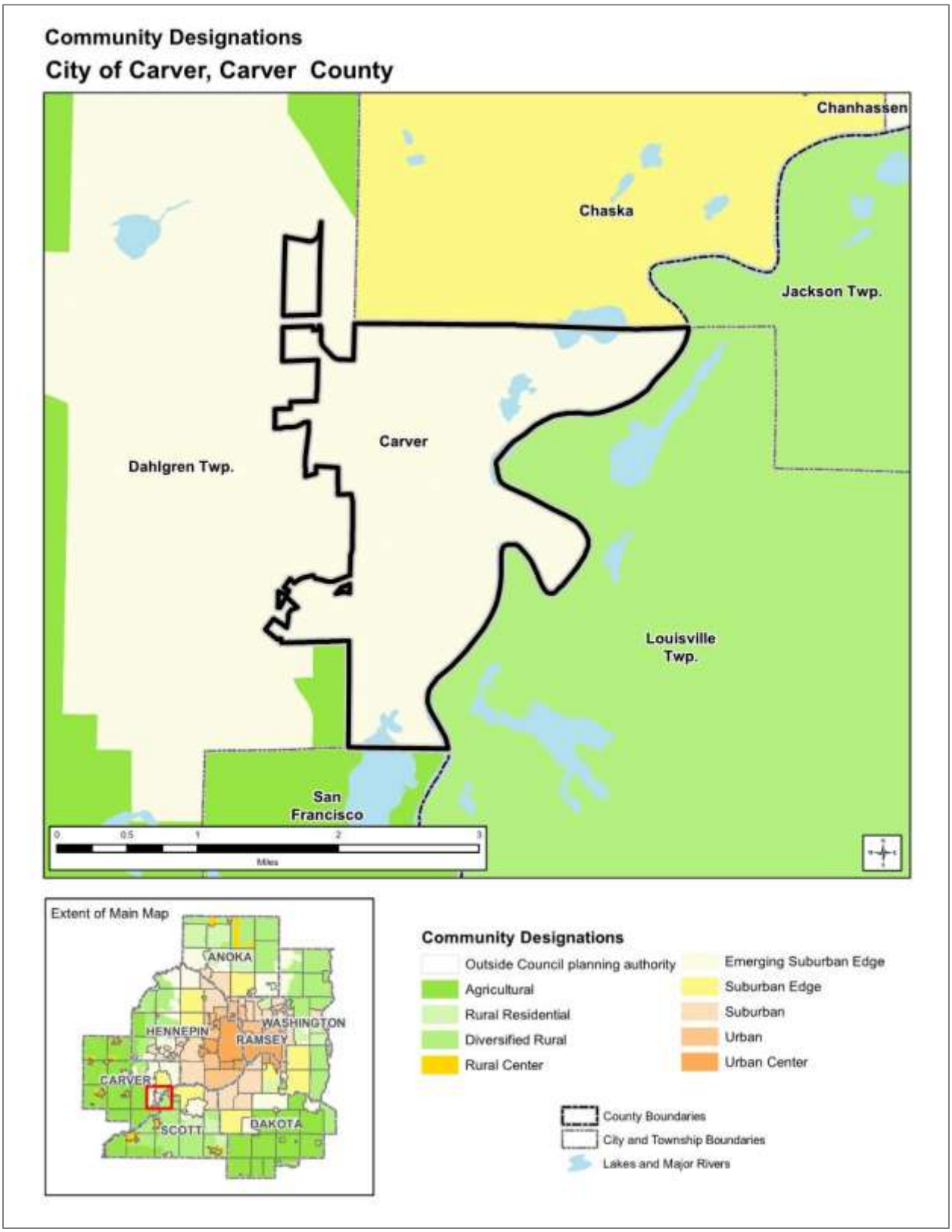
Background

The Village of Carver was founded in 1854 by the Carver Land Company and incorporated in 1877. The Village of Carver had exponential growth throughout the late 1800s. Carver was an essential location for trade and immigration travel along the Minnesota River and was a bustling town for several decades. The introduction of rail and widespread flooding throughout the once active downtown created major challenges for Carver leading to a downtown that once flourished, impoverished. In 1969, Carver-on-the Minnesota was founded to stop decline of the early river town. The work by Carver-on-the-Minnesota helped bring the historic downtown back to some of its early glory. Carver created a Heritage Preservation Commission in 1989. The group was recognized in 2005 by the Minnesota State Historic Preservation Office as a Certified Local Government.

Regional Setting

According to *Thrive MSP 2040*, the regional development guide, Carver is identified as an Emerging Suburban Edge community (see Figure L-1).

Figure L-1 – Community Designation



Emerging Suburban Communities are categorized by early transitions toward urbanized development but are less than 40% developed. They are characterized by low-density residential development and higher density commercial development in a small downtown or retail/service center and have access to Metropolitan Council sewer, transportation, and parks systems. Emerging Suburban Edges are anticipated to develop at an average density of three to five units per acre. This presents both the challenge and opportunity to engage in greenfield development, incorporating natural resources preservation in development practices. This is certainly true of Carver, which is tasked with balancing growth with the preservation of natural corridors located in the City.

Current Existing Conditions

Today, Carver has seen solid and steady development primarily of single family homes through the 1990s and 2000s while historic preservation efforts have created a destination downtown for residents and visitors. A majority of recent development has been north and northwest of the historic downtown expanding the City limits of Carver with new neighborhoods and commercial nodes.

Carver is nestled in an area of Carver County that allows residents to have direct access to a diverse landscape including topography, natural resources and preservation areas that allows residents to feel as if they can easily disconnect from the stresses and pressures of living in a metropolitan area. The City is currently bordered by the City of Chaska, the Minnesota River and Dahlgren Township. Development that is anticipated in the Carver will be both north and west of the existing City limits. Redevelopment opportunities are anticipated throughout the existing City limits but will not drastically change the landscape of the City.

Accessibility of Highway 212 has drastically changed the outlook for the City of Carver and has led to significant development both along the corridor of Highway 212 as well as Jonathan Carver Parkway (County Road 11). The future expansion of Highway 212 beyond the City of Carver will continue to spur development throughout Carver County.

Significant areas have been incorporated into the 2040 Future Lane Use Map beyond the 2030 Land Use Plan. The Future Land Use map included illustrates the Carver and Victoria sharing a northern border for the first time and area between Chaska and Carver that will continue develop toward one another through the life of this plan. Growth areas outlined in this plan is consistent with an orderly annexation agreement in place with Dahlgren Township that has allowed the City to expand our scope of work and future development. The exercise of working with surrounding communities to ensure similar development patterns where intersection is anticipated has allowed for greater collaboration and visioning processes based on growth areas for Carver, Chaska and Victoria.

Goals and Policies

Design Carver and the land use plan depicts a community with a variety of land uses that will lead to a community that allows residents to live, work and play in the community while respecting diverse natural and historical resources present in the community. The following goals and policies have been established to ensure thoughtful planning and development while maintaining awareness of our history.

1. The historic downtown in Carver will continue to be a destination area for residents and visitors and serve as the gateway to the Minnesota River. Redevelopment potential

throughout the downtown will continue to be cognizant to the deep and rich history in Carver. The City's Historic Preservation Commission will continue to play an active role in the development and redevelopment throughout the downtown.

2. Development techniques should be sensitive to the natural landscape and work to preserve mature trees, native plants and animals while respecting topography and natural wetlands.
3. With an extensive future growth area and land use types, development should include buffering and staging of incompatible uses.
4. Redevelopment opportunities of obsolete, underutilized and deteriorated sites uses should be explored.
5. Development of commercial and industrial uses are targeted to create a diverse tax base and allow for varied employment opportunities throughout the community.
6. Public services and facilities should be developed and implemented in cost-effective and in an accessible manner that allows both for future development while working to ensure adequate City resources to provide maintenance to existing infrastructure.
7. Establish and foster community spaces that include a mix of both public and private resources that create community destinations throughout the City.
8. Enhance major entrances and corridors throughout the City with signage, wayfinding and landscaping that identify the City of Carver.
9. Create a strong, inclusive culture throughout the City that brings community.

Forecasts

Carver is a growing community. The greatest period of growth, so far, occurred between 2000 and 2010, when the population increased by nearly 200 percent. The growth trend is expected to continue to 2040. Table L-1 details the estimated and forecasted population, household and employment for Carver.

Table L-1 | Forecasts

Year	Population	Households	Employment
2010	3,274	1,182	187
2017	4,623	1,503	288
2020	6,300	2,120	650
2030	10,300	3,630	1,030
2040	15,500	5,600	1,700

Existing Land Use

Carver's comprehensive planning effort focuses on more than the current City limits. This plan also encompasses the future growth area outside of the current City limits. The following paragraphs describe the existing land uses in both the current City limits, and the ultimate growth boundary.

Existing City Limits

Most land within the current City limits is developed. Some areas currently identified as undeveloped or agriculture have recently approved development plans in place, with construction scheduled to begin in late 2018 or early 2019. The eastern boundary of the City, adjacent to the Minnesota River, is part of the

Minnesota River Valley Wildlife Refuge. This is approximately 46% of the land use within the current City limits. Figure L-2 and Table L-2 identify existing land use within the current City limits.

Figure L-2 – Existing Land Use – Current City Limits

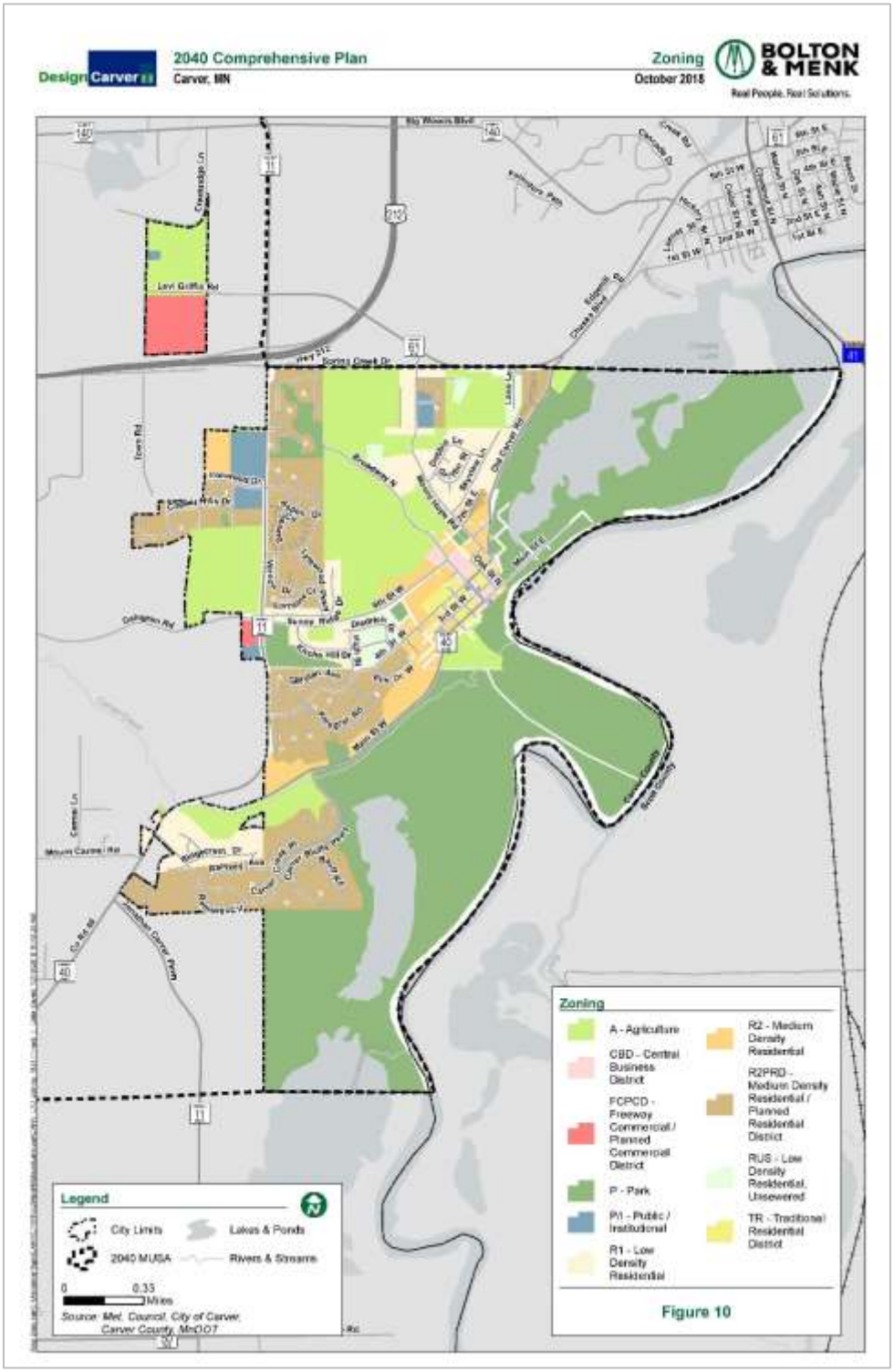


Table L-2 | Existing Land Use – Current City Limits

Existing Land Use	Acreage	% of Total
Agricultural	222.26	7.7%
Extractive	0	0.0%
Industrial and Utility	5.62	0.2%
Institutional	23.89	0.8%
Low Density Residential	604.8	21.0%
Major Highway	1.38	0.1%
Manufactured Housing Park	0	0.0%
Medium Density Residential	4.76	0.2%
Mixed Use	2.12	0.1%
Open Water (Lakes, Ponds, Rivers and Streams)	220.82	7.7%
Office	0	0.0%
Park, Recreational or Preserve	1330.81	46.2%
Retail and Other Commercial	36.75	1.3%
Undeveloped/Vacant	428.56	14.9%
Total	2881.77	100.0%

Orderly Annexation Agreement

The City of Carver and Dahlgren Township entered into an orderly annexation agreement in 2009 to establish roles and procedures for how and when a private property owner should be annexed into the City. The orderly annexation agreement defines the future growth area for the City. Properties outside of City limits are within the jurisdiction of Carver County until the time they are annexed.

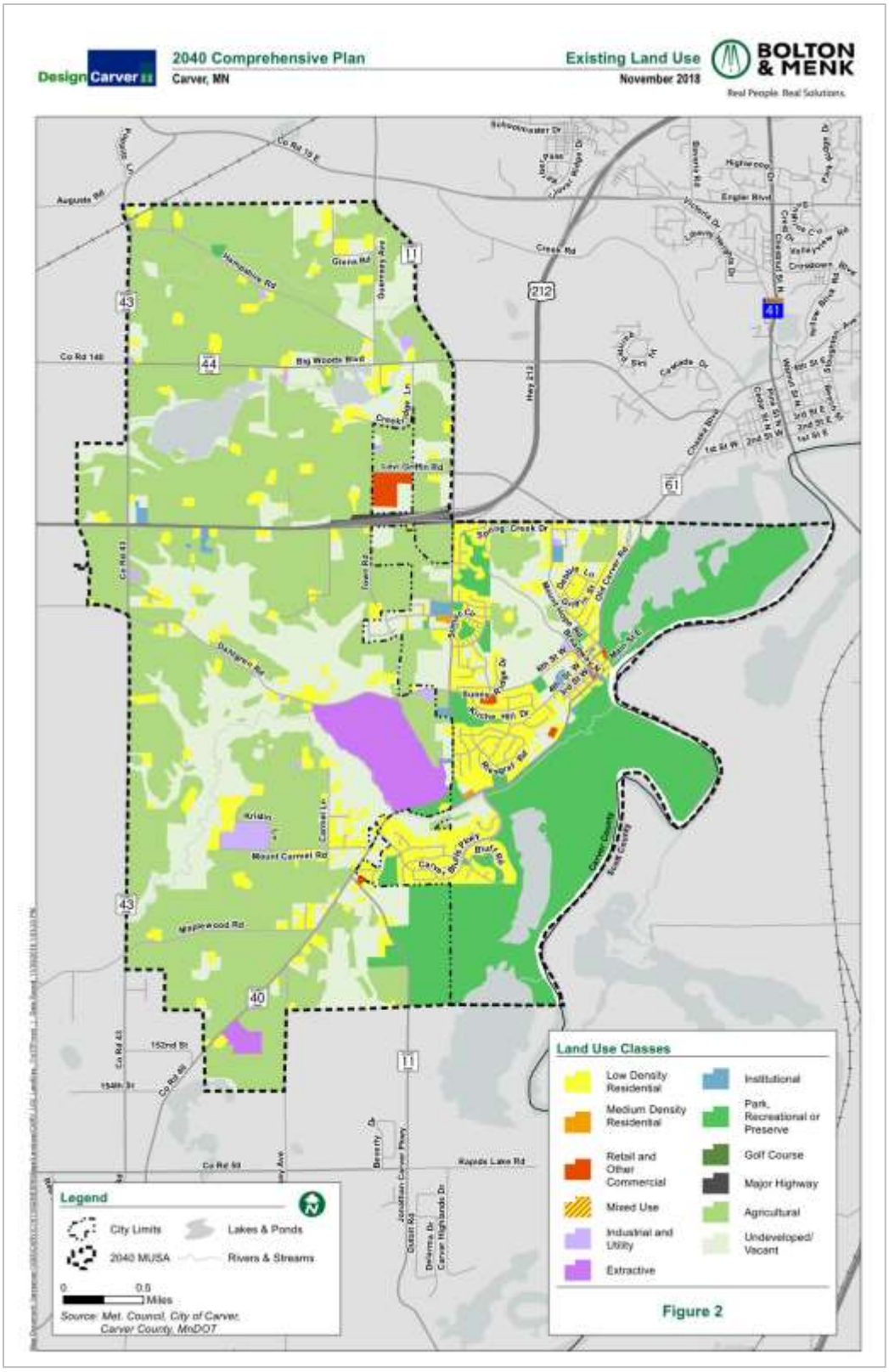
Ultimate Growth Boundary

The area within the ultimate growth boundary includes both the area within the existing City limits and the area covered by the Orderly Annexation Agreement. The predominate land uses within this area are agricultural and undeveloped land (65%). Table L-3 further details the existing land uses, and Figure L-3 illustrates the current land uses.

Table L-3 | Existing Land Use – Ultimate Growth Boundary

Existing Land Use	Acreage	% of Total
Agricultural	4042.85	44.1%
Extractive	233.15	2.6%
Golf Course	0	0.0%
Industrial and Utility	55.75	0.6%
Institutional	36.63	0.4%
Low Density Residential	994.3	10.9%
Major Highway	59.74	0.7%
Manufactured Housing Park	0	0.0%
Medium Density Residential	4.76	0.1%
Mixed Use	2.12	0.0%
Open Water (Lakes, Ponds, Rivers and Streams)	275.61	3.0%
Office	0	0.0%
Park, Recreational or Preserve	1497.59	16.4%
Railway	0	0.0%
Retail and Other Commercial	38.08	0.4%
Undeveloped/Vacant	1920.09	21.0%
Total	9160.68	100.0%

Figure L-3 – Existing Land Use – Ultimate Growth Boundary



Future Land Use

The City uses the Future Land Use Map to develop policies, strategies and recommendations for land use, infrastructure and development review and approvals. The Land Use plan includes both text and a Future Land Use Map that is used for guiding both day to day development decisions as well as large scale policy decisions. Development of area in the identified growth area for Carver will be completed when market conditions and willing private property owners initiate annexation into the City. Annexations of parcels that are not contiguous to City limits should be studied and leap-frogging of annexation should be avoided unless extenuating circumstances arise.

All property within the future growth area has been given a land use classification but City policy requires property not yet ready for development but recently annexed is to be held in an agricultural zoning classification. When urban services are available to the parcel and a development plan is proposed, rezoning should be consistent both with the Future Land use map as well as adopted zoning ordinances. The City may approve development if adequate public facilities are available to serve the development. Proposed new development is required to access public utilities and will not be permitted to be served via new well and septic.

Figure L-4 and the Future Land Use Map (Figure L-5) shows the desired land use for all property within the Carver growth area.

Figure L-4 – Land Use by Category

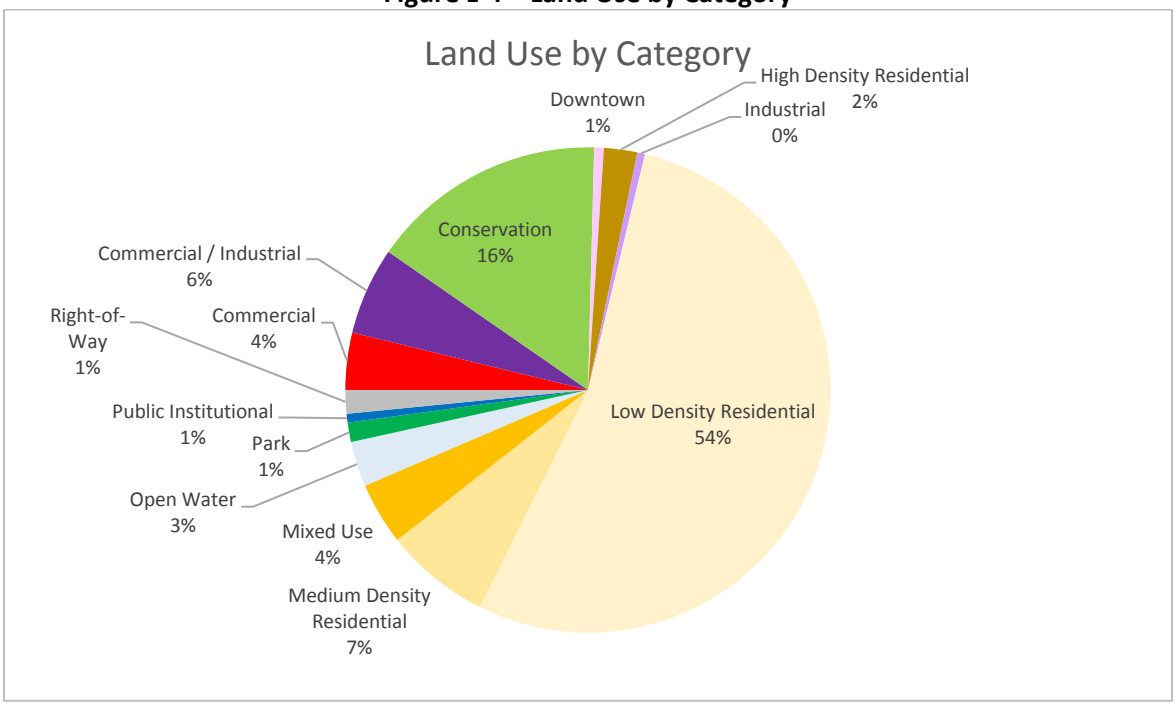
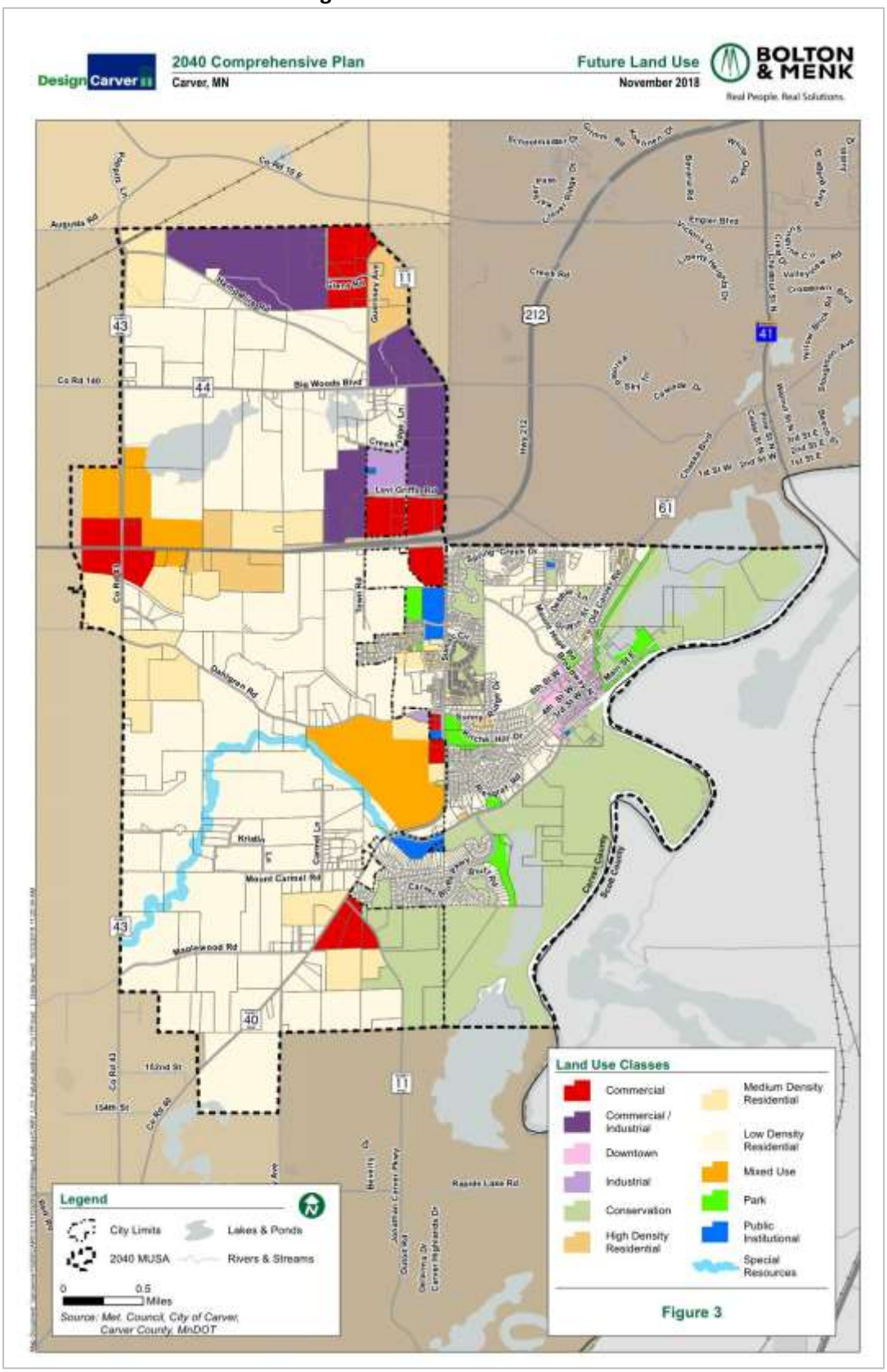


Figure L-5 – Future Land Use



Developable Land Use Areas

Not all land within the City or the growth area is developable. Factors influencing the ability to develop any parcel of land include

- 30+% Slopes
- City and Regional Parks
- Roads, Right of Way, Rail Lines
- Waterbodies

Figure L-6 illustrates the development constraints in Carver.

Figure L-6 – Development Constraints

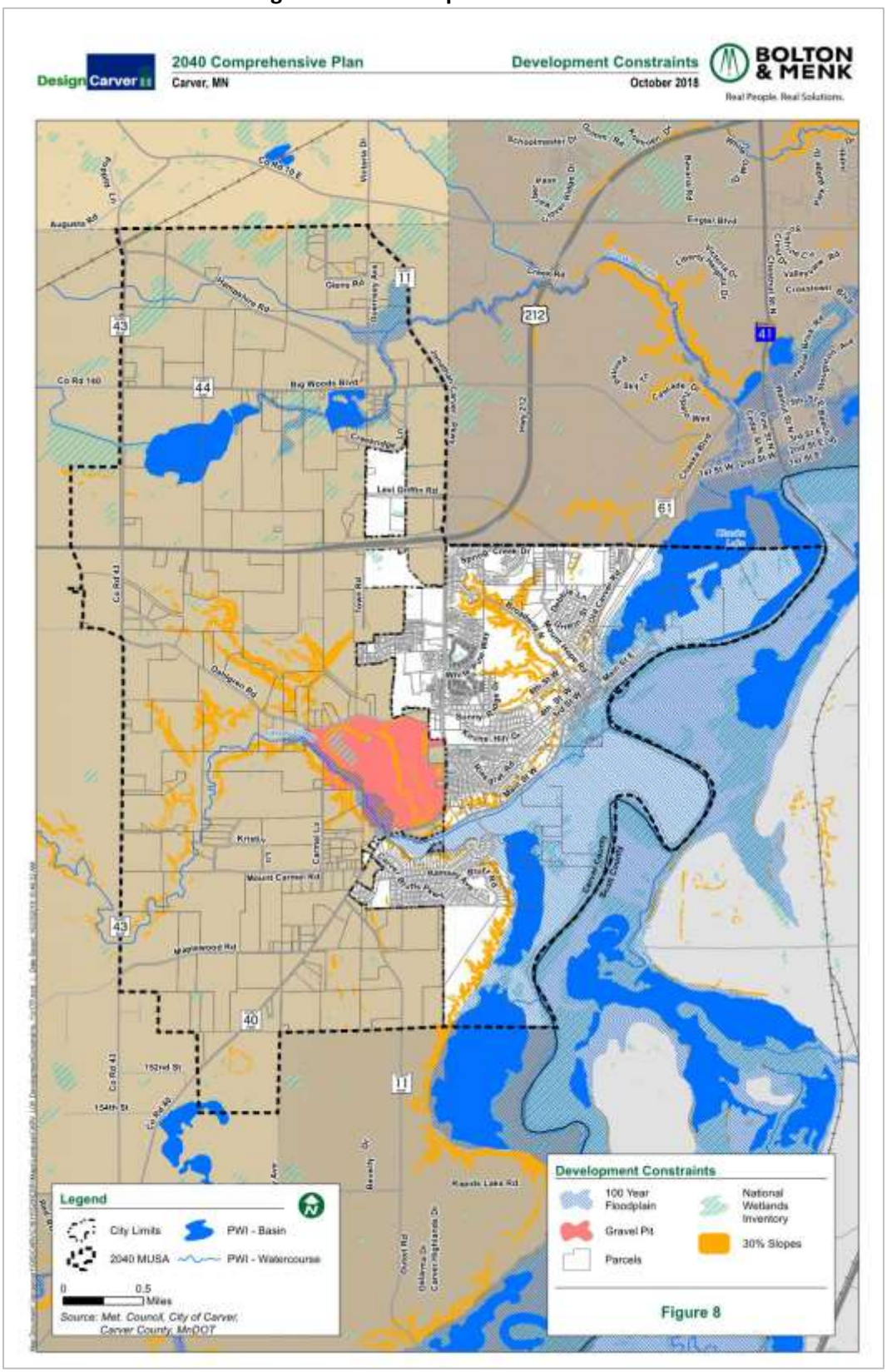


Table L-4 summarizes the planned land uses by category shown on the map. This table includes both gross acres and net developable acres.

Table L-4 | Future Land Use

Future Land Use	Gross Acres	% of Total	Net Acres	% of Net
Commercial	348.41	4%	271.73	5%
Commercial / Industrial	534.49	6%	451.13	8%
Conservation	1444.53	16%	368.39	7%
Downtown	58.6	1%	7.84	0%
High Density Residential	203.47	2%	138.65	3%
Industrial	46.98	1%	40.68	1%
Low Density Residential	4908.46	54%	3375.6	62%
Medium Density Residential	643.56	7%	517.47	9%
Mixed Use	381.11	4%	242.56	4%
Open Water	275.61	3%	0	0%
Park	118.38	1%	28.11	1%
Public Institutional	53.61	1%	33.35	1%
Right-of-Way	143.47	2%	0	0%
Total	9160.68	100%	5475.51	100%

Land Use Categories

Land use categories are a general guide for proposed densities and types of development that may occur on the property. The land use categories work hand in hand with the adopted zoning ordinances for the City to ensure that development is consistent and methodical.

Residential Development Classifications

Residential classifications within the land use map allow for a range of housing options, densities, and related uses to achieve the goals and policies outlined in this chapter.

Downtown

The existing downtown designation encompasses Carver's historic downtown and includes both residential, commercial, and public uses. The downtown designation allows for flexibility in uses so adaptive reuse and infill redevelopment may occur over time if compatible with preservation of the historic district. The corresponding zoning district is Central Business District (CBD). Residential uses are permitted in the CBD above the first floor of commercial establishments, at densities of 4 to 12 units per acre.

Low Density Residential
Low density residential development typically captures traditional single family neighborhoods and developments on large, executive lots. The average density for low density residential ranges from 2 to 5 units per acre. Historical examples of low density residential in Carver include the Bluffs and Spring Creek neighborhoods. Low density will primarily offer development potential of single family homes but attached housing units may be included to protect sensitive environmental resources. Low density residential largely conforms to an R-1 zoning district.

Medium Density Residential
Medium density residential development allows for a range of housing types to be included. Small lot single-family homes, alley loaded developments, townhomes, twinhomes may be developed in the medium density residential category. Medium density allows for different housing intensities to have transition areas. Densities will range between 5 to 12 units per acre. This category closely aligns with a typical R-2 (Medium Density Residential) and TR (Traditional Residential) zoning districts.

High Density Residential
High density residential may include a variety of housing including townhomes, row homes, apartments and condominiums. High density residential will include density that is stacked in construction. Density for high density may range from 12 to 36 units per acre. This category closely aligns with the R-3 (High Density Residential) zoning district. Applicable projects in Carver include Carver Crossing and Sunny Ridge Senior Living.

Mixed Use
The mixed use designation includes property that is anticipated to be developed as master planning areas to allow for a mix of compatible uses. Areas designated as mixed use in the Future Land Use map include development of property near the Highway 212 corridor and Highway 43. Mixed use is also incorporated in the Future Land use map that will include unique resources in the City of Carver at the time of redevelopment. A mixed use district will allow for compatible land uses to develop without the use of a Planned Unit Development. Development of mixed use should include roughly 80% residential uses at a density range of 8 to 36 units per acre with 20% of property to be developed as a commercial use. Commercial components of the mixed use designation should be at a neighborhood level and provide day to day services.

Industrial and Commercial Uses

Commercial
The commercial designation primarily allows for development of retail uses that may include goods and services as well as office use. This designation is intended to allow broad flexibility to support the goals of Carver to diversify tax base and employment and services opportunities. The commercial use designation may include development of residential units supported by main floor retail or commercial space. Commercial nodes should be located near neighborhoods that can support the use via pedestrian traffic as well as good connection to collector and higher order streets. The commercial designation should be at a community level. The GC (General Commercial) zoning district is closely aligned with this designation.

Commercial/Industrial
The commercial/industrial designation allows for employment areas that may develop with both a mix of typical industrial and commercial users. Large scale retail users may occupy areas under this designation to create destinations for residents to acquire goods. The commercial/industrial designation may include office parks, flex space, data centers and light industrial users. Proximity to major road corridors and availability of on-site parking are two driving features that should be included in this designation. The commercial/industrial designation should provide services at a more regional level.

Properties directly adjacent to Highway 212 and Jonathan Carver Parkway should be preserved for commercial uses with direct frontage onto major roadways. Zoning districts similar to the Commercial/Industrial district include the following: commercial and freeway commercial. Users directly adjacent to major roadways should have a focus on job creation, consumer traffic and economic development of community needs.

The current corresponding zoning districts are the FC (Freeway Commercial) and PCD (Planned Commercial) districts.

Industrial
The industrial land use designation allows for an end user that will require direct access to a connected road system. Development may include manufacturing, fabricating or assembly. The uses and standards in the I-1 (Industrial) zoning district correspond to this designation.

Public Spaces and Land Uses

Park
The park classification represents active and passive recreation areas. The parks and trails section speaks to search areas for future park areas.

Public/Institutional
The public/institutional designation allows for development of City services as well as development of County, School District or State facilities in Carver.

Conservation
The conservation land use designation illustrates areas owned, operated and maintained by the U.S Fish and Wildlife Service within the Minnesota Valley National Wildlife Refuge.

Population Density and Employment Intensity Calculations

Residential and commercial land use requirements have been calculated to help Carver plan for and meet Metropolitan Council projections for population, households, and employment.

Residential Density

The 2040 population and household projections indicate an additional 4,097 housing units by 2040. Based on previous development patterns and available land, it is anticipated development will occur in the following percentages in each respective land use district.

The 2040 population and household projections indicate an additional 5,409 housing units in Carver by 2040. Table L-5 identifies the percentage of residential development anticipated to occur in each of the respective land use designations. These calculations are based on previous development patterns and available land.

Table L-5 | Planned Land Use Characteristics

Land Use	Percent of Anticipated Housing Units
Low Density Residential	65%
Medium Density Residential	20%
High Density Residential	10%
Mixed Use	3%
Downtown	2%
TOTAL	100%

The calculations in Table L-6 show the number of acres needed to accommodate all needed housing units in each land use category. Residential development is anticipated to take place in all residential zoning districts in an orderly manner. Actual acreage needed to accommodate future households and their locations will be influenced by market forces.

Table L-6 | Residential Density Calculations

Land Use Category	Density (units/acre)		Desired Distribution	Number of Households	Acres Needed	Net Developable Acres
	Minimum Value	Maximum Value				
Low Density Residential	3.0	5.0	65.0%	2,663	888	3,376
Medium Density Residential	5.0	12.0	20.0%	819	164	517
High Density Residential	12.0	36.0	4.5%	184	15	139
Mixed Use	8.0	36.0	10.0%	410	51	243
Downtown	4.0	12.0	0.5%	20	5	8
TOTAL			100.0%	4,097	1,123	4,282
AVERAGE NET DENSITY	3.65 units/acre					

The calculations above indicate the City has more than enough developable acres planned for residential uses to accommodate the forecasted growth. The average net density of 3.65 units per acre is consistent with the Emerging Suburban community designation.

Commercial

To meet forecasted 2040 employment projections, an additional 1,412 jobs will be added by 2040. Table L-7 identifies the potential number of new jobs, based on developable acres in the commercial and industrial land use categories.

Table L-7 | Commercial/Industrial Intensity Calculations

Land Use Category	FAR[1]	Developable Acres (based on FAR)	Developable SF	Potential Number of Jobs	
				Minimum	Maximum
Commercial	0.17	46.19	2,012,215	808	3,603
Commercial/Industrial	0.19	85.71	3,733,732	1500	6,686
Downtown	0.25	1.96	85,378	34	153
Industrial	0.19	7.73	336,684	135	603
Mixed Use	0.17	8.25	359,241	144	643
Public Institutional	0.25	8.34	363,182	146	650
TOTALS		158.18	6,890,431	2,768	12,338

[1] FAR based on Metropolitan Council's "Measuring Employment" Fact Sheet

These calculations indicate the City has more than enough land planned for commercial and industrial uses to accommodate the forecasted employment by 2040. Actual acreage needed to accommodate jobs will greatly depend on the types of new or expanding businesses. These calculations also do not include remote telecommuting, home occupations, or other less traditional employment bases.

Staged Development

Table L-8 summarizes the developable land available by decade in future land uses classifications. Forecasted development is based on projected housing and employment needs (as projected in Table L-1, Forecasted Population, Households and Employment), minimum lot sizes by each land use district and an anticipated allocation of the projected housing development between each of the land use districts. This table indicates the anticipated timing and sequence of growth. It identifies the developable acres, number of housing units and jobs that may be developed in each 10-year planning period. The table is not intended to limit or to compel growth in any specific area within the planning period. Rather, it is an estimation of where and when growth may logically occur.

Table L-8 | Developable Land Area by Category and Decade

Residential	Density (units/acre)		Existing Net Acres	2020		2030		2040	
	Min	Max		Acres	Units	Acres	Units	Acres	Units
Low Density Residential	3.0	5.0	3375.6	444.7	1334.0	351.0	1053.0	735.3	2206.0
Medium Density Residential	5.0	12.0	517.5	41.0	204.0	137.9	690.0	0.1	0.0
High Density Residential	12.0	36.0	138.7	0.7	9.0	92.4	1109.0	0.0	0.0
Mixed Use	8.0	36.0	194.0	0.1	0.0	0.1	0.0	51.6	330.0
Downtown	4.0	12.0	7.8	7.8	31.0	0.0	0.0	0.0	0.0

Non-Residential	Employment		Existing Developable Acres	2020		2030		2040	
	Min	Max		Acres	Jobs	Acres	Jobs	Acres	Jobs
Commercial	17.0	78.0	271.7	74.4	1265.1	0.0	0.0	0.0	0.3
Commercial/Industrial	17.0	78.0	451.1	14.1	239.2	155.7	2646.1	281.4	4783.8
Downtown	17.0	78.0	7.8	7.8	132.9	0.0	0.0	0.0	0.3
Industrial	17.0	78.0	40.7	40.7	691.6	0.0	0.0	0.0	0.0
Mixed Use	17.0	78.0	48.5	0.1	1.2	0.1	1.2	51.6	877.7
Public Institutional	17.0	78.0	33.4	33.3	566.8	0.0	0.0	0.0	0.0

Special Resource Protection

Natural resources are beneficial to the social, environmental, and economic vitality of a community. To ensure their quality and benefits, it is essential to plan and manage natural resources and areas as we do residential and commercial areas.

The City of Carver will promote, preserve and enhance natural resources within the City and protect them from adverse effects by regulating land disturbances or development activities that would have an adverse and potentially irreversible impact on environmentally sensitive land. The City will encourage development techniques that are sensitive to the natural landscape and work to preserve mature trees, native plants and animals while respecting topography and natural wetlands.

Tree Preservation

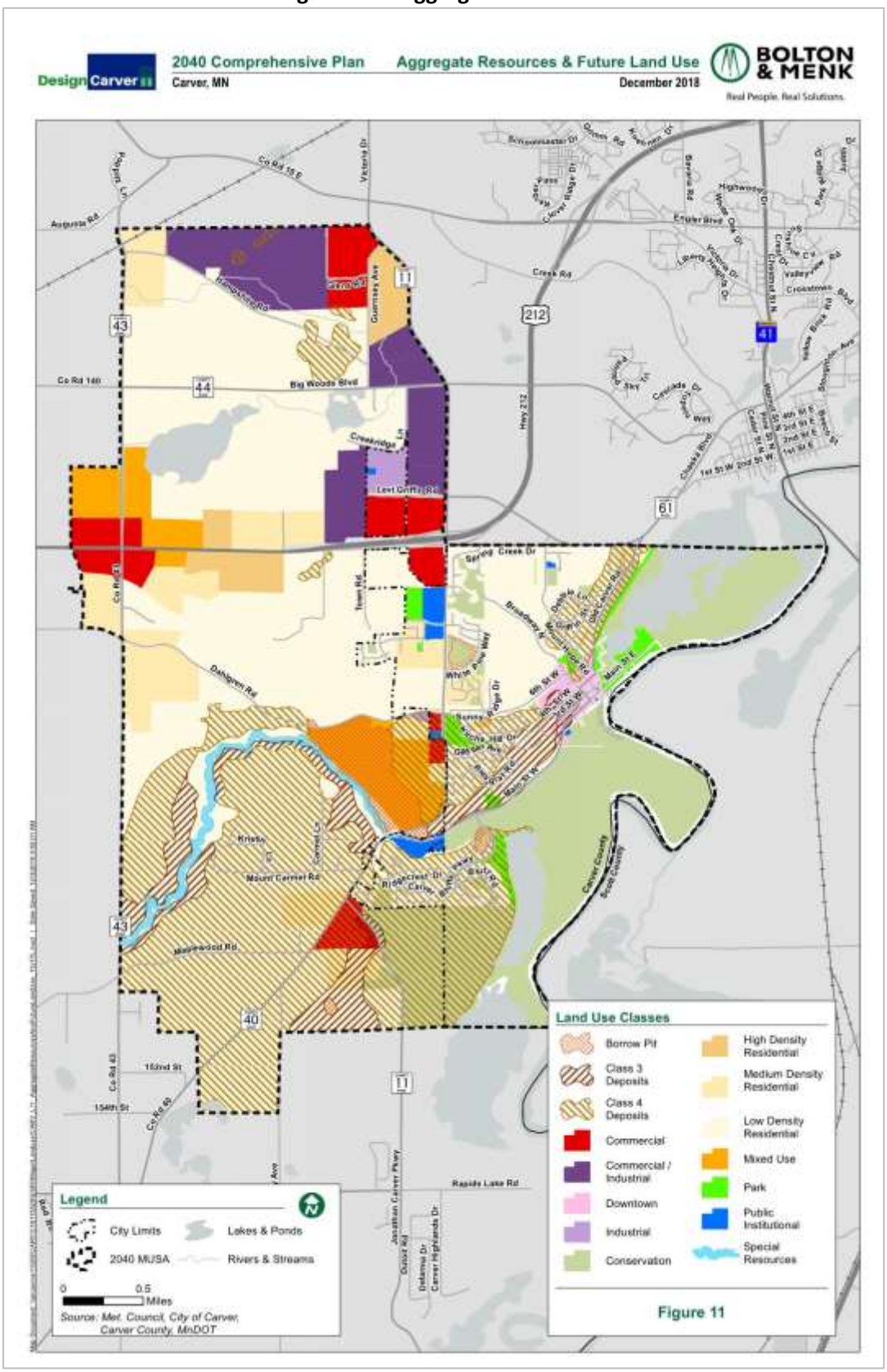
The City's Tree Preservation, Replacement and Reforestation ordinance is intended to preserve, protect, maintain and manage the community's existing forest resources. The ordinance recognizes the benefits of tree preservation and reforestation for erosion control, reduction of stormwater runoff, removal of carbon dioxide and generation of oxygen in the atmosphere, buffering noise pollution, protection against severe weather, providing wildlife habitat, conserving and enhancing the City's physical and aesthetic environment, and generally protecting and enhancing the quality of life and the general welfare of the City.

Aggregate Resources

In 2000, the Metropolitan Council, the Department of Natural Resources, and the Minnesota Geological Survey collaborated on an aggregate resource inventory of the seven-county metropolitan area. The inventory identified and categorized likely areas of dolostone deposits, and sand and gravel deposits.

Significant sand and gravel deposits exist in the entire southern portion of the existing City of Carver as well as the portion of Dahlgren Township included within the Comprehensive Plan; however, a large portion of these deposits do not meet current industry standards. There are two generalized areas of natural aggregate that meet industry standards, located generally adjacent to Carver Creek and also contained with the land area situated between CR 40 and CR 11. Mining in the area located near Carver Creek would negatively impact the bluff, ravine and forest resources in the area. The area located between CR 40 and CR 11 would have less impact on natural resources. Aggregate resource deposits are shown on Figure L-7.

Figure L-7 – Aggregate Resources



Solar Access

The Metropolitan Land Planning Act (Minnesota Statues 473.859, Subd. 2) requires local comprehensive plans to include for the protection and development of access to direct sunlight for solar energy systems. Table L-9 identifies the solar potential in Carver.

Table L-9 | Solar Resource Calculations

Gross Potential (Mwh/yr)	Rooftop Potential (Mwh/yr)	Gross Generation Potential (Mwh/yr)	Rooftop Generation Potential (Mwh/yr)
5,593,491	186,291	559,349	18,629

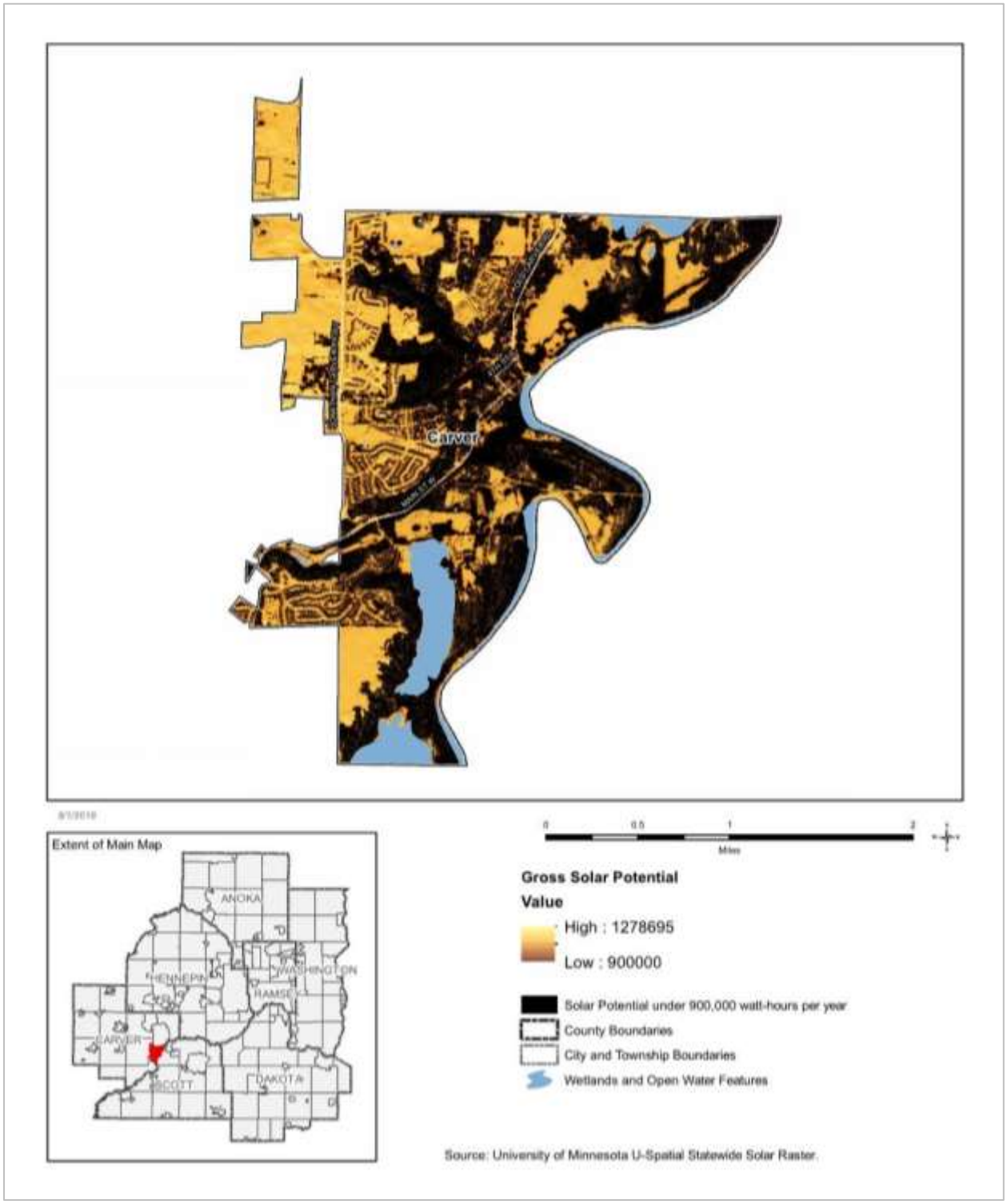
Source: Metropolitan Council

These calculations assume a 10% conversion efficiency and current (2016/17) solar technologies. The average home in Minnesota consumes between 9 and 10 Mwh/year (Solar Energy Industries Association; US Energy Information Administration). Using only Carver's rooftop generation potential, between 1,863 and 2,070 homes could be powered by solar energy annually.

These numbers should be interpreted as a baseline; on average, communities would be able to expect between 30% and 60% of total energy used to be able to be generated by solar rooftops. The rooftop potential estimated here does not consider ownership, financial barriers, or building-specific structural limitations. Solar potential in the City of Carver is displayed in Figure L-8.

The City of Carver shall continue to consider the impacts of solar throughout the community for residential, commercial and industrial use. Carver has an existing solar ordinance that allows for solar development in all zoning districts and preserves direct solar access. The City will continue to monitor and update the ordinance to ensure access to solar energy should a property owner choose and ensure minimum lot size, setbacks and open space allow for development.

Figure L-8 – Gross Solar Potential



Historic Resources

Historic assets help to maintain a strong “sense of place” and community pride. Carver has a rich history as a steamboat community. The downtown with its concentration of historic buildings adjacent to the riverfront provides a community gathering location and helps to distinguish Carver from other growing suburban communities.

National Historic District

Much of Carver's downtown, comprising about 60 acres, is listed in the National Register of Historic Places as a historic district. According to the district's nomination form, compiled in 1978, Carver is significant as a well-preserved Minnesota River town dating from 1852- 1900. The 100 buildings and structures within the district represent the most significant and best preserved concentration of commercial, religious, residential and social buildings in Carver County. In addition, Carver contains the most concentrated number of architecturally distinguished buildings in the county.

The nomination form lists fifty buildings that were considered historically and/or architecturally significant, another 39 that were considered complementary to the district, and only nine that were considered "intrusions" because of later construction. Although a number of significant and complementary buildings have been demolished or destroyed, the district still retains its integrity, and restoration efforts have continued.

Although "pure" architectural styles are not found in Carver, architectural influences represented in the district's earlier buildings (1854-1875) include Federal, Greek Revival, and Italianate styles. Later buildings (1875-1900) show the influence of Eastlake, Stick Style, Queen Anne, and Neo-Classic styles.

Most of the historic resources within the current City boundary are located within the locally designated historic preservation district. An intensive survey of the resources within the City has not been completed since the initial National Register nomination in 1970. The City will be completing a survey this year in cooperation with the State Historic Preservation Office (SHPO).

Traditionally, the Carver downtown has served as the hub for all commercial and civic activity in the community. The impending developments near CSAH 11 and TH 212 are anticipated to service the general retail and service needs of the community in the future. The downtown will likely experience a shift from providing for the general needs of the community to providing more specialized goods and services. The City should work with the downtown business community to promote and enhance the central business district.

Other Historic Resources

There are many other historic resources located within the City of Carver and the expansion area in Dahlgren Township, many of which are associated with agricultural uses. The City will be inventorying the historic resources coincident with review of development requests and evaluating their reuse potential. The majority of these resources are not protected from demolition and are currently outside of the corporate limits of Carver. As such, Carver County’s regulations apply to these structures, which may be removed at the request of the property owner following issuance of a demolition permit from Carver County.

Preservation Initiatives

In the late 1960s and early 70s, historic preservation took hold in Carver through the efforts of two new residents, Anne Neils and Edith Herman. They began the restoration of a number of historic homes and established an organization, Carver-on-the- Minnesota, with the goal of restoring Carver as an 1870s river town. The organization ran tours of restored homes, encouraged development of antique stores and other businesses, and started the Steamboat Jubilee, a yearly festival, held the first weekend after Labor Day.

Several preservation and design initiatives were undertaken in the early 1980s. Carver Historic District; Design One: Architecture, an architectural history and guide, was published by Carver-on-the Minnesota in 1981, with additional funding from the Minnesota Historical Society and the Heritage Conservation and Recreation Service (a former agency of the federal Department of Interior).

In an essay in this work, Gary Roberts cites three main reasons for the homogeneity of age, style, size and quality among Carver's buildings. First, the scarCity of usable land between the river's floodplain and bluffs meant that development occurred rapidly in outlying areas. Second, the town site had been platted before settlement, leaving no large parcels undeveloped. Third, the town's early and rapid growth meant that it was nearly fully developed by the 1880s. Roberts describes many of the City's noteworthy buildings in detail. The guidebook also contains a history of Carver's boom years, by Lucie Hartley, and guidelines for historic preservation and new construction, by MacDonald and Mack Partnership. This firm also provided case studies of facade renovations for three buildings on Broadway.

In 1983-84, a team of landscape architecture students from the University of Minnesota conducted a study of Carver's existing setting, history, tourism potential and resident opinions, and developed a design framework, entitled Visual Master Plan: Carver, Minnesota. Their survey of resident opinions about the downtown showed a desire to build on the City's history, improve access to the river, and to retain Carver's rural small town character. Their plan included a photo survey and recommendations for downtown design improvements, new parks, and improvements to existing parks (see below under "Urban design").

Historic District Regulations

Carver is a Certified Local Government through the National Park Service. Carver has a Heritage Preservation Commission, which advises the City Council on the issuance of permits and other activities within the historic district. The Commission has the authority to review any applications for repair or remodeling (except for painting), new construction, moving or demolition of buildings.

Because much of the downtown falls within the 100-year floodplain, many existing buildings are considered non-conforming under the floodplain regulations. According to the City's floodplain ordinance, such non-conforming structures may continue in use, but may not be enlarged or altered in any way that would increase flood damage potential, unless they are flood-proofed. Thus, expansion of buildings, new construction, and even subdivision of land are all quite difficult in much of the downtown. However, existing buildings may be repaired and renovated, or converted from one permitted use to another, without violating the regulations. Many properties within the historic downtown are required by their mortgage lenders to carry flood insurance.

HOUSING

Introduction

The most significant development in the City of Carver over the past 10 years has been new residential housing units throughout the community. With growth comes responsibility and Carver will be tasked with developing housing that allows for a broad demographic of residents to enter and thrive in the community. To ensure future success for Carver, housing opportunities must span a range of price points, target markets and meet people of all abilities. Through responsible residential growth, development of commercial, retail and daily services follow close behind creating a sustainable and lively community.

A goal identified through the Comprehensive Planning process included providing homes for all. Goals and strategies that have been identified that will be pursued include the following:

1. Development opportunity for high quality housing that is diverse in ownership, price, type and style
2. Encourage or require residential developers include affordable housing as part of development proposals to create a range of incomes in the community
3. Develop affordable housing partnerships and programs with agencies
4. Provide City services at a level that encourages partnership, growth and commitment to all residents from the development community

Existing Conditions

As of 2016, The City of Carver had 1,489 housing units. Roughly 93% of the units are detached, single-family homes but Carver is beginning to see greater housing diversity with the introduction of Carver Crossings, detached townhomes and focus on senior living facility development. Through the Comprehensive Planning process, several areas in the future land use map have been identified at either medium or high density to encourage greater density in housing which would lead to larger diversity in bringing options for a range of price points and will cater to groups in all stages of their life. Table H-1 summarizes housing conditions in Carver.

Table H-1| Housing Conditions

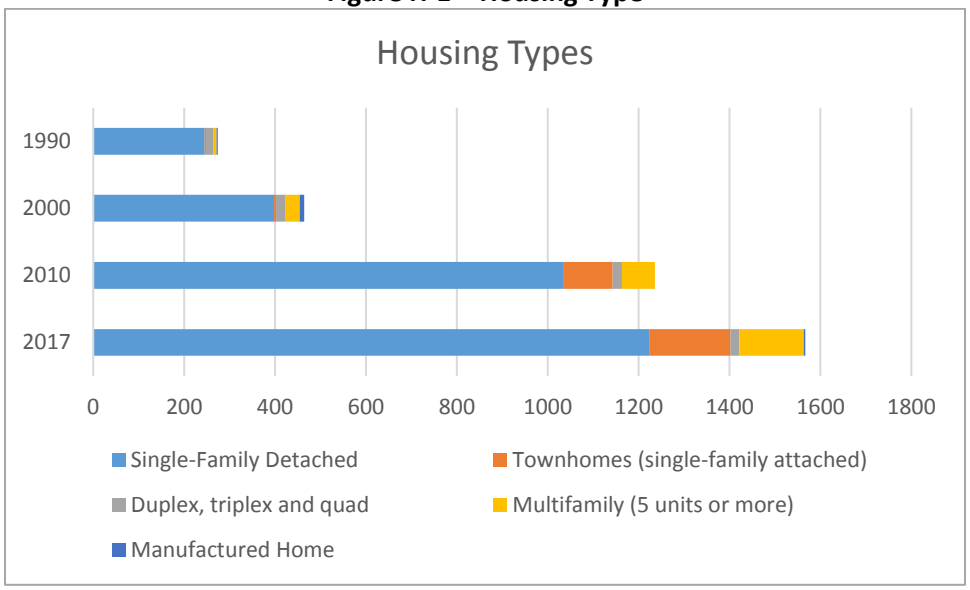
Housing Units	Number of Units	Percent of Total Units
Total Housing Units	1,489	100%
Housing Units affordable to households with incomes at or below 30% Area Median Income (AMI)	38	3%
Housing Units affordable to households with incomes between 31 and 50% Area Median Income (AMI)	70	14%
Housing Units affordable to households with incomes between 51 and 80% Area Median Income (AMI)	433	37%
Ownership Units	1,392	80%
Rental Units	97	20%
Single Family Units	1,325	88%
Multi-family Units	160	12%
Manufactured Homes	4	
Publicly Subsidized - Senior Housing	0	0.4%
Publicly Subsidized – Housing for People with Disabilities	0	0%
Publicly Subsidized – All Other Publicly Subsidized Units	85	1.3%
Total Publicly Subsidized Units	86	1.7%

Source: Metropolitan Council

Housing Type

Single-family detached homes make up the majority of housing units in Carver. By 2017, 78% of housing units were single family. The number of townhomes and multifamily units have increased significantly since 1990, but still represent only 11% and 9% of the housing stock. Figure H-1 illustrates the types of housing in Carver between 1990 and 2017.

Figure H-1 – Housing Type

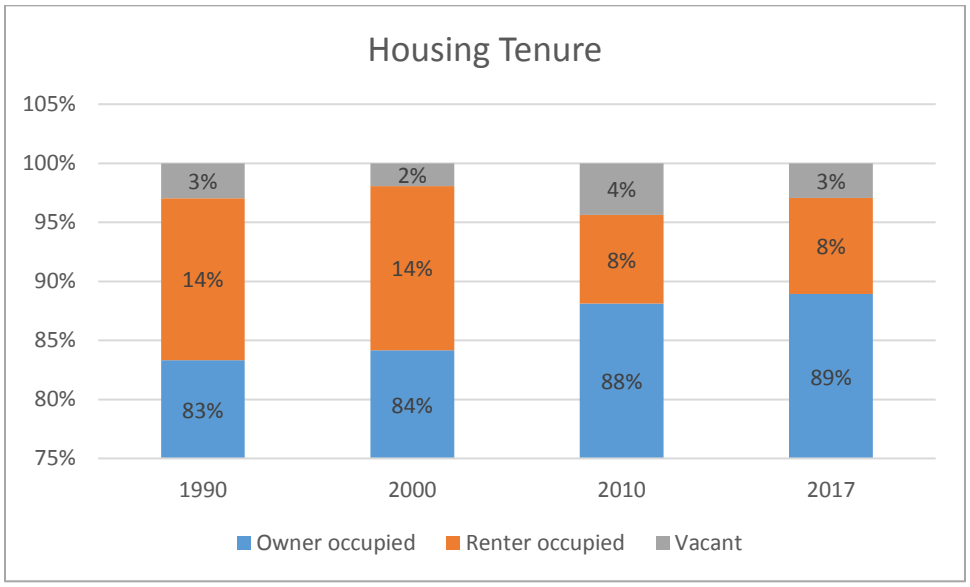


Source: U.S. Census Bureau Decennial Census and Metropolitan Council Housing Stock Estimates

Housing Tenure

Most housing units in Carver are owner-occupied. The percentage of owner-occupied housing units increased from 83% in 1990 to 89% in 2017. The vacancy rate in 2017 was 3 percent. This has been consistent since 1990. Figure H-2 illustrates housing tenure.

Figure H-3 – Housing Tenure

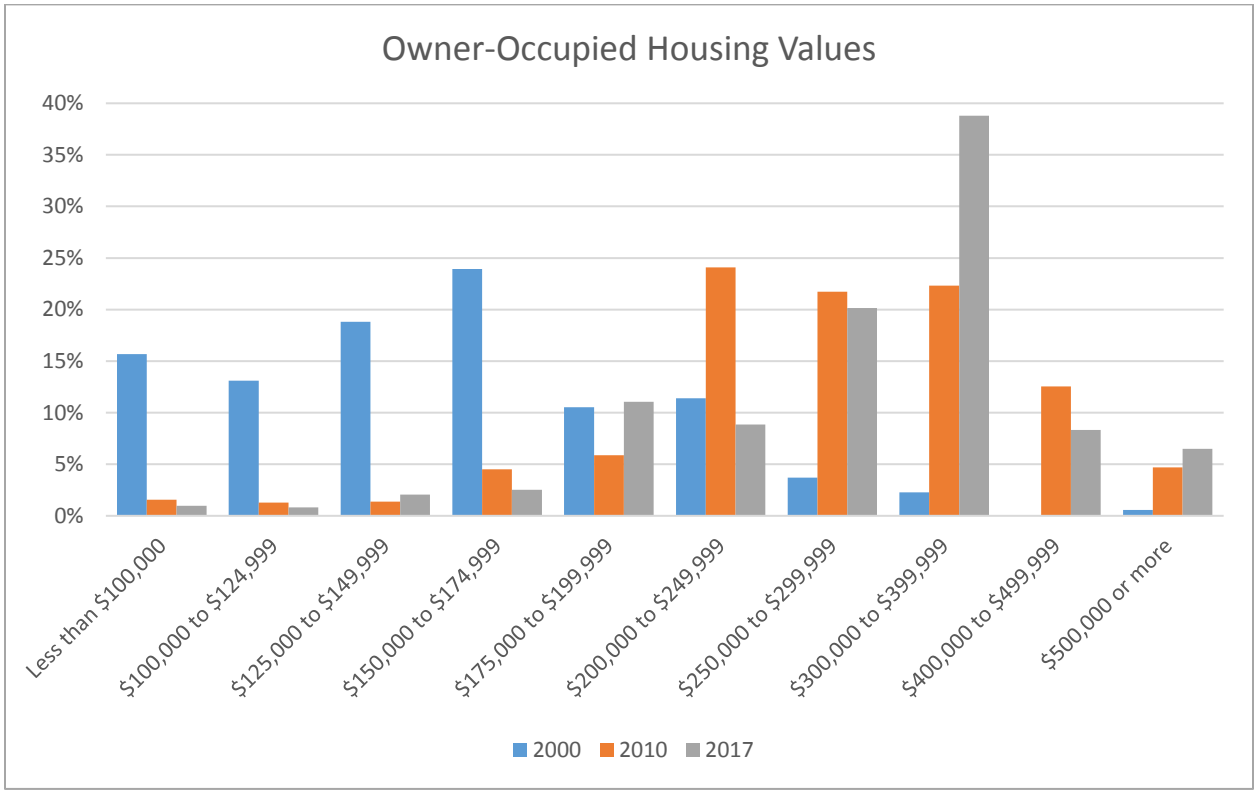


Source: U.S. Census Bureau Decennial Census and Metropolitan Council Housing Stock Estimates

Housing Values

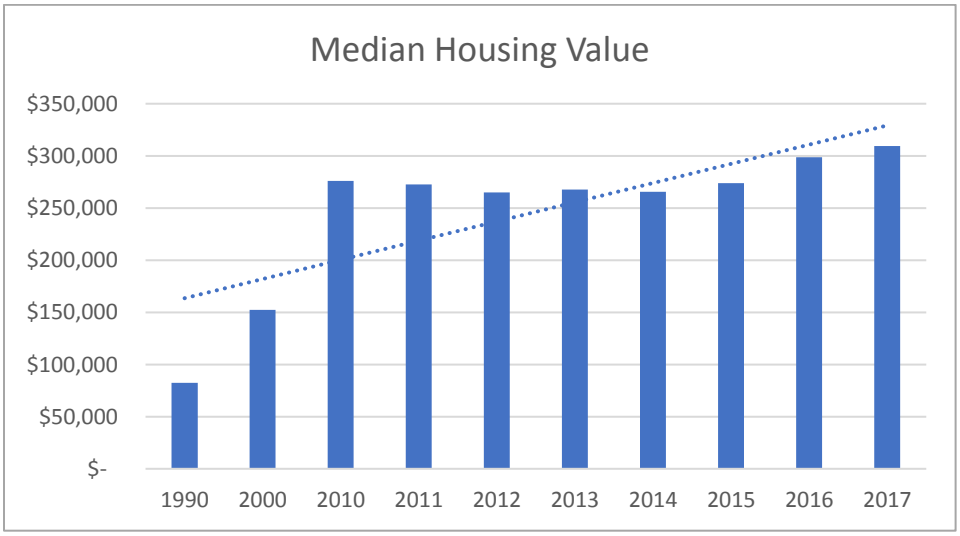
According to the American Community Survey, the average value of an owner-occupied unit in Carver is $309,300 in 2017. The value of owner-occupied units in 2000, 2010 and 2017 is detailed in Figure H-4, while Figure H-5 illustrates the median housing values from 1990-2017.

Figure H-4 – Owner-Occupied Housing Values



Source: American Community Survey

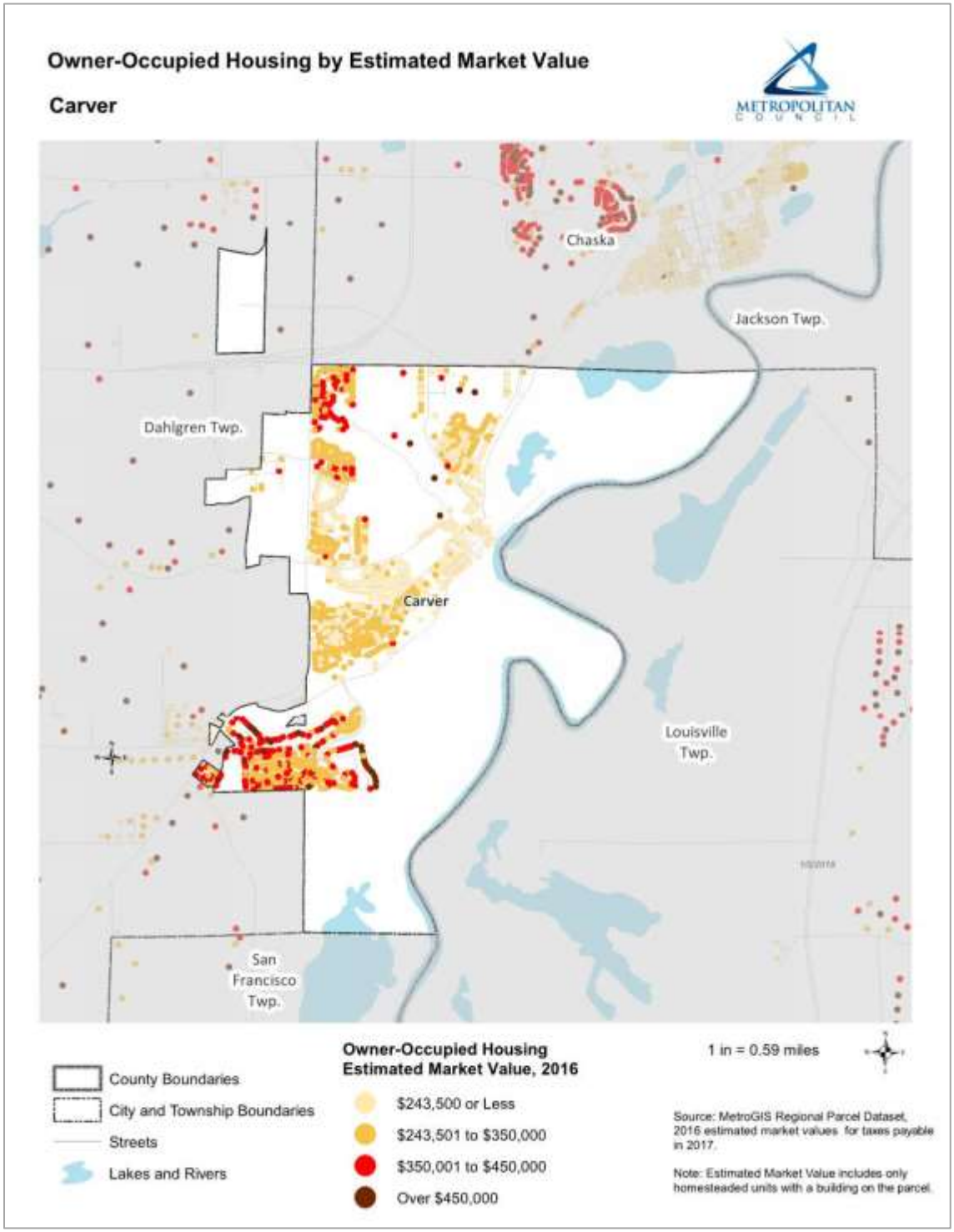
Figure H-5 – Median Housing Value



Source: U.S. Census Bureau Decennial Census and Metropolitan Council Housing Stock Estimates

The increase in housing unit values is due to a combination inflation, property values, and the type and quality of homes built in Carver. Median home values dramatically increased between 1990 and 2010 but have remained fairly steady since then. Figure H-6 illustrates the location of owner-occupied housing units in Carver by estimated market value.

Figure H-6 – Owner-Occupied Housing by Estimated Market Value



The age of housing stock in Carver reflects the Historic District that encompasses a majority of downtown in contrast to recent new development. Nearly 74% of housing units in Carver have been built since 1990.

Table H-2 | Age of Housing Stock

Year Built	Number
Built 1939 or earlier	195
Built 1940-1949	0
Built 1950-1959	45
Built 1960—1969	11
Built 1970-1979	65
Built 1980-1989	81
Built 1990-1999	321
Built 2000-2009	606
Built 2010-2013	136
2014 or later	65

Source: American Fact Finder, 2013-2017 American Community Survey

Cost of Housing

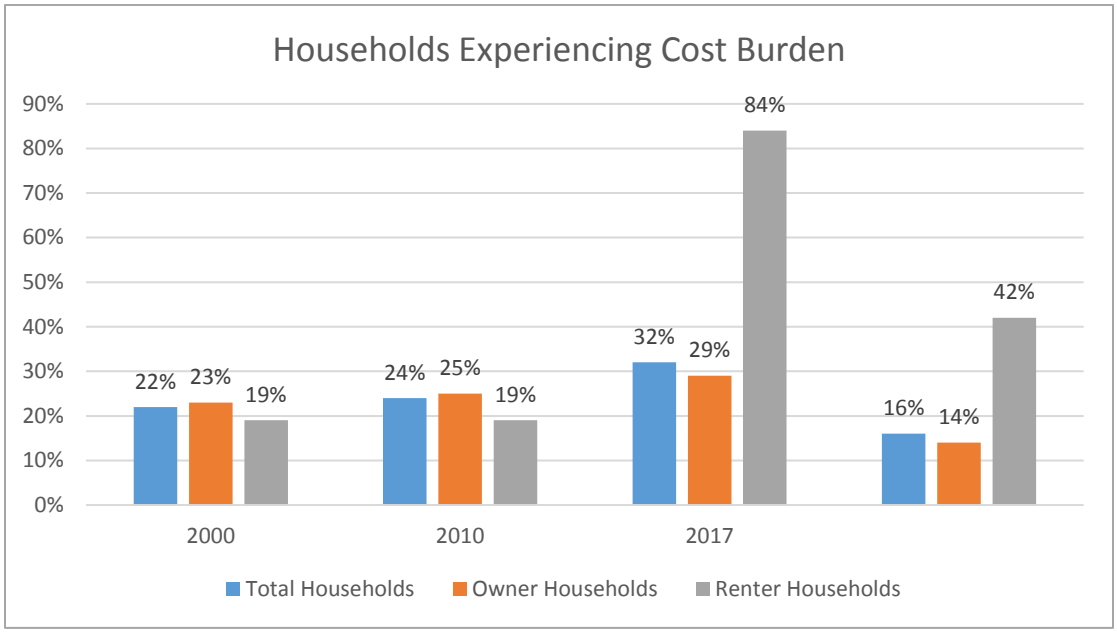
Housing costs are an increasing concern throughout the region. Housing costs influence the ability of young adults, families, and seniors to remain in the community. It can also affect the ability of local employers to find workers. Housing costs are influenced by a variety of factors, including land costs, labor and materials, community regulations, and interest rates. The number of cost burdened households, or households spending 30% or more of their income on housing in Carver, are outlined in Table H-3. Cost burden is further detailed below for both homeowners and renters in Figure H-7

Table H-3 | Households Experiencing Cost Burden

Existing households experiencing housing cost burden	Number of Households	Percent of Households
- with incomes below 30% AMI	51	4%
- with incomes between 31 and 50% AMI	14	1%
- with incomes between 51 and 80% AMI	80	6%
Total	145	10%

Source: Metropolitan Council

Figure H-7 – Percent of Households Experience Cost Burden



Source: U.S. Census Bureau Decennial Census and Metropolitan Council Housing Stock Estimates

Affordable Housing Allocation

The Metropolitan Council is tasked with ensuring communities are affordable and attainable at any price point and have identified that by 2040, Carver will be required to include 528 units. Housing is considered "affordable" when no more than 30% of household income goes to housing, so households with different income levels have different thresholds of "affordable," as outlined in Table X. The Metropolitan Council selected the 4-person household thresholds as the general measurement for affordable housing needs at each income level. Affordability for the Twin Cities region is outlined in the following table based on average median income:

Household Size	Extremely Low Income (30% of AMI)	Very Low Income (50% of AMI)	Low Income (80% of AMI)
One-person	$18,050	$30,050	$46,000
Two-person	$20,600	$34,350	$52,600
Three-person	$23,200	$38,650	$59,150
Four-person	$25,750	$42,900	$65,700
Five-person	$28,440	$46,350	$71,000
Six-person	$32,580	$49,800	$76,250
Seven-person	$36,730	$53,200	$81,500
Eight-person	$40,890	$56,650	$86,750

Source: HUD, 2016.

Average median income (AMI) includes all wages received by a household, whether the household have one income earner or several. An example, a housing unit that is affordable at 50% of AMI would include a household where the income is at or below 50% OF AMI (shown above) is able to occupy the unit without spending more than 30% of their income on housing costs. A household whose housing

costs exceed 30% of their income is called housing cost burdened. Affordable monthly costs for rents as of 2016 are as follows:

Number of Bedrooms	Affordable rent (including utilities) at 30% of AMI	Affordable rent (including utilities) at 50% of AMI	Affordable rent (including utilities) at 80% of AMI
Studio	$450	$751	$1,201
1-BR	$483	$805	$1,288
2-BR	$579	$966	$1,545
3-BR	$669	$1,115	$1,784
4-BR	$747	$1,245	$1,992

The allocation of affordable housing need is calculated based on a variety of factors:

- Projected growth of households experiencing housing cost burden
- Current supply of existing affordable housing, whether subsidized or naturally occurring
- Disparity of low-wage jobs and housing for low-wage households within a community

The Metropolitan Council determined Carver's share of affordable housing need is 528 units:

AMI Threshold	Number
At or Below 30 AMI	310
From 31 to 50 AMI	125
From 51 to 80 AMI	93
Total Units	528

With 2018 data, the number of affordable housing units in relation to the AMI is as follows:

Units affordable to households with income at or below 30% of AMI	Units affordable to households with income 31% to 50% of AMI	Units affordable to households with income 51% to 80% of AMI
38	70	433

To determine if the city can achieve the identified number of units, it is necessary to identify which future land use designations count towards the Affordable Housing Allocation need. According to the Metropolitan Council, any residential future land use designation that has a minimum density of eight units per acre or more will count towards affordable housing allocation calculations. Table features the future land use designations for Carver and the minimum units per acre.

Land Use	Minimum Density (units/acre)	Qualify for Affordable Housing
Downtown	4	No
Low Density	2	No
Medium Density	6	No
High Density	12	Yes
Mixed Use	8	Yes (% Residential Applied)

Any vacant or redevelopable land designated as High Density or Mixed Use is counted in the affordable housing allocation calculations. In Table H-4 below, the net developable or redevelopable acres of each applicable land use have been multiplied by the minimum units per acre to determine the minimum number of units that could be developed. The Mixed Use and Town Center only require a proportion of their developable or redevelopable land to be residential, so those percentages apply to the unit count for this calculation. Developable acreage does not include unbuildable areas, such as right-of-way, open water, and wetlands.

Table H-4 | Development Potential for Affordable Housing Allocation

Land Use	Net Acres	Min Units/Acre	Min % Residential	Units
High Density	138.7	12.0	100%	1,664
Mixed Use	194.0	8.0	20%	310
Total	**332.7**			**1,975**

With the developable land in the High Density Residential and in the Mixed Use designations, Carver has enough land to meet its affordable housing allocation.

Housing Needs

A housing need that will affect both the Twin Cities region as well as much of the nation is providing housing that is approachable to an elderly population that may struggle with typical single family home construction. Emphasis should be put on home styles that can lend themselves to single level, zero entry living. Universal design features that allow residents to continue living in their homes is needed.

Diversity in Housing Type, Price

A variety of housing types is a focus that will allow for diverse demographic in the City of Carver. Smaller single family lots, guiding property at a greater density and encouraging a mix of housing types throughout developments to include different price points are strategies that will increase the diversity of housing types in the Carver to allow a more inclusive community.

Though much of Carver's single family residential development has occurred over the past 30 years, much of Carver's existing housing stock in the historic downtown is naturally occurring affordable housing and preservation of existing affordable units will be crucial.

Implementation

To support Carver's goals of providing housing opportunities to a diverse range of residents, various tools are available to the City and will be explored on a project by project basis.

Housing Goal/Need	Available Tool	Circumstances, Opportunity and Sequence of Use	Potential Partner
Preservation of naturally-occurring affordable housing	Improvements to flood control system	Improvements to the City's flood control system can either directly impact the costs of housing by eliminating the requirement for flood insurance for affected properties, or by making the possibility of future flooding events less likely which decreases the cost necessary for future repair. The City studies and reviews certification of the levee and explores different options that are available. The City has entered into an agreement with WSB to complete a levee certification project.	
	Community Rating System	Discounts on flood insurance premiums provided to all property owners at levels commensurate with the City's level of participation in the program. Available to all property owners purchasing flood insurance. It is in the City's plan to continue participation in CRS and actively work to increase the CRS rating.	
Affordable Housing for households at or below 80% AMI	Start-Up Loan Program	Assist first-time homebuyers with financing a home purchase and down payment through a dedicated loan program.	Minnesota Housing
	Step-Up Loan Program	Assist non first-time homebuyers to purchase or refinance a home through a dedicated loan program	Minnesota Housing
	Livable Communities Demonstration Account	City will consider support or sponsorship for development proposals incorporating or connecting affordable housing to jobs, government facilities, Downtown Carver, or public transportation	Metropolitan Council
	Local Housing Incentives Account	City will consider support or sponsorship for development proposals serving households at or below 80% AMI	Metropolitan Council
	Housing Bonds	City will consider issuing housing bonds to support development of affordable housing at or below 80% AMI in high density zoning districts	

	Tax Increment Financing	City will consider TIF for development proposals including housing affordable to households at or below 80% AMI	
	Tax Abatement	City will consider tax abatement for development proposals including housing affordable to households at or below 80% AMI	
	Inclusionary Zoning Policy	City will consider the exploration and development of Inclusionary Zoning policy to incentivize the development of affordable housing in the city	
Senior Housing for all income levels	Home Improvement Loans	Assist homeowners in financing home maintenance projects to accommodate a physical disability	Minnesota Housing
	ADU Ordinance	Develop an ordinance permitting the construction of accessory dwelling units or guest homes in specific zoning districts.	Property owners
	Program of Framework	Work with groups of stakeholders to develop guiding principles, frameworks, and action plans to consider and incorporate the needs of older residents into development decisions	Senior advocacy groups or networks, residents
	Housing Bonds	City will consider issuing housing bonds to support senior housing development affordable to households at or below 80% AMI in high density zoning districts	
Multifamily Housing Construction	Livable Communities Demonstration Account	City will consider support or sponsorship for development proposals incorporating or connecting multifamily housing to jobs, government facilities, Downtown Prior Lake, or public transportation. Special consideration will be given to projects that include affordable housing	Metropolitan Council
Maintenance of Existing Housing Units	Home Improvement Loans	Assist homeowners in financing home maintenance projects like roof repair, plumbing and electrical work, accommodating a physical disability, or select energy efficiency improvement projects	Minnesota Housing

PARKS AND TRAILS

Introduction

Natural resources, access to the Minnesota River and a thriving parks and trails system rank high as quality of life contributors for residents in Carver. As part of the Comprehensive Planning process, Carver is tasked with both planning for both future parks and trails while maintaining the robust system that is currently constructed.

Goals

The following goals have been developed to help guide development of the park and trail system:

1. Provide a balance of both active and passive recreational opportunities in a high-quality, multi-jurisdictional and private park system that responds to needs of both the community and visitors.
2. Construct and maintain a robust trail system that provides recreational opportunities and allows for a connected community with multi-modal transportation. Partnerships with neighboring communities and surrounding jurisdictions will allow residents and visitors to enjoy both the City of Carver and Carver County collectively.
3. Promote existing and future parks with wayfinding and signage to encourage use of parks and trails system.
4. Create a diverse parks and trails system that is accessible for all stages of life, abilities and provide space for all community members to feel comfortable in public spaces.
5. Explore and identify a destination park concept that will both benefit residents of Carver as well as visitors to the community.

Strategies

1. Maintenance of existing parks with planned renovation or improvements allows Carver to leverage existing land and programming
2. Active living principles will be applied to future development
3. Acquire area that has been identified as unique, high-quality resources that will allow for development of new parks and trails at the community park level or destination park level
4. Revisit and revise the City's adopted Parks Master Plan biennially to ensure work is consistent with broad, big picture goals
5. Apply National Recreation and Parks Association (NRPA) findings and literature to development of the parks and trails system

Park Inventory

The City of Carver has extensive park facilities available for the enjoyment of its residents and visitors. Figure P-1 shows the existing park facilities. City park facilities currently available within the City include the following:

Ironwood Park | Ironwood Park is adjacent to Carver Elementary and contains two lighted multi-use fields and one practice field. Playground facilities are at the adjacent school. A network of trails provides opportunities to enjoy wetland features.

Community Park | Centrally located within the community at the crossroads of CSAH 11 and Sixth Street, Community Park provides a full range of active recreational facilities, and is home to the Carver Black Sox. Baseball and softball fields, playgrounds, picnic shelter, skate park, ice rink with warming house, and rock climbing apparatus are the signature items at this park.

Carver Bluffs Park | Located at the bottom of the bluff adjacent to the Carver Bluffs neighborhood, a gateway into the Rapids Lake Unit of the Minnesota Valley National Wildlife Refuge. Carver Bluff Park includes Soccer fields and playground equipment.

Riverside Park | Riverside Park includes the riverfront which both provides unique recreation opportunities through the boat ramp but also has significant challenges due to annual flooding. The park includes an archery range and primitive camp-sites. The Fish and Wildlife Service has the ability to construct and maintain an information kiosk, access trail and vehicular gate through an agreement with the City.

Depot Park | Depot Park surrounds the historic water tower, which serves as an important entry landmark for the City. The water tower was restored in 1997-1998. Depot Park is a trailhead for the Minnesota River Bluffs Regional Trail and provides entry into Carver's Historic Downtown.

Gazebo Park | A public square at the corner of Third Street and Broadway that provides a central gathering focus for the downtown area.

Lions Park | Four (4) acre park on Mount Hope Road is primarily used for active recreation and the park contains ballfields, tennis courts, and playground equipment. The site consists of two level "terraces" on a sloping hillside overlooking downtown.

Overlook Park | The small scenic overlook park in the Carver Creek neighborhood provides some of the city's most impressive views and a picnic area for the public.

Olsen Park | Olson Park near the Copper Hills neighborhood provides playground equipment and open multi-purpose play space.

Regional and Federal Park and public land facilities are also located in Carver. These include:

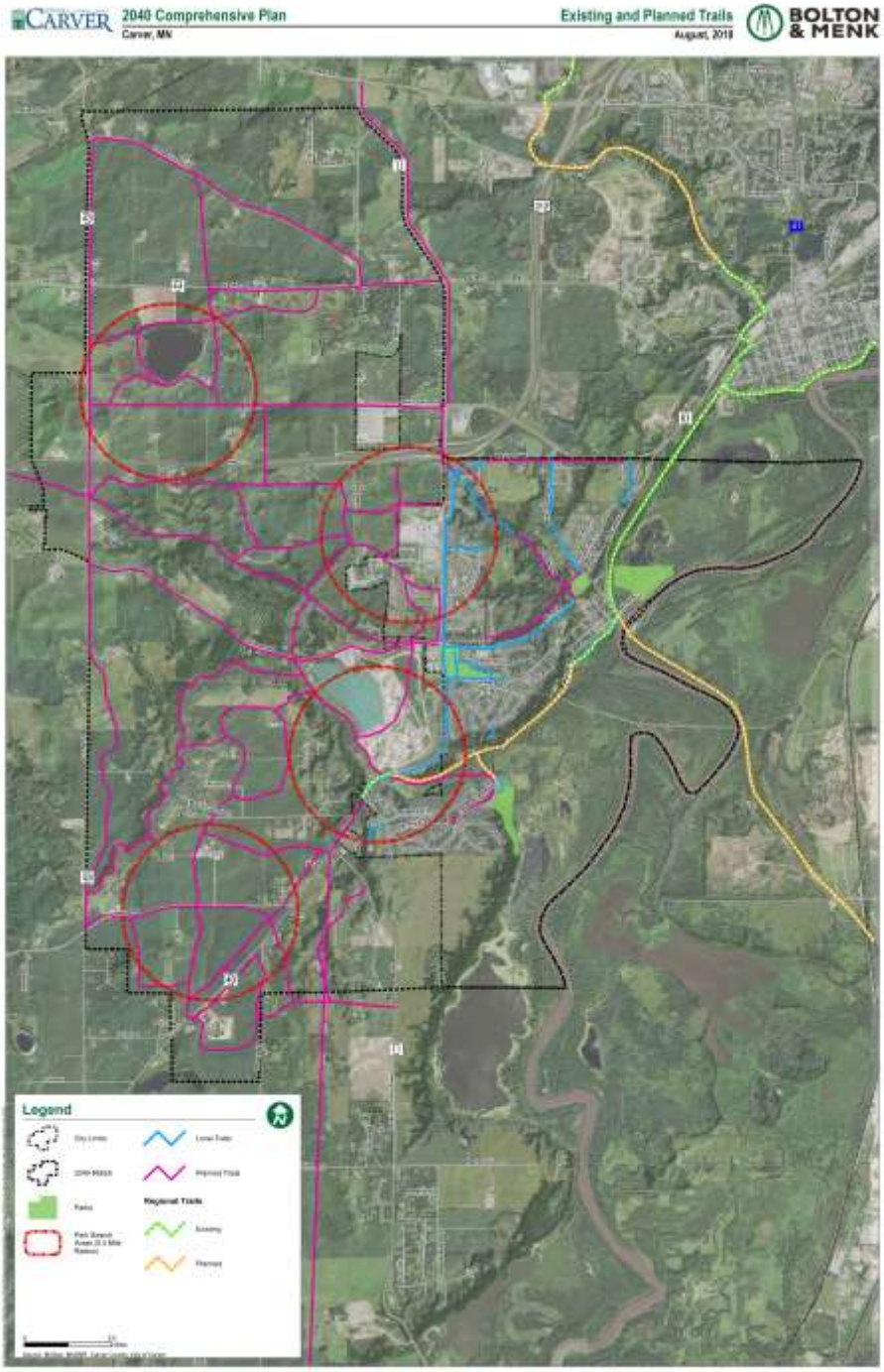
Minnesota River Bluffs Regional Trail | A section of this trail has been constructed between Chaska and downtown Carver along the former Union Pacific railroad corridor. Depot Park is adjacent to the trail, and serves as a trailhead location. An additional small section of this trail has been constructed adjacent to CSAH 11 near the Carver Bluffs neighborhood.

Minnesota Valley National Wildlife Refuge | The MVNWR is gradually being expanded along a 34-mile stretch of the Minnesota River from Fort Snelling to Jordan. The refuge consists of seven management units.

Much of Carver's floodplain north of Riverside Park is located in the Chaska Unit of the refuge. This 589-acre unit is undeveloped except for trails providing access within the unit.

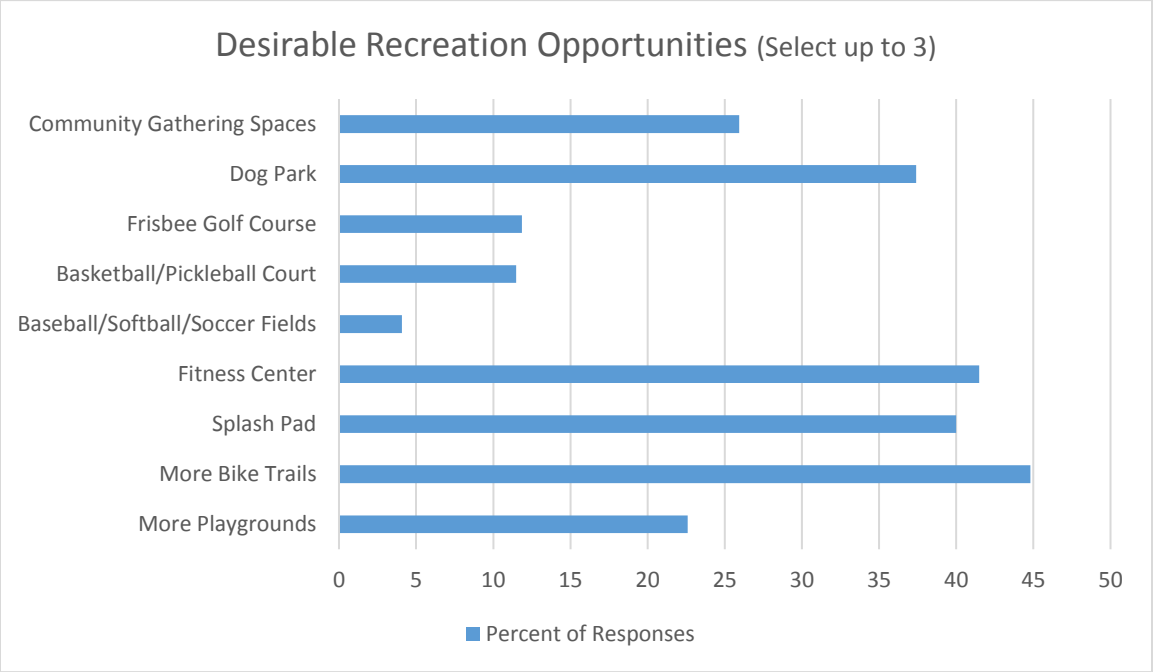
The floodplain south of downtown has recently been acquired for inclusion in the Rapids Lake Unit. A new interpretive center was constructed in 2007, and a large wetland and habitat restoration and trail development project was completed in 2008. The US Fish and Wildlife Service has an on-going efforts to improve the habitat within this unit as much of the land was farmed prior to acquisition.

Figure P-1 - Existing and Planned Trails Map | Park Search Areas



Survey Results

The Design Carver survey had several questions and responses related to existing and future parks and trails throughout the City of Carver.



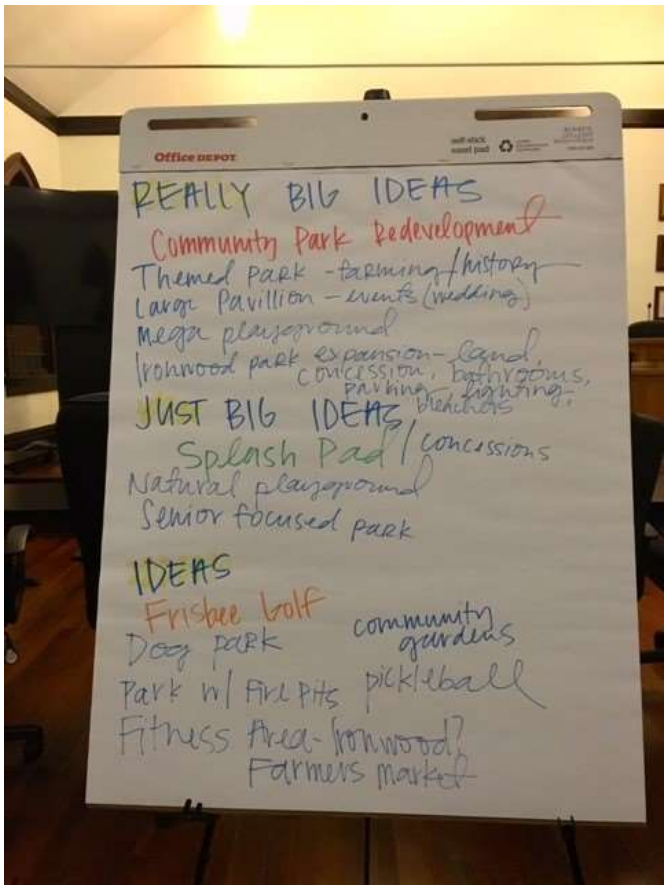
Parks and trails additionally scored as the second highest priority for future growth throughout the City after commercial/retail use with 136 of 270 responses. Several responses in the open ended question of what people value most about living in the City of Carver included the trail system, natural resources and access to the outdoors.

Table P-1 | City of Carver Park Classifications – Existing and Future

Type of Park	Criteria	Service Area	Size	Existing Acres	Notes
Neighborhood Park	Connectivity to the park is important through trail connections and crosswalks to ensure safe transportation to the park	½ mile to 1 mile service area, cannot be separated from neighborhood by nonresidential road.	.75-10 acres		Neighborhood parks can publically or privately owned.
Community Scale Park	Large service area, easily accessible both for residents and visitors to the community	1-3 mile service area	15-50 acres		
Destination Park	Unique park use for both existing residents and visitors to the community	Citywide	50-100 acres	0	
Conservation Area	Can vary based on resources, location	Citywide/Regional			May be publically or privately owned.
Local and Regional Trails	Development and construction of new trails as well as identifying and constructing trail gaps	Citywide/Regional			Trails should focus on connections for community users and amenities as well as development of a looped system to provide for recreational opportunities

Neighborhood Park

Carver has a relatively young population. The largest age groups for the population for females is ages 5-9 years old at 6.82% of the population. The largest age group for males is 10-14 years old at 6.03% of the population. As of the 2010 Census, 36.5% of Carver's population was under the age of 20. A goal of the City is to provide a broad offering of park services for different age groups. Most developing neighborhoods in Carver currently are within commutable distance to a community park. It is a goal of the City to provide larger, more inclusive parks for residents of all ages and abilities. Development of neighborhood parks may be included in land development but will shift to private ownership of the neighborhood parks. The City is not obligated to accept ownership of proposed neighborhood park if a need or special amenity is not fulfilled in development of the park.



Community Scale Park

Development of community scale parks create recreational opportunity for people of all ages from several neighborhoods with a broad range of facilities and programming. Community parks can accommodate organized sports for larger groups of people. Connection to community parks should be available both through the system of trails as well as via a collector road.

Destination Park

A destination park should be a unique park that hits a niche typical neighborhood and community parks do not meet. Destination parks often have creative programming including but not limited to park features at a greater scale. Examples of destination park programming includes boardwalks over naturally sensitive areas, play equipment on a grand scale to allow for accessibility for all ages, community spaces including but not limited to amphitheaters, gathering spaces or a splash pad. Destination parks may include creative lighting, programming and use for both residents and visitors to the park. Programming of a destination park often requires several years of planning and development. At the time of plan development, the Parks Commission recognized the regional need for a park that allows for play at all levels of ability. An inclusive park would fill a need both in Carver and throughout Carver County.

Conservation Area

Carver has several conservation areas that create a diverse and unique opportunity for both residents and visitors of the community. In many cases, the size and location of conservation areas are dictated

by the natural landscape. Conservation areas are typically used as a passive park use to include a minimum level of development although interpretive facilities or formal access points may be developed. Design of facilities should be determined by natural features, terrain, and the resources of the site. The nature conservation areas should be linked with greenways where possible and appropriate.

The City of Carver has a long history of protecting environmentally sensitive areas. Although these areas may serve some park functions, protection of special and unique areas for conservation is priority. Land identified as a known conservation area has been identified in the 2040 Future Land Use Map and will guide development for areas identified and known as unique terrain and natural features.

Local Trails

A robust trail system creates recreational opportunity for residents, builds community through interaction, decreases dependence on automobiles and can enhance quality of life for residents. Development and construction of trails is a priority for the City of Carver and should be considered with every development project proposed within the City. Trail development and connection should include large looped trail options with signage and wayfinding both related to destinations and solely for recreation opportunity. Gaps within the existing trail system will be priority to ensure future development of trails are connected into a robust system. With extensive area within the future growth area for Carver, development may occur in conjunction of development of roadways when necessary. Trail corridors are identified in the future park and trail map and should be identified and considered when the community is reviewing upcoming development projects.

Trails will be constructed of bituminous unless determined beneficial by the Parks Commission and the City. Development and construction of new trails should meet the standard of ten (10) feet in width. Maintenance level of trails will depend on factors including the type of trail and programming. Carver is open to creative ways to leverage the existing and future trail system that could allow for a more year round approach. This could include trails designation of trails to be used for snow-shoeing throughout winter months.

Regional Trails

Two proposed regional trails are included in Carver's future growth area. The Minnesota River Bluffs Extension and Scott County Regional Trail Plan are incorporated as part of this planning process. Carver is supportive of partnerships across jurisdictions that could lead to opportunity to partner and develop regional trails throughout Carver County and the area.

Parks and Trails Improvement Funding

Carver park system is identified with either the classification of a neighborhood benefit or a community benefit. The two classifications address different target markets and different programming goals. Community benefit improvements are classified as community parks, destination parks and the trail system throughout Carver. The City has a long term capital improvement program and controls to manage the construction and funding portion of the park system through build out of the City. Funding for improvements may be a combination of general fund revenues and park dedication fees collected at the time of subdivision. At the time of subdivision, if a development falls within one of the City's search areas for a future park, park dedication requirement may be met with dedication of land, construction

of improvements or a combination of both. If a development is not within a search area and the City has determined no additional need for park facilities in the area, a cash-in-lieu of dedication is required.

A park or recreation feature that most directly impacts a specific neighborhood will be installed at the time of subdivision by the developer. These parks will typically be privately owned and maintained. If trails are constructed as part of a development, the City will receive an easement over the trails for maintenance once they are constructed and accepted by the City. Trail locations will be determined in partnership between the City and developer and are typically required at the time of development.

Park and trail development related to subdivision will be reviewed by the Parks Commission and City Staff to determine the best use of dedication from the developer.

TRANSPORTATION

Overview

Carver is an Emerging Suburban Edge community, defined as an area that is in the early stages of transitioning into more urbanized levels of development. By 2040, significant population and employment growth is forecasted that will expand and intensify development patterns.

Accommodating future growth provides a key opportunity to improve the city's multimodal transportation network. The city needs to plan for the construction of new roads, the maintenance of existing roads, safety, nonmotorized transportation improvements, and overall enhancement of the transportation network for both local and regional connections. Additionally, the City of Carver may need to assess current transportation options to ensure they align with transportation preferences of residents and are fully accessible to all members of the community. This may include expansion of multimodal options and improvements to connectivity and safety.

The primary purpose of this chapter is to provide guidance to city staff and elected officials regarding the implementation of effective, integrated transportation facilities and programs through the 2040 planning timeframe. This chapter is consistent with regional requirements for the transportation element of the comprehensive plan as provided in the Metropolitan Council's 2040 Local Planning Handbook.

This chapter includes all modes of travel in and around Carver, including automobile, bicycle, pedestrian, freight, transit, and aviation. The parks chapter has additional content relevant to the trail network.

Goals and Objectives

The City of Carver operates and maintains a roadway and trails system which, in conjunction with County facilities, provides a system that fulfills the basic travel needs of its residents. Since Carver is a growing suburb, there are decisions that the city faces that affect these existing and future facilities in addition to affecting other transportation modes and systems. These decisions need to be made in the most informed manner possible. The establishment of **transportation goals** helps to guide these decisions by guiding the development of the transportation system.

The **goals** that guide the further development of the city's transportation system are provided below:

1. Provide a transportation system that serves the existing and future access and mobility needs of the city.
2. Provide a safe and efficient transportation system that is cost effective.
3. Ensure that the transportation system, in the implementation phases, is as environmentally sensitive as possible.
4. Provide a coordinated transportation system with respect to regional and adjoining municipalities' plans.
5. Provide a transportation system that supports multimodal transportation whenever and wherever feasible and advantageous, including transit, bicycle, and pedestrian modes.
6. Provide a transportation system that reflects the values and goals of the residents of Carver.

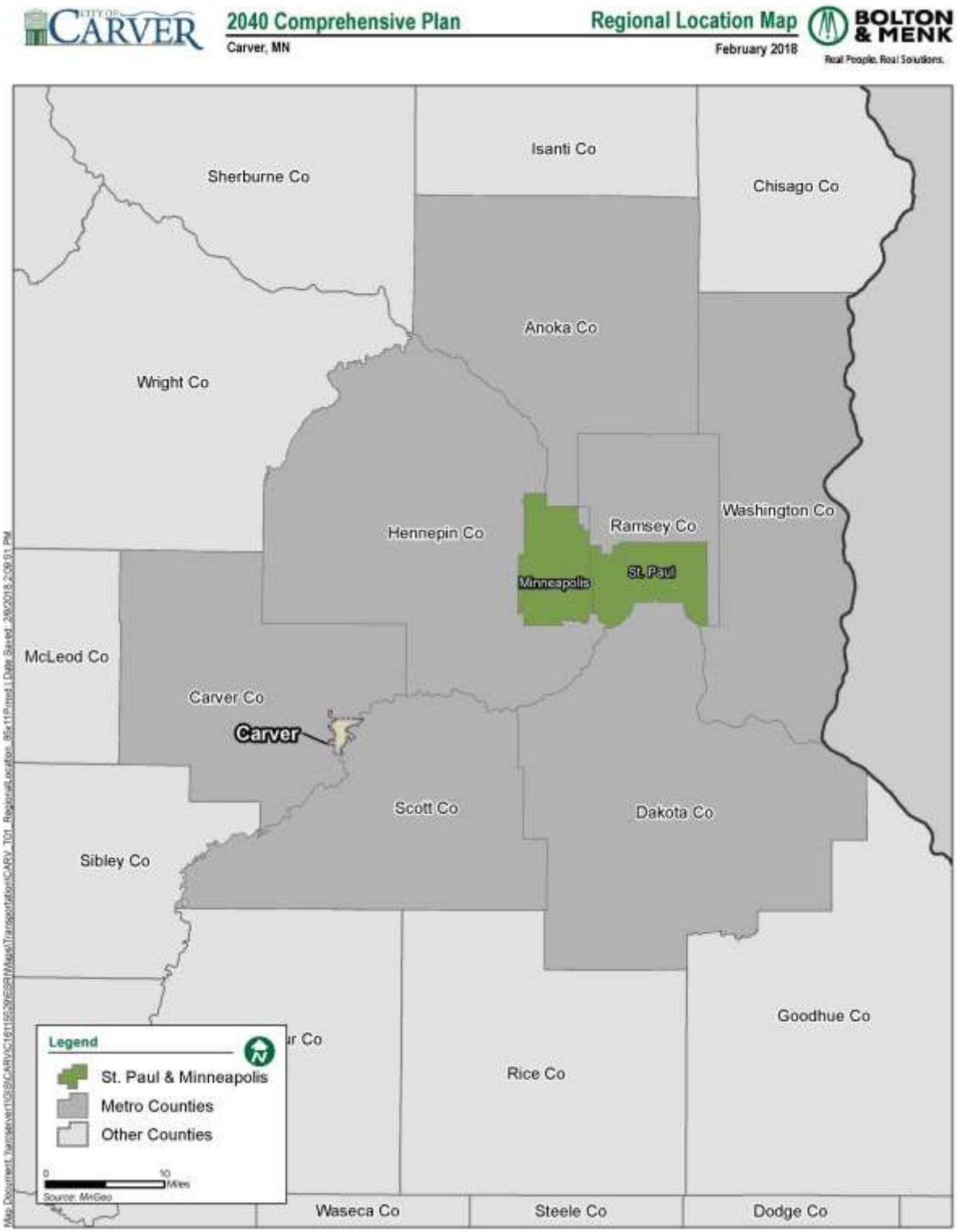
7. Provide and support a transportation system that enhances quality economic development within the city.

Decisions and actions made by the City of Carver, as they affect the transportation system, should be consistent with the transportation goals.

The **objectives** of the Transportation Plan indicate something toward which effort is directed, such as an aim or a goal. The **objectives** of the Carver Transportation Plan are as follows:

1. Consider the impacts of improvements to the existing transportation system on land use, environment, social, historic, and cultural resources.
2. Facilitate an appropriate level of mobility for persons and goods within and through the city by providing connections to adjacent municipalities and ultimately to the regional transportation system.
3. Provide a roadway system that includes a functional hierarchy that accommodates existing and future travel demands while including appropriate design features that complement the roadway's intended use.
4. Consider multimodal transportation alternatives where appropriate.
5. Provide for sufficient roadway capacity to accommodate existing and future demand.
6. Provide a plan that ensures state, county, and adjacent city cooperation, where appropriate, in the provision of the plan elements.
7. Promote increased vehicle occupancies throughout the city.
8. Continue to work with transit providers and others regarding plans for transit service and potential expansion in the city.
9. Develop bicycle and pedestrian networks that serve both recreational and transportation needs, and connect to local and regional destinations.
10. Support a roadway system that manages freight and heavy commercial traffic safely and efficiently.
11. Comply with all state and federal standards regarding aviation and airspace.

Figure T-1 – Regional Location



Existing Roadway Conditions

Existing Traffic Volumes and Crash Data

One of the most basic characteristics of a given roadway is the volume of traffic that it carries. Existing and forecasted traffic volumes are used to determine which roads are approaching or exceeding the capacity for which they were designed.

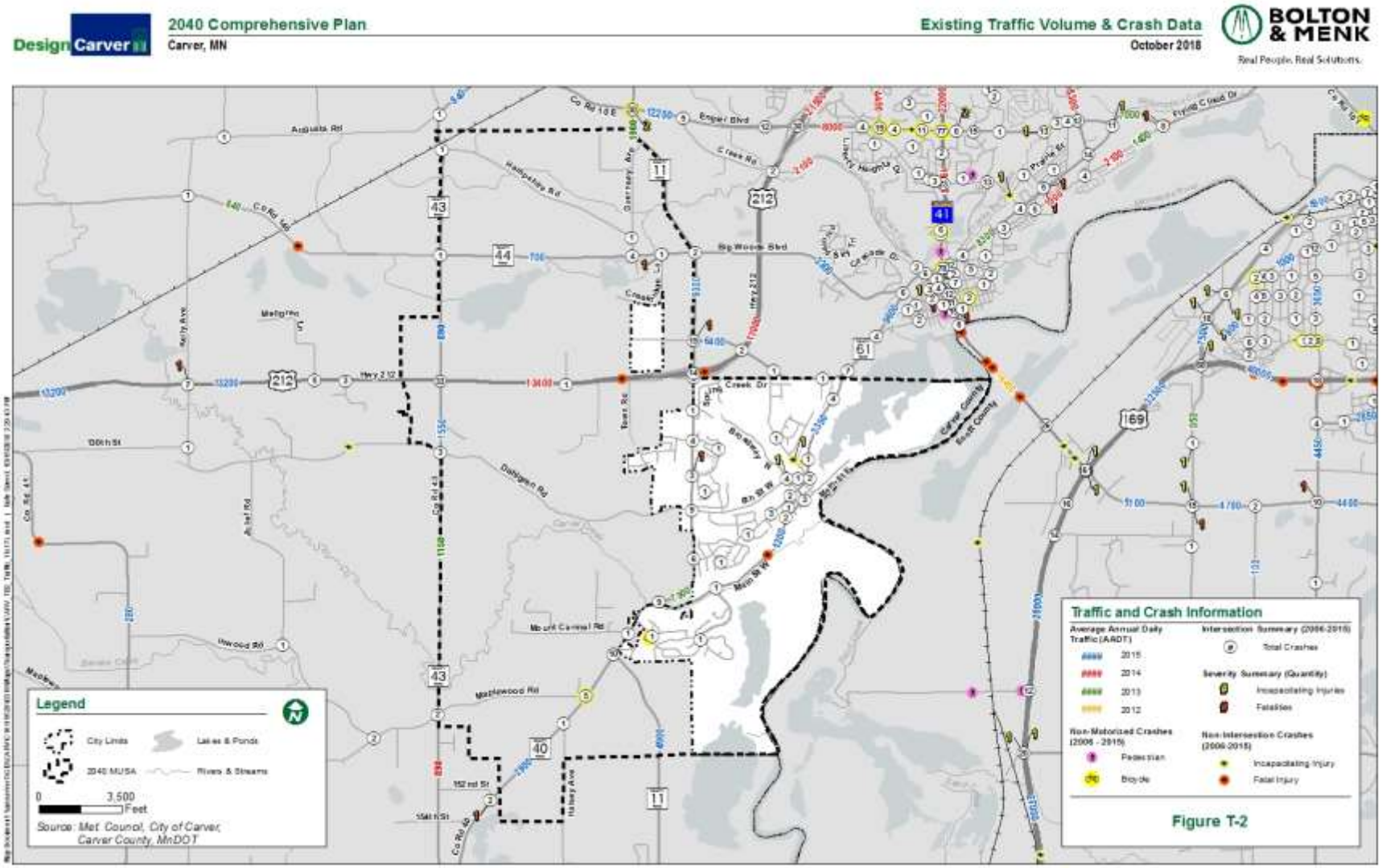
Existing average daily traffic volumes on roadways within Carver are presented on **Figure T-2**. These numbers are based on the most current MnDOT data available for traffic on these roads.

Crash statistics are used to determine which locations on the roadway network have safety concerns, which may need improvements to address. The most recent crash data for roadways are summarized on **Figure T-2**. The highest volumes of crashes in Carver are at:

- Highway 212 and Jonathan Carver Parkway/CSAH 11
- Carver Bluffs Parkway and Jonathan Carver Parkway/CSAH 11
- CSAH 40 and Jonathan Carver Parkway/CSAH 11
- Dahlgren Road/6th Street West and Jonathan Carver Parkway/CSAH 11

Within the City of Carver's 2040 Growth Boundary, the CSAH 61/Chaska Boulevard and Jonathan Carver Parkway/CSAH 11 intersection has the largest volume of crashes.

Figure T-2 – Existing Traffic Volume and Crash Data



Jurisdictional and Functional Classification

Jurisdictional Classification

Roadways are classified based on which level of government owns and has jurisdiction over them. Typically, roadways with higher mobility functions are under the jurisdiction of a county, regional, state, or federal level of government. Likewise, roads with a focus on local circulation and access typically are under the jurisdiction of a local government.

In the City of Carver, three jurisdictions have responsibility for the overall road network. MnDOT is responsible for US Highway 212, and Carver County is responsible for County State Aid Highway (CSAH) 40/Main Street W, Jonathan Carver Parkway/CSAH 11, and Chaska Boulevard/CSAH 61. The City of Carver is responsible for all remaining roadways**.** In the 2040 Growth Boundary, existing roads are also under the jurisdiction of these three levels. **Figure T-3** depicts the existing roadway jurisdictional classification system in Carver.

Functional Classification

Individual roads and streets typically do not operate independently in any major way. Functional classification is a cornerstone of transportation planning. Within this approach, roads are located and designed to perform their designated functions.

The functional classification system defines the hierarchy of roads within a network that distributes traffic from local access routes all the way up to major mobility corridors. A typical system connects neighborhood streets to collector roadways, then to minor arterials, and ultimately the Metropolitan Highway System. Roads are classified based on the degree to which they provide **access** to adjacent land uses and lower level roadways versus providing higher-speed **mobility** for “through” traffic.

The current roadway functional classification system for Carver as identified by the Metropolitan Council is presented on **Figure T-4.** The roadway system presently consists of five roadway functional classifications:

- Principal Arterial
- A Minor Arterial
- Major Collector
- Minor Collector
- Local Street

For arterial roadways, the Metropolitan Council has designation authority. Local agencies may request that their roadways become arterials (or are downgraded from arterial to collector), but such designations or re-designations must be approved by the Metropolitan Council. The agency which has jurisdiction over a given roadway (e.g. Carver County or the City of Carver) has the authority to designate collector status.

Figure T-3 – Existing Roadway Jurisdiction

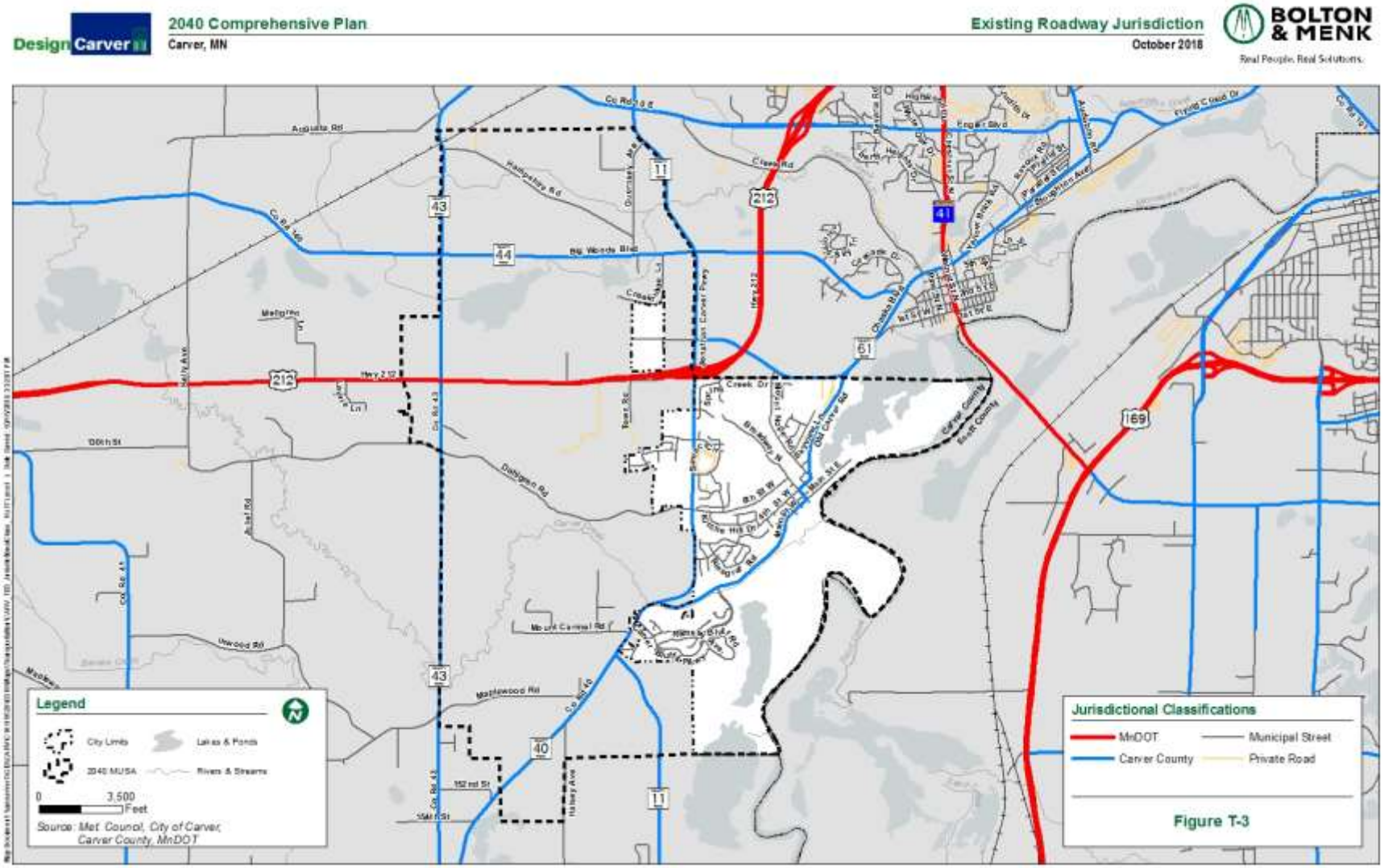
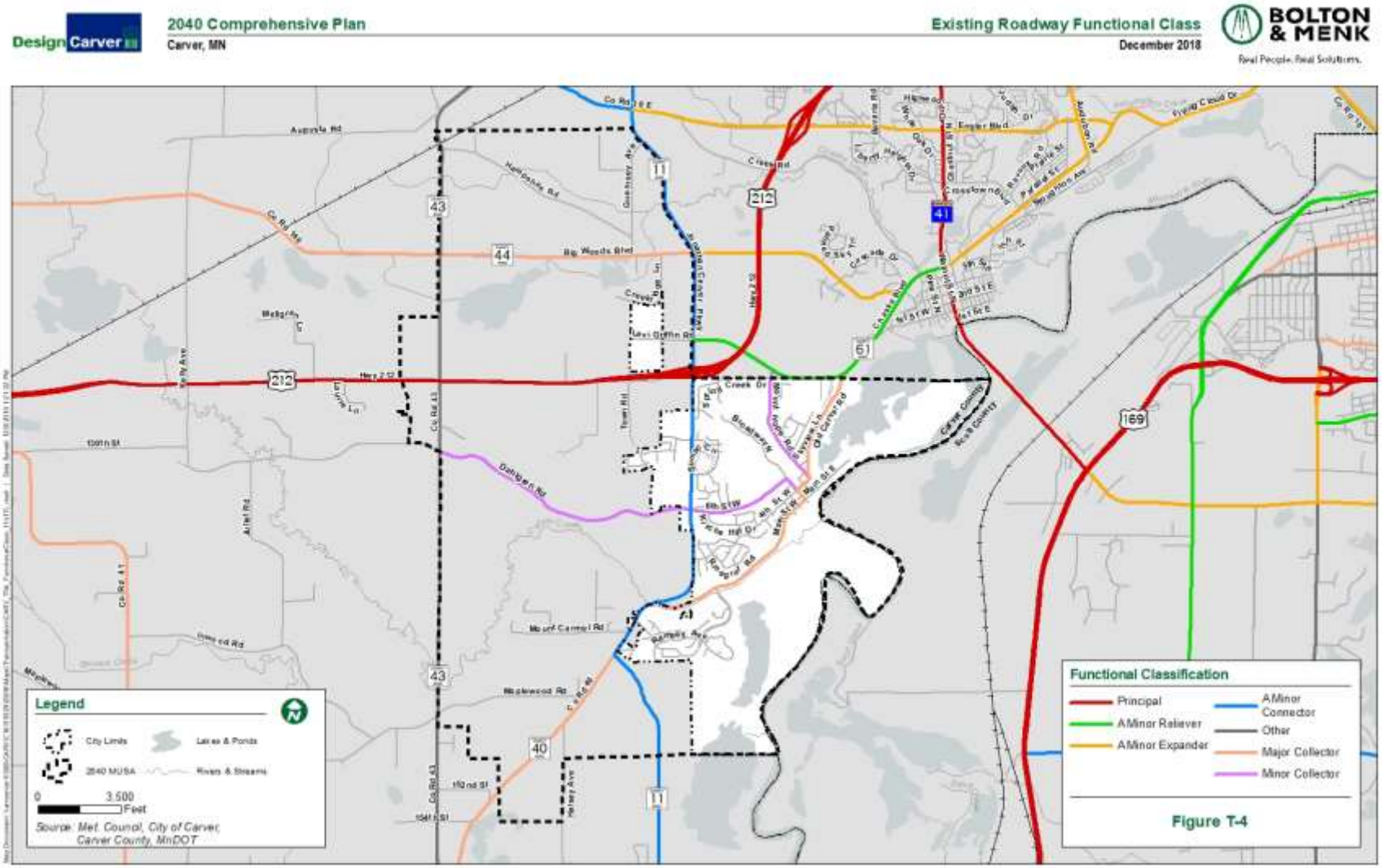


Figure T.4 – Existing Roadway Functional Class



Principal Arterials

Principal arterials are the highest roadway classification and make up the Metropolitan Highway System. The primary function of these roadways is to provide mobility for regional trips, and they do not provide a land access function. They are intended to interconnect regional business concentrations in the metropolitan area, including the central business districts of Minneapolis and St. Paul. These roads also connect the Twin Cities with important locations outside the metropolitan area. Principal arterials are generally constructed as limited access freeways, but may also be multiple-lane divided highways.

The one principal arterial in Carver is Trunk Highway (TH) 212, located in the northern half of the city. This US highway connects the Twin Cities metropolitan area to cities and towns throughout western Minnesota, South Dakota, Wyoming, and Montana. It has been designated as a High Priority Regional Corridor in the Twin Cities, as well as being placed on the National Highway System.

Two other principal arterials – TH 41 and TH 169 – are located nearby and provide additional connectivity to the regional highway network.

Table T-1 | Principal Arterial Roadways

Roadway	From	To	Number of Travel Lanes (Total)
TH 212	CSAH 10/Engler Boulevard	CSAH 41	2-4

A Minor Arterials

These roads connect important locations within the City of Carver to access points of the metropolitan highway system and with important locations outside the city. These arterials are also intended to carry short to medium trips that would otherwise use principal arterials. While A Minor arterial roadways provide more access than principal arterials, their primary function is still to provide mobility rather than access to lower level roadways or adjacent land uses.

Metropolitan Council has defined four sub-categories of A Minor arterials: reliever, expander, connector, and augmentor. These sub-categories are primarily used by the Metropolitan Council to allocate federal funding for roadway improvements. The different types do not have separate, specific design characteristics or requirements. However, they have somewhat different functions in the roadway network, and are typically found in certain areas within the region.

- **Relievers** provide supplementary capacity for congested parallel principal arterials. They are typically found in urban and suburban communities.
- **Augmentors** supplement the principal arterial system in more densely developed or redeveloping areas. They are typically found in urban communities.
- **Expanders** supplement the principal arterial system in less densely developed or redeveloping areas. They are typically found in urban and suburban communities.
- **Connectors** provide safe, direct connections between rural centers and to principal arterials in rural area without adding continuous general purpose lane capacity. They are typically found in rural communities.

As shown on **Figure T-4**, the A Minor network in Carver includes a Connector, providing access to other A Minor arterials and principal arterials, and a Reliever, supplementing the principal arterial network. Current A Minor arterials are identified in **Table T-2**, below. There are no additional A Minor arterials in the 2040 Growth Boundary.

Table T-2 | A-Minor Arterial Roadways

Roadway	From	To	Number of Travel Lanes (Total)
CSAH 11/Jonathan Carver Parkway	US 212	US 169	2
CSAH 61/Chaska Boulevard	CSAH 11	TH 41	2

Major and Minor Collectors

Collector roadways provide a balance of the mobility and land-use access functions discussed above. They generally serve trips that are entirely within the city and connect neighborhoods and smaller commercial areas to the arterial network. Minor collectors generally are shorter in length, with lower volumes and lower speeds than major collectors. Current major and minor collector roadways in Carver are identified in **Table T-3**, below. CSAH 44/Big Woods Boulevard is an additional Major Collector located within the 2040 Growth Boundary.

Table T-3 | Major and Minor Collector Roadways

Roadway	From	To	Number of Travel Lanes (Total)
Major Collectors			
County Road 40	CSAH 61/Chaska Boulevard	CSAH 50	2
Minor Collectors			
Dahlgren Road/ 6th Street West	County Road 40	CSAH 43	2
Mount Hope Road	CSAH 61/Chaska Boulevard	County Road 40	2

Problem Issues and Locations

In discussions with city leadership, staff, and residents, the biggest transportation issue raised was related to Jonathan Carver Parkway/CSAH 11. As the city's main north-south corridor providing connectivity to the regional highway network and neighboring municipalities, Jonathan Carver Parkway experiences regular congestion during peak hours. Additionally, as identified in crash data provided earlier in this chapter, several intersections along the parkway are traffic safety concerns due to high crash counts. Growth and development planned along this corridor in Carver will likely continue to increase the traffic volumes using this roadway in the future. As of 2018, the City of Carver is involved in a corridor study for Jonathan Carver Parkway.

The city is also concerned about the future of Highway 212, its main east-west corridor. The city has been involved in ongoing work with the County, MnDOT, and local jurisdictions regarding phased improvements and upgrades to this corridor.

In addition to improvements to these two facilities to address capacity and safety issues, this chapter addresses the need for a supporting roadway network that increases connectivity and provides alternatives for traffic.

Summary of Relevant Transportation Studies

A summary of transportation studies relevant to the City of Carver's roadway system is provided below.

Carver County Studies

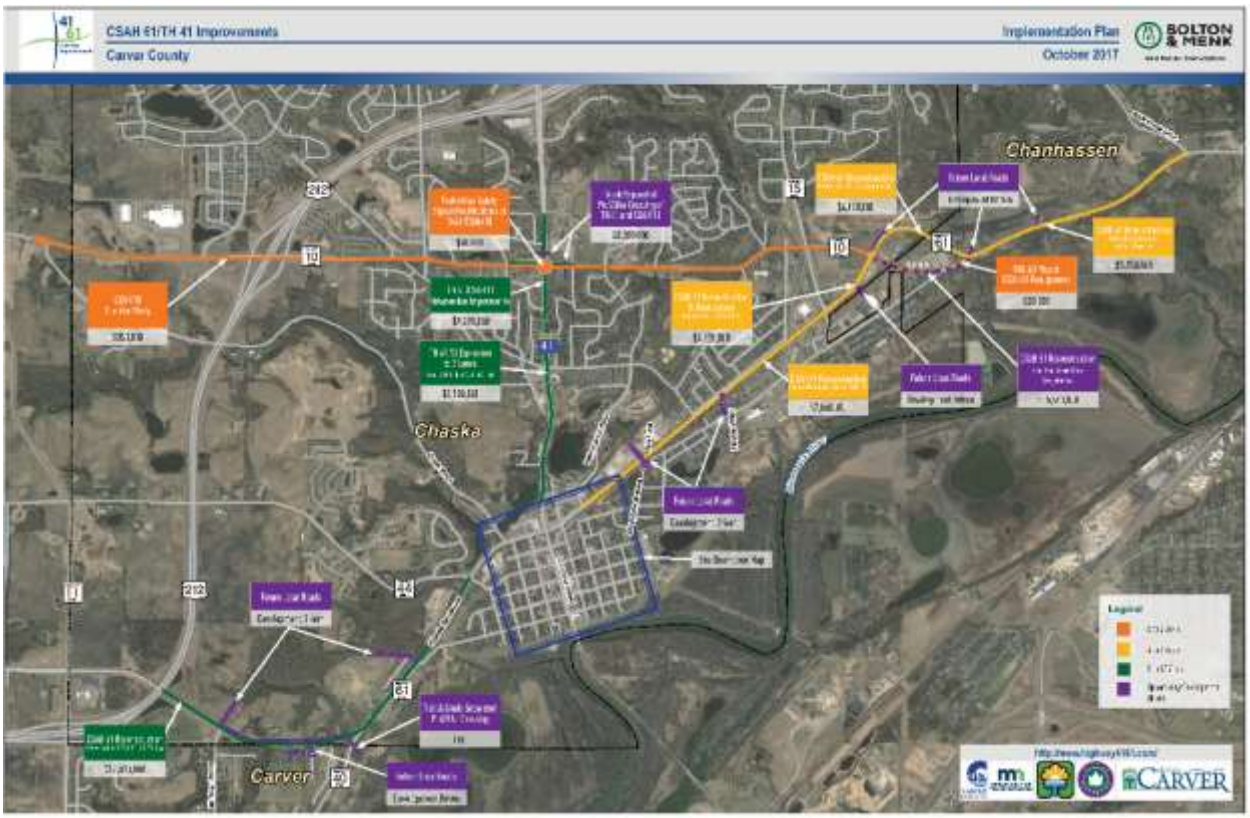
County Road 41 and Highway 61 Corridor Study

Carver County and MnDOT, in partnership with the Cities of Chaska, Chanhassen and Carver, are working together to identify transportation system improvements on County Highway 61 and State Highway 41. These corridors serve important roles in connecting the southwest metro area and providing access and connectivity within the local communities they serve to move pedestrians, automobiles, transit, and freight users alike.

The City of Carver is located in the western subarea of the plan's overall study area. Issues in this area include the fact it is a large growth area with significant new development expected, a lack of bicycle and pedestrian facilities, challenging topography, and a skewed intersection at CSAH 40.

Recommended improvements for the western subarea of the study include:

- Reconstruction of CSAH 61 from east of CSAH 11 to CSAH 44 (in 8-15 years)
- Future local road connections (development driven)
- New trail improvements along CSAH 61, with a grade separated bike/pedestrian crossing (development and opportunity driven)



Highway 11 Study – West Carver Area (2018-2019)

Carver County and the City of Carver are partnering on a corridor study along Jonathan Carver Parkway (Highway 11) between Highway 40 (south leg) and US Highway 212. The purpose of the study is to identify the short-, mid-, and long-term improvements along the corridor to address the transportation needs of the community and region for the next 20 years. The local supporting roadway network that feeds into and parallels Jonathan Carver Parkway will also be addressed during the study, which is anticipated to be completed in 2019.

The corridor has been experiencing incremental growth over the years and residential and commercial development is anticipated to intensify over the next 10 years, in Carver, as well as other nearby communities. Traffic demands on the corridor are expected to continue to increase significantly, prompting a need to expand Jonathan Carver Parkway between CH 40 (south leg) and US Highway 212. The expansion will support the additional traffic, maintain safety, and accommodate bicycle and pedestrian activity. Supporting roadway network needs will also be considered to relieve travel demands on Jonathan Carver Parkway and provide alternate north-south continuity as the City of Carver and Carver County develops.

County Roadway Safety Plan (2013)

The Carver County Roadway Safety Plan was commissioned by MnDOT as part of a statewide highway safety planning process. This study covers the entire Carver County roadway system, and aims to reduce the number of fatal and serious injury crashes on county highway systems. The study analyzed safety data and recommended a number of improvements.

Priority corridor and intersection improvement projects in the City of Carver and the 2040 growth area are identified in the tables below. Additionally, the study identified a number of rural curves along both CSAH 11 and CSAH 40 that need safety improvements.

Table T-4 | County Roadway Safety Plan Priority Corridor Projects

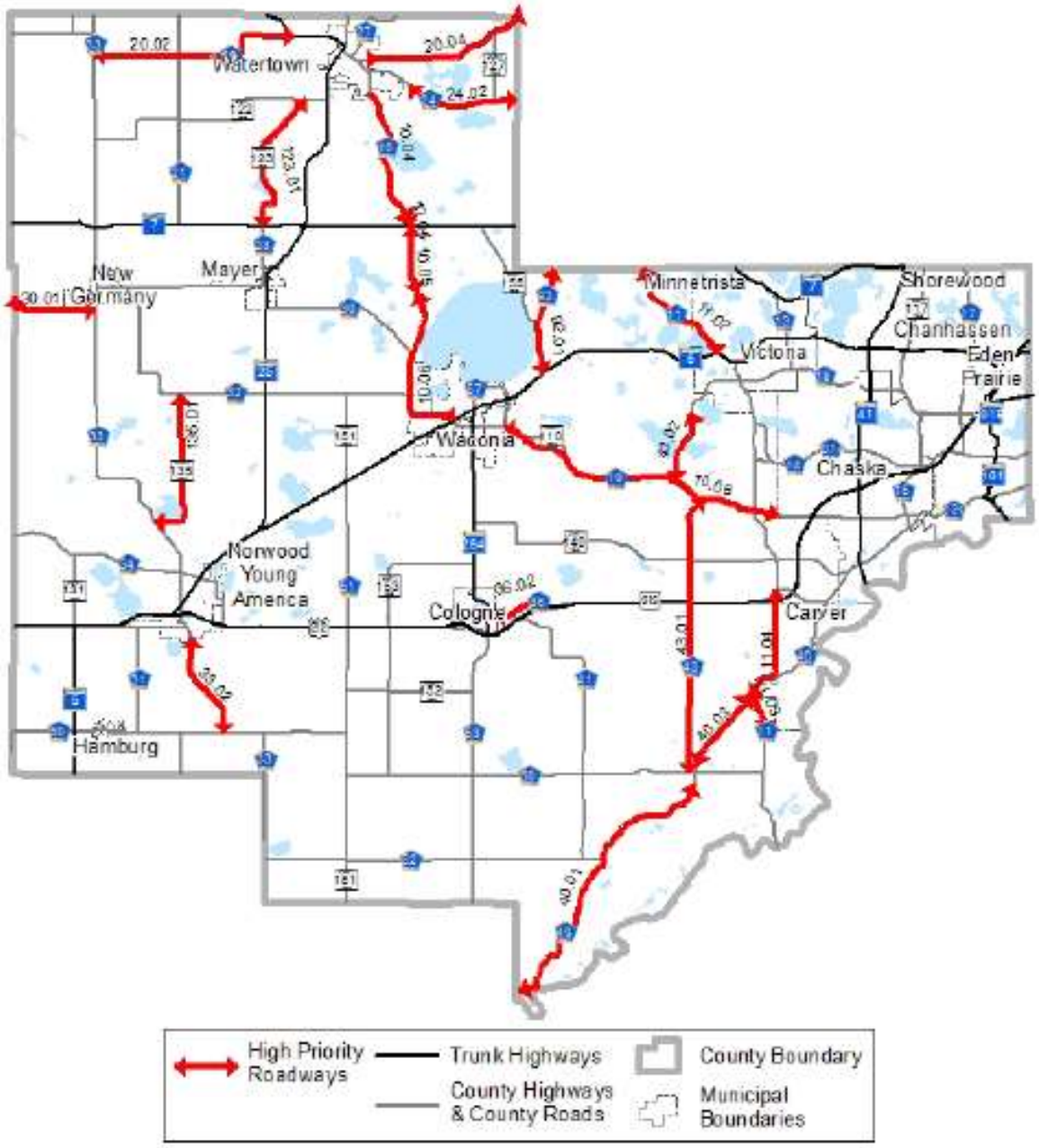
Corridor	Start	End	Recommendation
CSAH 11	San Francisco Twp.	CSAH 50	Rumble strip
CSAH 11	CSAH 40	CSAH 61	Ground in wet-reflective markings
CSAH 40	East Union Twp.	CSAH 11	Rumble strip
CSAH 40	Sibley County	East Union Twp.	Pave shoulders, rumble strip, safety wedge
CSAH 43	CSAH 50	CSAH 10	Rump strip, centerline rumble strip

Table T-5| County Roadway Safety Plan Priority Rural Intersection Projects

Intersection	Recommendation
CSAH 43 & CSAH 50; Nathan Cr T-514	Install street lights, stop ahead signs, and related improvements
CSAH 43 & TH 212	Mainline dynamic warning sign, streetlights, and related improvements
CSAH 40 & CSAH 50	Install street lights, stop ahead signs, and related improvements

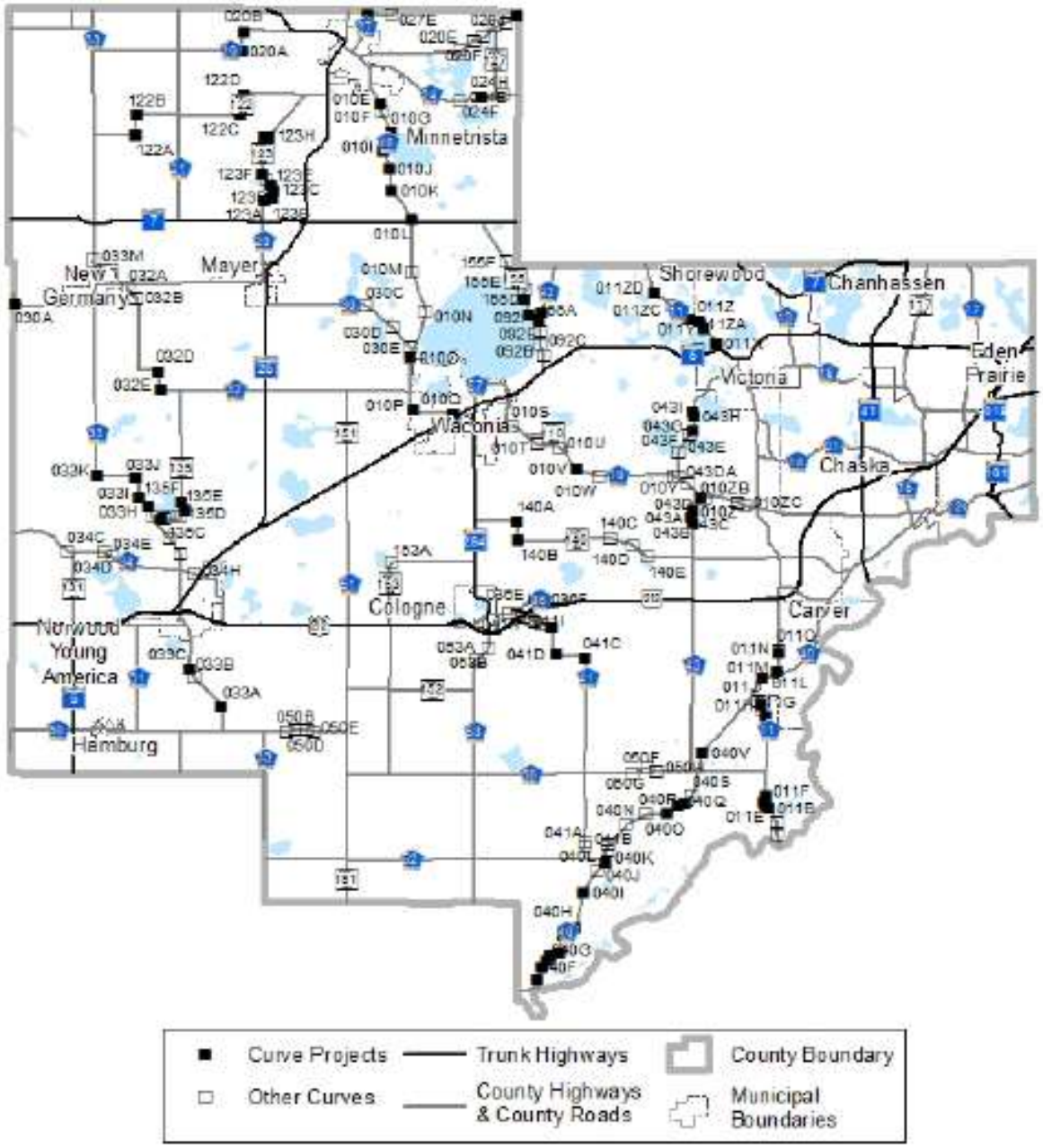
The following illustrations from the plan show the location of priority corridors identified in the safety plan countywide.

The expectation of the plan was that it would be periodically updated to reflect additional safety needs.



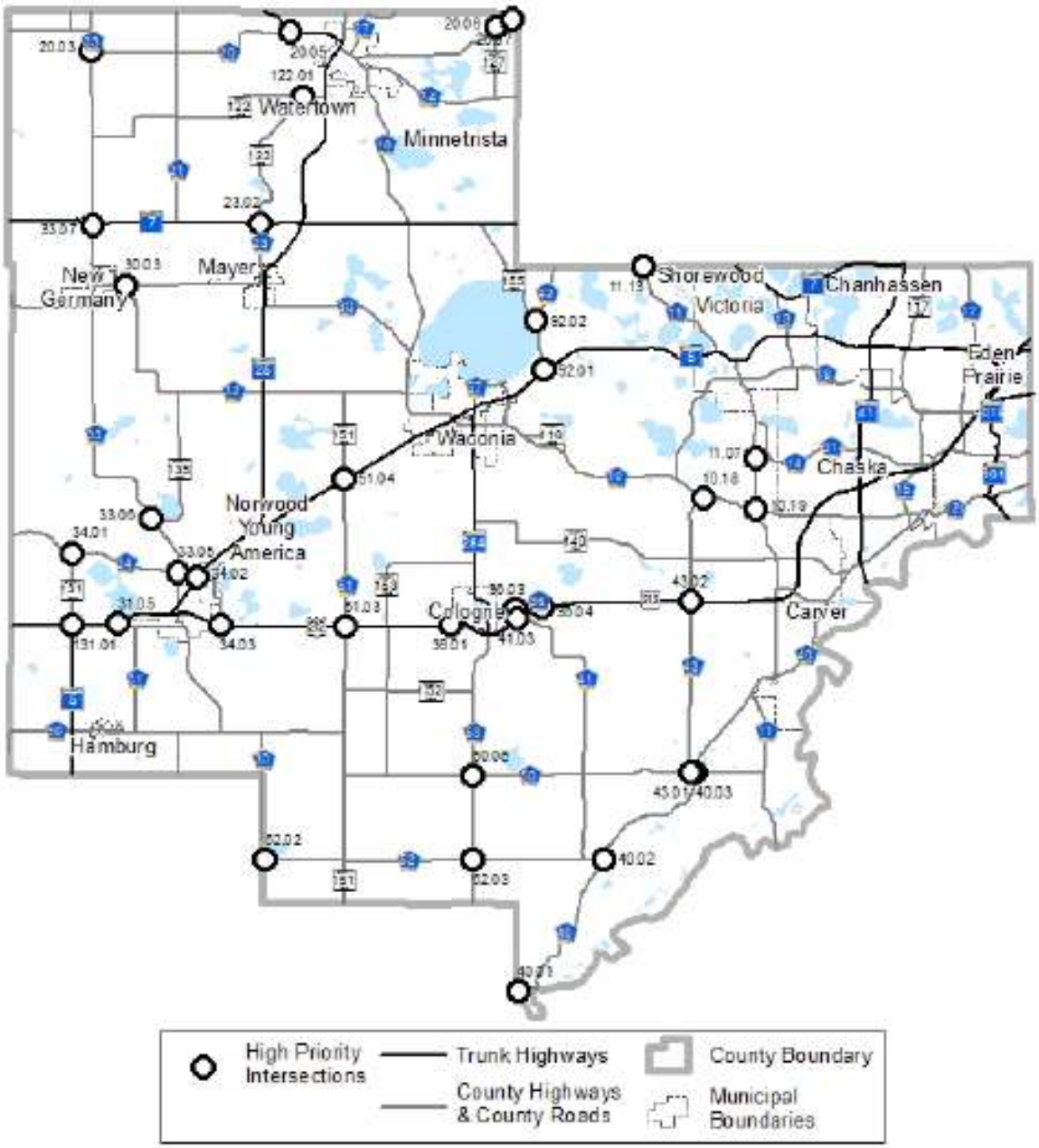
Source: CRSP Safety Analysis, 2013

Figure 4-10
Rural Segment Projects



Source: CRSP Safety Analysis, 2013

Figure 4-11
Rural Curve Projects



Source: CRSP Safety Analysis, 2013

Figure 4-12
Rural Intersection Projects

Regional Studies

Principal Arterial Intersection Conversion Study (2017)

The Metropolitan Council commissioned this regional study to evaluate at-grade intersections which may be candidates for conversion to an interchange.

While not identified as a top priority, the TH 212 & CSAH 43 intersection was advanced for Phase II analysis. It currently does not meet the study's established volume criteria. However, local stakeholders identified that this location warrants Phase II consideration based on potential future development in the area, as well as its role in the overall TH 212 capacity expansion concept. Stakeholder input suggested that access modification between CR 43 and the existing interchange to the east at Jonathan Carver Parkway should be considered.

Highway 212/44 Interchange Project

Although not directly located in the City of Carver, the Highway 212/44 Interchange Project in the City of Chaska will ease traffic congestion and address anticipated development and growth in Chaska and in the area southwest of Chaska.

The overall objective of the project includes approximately two miles of safety and modernization improvements along Highway 44 between Highway 11 and Highway 61 (Chaska Blvd.) in Chaska and a new partial Highway 212 interchange. The project includes reconstruction of the highway from a two-lane undivided to a two-lane divided urban highway. At the new Highway 212 interchange, northbound entrance and a southbound exit ramps will connect to the existing freeway.

As part of the project, a number of technical evaluations will be conducted to identify existing and future issues associated with:

- Mobility/Congestion
- Safety
- Pedestrian/Bicycle Connectivity
- Infrastructure Needs

Roadway System Plan

Future Roadway Network

Figure T-5 shows the future 2040 roadway network planned for the Carver area, including the existing and anticipated number of travel lanes on arterials and major collectors.

The roadway network assumed for the 2040 analysis include the existing network, plus projects that have been programmed and/or planned. The roadway projects that will enhance the existing network that are anticipated to be in place as part of the 2040 network are identified and summarized below:

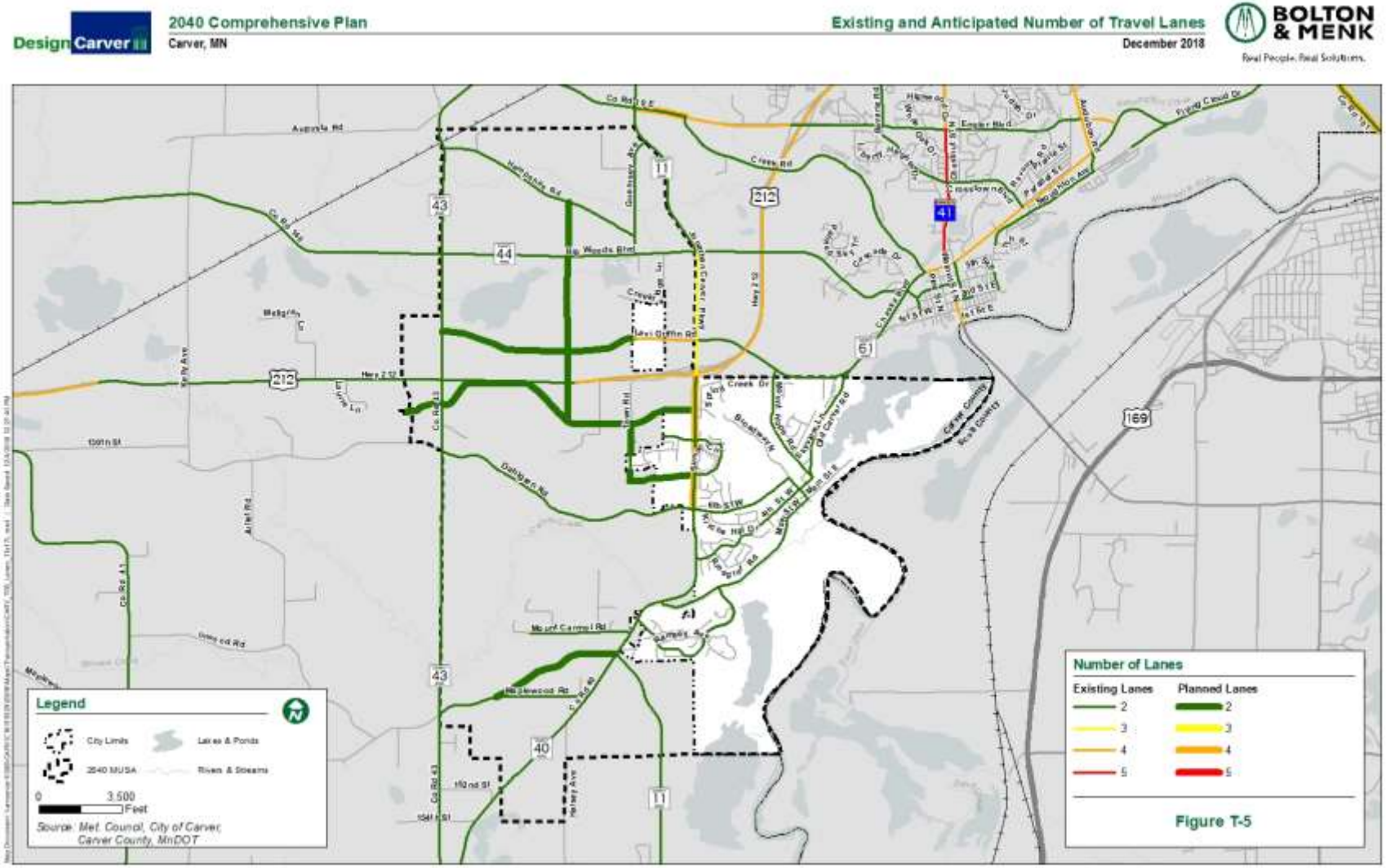
- CSAH 140 bridge over Carver Creek replacement (2017)
- CSAH 43 from Maplewood Road to CSAH 50 improvements (2017)
- TH 212 at CSAH 41 & 36 intersection safety improvements (2018)
- 3rd Street culvert replacement – City project (2018)
- CSAH 44 from TH 284 to TH 212 improvements (2020)
- CSAH 40 from Dahlgren Road to CSAH 11 improvements (2021)
- CSAH 11/Jonathan Carver Parkway improvements (2022)
- Monroe Drive extension

While outside the Carver growth boundary, plans for the TH 212 & CSAH 44/Big Woods Boulevard interchange north of the city in Chaska will impact traffic and access to properties in the northern portion of Carver's growth area. These projects are considered non-CIP, and will be development driven.

- CSAH 44 & TH 212 interchange (2019)
- CSAH 44 from TH 212 to Cemetery Drive improvements (2019)
- CSAH 44 from CSAH 11 to TH 212 improvements (2020)

The figure below illustrates priority routes for improvement within the vicinity of Carver, as identified through a former study.

Figure T-5 – Existing and Anticipated Number of Travel Lanes



Transportation Analysis Zones

As part of the support for regional, county, and local transportation planning, the Metropolitan Council has developed and maintained a regional travel demand model. This model forecasts 2040 traffic volumes on major roadways throughout the Twin Cities region, based on expected population and job growth, observed travel behavior, and other factors. Since the model is mainly designed to work at the regional level, Carver County has done additional work to refine the analysis and results to provide more locally relevant forecasts for the county and its cities. The model information included in this plan is derived from the Carver County modified version of the regional model.

Traffic projections are based on the use of Transportation Analysis Zones (TAZs). The TAZs for the City of Carver, as defined by the Metropolitan Council, are presented on **Figure T-6**. TAZs are defined to reflect travel patterns for an area, and are used as a unit of analysis in a regional travel demand model which forecasts future travel patterns based on expected growth of an area. The model's outputs include estimated traffic volumes and capacity on the roads included in the model (typically those with a functional class of collector or above).

The anticipated land use patterns discussed in the land use chapter of this Comprehensive Plan were used to develop the 2040 population, household, and jobs projections by TAZ are were used in the model. The TAZ socioeconomic data projected for 2040 conditions are presented in **Table T-6**.

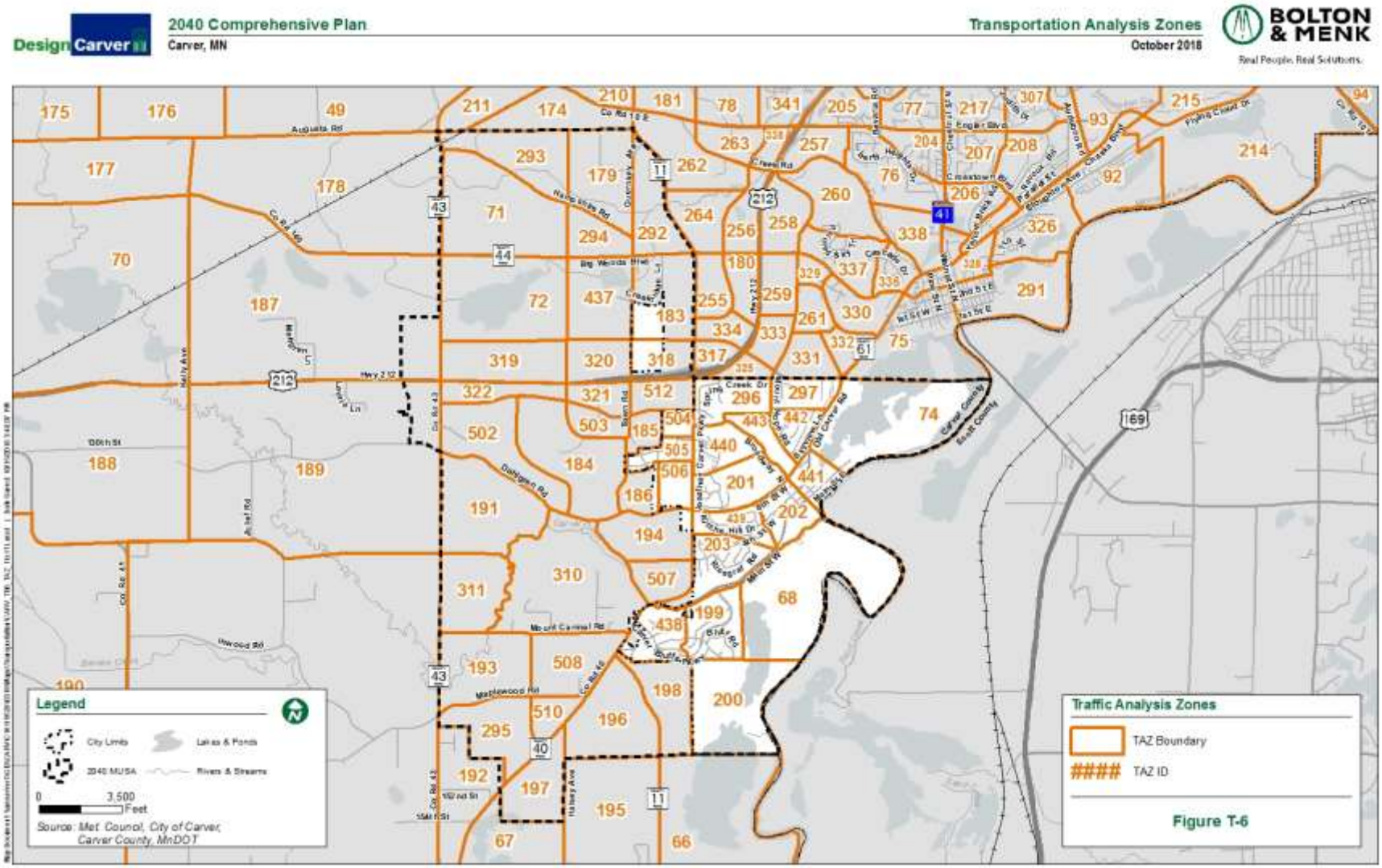
Table T-6| City of Carver TAZ Data

TAZ		2020				2030				2040			
METC	CARVER CO	POP	HH	R-EMP	NON-R	POP	HH	R-EMP	NON-R	POP	HH	R-EMP	NON-R
360	201	475	160	0	0	520	170	0	0	530	175	0	0
360	296	737	250	0	0	737	273	0	0	737	273	0	0
360	297	120	43	0	0	170	60	0	0	210	80	0	0
360	439	350	115	0	0	430	185	0	0	420	185	0	0
360	440	564	180	0	0	564	209	0	0	564	209	0	0
360	442	399	120	0	0	390	120	0	0	375	120	0	0
360	443	0	0	0	0	0	0	0	0	0	0	0	0
357	71	30	9	0	0	25	10	0	0	30	10	0	0
358	72	12	4	0	0	20	10	0	0	700	225	0	0
357	179	20	7	2	8	2	1	3	20	225	75	5	75
359	184	50	17	0	0	540	162	0	0	870	300	0	0
359	185	45	15	0	0	405	150	0	0	440	150	0	0
359	186	22	11	0	0	350	115	0	0	320	115	0	0
356	187	0	0	5	90	0	0	8	105	0	0	5	130
355	189	0	0	0	0	0	0	0	0	60	20	5	60
354	191	30	10	0	0	30	10	0	0	30	10	0	0
352	196	33	11	0	5	33	11	0	8	33	11	0	12
352	197	6	3	0	0	6	6	0	0	6	3	0	0
353	198	6	3	0	0	0	0	0	0	0	0	0	0
357	293	3	1	0	0	3	1	0	5	3	1	0	100
357	294	15	5	0	0	110	55	0	0	400	150	0	0
354	295	10	3	0	0	10	3	0	0	10	3	0	0
354	311	6	2	0	0	6	2	0	0	6	2	0	0
358	319	0	0	0	5	280	150	0	50	540	200	5	75

TAZ		2020				2030				2040			
METC	CARVER CO	POP	HH	R-EMP	NON-R	POP	HH	R-EMP	NON-R	POP	HH	R-EMP	NON-R
358	320	0	0	0	80	200	100	5	175	450	150	8	200
359	512	227	75	0	5	227	84	5	10	227	84	10	30
359	322	2	1	0	15	2	1	0	20	700	250	5	20
358	437	45	15	0	0	225	80	0	0	450	150	0	0
353	68	0	0	0	0	0	0	0	0	0	0	0	0
360	74	0	0	0	0	0	0	0	0	0	0	0	0
358	183	40	15	2	95	35	14	4	190	25	10	50	310
354	193	6	2	0	0	6	2	0	0	6	2	0	0
354	194	0	0	2	70	0	0	3	80	0	0	5	90
353	199	525	170	0	0	500	150	0	0	461	150	0	0
353	200	0	0	0	0	0	0	0	0	0	0	0	0
360	202	179	66	20	51	180	70	23	56	170	68	25	60
360	203	704	240	0	0	850	280	0	0	750	280	0	0
363	292	4	2	0	10	4	2	0	20	730	350	10	143
354	310	80	29	0	0	324	90	0	0	1200	400	0	0
358	318	0	0	35	20	0	0	40	32	0	0	45	35
353	438	460	155	0	0	800	255	0	0	750	250	0	0
360	441	104	36	30	70	100	40	42	80	80	40	45	90
359	505	325	120	0	0	647	238	0	0	643	238	0	0
359	502	21	7	0	0	66	20	0	0	300	100	0	0
354	510	3	1	0	0	3	1	0	0	3	1	0	0
354	508	60	20	0	0	60	20	0	0	480	180	0	0
354	507	0	0	0	20	0	0	0	23	0	0	0	25
359	506	540	185	0	0	690	230	0	0	621	230	0	0
359	321	42	12	0	0	450	150	0	0	540	200	0	0
359	503	0	0	0	0	300	100	0	0	405	150	0	2
359	504	0	0	0	10	0	0	0	23	0	0	0	20
Total		**6300**	**2120**	**96**	**554**	**10300**	**3630**	**133**	**897**	**15500**	**5600**	**223**	**1477**
Employment Total					**650**				**1030**				**1700**

Source: Carver County and City of Carver

Figure T-6 – Transportation Analysis Zones



2040 Traffic Forecasting

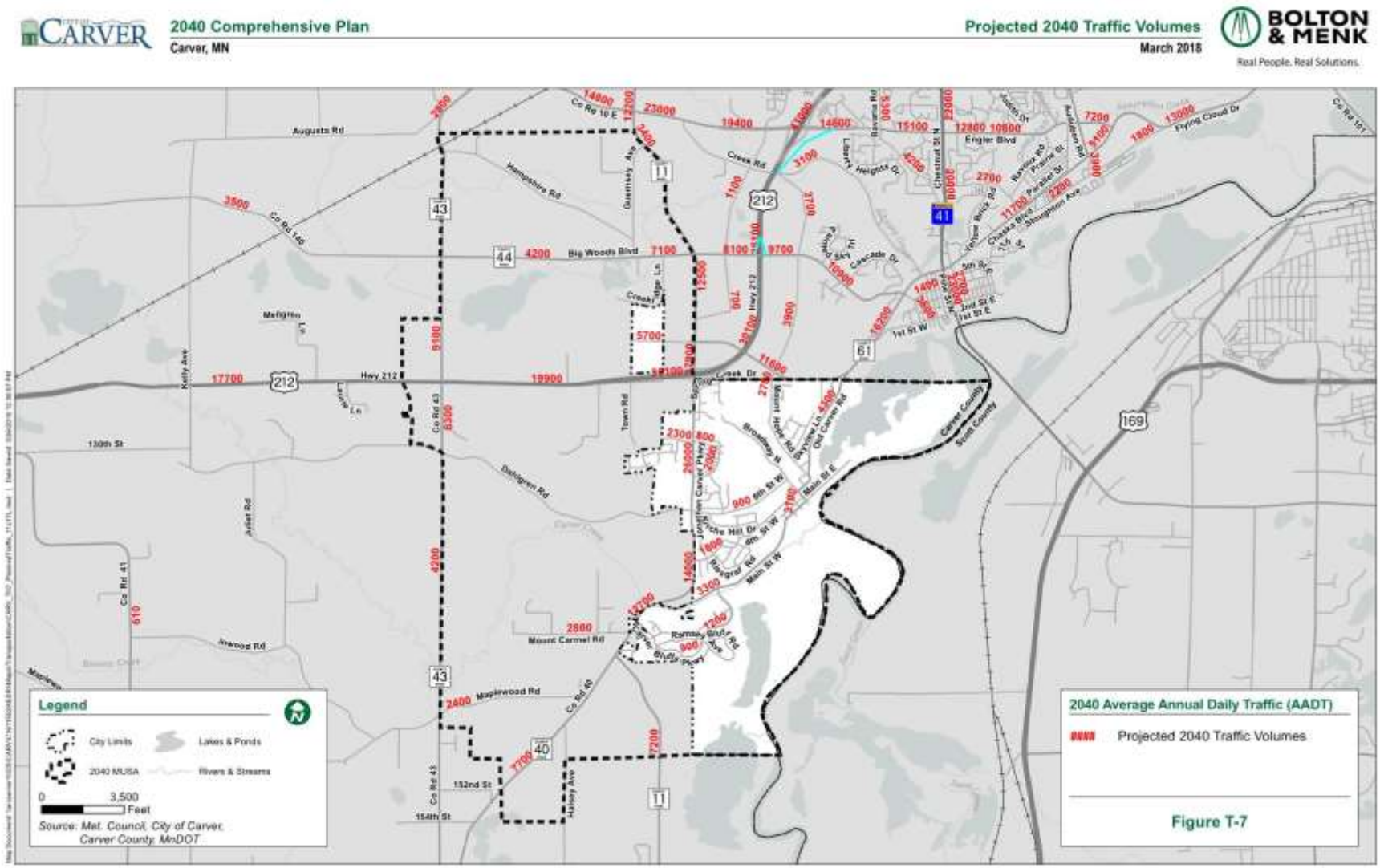
Traffic projections for the year 2040 are from the Carver County transportation model. They were made based on modifications to the regional Metropolitan Council model. Factors considered in developing the model included:

- Historic trend analysis for volumes
- Assessment of anticipated local and regional development patterns and associated TAZ information
- Discussion and coordination with local, county, and regional staff regarding future plans and the update the regional travel demand model
- Review of other studies and plans for consistency

The 2040 traffic projections are presented on **Figure T-7**. These reflect forecasted 2040 traffic volumes on roadways that are currently funded through a capital improvement plan (CIP). The purpose of this model run is to identify future capacity deficiencies in the roadway network, so that the plan can address them with planned improvements.

Comparing this with existing volumes on **Figure T-2**, it is apparent that these new volumes overall represent a substantial increase over existing levels of traffic. Without additional investment in the roadway network beyond the current CIP projects, volumes couple double or triple on several main corridors – including Highway 212, Jonathan Carver Parkway/CSAH 11, CSAH 61, CSAH 40, and CSAH 43. These increases in volumes reflect the impact of forecasted growth in the community through 2040.

Figure T-7 – Forecasted 2040 Traffic Volumes – TO BE UPDATED ONCE COUNTY MODEL RUNS COMPLETE



Future Capacity Deficiencies

In addition to forecasting volumes, the travel model can be used to determine roadways with future capacity deficiencies – defined as areas where traffic volumes regularly exceed roadway capacity.

All roads are designed to handle a defined level of traffic volume. Once the road begins to approach or exceed capacity, traffic movements become more difficult and there may be congestion. It is at that point when it is determined whether there needs to be a capacity increase in the transportation system – through the addition of new travel lanes, new roads, intersection or interchange redesign, or other capacity-increasing improvements.

A planning-level analysis was performed to identify roadway segments where capacity problems are anticipated to occur by 2040. Based on the projected 2040 traffic volumes and the assumed 2040 roadway network, an analysis of anticipated future congestion conditions was performed. This analysis used the volume-to-capacity method. The volumes were taken from the 2040 projections discussed under the previous heading. The capacity is based on typical capacity levels for different types and configurations of roadways as summarized in **Table T-7**.

Table T-7| Typical Traffic Capacity by Roadway Type/Configuration

Roadway Design	Planning Level Daily Capacity
Local	
Gravel Roadway	Up to 500
Local 2-Lane	Up to 1,000
Collector and Arterial	
Urban 2-Lane	7,500 – 12,000
Urban 3-Lane or 2-Lane Divided	12,000 – 18,000
Urban 4-Lane Undivided	Up to 20,000
Urban 4-Lane Divided	28,000 to 40,000
4-Lane Freeway	Up to 70,000

The results of the volume to capacity analysis are shown on **Figure T-8.** The roadway segments where projected volumes exceed planning-level capacity are summarized in **Table T-8**, below.

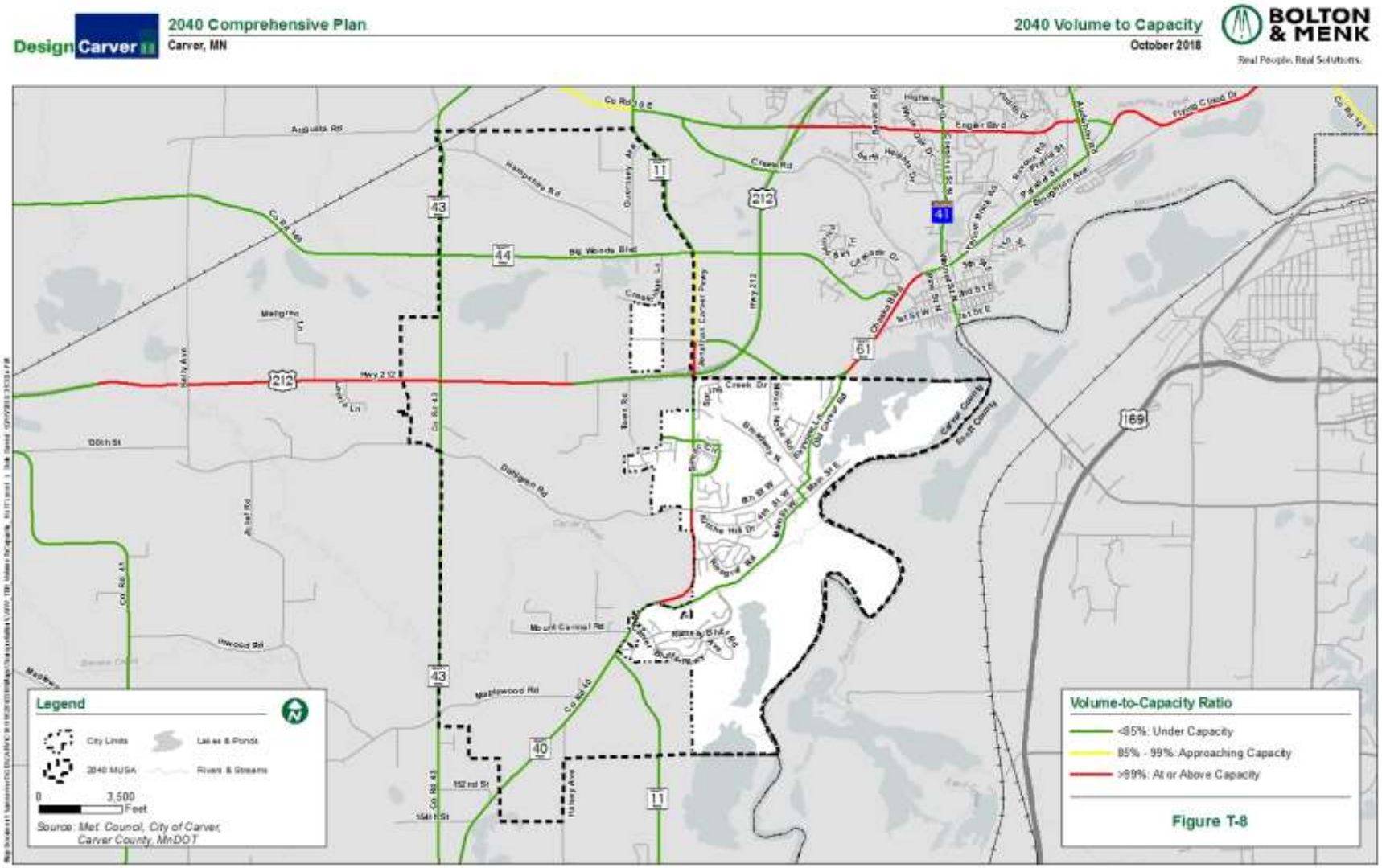
Table T-8| Projected 2040 Roadway Capacity Deficiencies

Roadway Segment	Volume to Capacity Ratio
US Highway 212 – Kelly Avenue to CSAH 43	1.18
US Highway 212 – CSAH 43 to CSAH 11	1.32
CSAH 11/Jonathan Carver Parkway – US Highway 212 to CSAH 61	1.38
CSAH 11/Jonathan Carver Parkway – Dahlgren Road to CSAH 40	1.40

As can be seen on **Figure T-8**, there are additionally some roadway segments which are "approaching capacity," defined has having a volume-to-capacity ratio of 0.85 – 0.99. These locations should be monitored in the coming years to determine if problem conditions develop and whether next steps should be implemented including more detailed analysis. This includes:

- CSAH 11/Jonathan Carver Parkway – CSAH 44 to CSAH 61

Figure T-8 – 2040 Volume to Capacity – TO BE UPDATED ONCE COUNTY MODEL RUNS COMPLETE



Recommended Roadway System Improvements

Roadway Segments

A suitable arterial-collector system to accommodate future development and traffic patterns is necessary in the growing community of Carver. The existing county and state highways have historically provided much of the local circulation and connectivity; however, these roadways will not be capable of meeting both the future local and regional travel demands. A city collector system consisting of major collector and minor Collector streets is needed to provide acceptable local circulation and access to developing areas, as well as to enable the Principal Arterial and Minor Arterial roadways to serve longer, regional travel. It is not anticipated that all of the proposed collector streets will be constructed by 2040. Rather, collector streets should be constructed as development occurs.

Based on the results of this analysis, the following new roadways are recommended. They are also shown on **Figure T-9**.

- **Jonathan Carver Parkway/CSAH 11 improvements** – Jonathan Carver Parkway/CSAH 11 is forecasted to be over capacity on several segments by 2040. This roadway will need to be widened to accommodate demand. While additional analysis by the County is needed, it is anticipated that it may be up to six lanes north of Dahlgren Road and four lanes south. A study now underway (anticipated to be complete in 2019) will provide more specific recommendations for the future roadway configuration.
- **Collector roadway network to support growth** – as the city grows westward, an improved roadway network should be developed to provide connectivity to the existing county roadway network and reduce the travel demand on Jonathan Carver Parkway/CSAH 11. This will most likely include frontage roads on the north and south sides of Highway 212 between CSAH 11 and CSAH 43, as well as other connections. See Figure T-9 for approximate location of these future roadways.
- **New access at Highway 212** – The improved roadway network should include a new access to Highway 212 between CSAH 11 and CSAH 43. The future of this intersection (overpass, limited or full interchange) will need to be determined through additional analysis and discussions as planning for Highway 212 continues.
- **Other roadways** – Capacity and safety improvements may be needed on other existing roadways, which will have to be updated to meet increased usage. This includes CSAH 43, CSAH 45, Maplewood Road, Dahlgren Road, and 6th Street. Improvements may include upgrading to a 2-lane with turn lanes or 3-lane facility depending upon the access.

The timing of these improvements has not yet been finalized. As is the case with the local street network, timing of construction for collector routes will likely be development driven. The City should continue to work with the County and other agencies to monitor the actual growth in traffic on roadways and intersections and to determine the appropriate timing on any improvements.

Additionally, the City should work with other agencies and developers to provide adequate access management on the study roadways, consistent with city, county, and state guidelines as appropriate. This will increase the safety and capacity of the roadway network.

Intersections

It is beyond the scope of this 2040 transportation plan to perform intersection analyses with detailed

recommendations. However, based on information gathered as part of this planning process, including previous studies, the following intersections will likely require attention over the 2040 planning horizon. It is anticipated that these may need signalization or roundabouts, although further analysis is needed to determine the appropriate treatment.

- CSAH 40 is planned for a turnback route to the City of Carver. As part of improvements to the corridor, the intersections of CSAH 40/CSAH 11 and CSAH 40/CSAH 61 may need to be addressed.
- Many of the intersections along Jonathan Carver Parkway/CSAH 11 need additional evaluation for improvements. The Jonathan Carver Parkway Study currently underway will have some recommendations for improvements. The study is anticipated to be complete in 2019.

As with the roadway network, the City should continue to monitor traffic and safety data in the city and growth area to determine needs for capacity and safety improvements to area intersections. This may include addition of turn lanes, improved signage and lighting, new intersection design such as roundabouts, or other improvements.

Future Functional Classification

Re-designations of roadways involving the A-minor arterial functional classification (e.g. from collector to arterial, from arterial to collector, or changing designations within arterial) are under the authority of the Metropolitan Council. No changes to the existing arterial system are proposed at this time.

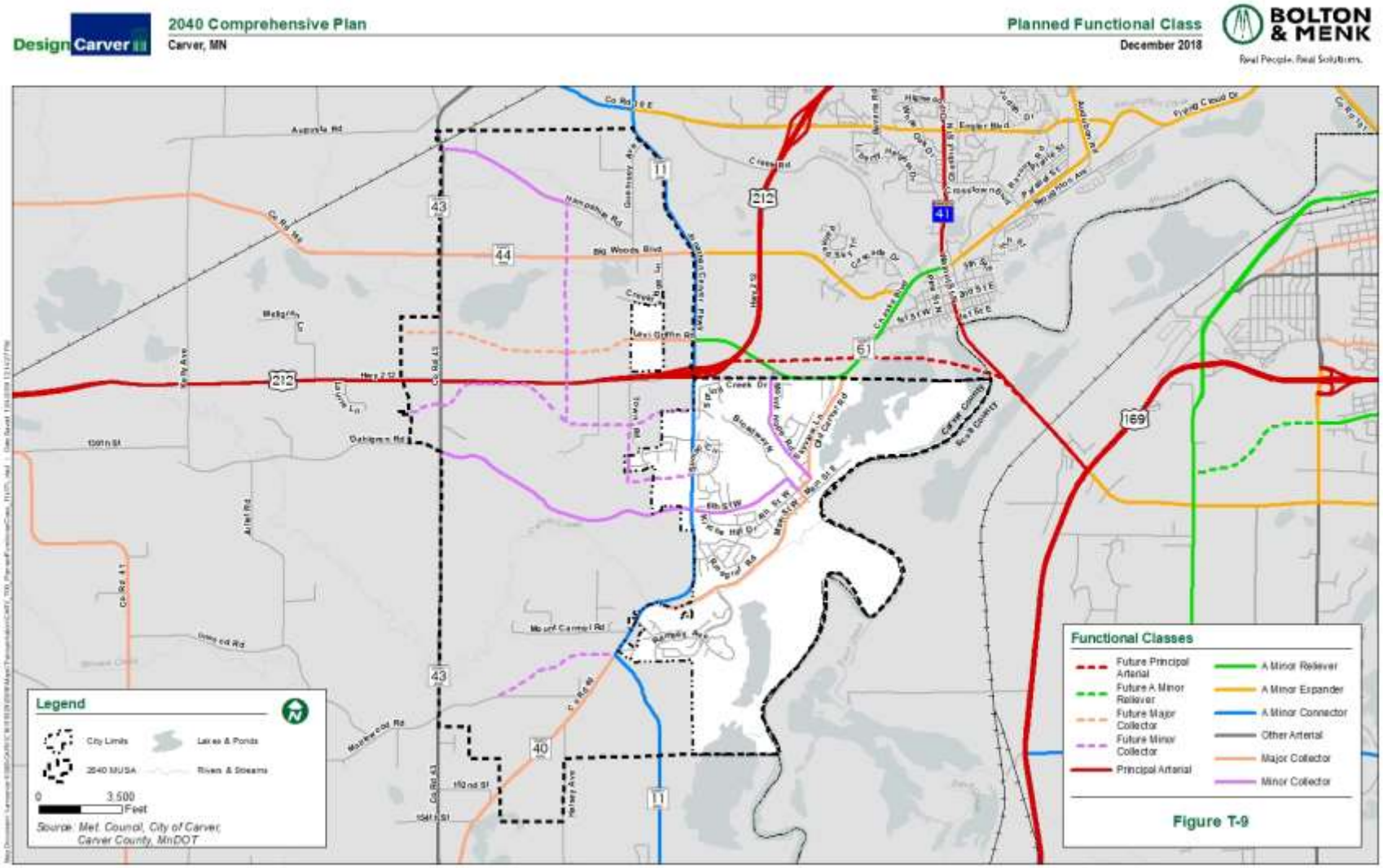
For collector roadways, the functional class designation is under the authority of the agency which owns the given road. This plan recommends the designation of additional new collector routes that will serve the city's western growth area. These locations are depicted on **Figure T-9**.

Future Jurisdictional Classification

Jurisdictional changes are made when it is determined that a road is better maintained by another jurisdiction. Roads are sometimes turned back to local communities, and hence removed from a county or regional system. Likewise, local roads at times become county or regional routes, often in the context of new development which changes the function and usage of the roadway within the network. Proposed jurisdictional changes include:

- The County envisions a turnback of County Road 40, from CSAH 61 CSAH 11, to be turned back to the City.
- The County proposed Dahlgren Road, from CSAH 11, then extending westerly through Carver to be a future County Road.

Figure T-9 – Planned Functional Classification

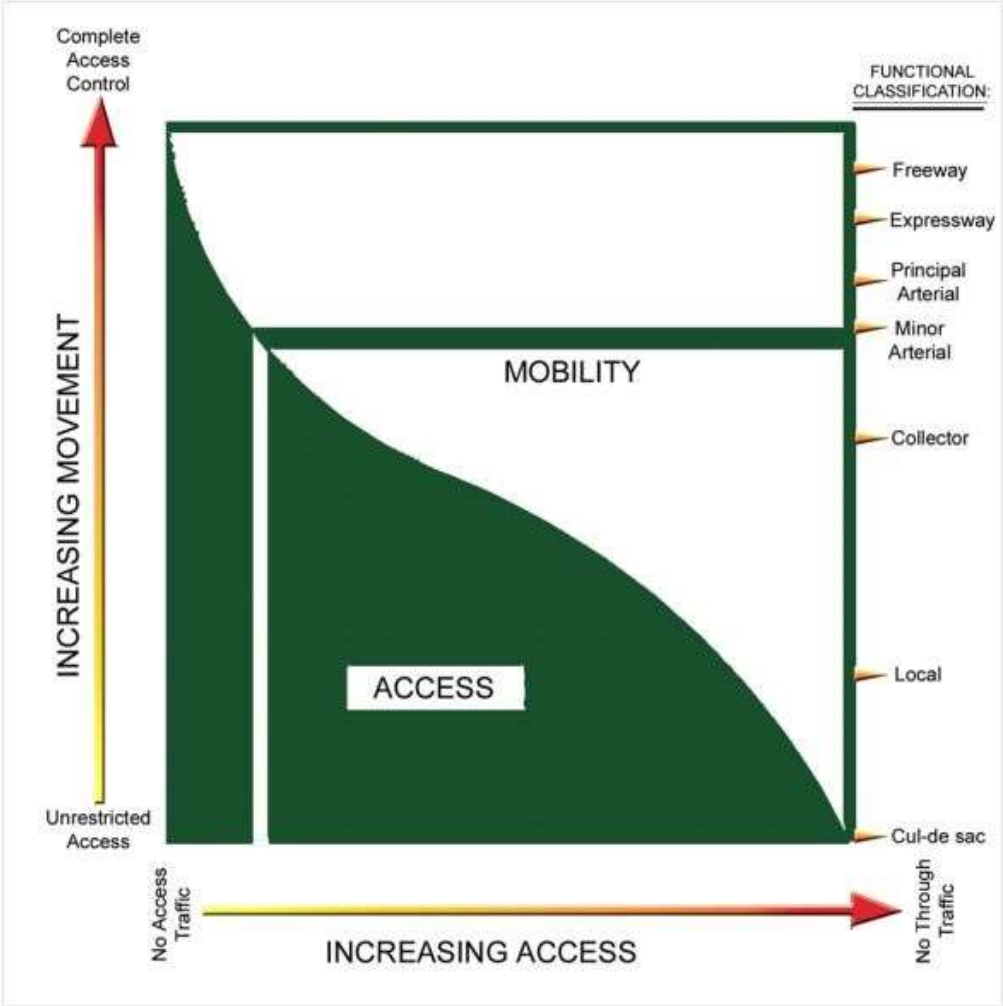


Access Management

Overview

Access management refers to balancing the need for connections to local land uses (access) with the need for network-level movement (mobility) on the overall roadway system. Arterials generally have limited access in the form of driveways and low volume side streets because their role in the network is to support relatively long, high speed traffic movements; collectors allow a greater degree of access given their combined mobility/access function, and local streets have relatively few limits on access. Appropriate access control preserves the capacity on arterial and collector streets, and improves safety by separating local turning movements from higher-speed "through" traffic. Moreover, it concentrates higher volume traffic linkages at intersections controlled with traffic signals, roundabouts, or other measures.

MnDOT and Carver County Roadways in Carver are identified on **Figure T-3**. For MnDOT roadways, MnDOT access management guidelines apply. Similarly, for County roadways, Carver County's access management guidelines apply. MnDOT and Carver County guidelines are included in **Appendix T-1**.



Access spacing guidelines for the City of Carver are shown on **Table T-9**. These guidelines are the same as Carver County for the minor arterials and the collectors. The City of Carver has two collector types,

major and minor. The management guidelines refer to both. However, it is fully realized that the access guidelines for a minor collector will allow for spacing at lesser intervals. The notation of private access to be permitted under special conditions will allow for deviation from the guidelines for access to minor collectors.

Table T-9| City of Carver Access Management Guidelines

Area of Facility Type	Typical Functional Classification	Intersection Spacing		Signal Spacing	Private Access
		Primary Full Movement Intersection	Conditional Secondary Movement		
Minor Arterials					
Rural, Exurban, and Bypass	Minor Arterials	½ mile	¼ mile	½ mile	Permitted Subject to Conditions
Urban and Urbanizing		¼ mile	1/8 mile	¼ mile	By Exception or Deviation Only
Urban Core		300-600 feet dependent on block length		¼ mile	Permitted Subject to Conditions
Collectors					
Rural, Exurban, and Bypass	Collectors	½ mile	¼ mile	½ mile	Permitted Subject to Conditions
Urban and Urbanizing		¼ mile	1/8 mile	¼ mile	
Urban Core		300-600 feet dependent on block length		1/8 mile	

Geometric Design Standards

The City of Carver requires all new roads and road improvements to be constructed as an urban road section., where drainage is provided by curb and gutter. Urban road sections shall consist of a bituminous surface with surmountable concrete curb and gutter in residential areas, B618 concrete curb and gutter in all others on each side. Minimum right-of-way widths, pavement widths (as measured from face to face of curb), and parking shall be reviewed by the city and city engineer based on functional classification, traffic volume, and design speed. The minimum widths for each type of public street or road are shown in **Table T-10**.

Table T-10| Urban Roadway Widths

Type of Street	Right-of-Way Width (feet)	Roadway Width (feet)
Minor arterial	120—160	As determined by traffic needs
Collector street/residential	80	40
Industrial collector service street	80-102	40 minimum
Local street	53-60	26-32
Cul-de-sac turn-around radius	60	46-48

All roadways within the city shall be design strength of seven ton in accordance with the most current edition of the Minnesota Department of Transportation Standard Specifications for Construction. All roadways shall be crowned a minimum of four inches. The centerline grades of all streets shall be a minimum of five-tenths (0.50) percent. The maximum centerline grades of all streets shall be at the discretion of the city.

County Roadways

Geometric design standards for Carver County roadways are generally based on the standards as specified by the State Aid Office. It should be noted there are a number of roadway sections that could be chosen for county roadways. These roadways, which typically have a range of 15,000-18,000 ADT, can operate with 3-lane, 4-lane undivided, and 4-lane divided cross sections. Carver County and the City of Carver will work collaboratively to determine what is most appropriate for each section.

Future Right-of-Way Preservation

MnDOT, Carver County, and the City of Carver will work collaboratively to determine appropriate right-of-way needs and preservation for planned and future projects.

Bicycling and Walking

A well-developed bicycle and pedestrian network provides a way for people of all ages and abilities to travel in a way that is safe, comfortable, accessible, and active. It connects people to community destinations, improves bicycle and pedestrian safety, increases multimodal opportunities, encourages active living, and provides a community amenity.

Pedestrian Facilities

Pedestrian travel provides an alternative to driving for short distance trips, and safe connections between other modes and final destinations for longer ones. It also can serve as an amenity for residents and visitors who are looking for a safe and active means of recreation, and for businesses districts looking for street life. Dedicated pedestrian facilities also help prevent fatalities resulting from pedestrians mixing with vehicle traffic. The current sidewalk system serving Carver is depicted on **Figure T-10**. Also depicted are the new sidewalk and trail links that the City intends to build to extend and enhance the overall pedestrian network, as consistent with city plans and the zoning and subdivision ordinance.

Section 42-115 of the City's subdivision ordinance covers requirements for installing new sidewalks and pedestrian ways:

> *Sidewalk requirement. Sidewalks may be required by the city council in situations where the safe and efficient conduct of pedestrian traffic makes the installation of sidewalks necessary.*
>
> *Pedestrian way requirement. Pedestrian ways may be required in order to provide pedestrian access across long blocks or to provide access to schools, parks, playgrounds, or other activity centers that attract pedestrian traffic, or to provide a pedestrian travel system within the development and/or to connect to such systems outside the development. Pedestrian ways shall be constructed in accordance with article XI of this Code.*

Bicycle Facilities

Bicycle facilities provide additional opportunities for non-motorized connectivity and travel. Bicycle trips can be longer than pedestrian trips, which opens possibilities for both replacing auto trips and connecting to a regional network. As traffic volumes grow, having an alternative means of travel can ease pressure on roads with limited capacity. Additionally, bicycle tourism has become increasingly popular in many communities, as a low-impact way to enjoy area attractions and support local businesses.

They can also be developed as a system that is similar to road functional class – with different facility types for different travel needs. Major categories of bicycle facilities in Carver include:

- **Off-street trails** – These trails link destinations and communities and may have a range of supporting amenities, including signage, parking, seating, and wayfinding. They may be located along major roadways, or in their own dedicated right-of-way (such as an abandoned rail corridor, as is the case with the Minnesota Bluffs Regional Trail). They are frequently located along higher volume and speed corridors where on-street bicycling would be less safe. Regional trails are developed and maintained at the county or regional level, and provide connections

over longer distances and between cities. Local trails are maintained at the city level, and typically provide connectivity between local destinations and regional systems.

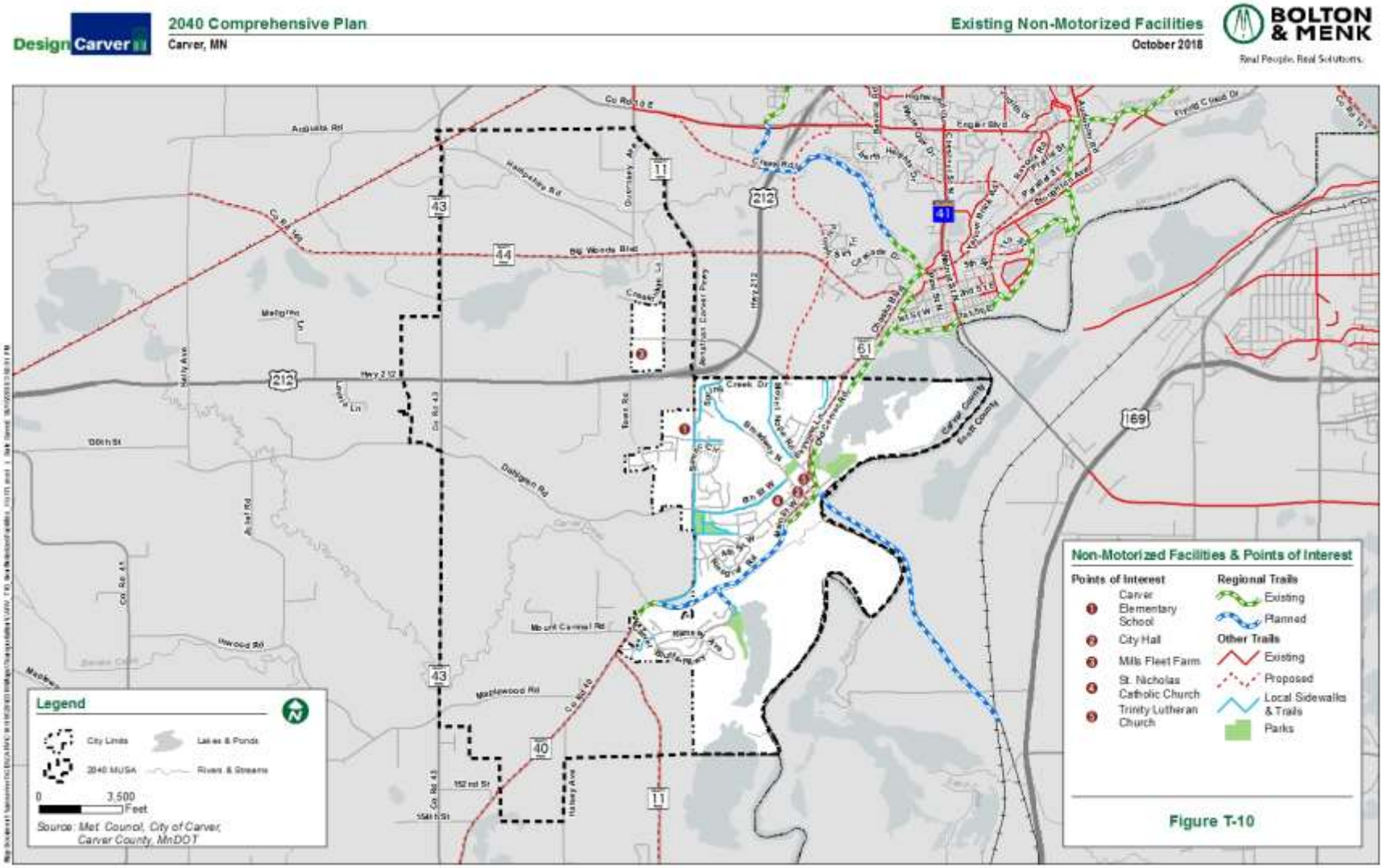
- **On-street bike lanes** – On-street bicycle facilities are typically developed by the county or municipality when funding or right-of-way constraints preclude off-street facilities – or where traffic volumes do not justify the additional investment. They can provide important local connections to the off-street system and local destinations.

Existing bicycle facilities in Carver are depicted on **Figure T-10**. Also depicted are regional trail search corridors that would connect Carver with other Western Carver County communities and other regional trail networks (discussed more below).

Section 42-115 of the City's subdivision ordinance covers requirements for installing new bicycle paths:

> *Bicycle path requirement. Bicycle paths may be required to provide for internal bicycle travel and/or to provide a connection to bicycle systems external to the development. If bicycle paths are shown in the comprehensive plan, installation shall be mandatory. Bicycle paths shall be constructed in accordance with MnDOT standards.*

Figure T-10 – Existing and Planned Non-Motorized Facilities



Regional Trail Facilities

As shown in **Figure T-10**, the main regional bicycle and pedestrian facility in the city is the Minnesota River Bluffs Connection Regional Trail. The Minnesota River Bluffs LRT Regional Trail is a 12-mile aggregate trail that follows an old railroad route from Hopkins to Minnetonka, Eden Prairie, Chanhassen, Chaska, and Carver. The trail offers access to several destinations including Downtown Hopkins, Downtown Chaska, Shady Oak Lake, Miller Park, Riley Lake Park, and the forested hills around the Minnesota River Valley. The trail is open daily from 5 AM-10 PM. The trail is maintained by the Three Rivers Park District during most of the year, though cities along the route are responsible for snow plowing (currently, only done by Hopkins, Eden Prairie, and Minnetonka). A portion of the trail in Carver County is currently closed due to a 2014 mudslide. The Hennepin County Regional Railroad Authority, the trail corridor's owner, has the goal of reconstructing the slope in 2019.

Just north of Carver, the Minnesota River Bluffs Regional Trail is soon to be connected to the Southwest Regional Trail. The Southwest trail is a developing 13-mile trail corridor between the cities of Chaska and Victoria. When completed, it will connect the Minnesota River Bluffs Regional Trail to the Lake Minnetonka Regional Trail, creating a looping trail network between the three trails. Implementation of this regional trail will occur over time as new development occurs, and with the construction of new roads or as reconstruction of roadways takes place.

In Carver, the Minnesota River Bluffs trail connects also to the Minnesota Valley State Trail, which follows the course of the Minnesota River through the Minnesota Valley National Wildlife Refuge.

See the Parks chapter for additional information on these trail facilities. While these are primarily recreational facilities, they may also serve a transportation purpose, connecting people to destinations.

Regional Bicycle Transportation Network

The Metropolitan Council has reflected the need for a hierarchy of non-motorized transportation facilities through their designation of the Regional Bicycle Transportation Network (RBTN). The RBTN was developed by the Metropolitan Council through the Regional Bicycle System Study in 2014, and was incorporated into the 2040 Transportation Policy Plan. It is the Metropolitan Council's intent that the RBTN will "serve as the 'backbone' arterial system for biking in the region." The guiding principles for this network include:

- Overcome physical barriers and eliminate critical system gaps.
- Facilitate safe and continuous trips to regional destinations.
- Function as arteries to connect regional destinations and the transit system year-round.
- Accommodate a broad range of cyclist abilities and preferences to attract a wide variety of users.
- Integrate and/or supplement existing and planned infrastructure.
- Provide improved opportunities to increase the share of trips made by bicycle.
- Connect to local, state, and national bikeway networks.
- Consider opportunities to enhance economic development.

- Be equitably distributed throughout the region.
- Follow spacing guidelines that reflect established development and transportation patterns.
- Consider priorities reflected in adopted plans.

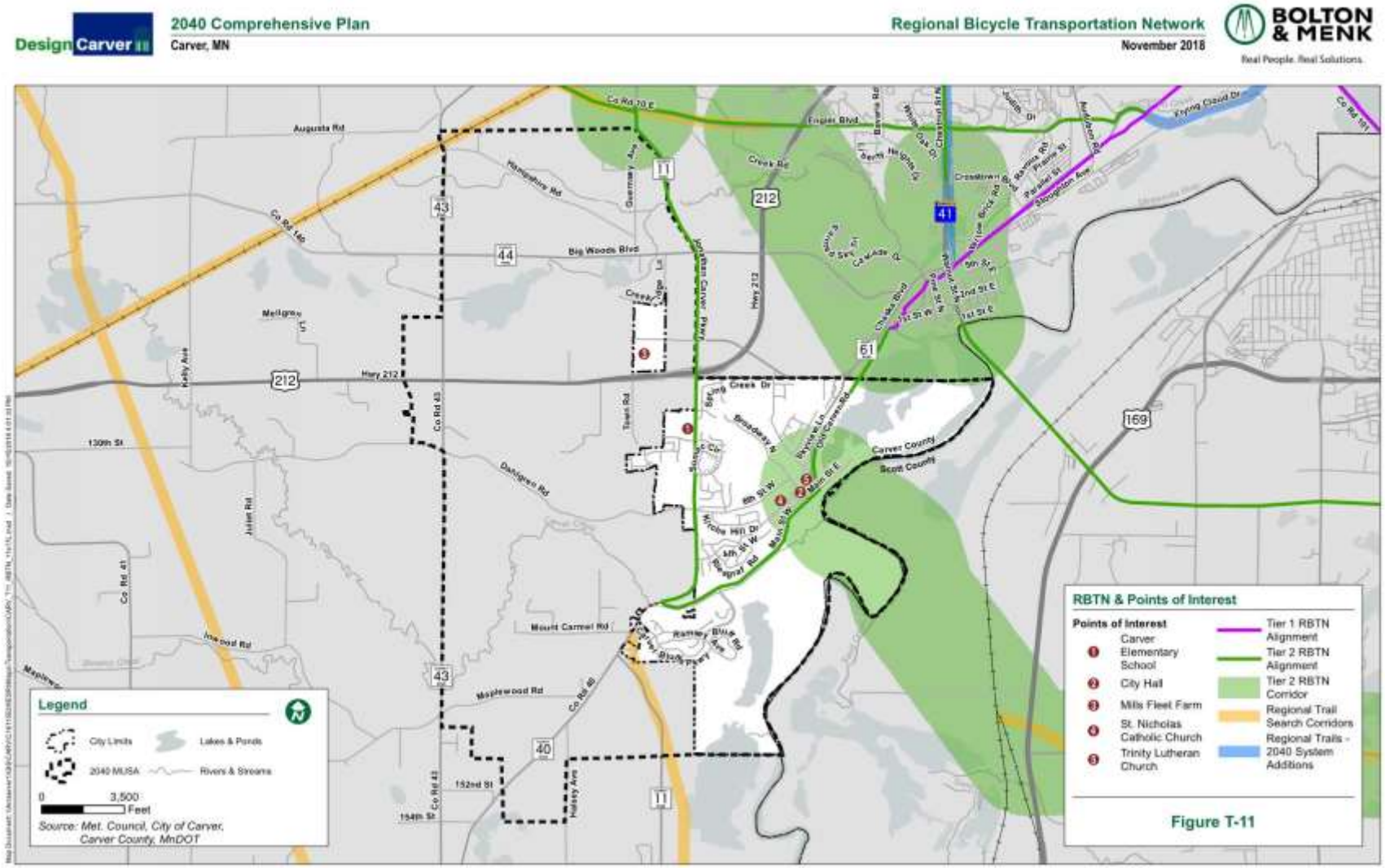
The RBTN is subdivided into two tiers for planning and investment prioritization:

Tier 1 and Tier 2 Regional Bicycle Transportation Alignments reflect specific routes that have already been constructed and/or identified through local plans. Some may need little or no improvement, while others have not yet been developed. The Tier 1 subset reflects those that provide direct connections to and between regional destinations.

Tier 1 and Tier 2 Regional Bicycle Transportation Corridors are the highest priorities for regional planning and investment, with Tier 1 being the top ones. They were chosen to reflect areas where it would be possible to attract the most riders and thereby make the biggest difference in terms of mode shifts. At present, they are shown as broad lines on the map because the exact alignment has not yet been determined.

In Carver, portions of Jonathan Carver Parkway/CSAH 11 and Main Street/Old Carver Road/CSAH 40 are identified as Tier 2 Regional Bicycle Transportation Alignments. See Figure T-11 for the location. Existing off-road trails follow along the roadway corridors for both alignments, and connect at the northern end of the city with regional trail corridors in Chaska.

Figure T-11 – Regional Bicycle Transportation Network



Facility Improvements

Planned Regional Facilities

Planned regional trail search corridors are shown on **Figure T-11**. The primary one in Carver is the proposed southward extension of the Jonathan Carver Parkway/CSAH 11 trail further south of its current terminus. For more information on both the planned trail extensions and regional trail search areas, see the Parks chapter.

Potential RBTN corridors near Carver are also shown on **Figure T-11**. An additional trail crossing the Minnesota River to Scott County is shown on the southeast side of Carver, near a former Union Pacific Railroad corridor. This potential crossing is designated as a Tier 2 RBTN Corridor. Other connections are located outside the city limits, but with potential to increase connectivity between the city and other regional destinations.

General Guidelines

Bikeways, sidewalks and/or multi-use trails are recommended to be adjacent to minor arterial, major collector and minor collector roadways within Carver to accommodate pedestrian, bicycle, and other non-motorized travel in a safe and comfortable manner. These roadways carry a considerable amount of vehicular traffic and separation of vehicular and non-vehicular travel modes is recommended. At the discretion of the City, in commercial and industrial areas, the requirements for trails and sidewalks may vary to accommodate additional pedestrian and bicycle traffic to provide connectivity as illustrated in **Figure 6.9**.

Along major collectors, on-street bikeways are recommended, and when possible a sidewalk on at least one side. On minor collectors, due to varying right-of-way widths and existing limitations, on-street bikeways or off-street trails or sidewalks are recommended, where right-of-way permits. When possible, pedestrian facilities on both sides of major collector roadways are recommended to allow for pedestrian travel within the corridor without introducing excessive crossing demand. With the vehicular volumes anticipated on minor collector streets, pedestrians can safely cross the roadway; however, pedestrian travel along the roadway may become less comfortable as traffic levels increase. An off-street sidewalk or trail will accommodate pedestrian travel along the corridor as well as provide a safe, comfortable link between lower volume residential streets and the other pedestrian facilities within the community.

Transit

Transit Market Area

Transit connections for Carver are important to the community, providing a transportation alternative for workers in and around Carver, particularly to major job centers in the Twin Cities metropolitan region. Levels of transit service in the region are determined by a series of Transit Market Areas. The Metropolitan Council has defined Transit Market Areas based on the following primary factors:

- Density of population and jobs
- Interconnectedness of the local street system
- Number of autos owned by residents

In general, areas with high density of population and jobs, highly interconnected local streets, and relatively low auto ownership rates will have the greatest demand for transit services and facilities. Transit Market Areas are a tool used to guide transit planning decisions. They help ensure that the types and levels of transit service provided, fixed-route bus service, match the anticipated demand for a given community or area.

Based on this analysis, the Metropolitan Council categorizes the City of Carver in Transit Market Area V. As identified in Appendix G of the Metropolitan Council's 2040 Transportation Policy Plan (TPP), the characteristics of this category area are as follows:

> *Transit Market Area V has very low population and employment densities and tends to be primarily Rural communities and Agricultural uses. General public dial-a-ride service may be appropriate here, but due to the very low-intensity land uses these areas are not well-suited for fixed-route transit service.*

Also from Appendix G of the 2040 TPP (Table G-2), the primary emphasis within Transit Market Area V is public dial-a-ride services for eligible riders. However, the City of Carver does have some limited fixed route transit service, as identified in the next section.

Current Transit Service and Facilities

Fixed Route Transit

Figure T-12 shows existing and planned transit routes and infrastructure in Carver.

The City of Carver is served by fixed route bus transit through SouthWest Transit. The routes serving the area make a single stop at the Carver Station park and ride, located at the intersection of Jonathan Carver Parkway and Ironwood Drive. The climate controlled station has a parking lot with capacity for 400 vehicles.

The routes currently servicing Carver Station include:

- Route 697: Provides weekday peak hour express service connecting Carver Station, East Creek Station (Chaska), and Downtown Minneapolis. Buses run 6:01-8:12 AM eastbound, and 3:56-5:50 PM westbound.
- Route 698: Provides weekday service connecting Carver Station, Pioneer Trail & McKnight Road

(Chaska), Clover Field Park & Ride (Chaska), East Creek Station (Chaska), SouthWest Village (Chanhassen), Chanhassen Transit Station (Downtown Chanhassen), SouthWest Station (Eden Prairie), Downtown Minneapolis, and the University of Minnesota. Buses run 5:32 AM-3:55 PM eastbound and 11:15 AM-10:31 PM westbound. Presently, Carver Station stops are only available for select westbound trips.

- Route 699: Provides weekday peak hour service connecting Carver Station, East Creek Station (Chaska), SouthWest Village (Chanhassen), and Downtown Minneapolis. Buses run 5:50 AM-8:52 AM eastbound and 3:31-6:24 PM westbound.

Dial-a-Ride Service

Carver is serviced by Transit Link, the dial-a-ride service provided through the Metropolitan Council at the County level. Transit Link provides metro-wide transit connections and access to qualifying rides, such as last mile service, connections between transit stations, or to and from areas not serviced by regular bus routes. Any member of the public may reserve a qualifying ride. Upon reservation, each trip is assessed to ensure it does not overlap with regular route bus services. Starting and ending destinations must be more than ¼ mile from regular route transit in winter months (November-March) and more than ½ mile from regular route transit in summer months (April-October). Transit Link Service does not operate on Thanksgiving Day, Christmas Day, and New Year's Day.

Transit Link fares are determined by distance traveled. Trips less than 10 miles are $2.25 one way, trips between 10 and 20 miles are $4.50 one way, and trips more than $20 miles are $6.75 one way. ADA-certified riders pay a maximum of $4.50 one way regardless of distance traveled. This fare includes transfer to a regular service route except for the Northstar Line or peak hour services.

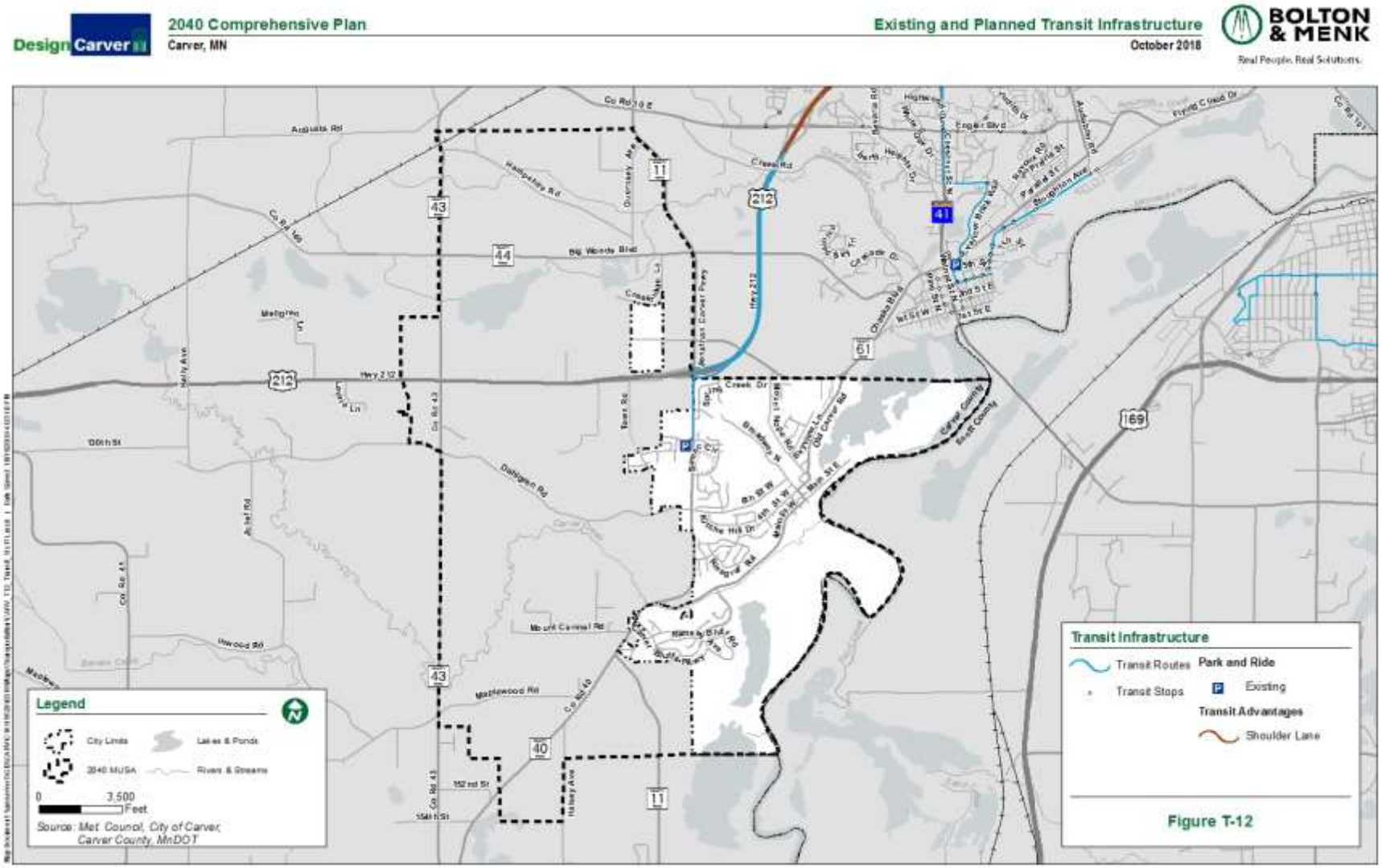
Transit Link service offered jointly through Carver and Scott Counties, called SmartLink Transit, serves all cities and townships in Carver and Scott Counties. Service is available Monday-Friday from 6:00am – 7:00pm. Transfers between Transfer Link and regular service routes take place at one of the following transit hubs: Chanhassen Transit Station, Southwest Village, East Creek Station, Marschall Road Transit Station, Eagle Creek Park & Ride (Secondary), and Southbridge Crossing Park & Ride (Secondary Rush). The following stations in Dakota County are also available for transfer service: Burnsville Shopping Center, Burnsville Transit Station.

Metro Mobility is also available to qualified individuals with disabilities on an on-call basis throughout the seven-county metropolitan area.

Recommendations

At this time, there are no specific plans for further extending transit into the City of Carver. However, as the city further develops and increases in the intensity of population and jobs, there may be additional need to provide transit service. The City of Carver will continue to work with Carver County, Southwest Transit, and others to periodically evaluate the existing transit usage, growth in both demand and ridership, and opportunities to expand transit frequency and/or coverage.

Figure T-12 – Existing and Planned Transit Infrastructure



Aviation

There are no existing or planned aviation facilities in Carver. Flying Cloud Airport, located in Eden Prairie, is the nearest airport to Carver within the regional airport system. Flying Cloud Airport is located approximately 12 miles northeast of Carver. Since Carver is outside the Airport Compatibility Area, the airport poses no potential impacts on Carver and there are no airspace restrictions affecting development in the city.

The Metropolitan Council states that each community has a responsibility to identify policies and ordinances that protect regional airspace from obstructions, including meeting any Federal Aviation Administration (FAA) notification requirements. The Transportation Policy Plan provides some guidance and resources to inform the development of ordinances and regulations. As appropriate, city ordinances to satisfy FAA requirements should be created.

Freight

TH 212 is the major truck freight corridor serving the Carver area. In its *Regional Truck Freight Corridor Study* (2017), the Metropolitan Council evaluated freight corridors throughout the region with four factors including: average annual truck volume, truck percentage of total traffic, proximity to identified freight clusters, and proximity to regional freight terminals. TH 212 was identified as a Tier One corridor, which were those ranking the highest in terms of these criteria.

The study identified TH 212 as the most important corridor for the movement of freight in Carver County. It also noted that there were some substandard segments, particularly relative to the traffic volumes, that needed improvements. Issues for freight included congestion, lack of places to pull off the roadway, and some tight turning movements. The ongoing work along TH 212 at the County level is designed to address a number of these deficiencies.

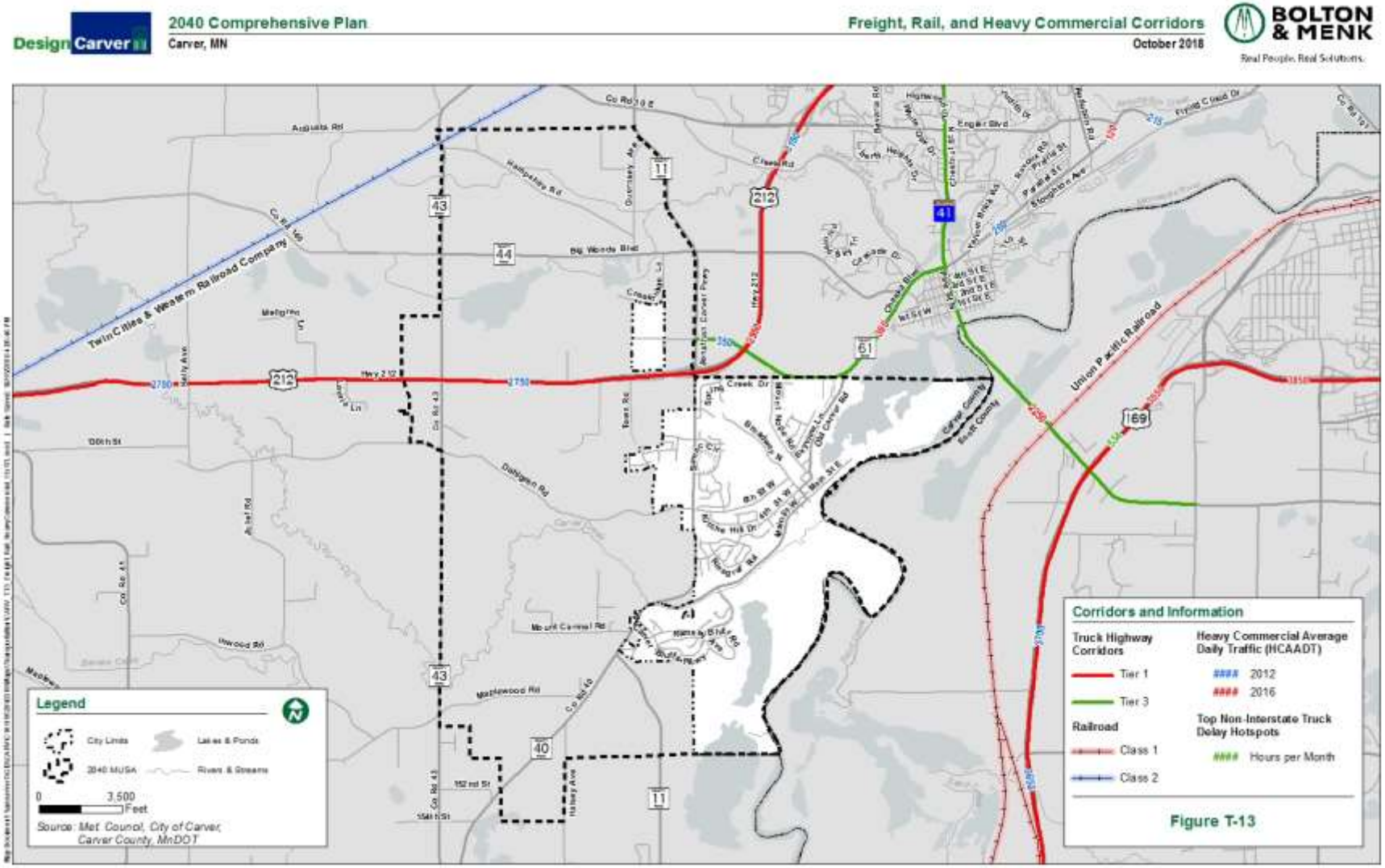
Nearby TH 169 in Scott County was also ranked as a Tier 1 corridor, while CSAH 41 and CSAH 61 were identified as Tier 3 corridors. In terms of current truck volumes on these routes:

- TH 212: around 2,950 heavy commercial vehicles per day, or 17% of total traffic
- TH 169: around 3,550 heavy commercial vehicles per day, or 11% of total traffic
- CSAH 41: around 2,250 heavy commercial vehicles per day, or 12% of total traffic
- CSAH 61: around 390 heavy commercial vehicles per day, or 4% of total traffic

There are no active rail lines in the City of Carver. There were two since-abandoned rail lines that used to run through the city. One of them has since been converted to a connecting link for the Minnesota River Bluffs Regional Trail.

The future land use map in the Land Use chapter shows the location of existing and planned commercial/industrial areas. The City of Carver will plan for safe and adequate truck access to freight generators in these locations, and work to mitigate impacts on other uses.

Figure T-13 – Freight, Rail, and Heavy Commercial Corridors



Emerging Trends in Transportation

While this plan for the most part assumes the continuation existing travel patterns and technology, there are some emerging trends that may impact how people travel in Carver in the future. These are summarized below, along with an explanation of implications for transportation planning at the city level. Since this are still developing and there is much uncertainty as to specific outcomes, it is recommended that the City (along with other partners) continue to monitor these and make changes as needed.

- **Multi-modal transportation**: As roads become more congested, it is not always feasible or cost effective to add new capacity to the roadway network. Additionally, some people are looking for expanded opportunities to be more active and/or environmentally friendly by driving less. When developing or improving roadway facilities, it is worthwhile to consider how other modes of travel can be accommodated safely in additional to automobile traffic.
- **Expanded use of autonomous vehicles**. Advances in self-driving car technology suggest that in the next few decades, these may become much more widely used. Some experts predict that by 2040, autonomous vehicles will be the primary personal transportation mode. This has broad potential implications for the City of Carver, including but not limited to: (1) the need to upgrade infrastructure markings, signage, and lane structure, to be compatible with the needs of autonomous vehicles, (2) the potential for substantial shifts away from parking for single-occupant vehicles to a more pooled vehicle model (with potential for redevelopment of old parking facilities), and (3) the need for interjurisdictional coordination on how facilities and standards may change across borders – and what new standards might look like. While it is still too early to know the timeline for rollout and adoption of this technology, it should be considered as part of this plan.
- **Mobility as a service, and shared vehicles**. While ride sharing is not a new concept (carpooling dates back decades), the expansion of this as a commercially available service has increased greatly in recent years. Companies such as Lyft and Uber offer ride-sharing services that may reduce the need for personal vehicle usage and ultimately car ownership. This has implications for the demand for dedicated drop off/pick up zones and parking and staging of vehicles. The need for a city level response in terms of regulations and enforcement will expand as these services expand, both in terms of usage and geographic cover.
- **Changes in shopping patterns and delivery methods**. People are increasingly shopping online (for pickup or delivery), leading to implications for both brick and mortar store design, as well as accommodating increased and expanded delivery methods. Increases in freight traffic from deliveries may have implications for existing city roadways. Additionally, the potential expansion of other means of delivery (such as drones or self-driving vehicles) raises questions about how these will be regulated for safety and efficiency. Increases in telecommuting and working remotely have similar implications.

WATER RESOURCES

Introduction

Sustainable water resources are key to the well-being of the community. One of the greatest challenges facing a growing community is protecting ground and surface water resources, while ensuring the needs of residents and businesses are adequately met. This chapter addresses the planning and management of the three key water resource systems: wastewater, water supply and surface water.

Wastewater and Comprehensive Sewer Plan

Overview and Background

A Wastewater and Comprehensive Sewer Plan is a useful tool for defining the strategies the City will use to accomplish planning, construction, and maintenance of the wastewater system. Under the state Metropolitan Planning Act, local governments are required to submit a Wastewater and Comprehensive Sewer Plan element as part of their overall Comprehensive Plan.

Forecasts

According to the Metropolitan Council population, household, and employment forecasts, the City of Carver will have the following sewer demands, as detailed in Table W-1.

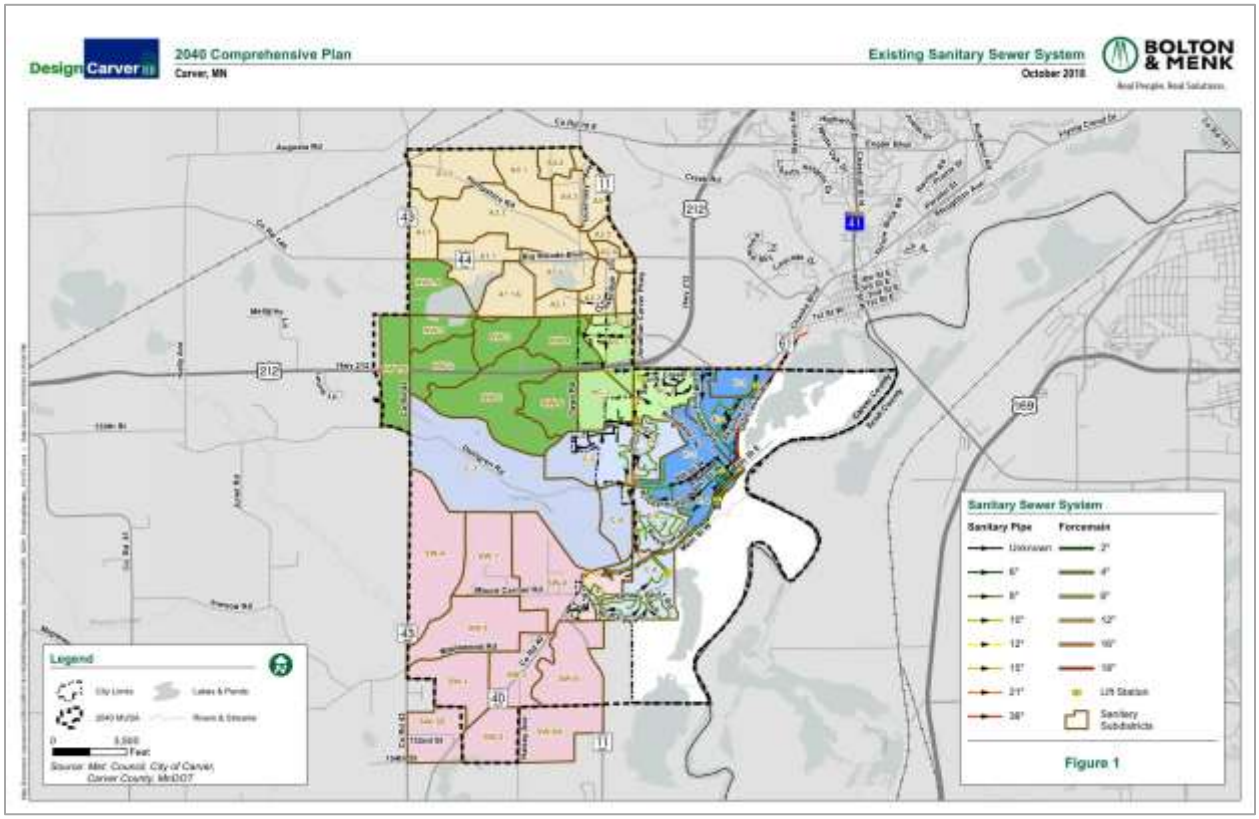
Table W-1 | Population, Housing and Employment Sewer Allocation Forecasts

	Forecast Component	2010	2020	2030	2040
Population	MCES Sewered	3,008	5,610	9,690	14,780
	Unsewered	716	690	610	720
Households	MCES Sewered	980	1,920	3,460	5,400
	Unsewered	202	200	170	200
Employment	MCES Sewered	182	650	1,030	1,690
	Unsewered	5	0	0	10

Existing System

The existing wastewater collection and treatment system is shown on Figure W-1. This system serves the majority of the area within the existing city limits, although there are some undeveloped, agricultural areas still served by on-site individual septic systems.

Figure W-1 - Existing Wastewater System



Ultimate Sanitary Sewer System

The Comprehensive Sanitary Sewer Plan (CSSP) assumes sanitary sewer will ultimately serve the entire Carver growth area. The majority of areas yet to develop are isolated undeveloped or underdeveloped lots interspersed throughout the City.

The planning area consists of six (6) sewer districts. Each district contains several sub districts. In general, districts and sub district boundaries are established to encompass gravity sewer pipe networks that commonly flow to a single discharge location such as a lift station or trunk sewer main.

The proposed trunk sewer system is schematic in nature with regard to actual facility location. The actual location of facilities may vary with development, based upon platted right-of-way, and development configuration.

The proposed trunk sewer system is designed to convey the estimated peak flows from the planning area, considering the topography of the area, likely plat boundaries, constructability of the system, including maintaining a maximum gravity sewer depth of approximately 30 feet, buildable areas, wetlands and bluff locations.

In addition, trunk gravity sewers are sized to be approximately 50-70 percent full with the estimated peak flows from the planning area in order to provide excess capacity to accommodate adjustments in anticipated development phasing and configuration, and current unforeseen future connection possibilities.

Metropolitan Council Actual and Projected Wastewater Flow

Figure W-1 illustrates the regional wastewater system long-term service area. Carver is served by the Blue Lake Treatment Plant.

Figure W-2 – Regional Wastewater System Long-Term Service Area

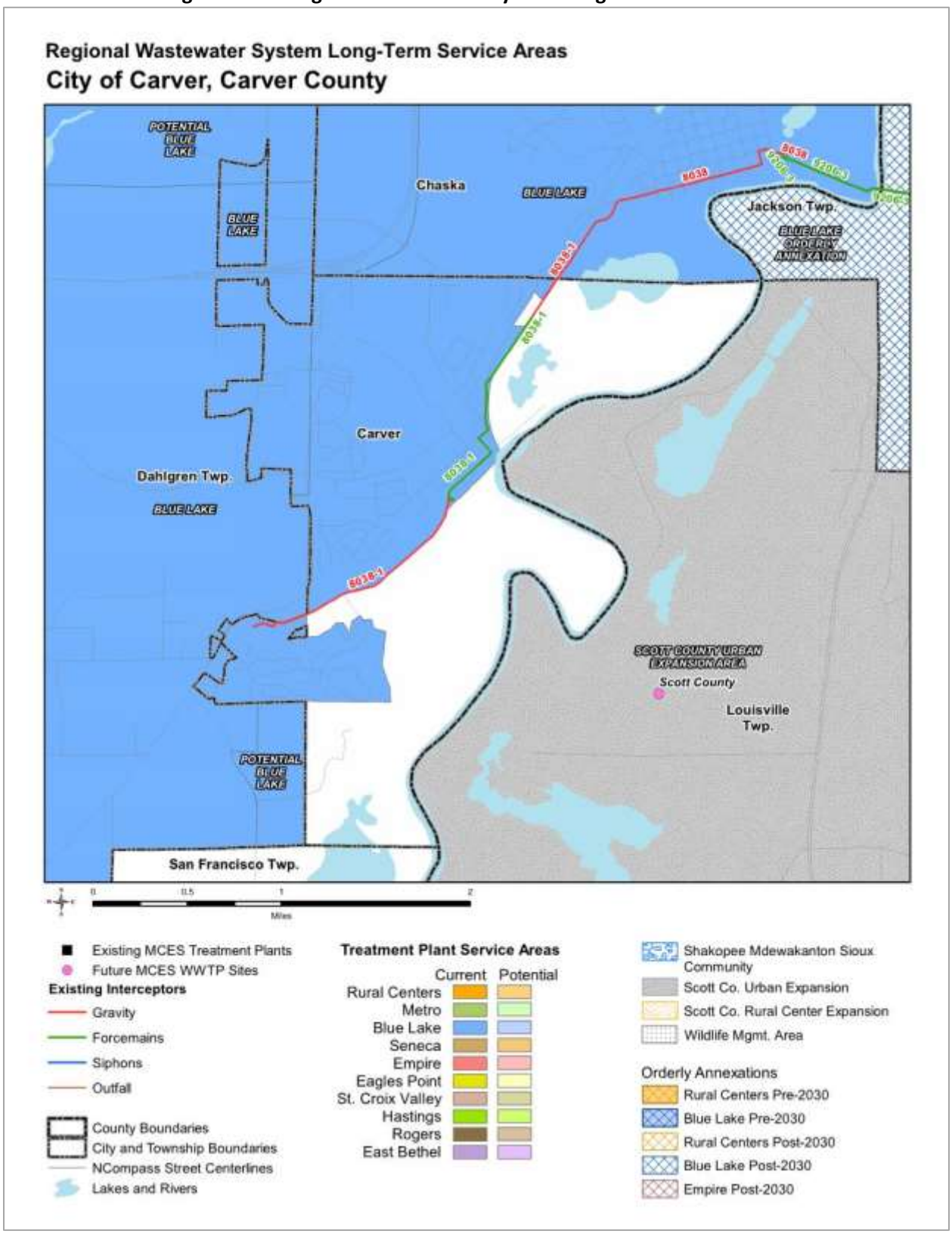


Table W-2 shows actual and projected MGD flows for the city's wastewater into Interceptor 8038-1.

Table W-2 | Projected Community Wastewater Flows (MGD)

2018	2020	2030	2040

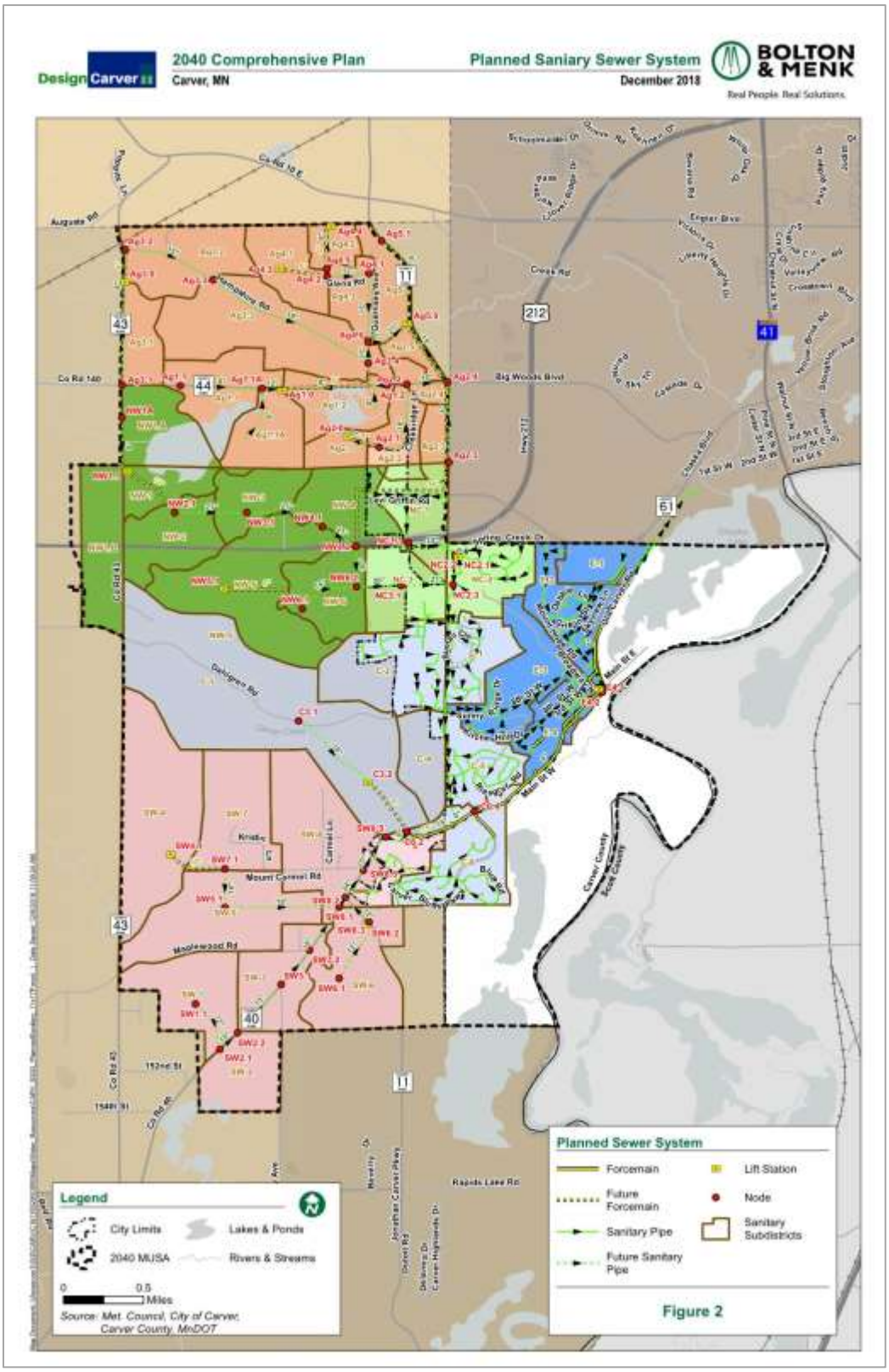
City Projected Wastewater Flow

The flow projections presented in Table W-2 are based on changes to the future land use plan from the 2030 Comprehensive Plan and to the City's Comprehensive Sewer Plan. Figure W-3 shows the ultimate sanitary sewer system and sewer districts. The updated ultimate average sanitary flow rates for the five districts are shown in Table W-3.

Table W-3 | Average Flows for the Full Development System

Sewer District	MGD
Northwest District	
North Central District	
Central District	
East District	
Southwest District	
Augusta District	

Figure W-3 – Ultimate Sanitary Sewer System



Existing/Proposed Pipe Capacities for the Ultimate System

Tables W-4 shows the updated pipe capacities based on the changes to the future land use for each of the sewershed districts. The ultimate build out of the Carver System will cause the need to increase the capacity of the system in a few locations. The City shall monitor these locations and address capacity issues as development continues to occur.

Table W-4 | Existing/Future Pipe Capacities for the Ultimate System

Insert Table

Inter-Municipal Agreement with the City of Chaska

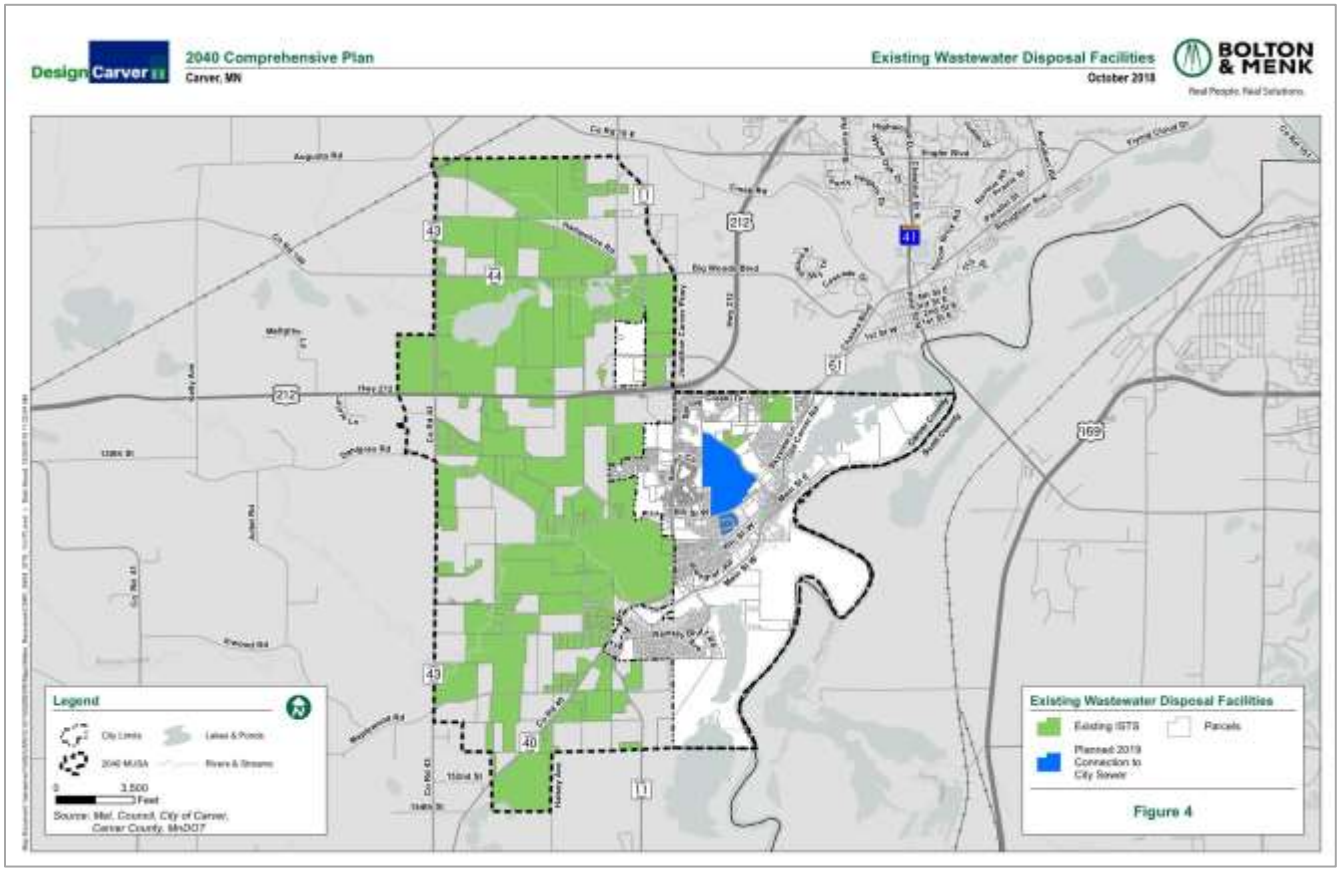
There is a potential for the City of Carver to enter into an agreement with the City of Chaska to convey portions of the Augusta, North Central and Northwest Districts of the Carver planning area through the City of Chaska's gravity sewer system to the MCES Chaska Interceptor System. Discussion regarding this potential inter-municipal agreement are underway.

Individual Sewage Treatment Systems (ISTS)

The City of Carver requires all new subdivisions connect to the municipal sewer system. Existing parcels not currently served by public sewer, and sewer service is more than 66 feet from the property line may either replace their existing system, or in the case of undeveloped lots of record, may install a new system with new home construction, provided the proposed ISTS meets the requirements of Carver County and the City Code. Once sewer service becomes available to the existing property (within 66 feet of the property line), the City requires the property connect to the sewer. Figure W-4 shows the location of ISTS within Carver.

The City of Carver has deferred the responsibility for tracking the operation, maintenance, and enforcement of ISTS in the city to Carver County. A copy of Chapter 52 of the Carver County Code of Ordinances (Subsurface Sewage Treatment Systems) and excerpts from the City Code related to the regulation of ISTS and "grey water" connections are included in Appendix __.

Figure W-4 – Individual Sewer Treatment System



Inflow and Infiltration (I/I)

The unit flow rates incorporate an allowance for an average of 10 gallons per capita per day of extraneous water entering the sanitary sewer system through inflow and infiltration. However, the City has taken numerous steps to minimize inflow and infiltration, including:

- Replacement of all old sanitary sewer within the City with PVC sanitary sewer pipe in 1986
- Inspection of approximately 1/3 of the sewer lines within the City annually
- Stringent testing of all new sanitary sewer lines
- Use of manholes with concealed pick holes
- Proper maintenance of the existing system
- Actively enforcing the City ordinance prohibiting the connection of roof drains and foundation drains to the sanitary sewer system (excerpts from this ordinance are provided in Appendix H)

The City Public Utilities Director, who is responsible for the maintenance and inspection of the City's sanitary sewer system, is not aware of any issues with inflow and infiltration in the City's existing system. The City is confident the current maintenance and inspection practices for the City's existing sanitary sewer system and requirements for the installation and inspection of new sanitary sewer will prevent inflow and infiltration from becoming an issue for the City of Carver.

Water Supply Plan

Overview and Background

Providing potable water for Carver's residents and businesses is one of the most important service the City provides. The potential impacts from water use must be considered when planning for development of new water sources or increased water withdrawals.

This chapter outlines the near and long-term water supply needs to satisfy the proposed growth of the City of Carver. Also, since the State requires a separate Water Supply Plan for communities with a public water system serving more than 1,000 people, the information included in this chapter is further outlined in Carver's Water Supply Plan (WSP), approved in December 2017, and included in **Appendix B** to the Comprehensive Plan**.**

Growth and Water Demand

Carver has experienced rapid growth over the last twenty-four years, growing from a population of 572 in 1994 to an estimated population of 4,293 in 2018. Water needs will continue to increase as the City grows to the forecasted 2040 population of 15,500.

Water use has increased steadily as population has grown. In 2015, Carver pumped an average of 0.36 million gallons per day (MGD), while the maximum daily water usage was 0.83 MGD. The projected maximum day water demand in 2040 is estimated to be 4.62 MGD.

Existing Facilities

The existing water supply and distribution system is shown on Figure W-5. The City presently obtains its raw water from four wells with a firm capacity of 1,200 gallons per minute (gpm) or 1.73 MGD. Firm capacity is defined as the capacity with the largest well out of service. Additional information on the City's wells can be found in Table 6 of the WSP in the Appendix.

An existing 1.0 MGD water treatment plant is located on Mt. Hope Road. This water treatment facility removes iron, manganese and radium from the well water before it is pumped to the distribution system. Three pressure zones exist within the City and the approximate maximum pressure supplied at ground elevation is shown on Figure W-6. There are two elevated storage reservoirs in the system to equalize pressures and supply peak demand; Tower 1 is a 100,000-gallon structure in the intermediate pressure zone, with a high water level of 1041 feet above sea level and Tower 2 is a 750,000-gallon structure in the northwest pressure zone of 1115 feet above sea level.

Additional information on the existing treatment capacity, storage capacity and water sources can be found in Tables 4-6 of the WSP in the Appendix.

Figure W-5 – Existing Water Distribution System

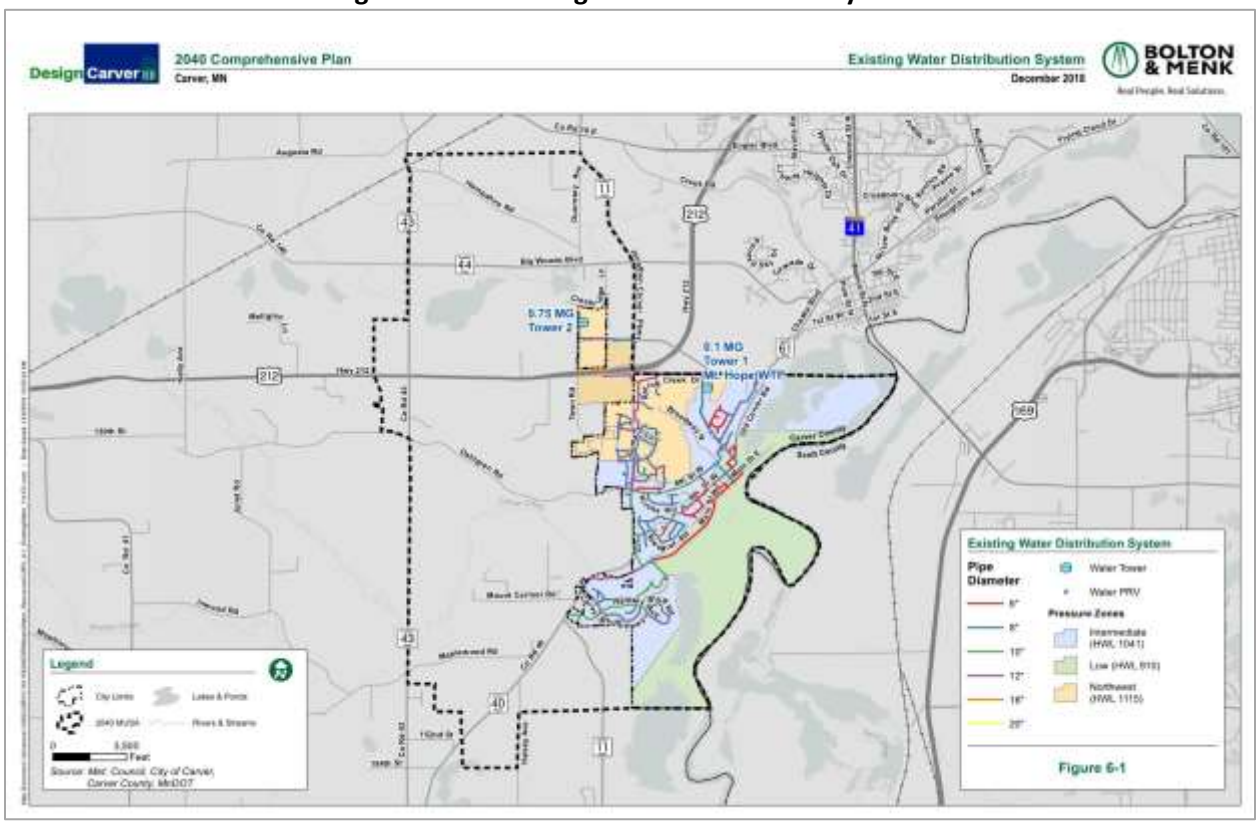
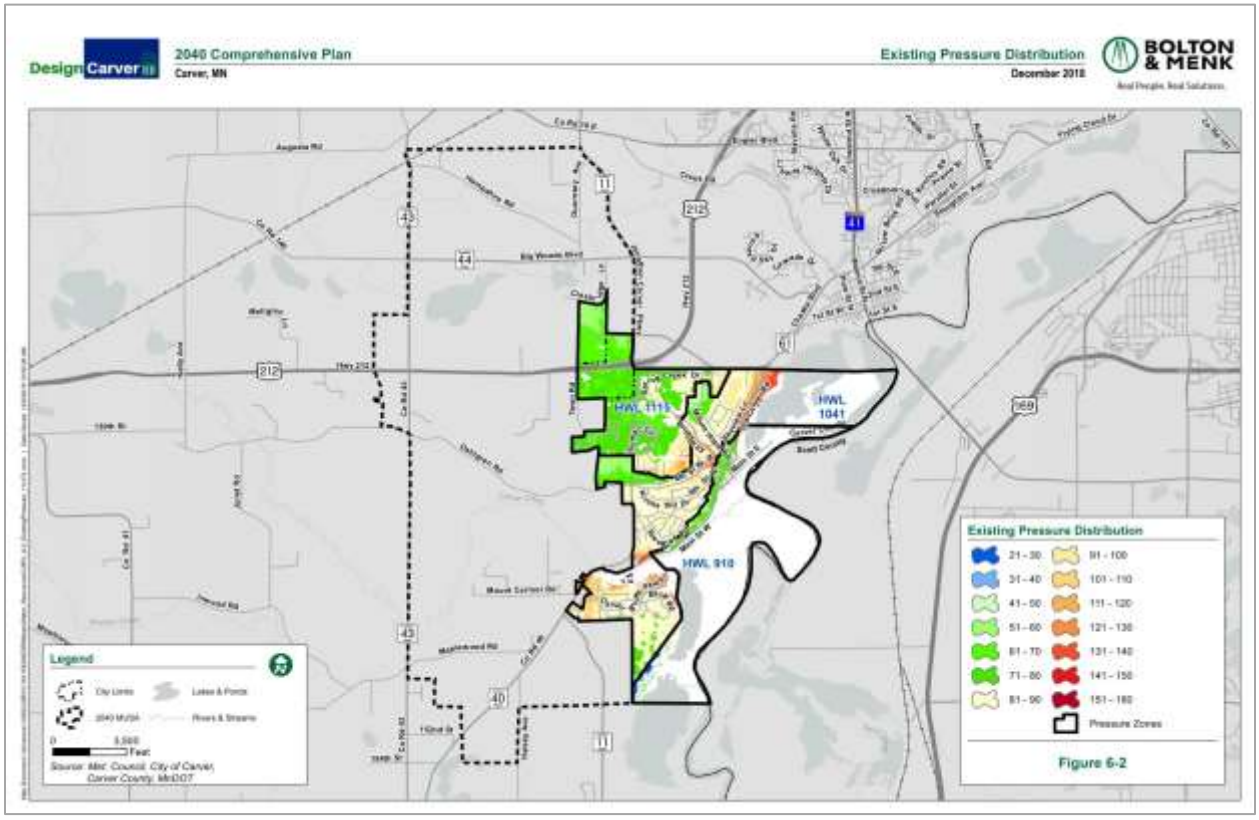


Figure W-6 – Existing Pressure Distribution



Future Improvements

Carver will need to serve approximately 15,500 people by 2040 with an expected average daily water demand of 1.54 million gallons and maximum daily water demand of 4.62 MG. To support this demand, storage should exceed average daily demand and supply should exceed maximum daily demand. The City will require an additional water tower of at least 700,000 gallons and wells with added firm capacity of 2,000 gpm.

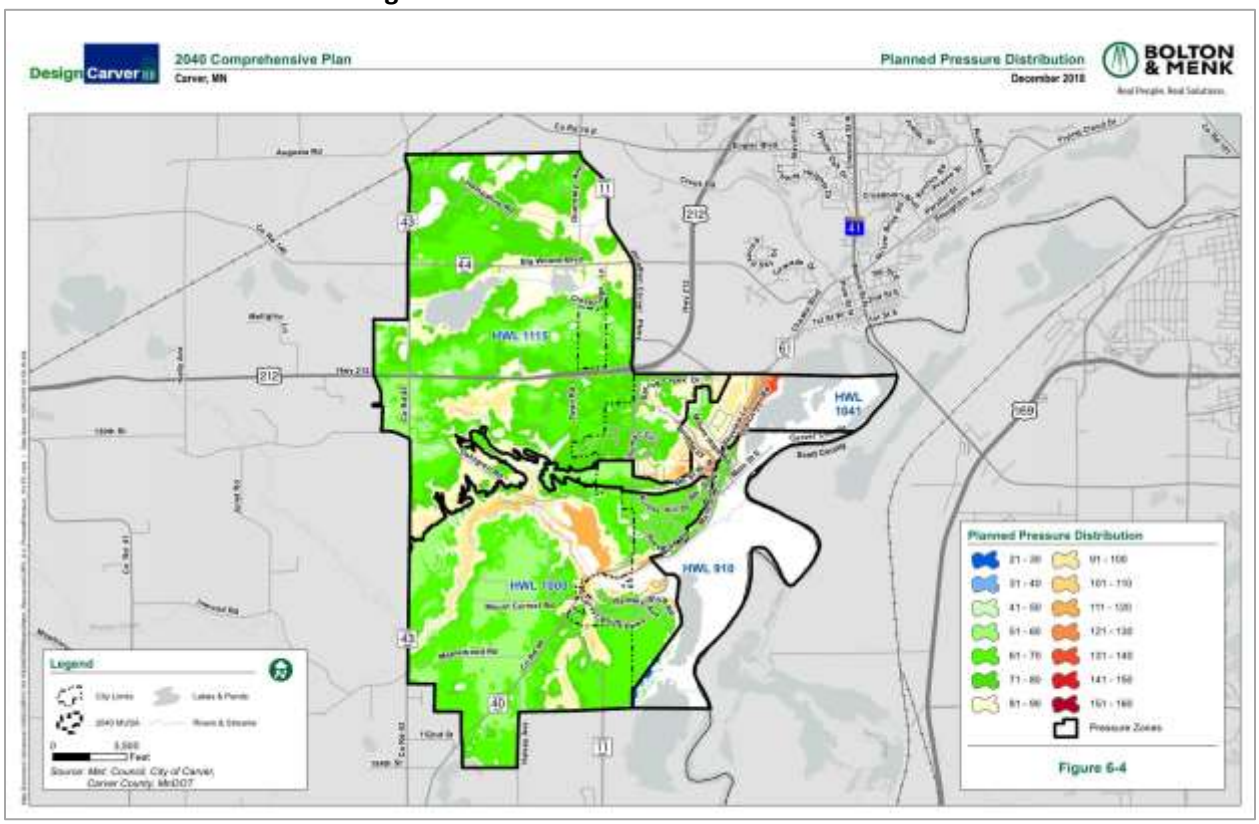
Anticipated phasing is detailed in Table 12 of the WSP, although additional study is currently being conducted on well locations, capacities and water treatment. Based on the well study and treatment plant analysis, wells and treatment will be constructed in the northwest area.

Current plans are for the northwest area to expand first, followed by the creation of the southwest area. Phasing of water storage tanks must be done carefully, to avoid freezing problems in the winter due to low use when the tank is first placed into service.

As the southwest area is developed, the new southwest pressure zone should be created, which requires updating and installing new pressure reducing valves. The new tower should be installed within this area so the storage is available to meet the average daily demand in the event the zone needs to be isolated for repairs or maintenance.

This new zone will absorb some of the existing intermediate zone and homes that currently have individual pressure reducing valves may be able to remove them as the supplied pressure is already reduced at the mains to acceptable levels. The existing high pressure areas can be seen on Figure W-6 and proposed pressure on Figure W-7.

Figure W-7 – Planned Pressure Distribution



Ultimate Design Water System

The ultimate design water system, shown on Figure W-8, is capable of serving approximately 30,000 people, which is about twice the anticipated 2040 population. However, the system should be updated to evaluate the ability to serve the average land use density at full build out, which would be 71,000 people.

Figure W-8 – Planned Water Distribution System

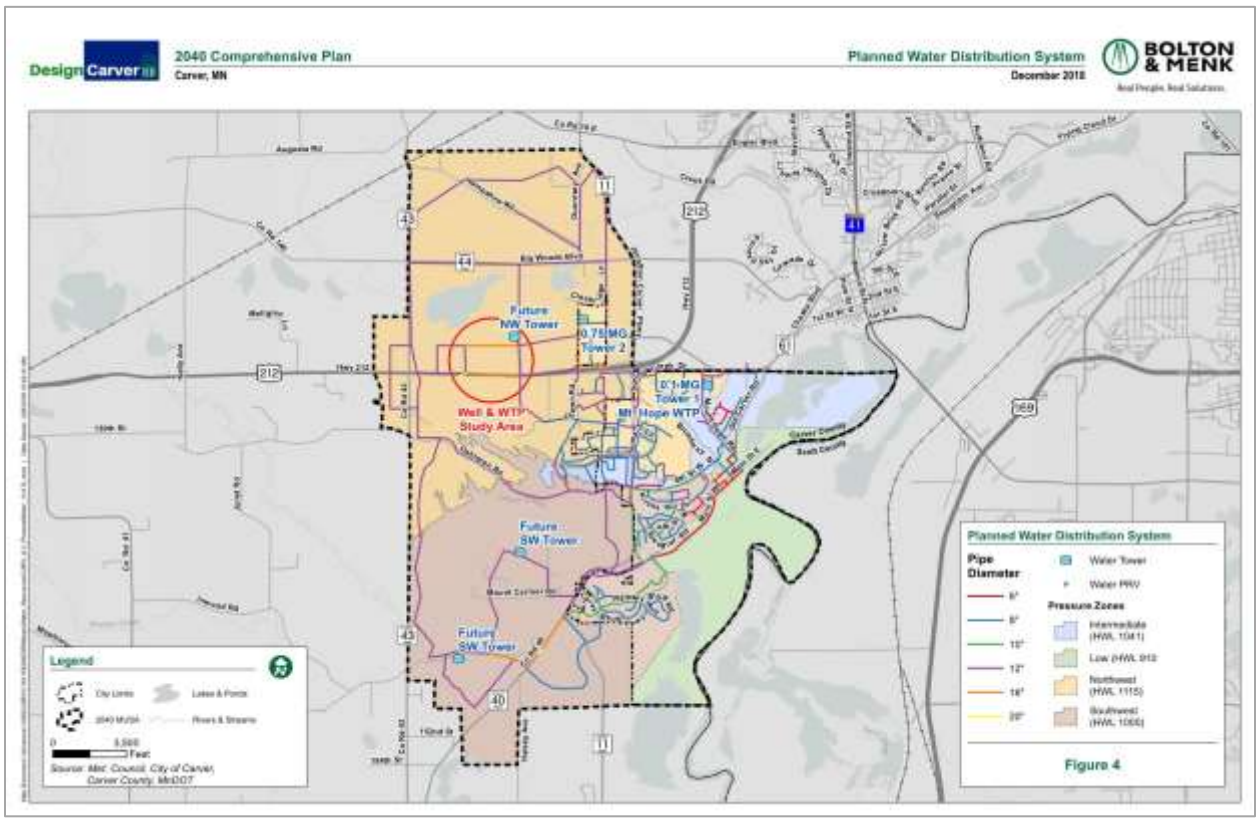


Table W-5 details the difference in additional infrastructure required to support varying levels of the ultimate buildout population. The ultimate scenarios use 70 gallons per capita day for residential use, while commercial and industrial demands assume 1,200 gallons per acre and remain the same between the low and middle density ranges.

Table W-5 | Future Water Demand Requirements

Density Scenario	Population	Avg. Day Demand (MGD)	Elevated Storage (MG)	Additional 0.75 MG Towers from Ex.	Max Day Demand (MGD)	Water Supply (GPM)
2040 MCES	15,500	1.54	1.6	1	4.62	3,208
Ultimate - Low Density Range	41,605	4.09	4.6	5	12.27	8,519
Ultimate - Middle Density Range	71,407	6.64	6.85	8	19.92	13,833

Infrastructure will need to be evaluated periodically during the ultimate growth stage and as densities increase to ensure adequate supply, treatment, storage and mains can meet demands and desired fire flows.

Local Surface Water Management Plan

Introduction

Water resources have played a critical role in the development of Carver, MN since its inception. The City was built on the banks of the Minnesota River in the 1850's at an ideal location as a steamboat and barge terminal. During low river levels steamboats could travel upstream only a short distance beyond Carver, thus steamboat cargo would have to be offloaded in Carver and reloaded for continuing trips in either direction. From this location along the banks of the Minnesota River, the City has expanded up the bluffs of the Minnesota River Valley following the tributaries, Carver and Spring Creek. It is these three water bodies that have most dramatically shaped not only the topography, but also the growth of the City. They enrich the community by providing habitat and social, economic and aesthetic benefits.

Responsible and cost-effective water management is an important strategy for maintaining environmental quality, while supporting the City's needs for water. The Metropolitan Land Planning Act requires that each community include a local water management plan as part of their comprehensive plan. This plan shows how the community will protect and improve water quality and quantity.

The primary purpose of this section is to provide guidance to City staff and elected officials regarding the implementation of effective, integrated storm water management practices and programs through the 2040 planning timeframe. This chapter is consistent with the regional requirements for surface water resources as outlined in the Metropolitan Council's 2040 Local Planning Handbook. Also, since the State requires a separate surface water management document for communities located within the Twin Cities seven county metropolitan area, the information included in this chapter is further outlined in Carver's Surface Water Management Plan (SWMP) which is included in Appendix B.

Carver Surface Water Management Plan

The City's Surface Water Management Plan (SWMP) serves as a comprehensive document to guide the City in conserving, protecting and managing its surface water resources. The SWMP is a separate document related to the Comprehensive Plan and is written to meet the requirements of Minnesota Statute 103B and Minnesota Rule 8410 administered by the Board of Water and Soil Resources. This plan is also consistent with the goals and policies of the Metropolitan Council's Water Resources Management Policy Plan, and the two watershed management organizations having jurisdiction within the City: Carver County Watershed Management Organization (CCWMO) and Lower Minnesota River Watershed District (LMRWD). The plan and its amendments will be adopted by the City as an element of this Comprehensive plan.

Through implementation of the City's SWMP, Carver aims to manage that growth sustainably. The SWMP includes a detailed description of the City's natural resources, including water resources, past studies and inventories, and current surface water management. An assessment of the existing and potential water resource and stormwater related concerns within the City and associated corrective actions are also provided. The SWMP includes goals and policies to address the long-term surface water management needs in the City, and outlines the regulations, standards, practices, projects and funding

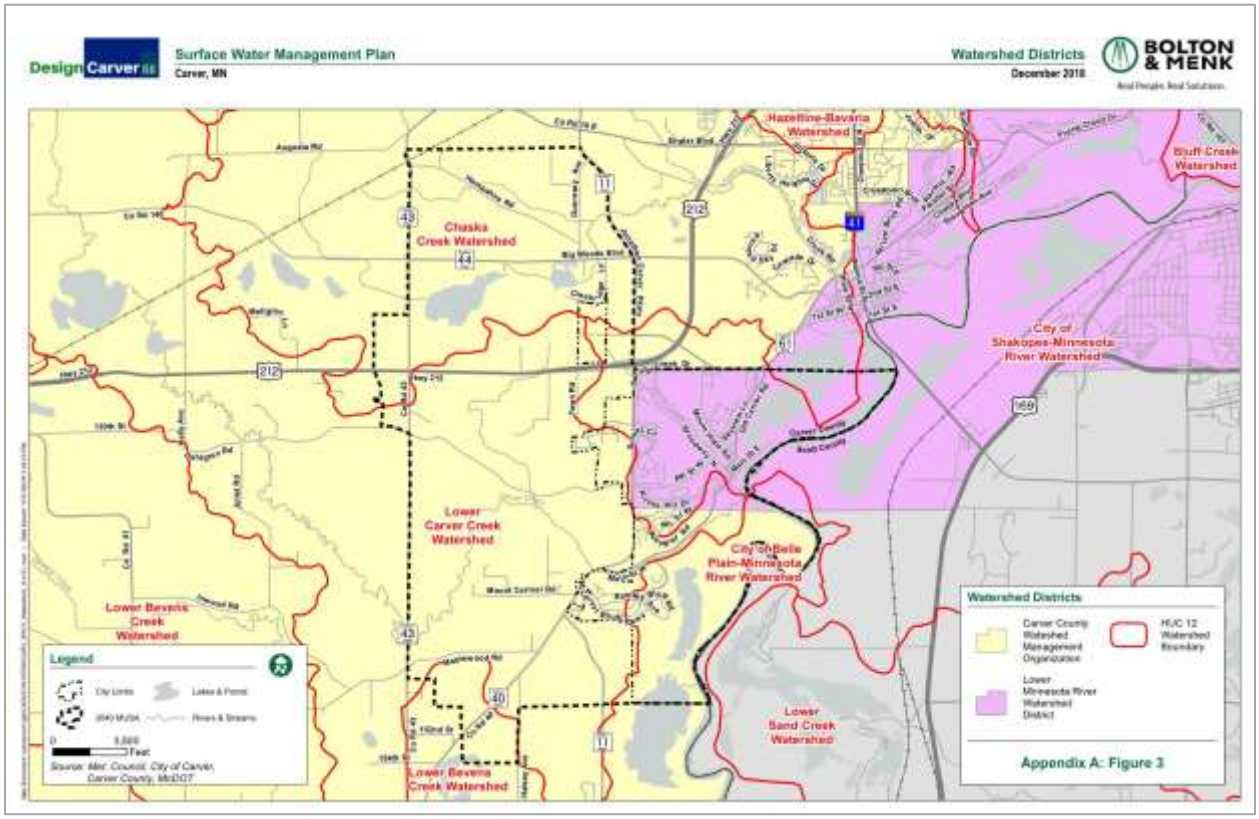
that will be needed to implement the goals and policies. The SWMP also includes an inventory and classification of the City's wetlands and a corresponding management plan.

Watershed Districts

Carver is located within the jurisdictional boundaries of two watershed districts: Carver County Watershed Management Organization (CCWMO), and the Lower Minnesota River Watershed District (LMRWD). The districts are special purpose units of local government, established under the Minnesota Watershed Act of 1955, with broad authority to regulate land use planning, flood control and conservation issues. As required under the Metropolitan Surface Water Management Act, both Districts have adopted a Watershed Management Plan, which contains the framework and guiding principles for the Districts in carrying out its statutory purposes.

The City regulates erosion control, wetlands, floodplain alteration, and stormwater management for all land development within the City limits in accordance with City Ordinance, the NPDES Permit, and the Wetland Conservation Act. The City has an agreement with the LMRWD and administers and enforces its rules within their regulatory area. Outside of the LMRWD boundary, the City relies on the Carver County Watershed Management Organization (CCWMO) to administer and enforce its rules. Figure W-9 presents the watershed districts and the HUC 12 Watershed Boundaries.

Figure W-9 – Watershed Districts



Amendments

This Surface Water Management Plan will be incorporated into the City's 2040 Comprehensive Plan. Periodic amendments to this SWMP may be required to incorporate changes in local practices or changes to either the LMRWD or CCWMO Watershed Management Plans. Plan amendments will be incorporated by following the review and adoption steps outlined below.

Amendment Process

The SWMP is intended to extend approximately through the year 2028. In conjunction with the SWMP, the NPDES SWPPP activities will be reviewed and evaluated annually in a public meeting, and the permit program itself will be updated as required by the MPCA NPDES permit program. For the SWMP to remain dynamic, an avenue must be available to implement new information, ideas, methods, standards, management practices, and any other changes which may affect its intent and/or its results. Amendment proposals can be requested at any time, by any person or persons, either residing or having business within the City.

Requests for Amendments

Any individual can complete a written request for a SWMP amendment and submit the request to City staff. The request shall outline the specific items or sections of the SWMP requested to be amended, describe the basis and need for the amendment, and explain the desired result of the amendment towards improving the management of surface water within the City. Following the initial request, staff may request that additional materials be submitted in order for staff to make a fully-informed decision on the request. The City may also initiate an amendment to respond to amendment to a local watershed organization plan or following the completion and approval of a TMDL Implementation Plan.

Staff Review

Following a request for Plan amendments, staff will make a decision as to the completeness and validity of the request. If additional information is needed by staff to determine the validity of the request, staff will generally respond to the requestor within 30 – 60 days of receiving the request. Following receipt of sufficient information such that validity of the request can be evaluated, there are three options which are described below:

a. Reject the amendment. Staff will reject the amendment if the request reduces, or has the potential to reduce, the ability of the SWMP to achieve its overall goals and policies, or will result in the SWMP no longer being consistent with one or more of the watershed district's plans.
b. Accept the amendment as a minor issue, with minor issues collectively added to the SWMP at a later date. These changes will generally be to clarify provisions in the SWMP or to incorporate new information available after its adoption in 2018. Minor changes will generally be evaluated on the potential of the request to help staff better implement and achieve the goals and policies of the SWMP. Minor issues will not result in formal amendments, but will be tracked and incorporated formally into the SWMP at the time any major changes are approved.
c. Accept the amendment as a major issue, with major issues requiring an immediate amendment. In acting on an amendment request, staff should recommend to the City Council whether or not a public hearing is warranted. In general, any requests for changes to the goals and policies or the development standards established in the SWMP will be considered major amendments.

Staff will make every attempt to respond to an amendment request within 30 – 60 days of receiving sufficient information from the requestor. The timeframe will allow staff to evaluate the request internally and gather input from the Watershed Districts/WMOs and other technical resources, as needed. The response will describe the staff recommendation and which of the three categories the request falls into. The response will also outline the schedule for actions, if actions are needed to complete the requested amendment.

Watershed District Approval

All proposed major amendments must be reviewed and approved by the appropriate Watershed

Districts prior to final adoption of the amendments. Major amendments would include changes to the goals and policies of the SWMP. Staff will review the proposed amendments with the Watershed Districts to determine if the proposed change is a major amendment, and if a proposal is determined to be major amendment, then City staff will assess the ability of the requested amendment to maintain consistency with Watershed District plans.

City Council Consideration

Major amendments and the need for a public hearing will be determined by staff, and if identified as a major amendment, the request will be considered at a regular or special City Council meeting. Staff recommendations will be considered before decisions on appropriate action(s) are made. The requestor will be given an opportunity to present the basis for, and intended outcomes of, the request at the public hearing and will be notified of the dates of all official actions relating to the request.

Public Hearing and City Council Action

The initiation of a public hearing will allow for public input or input based on public interest in the requested amendment. City Council, with staff recommendations, will determine when the public hearing should occur in the process. Consistent with other formal City Council actions and based on the public hearing, City Council would adopt the amendment(s), deny the amendment(s), or take other action.

City Council Adoption

Final action on any major amendments, following approval by the watershed Districts, is Council adoption. Prior to the adoption, an additional public hearing may be held to review the SWMP changes and notify the appropriate stakeholders.

Physical Environment

The City of Carver has been a long-standing rural community. Located within the bluffs of the Minnesota River Valley, there is a considerable amount of relief within the City. Land surface elevations range from roughly 1000 ft. in the west to 700 ft. at the Minnesota River, forming the eastern border of the City. A significant portion of the drainage is directed into either Carver Creek or Spring Creek which drain into the Minnesota River. The Carver Creek watershed incorporates the southern and western portions of the City. The Spring Creek watershed incorporates the northeastern portion of the study area. The very northeast corner of Carver drains overland directly to the Minnesota River and the northwest portion of the study areas drains to West Chaska Creek. Figure W-10 shows the surface and groundwater interaction in Carver.

Figure W-10 – Surface and Groundwater Interaction

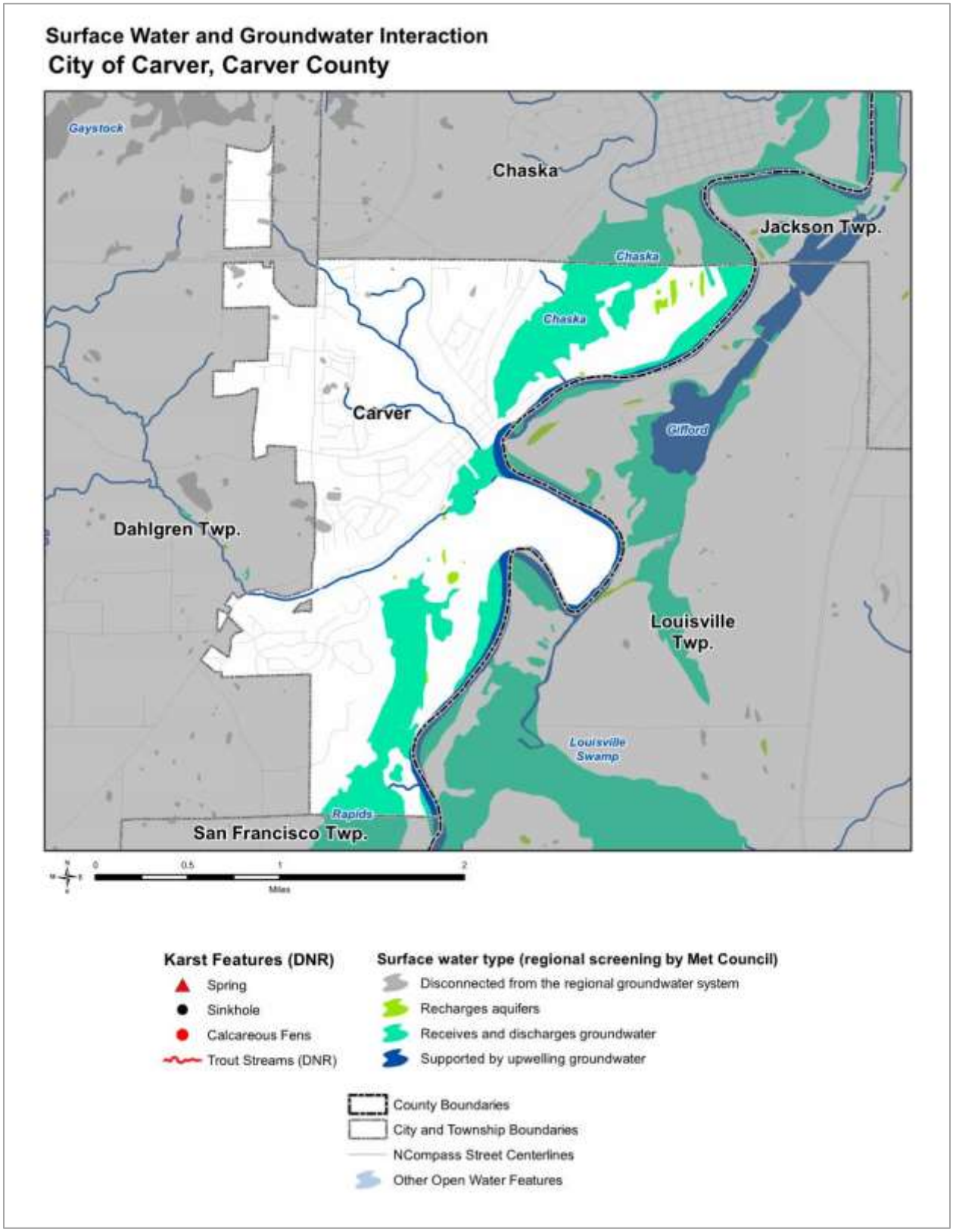
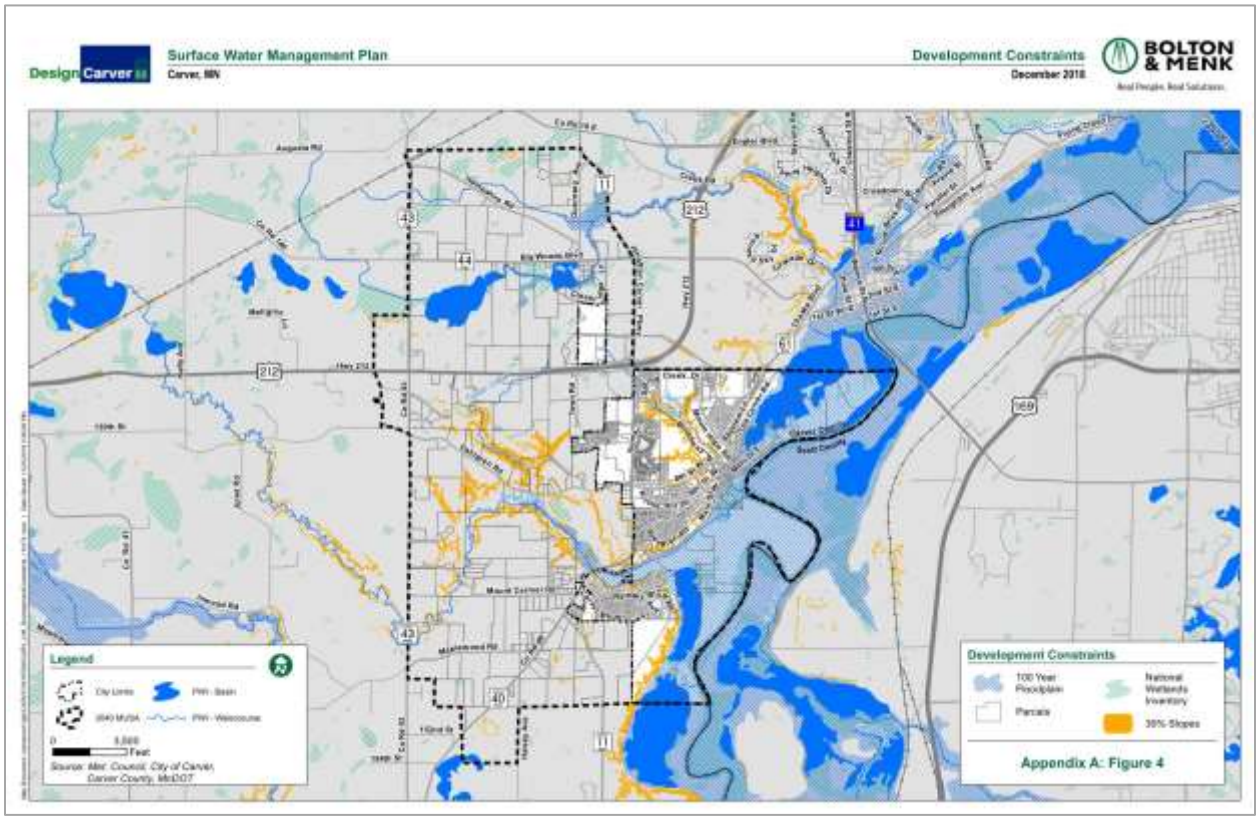


Figure W-11 shows development constraints for the City, including information on PWIs, NWIs and steep slopes.

Figure W-11 – Development Constraints



Spring Creek drains through the study area from the northwest to the southeast, traveling through the center of the downtown area before discharging into the Minnesota River. This creek is very vulnerable to channel erosion. The City has taken measures to help protect Spring Creek in the fully developed downtown area and desires to do additional stream restoration work within the creek. To help maintain the integrity of Spring Creek, it is critical to provide both rate and volume control within new developments within the Spring Creek watershed.

Carver Creek drains through the western and southern portion of the study area prior to discharge into the Minnesota River. Carver Creek is a main means of conveyance for a large portion of the City's trunk stormwater service area and the SWMP includes funds to restore and protect sections of Carver Creek as necessary.

Timber Creek is a tributary of Carver Creek. The Timber Creek watershed includes primarily agricultural land uses atop the rolling hills and forested land uses within the steeper sloped ravine down to Timber Creek. Timber Creek is highly susceptible to erosion due to its relatively steep grade, well established tree canopy, and sparsely vegetated banks. City rate and volume control measures will help stabilize Timber Creek as development within the watershed proceeds. This SWMP also includes funds to restore portions of Timber Creek as necessary.

A significant portion of the study area consists of loam type soils as identified in the Carver County Soil Survey. These soils are generally classified as Natural Resources Conservation Service (NRCS) Hydrologic Soil Group (HSG) B soils. HSG B soils typically yield a moderate runoff potential. Figure 5 in Appendix ___

presents a soils map showing soils classified by hydrologic group. Pockets of poorly drained soils appear primarily within existing depressions and upland drainageways. This type of silty clay loam soil typically yields low infiltration rates. Unless these areas are drained, periodic ponding of water following storm events will occur. Because this soil type is generally found in existing depression areas, many of the proposed stormwater detention areas utilizing these depressions will likely have low rates of infiltration.

Land Use

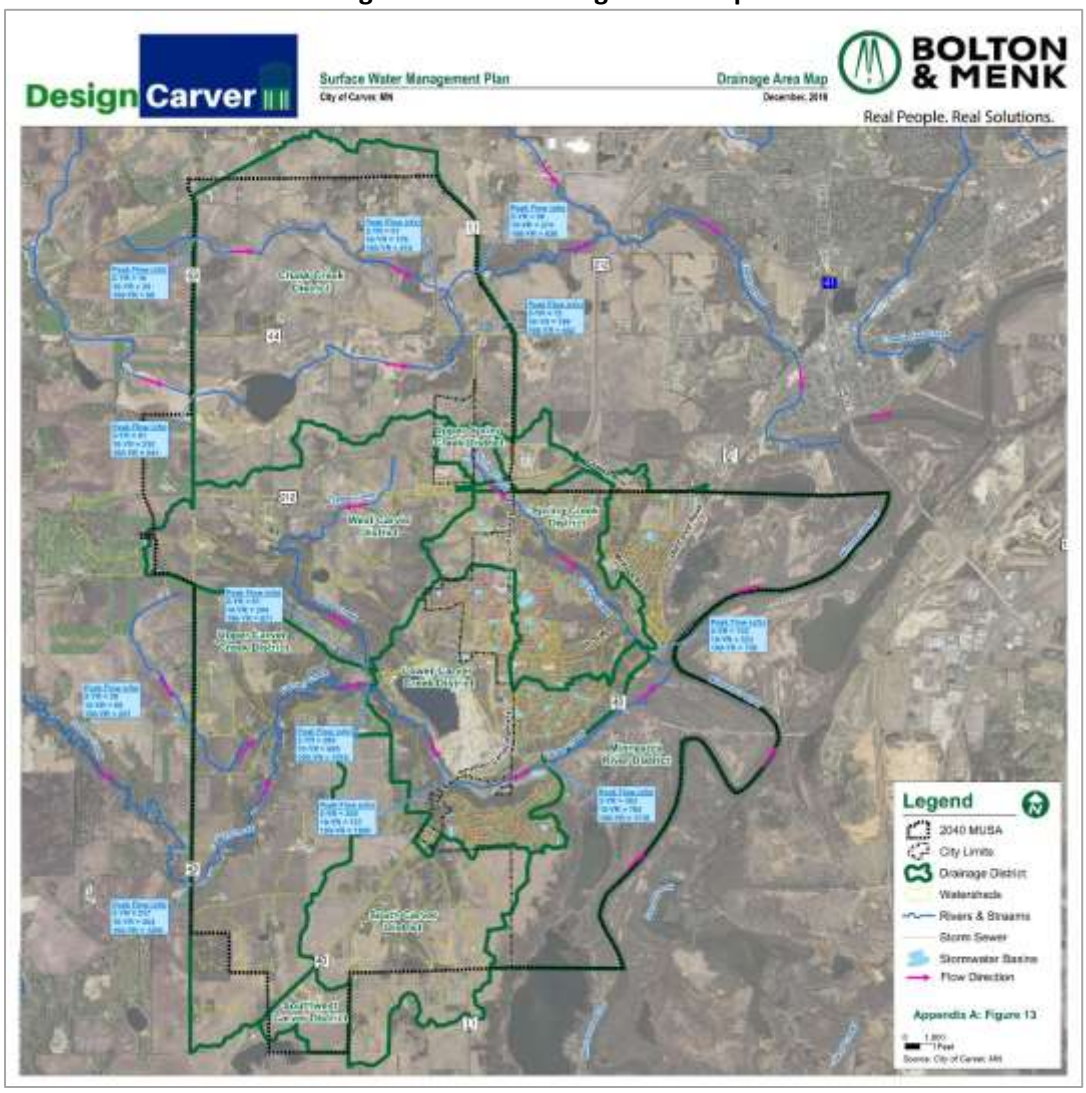
As development has occurred in the metro area including the expansion of Highway 212, Carver has experienced an influx of new development, drawing suburban commuters to the area. Recent development has been occurring to the west of the downtown area toward County State Aid Highway 11 (CSAH 11) and north of Trunk Highway 212. Future development will continue in this direction as infrastructure is continually added to serve the undeveloped areas.

According to the 2040 Land Use Map (Figure L-3), future development will be primarily commercial and industrial along TH 212 and along CSAH 11, north of the TH 212 intersection. The remaining portions of the study area will consist mainly of low and medium density residential development.

Existing and Potential Water Resource-Related Problems

The City of Carver was divided into 9 Drainage Districts, as shown in Figure W-12.

Figure W-12 – Drainage Area Map



The Drainage District names and the abbreviation for each district are presented in Table W-6 below.

Table W-6 | Drainage Districts

Major Drainage District	Abbreviation
Chaska Creek	CC
Lower Carver Creek	LCC
Minnesota River	MR
South Carver	SC
Southwest Carver	SwC
Spring Creek	SCr
Upper Carver Creek	UCC
Upper Spring Creek	USC
West Carver	WC

Table W-7 is a list of the current stormwater management issues or concerns identified in the City's SWMP. It is not intended to be a comprehensive list, but a list of issues with possible corrective actions that directly affects the City.

Table W-7 | Stormwater Issues and Possible Corrective Actions

Sub- District ID	Stormwater Issue	Potential Funding Partners	Possible Corrective Actions
LCC-A17, MR-A5, SCr-A12, SCr-A20, SCr-A22, SCr-A23	Carver downtown area discharges directly to Carver Creek, Spring Creek, and the Minnesota River without water quality treatment	CCWMO, LMRWD	Add structural pollution control devices such as sumps, SAFL Baffles, tree boxes, pervious pavement to future reconstruction projects. Construct water quality (infiltration/filtration) retrofit BMPs in downtown area where feasible. Provide education to residents and businesses on proper lawncare practices and other good housekeeping practices
MR-A1	Pond MR-P1 not currently sized to accommodate future development	LMRWD	Expand the existing pond MR-P1 as adjacent development occurs. Include additional treatment for surrounding runoff not routed through treatment device
SCr-A12, SCr-A23, MR-A7	Channel degradation and instability in Spring Creek and Carver Creek near downtown Carver	CCWMO, LMRWD	Restore and stabilize the degraded sections of these creeks upstream of 4th Street.
SCr-A20	Stormwater runoff from the Lenzen's 1st and 2nd Additions discharges untreated to Spring Creek	LMRWD	Retrofit structural treatment devices into existing storm sewer systems in these developments
SCr-A22	Gully erosion issue (LMRWD Gully Study) in the ravine north of 4th St. and Elm Dr. intersection is contributing sediment to Spring Creek	LMRWD	Repair and stabilize the active gully erosion issues.
SCr-A22	Gully erosion issue (LMRWD Gully Study) downstream of the northeast end of Diedrich Dr. is contributing sediment to Spring Creek	LMRWD	Repair and stabilize the active gully erosion issues
SCr-A22	Erosion issues in the ditch sections adjacent to 6th Street are contributing sediment to Spring Creek	LMRWD	Stabilize existing ditch sections or replace with storm sewer conveyance
UCC-A6	Erosion issues downstream of existing culvert under County Road 43	CCWMO	When development occurs, construct a new discharge to Carver Creek to avoid the erosion area
LCC-A2, LCC-A3	Erosion issues and excess flow routed along surface of existing Dahlgren Road	CCWMO	Add additional stormwater management features to ensure runoff does not encroach onto Dahgren Road
City-wide	Multiple gully erosion issues located on private property in City, as identified in LMRWD Gully Study	LMRWD	Where gully erosion is located on private property, address specific issues as future development allows
City-wide	Degraded wetlands within the study area, as identified in the 2002 Wetland Inventory and Assessment	CCWMO, LMRWD	Restore priority wetlands identified as having medium or high restoration potential as development allows
City-wide	Development activities occurring in areas beyond the City's trunk stormwater conveyance system	CCWMO, LMRWD	Coordinate interim conveyance measures with the CCWMO to protect downstream properties. Construct the City's trunk conveyance system

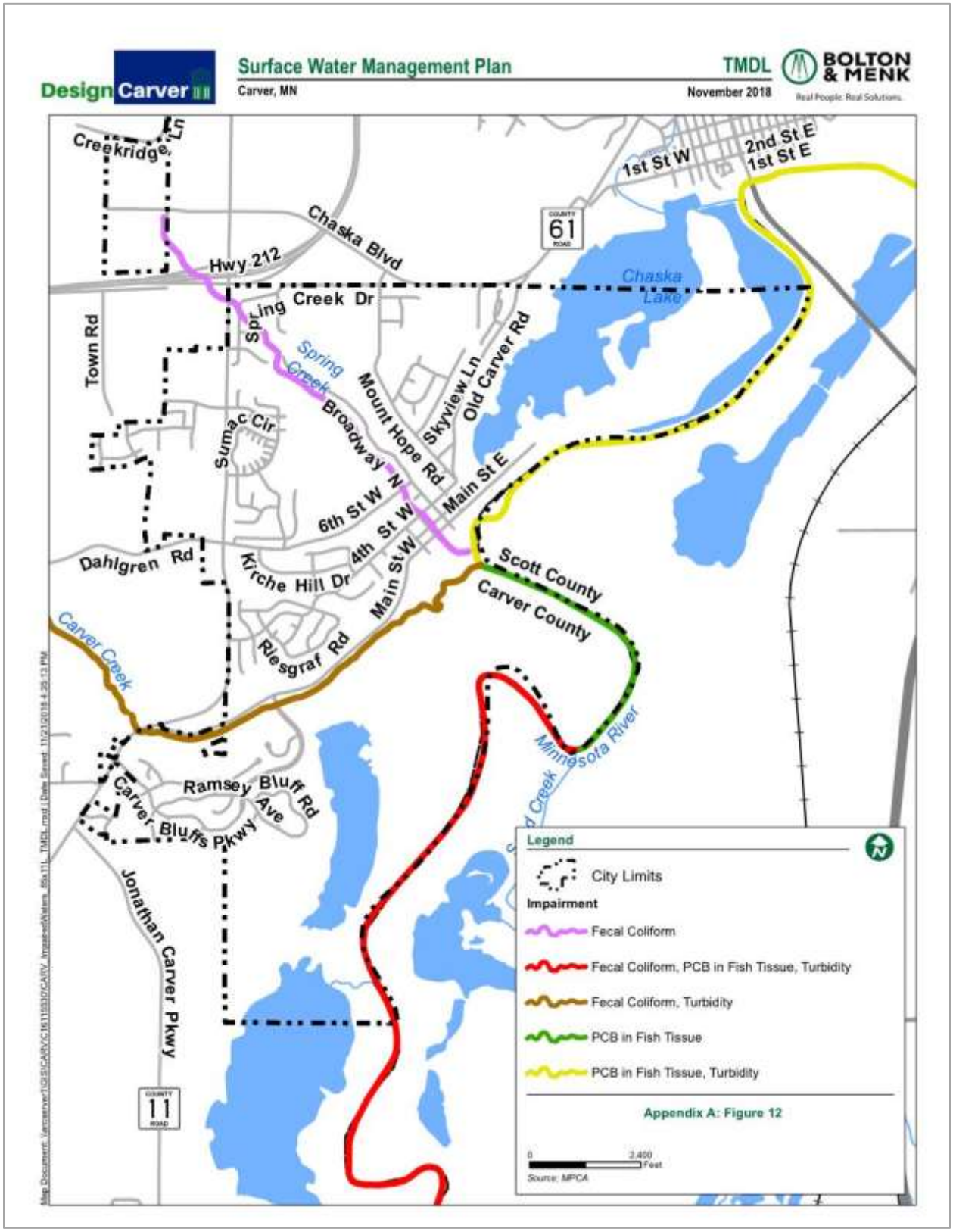
TMDLS

Three watercourses (Carver Creek, Spring Creek, and the Minnesota River) listed on the state impaired waters list receive discharge from the City of Carver. This list is known as the 303(d) list from the applicable section of the federal Clean Water Act, these waters do not currently meet their designated use due to the impact of a particular pollutant or stressor. If monitoring and assessment indicate that a waterbody is impaired by one or more pollutants, it is placed on the list. Information for impaired waters receiving discharge from Carver is presented in Table W-8. Figure W-13 identifies the watercourses in Carver and their approved TMDL pollutant.

Table W-7 | Impaired Waters Receiving Discharge from Carver

Waterbody / Watercourse	AUID#	Listed Pollutant	Impaired Use	TMDL Approved / Year
Carver Creek	07020012-806	Fecal Coliform	Aquatic Recreation	Yes / 2007
		Turbidity	Aquatic Life	Yes / 2012
		Nutrient / Eutrophication	Aquatic Life	No
Unnamed Creek (Spring Creek)	07020012-528	Fecal Coliform	Aquatic Recreation	No
Minnesota River (Bevens Creek to Sand Creek)	07020012-501	Turbidity	Aquatic Life	
		Mercury in Water Column	Aquatic Consumption	Yes / 2008
		Mercury in Fish Tissue	Aquatic Consumption	Yes / 2008
		PCB in Fish Tissue	Aquatic Consumption	No
		Fecal Coliform	Aquatic Recreation	No
Minnesota River (Sand Creek to Carver Creek)	07020012-532	Mercury in Water Column	Aquatic Consumption	Yes / 2008
		Mercury in Fish Tissue	Aquatic Consumption	Yes / 2008
		PCB in Fish Tissue	Aquatic Consumption	No
Minnesota River (Carver Creek to RM 22)	07020012-506	Turbidity	Aquatic Life	No
		Mercury in Water Column	Aquatic Consumption	Yes / 2008
		Mercury in Fish Tissue	Aquatic Consumption	Yes / 2008
		PCB in Fish Tissue	Aquatic Consumption	No

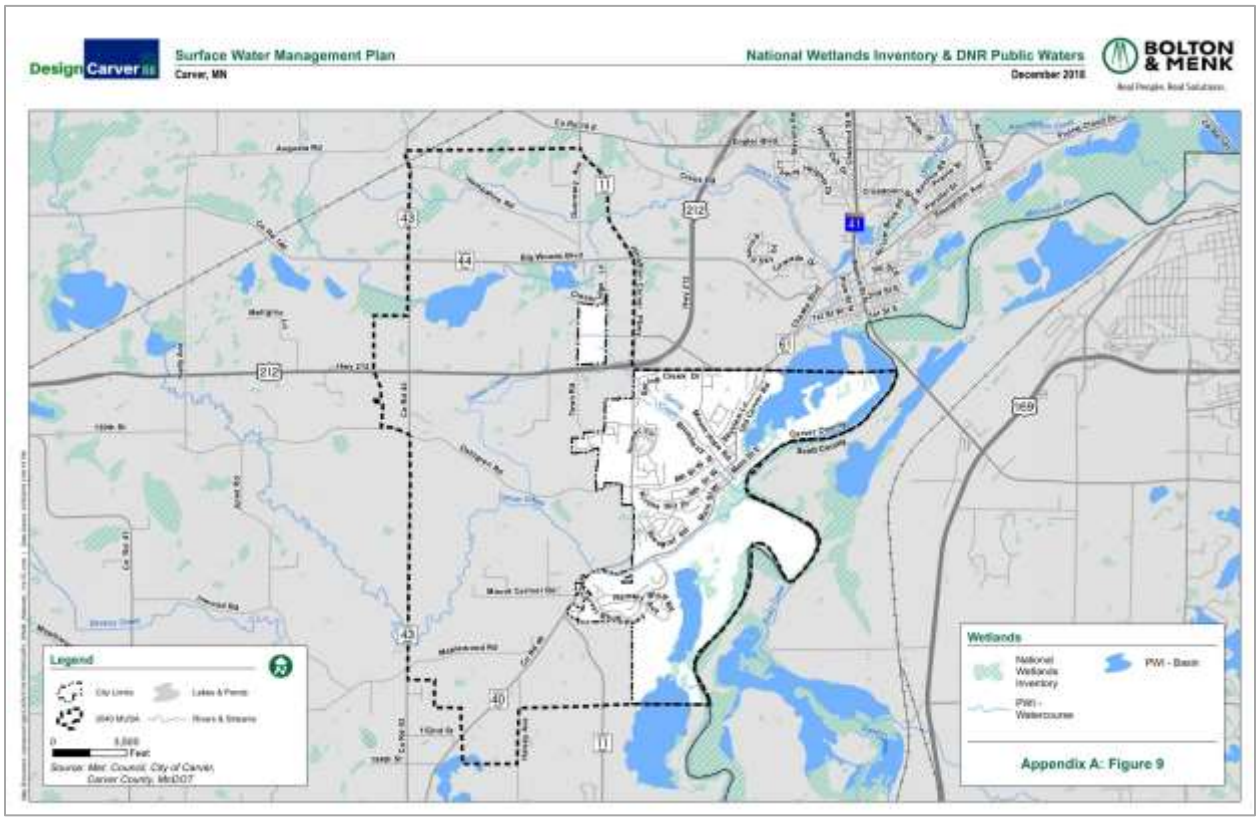
Figure W-13 – TMDL



Wetland Inventory & Assessment Report

In 2002, the City completed a Wetland Inventory and Assessment detailing the wetland classification and management standards for wetlands within the majority of the Study Area. A copy of this report in included in Appendix E for reference. This 2002 report includes a functions and values assessment for the wetlands within the study area, as well as stormwater pretreatment standards, water quality and quantity protections requirements, and buffer standards for all wetlands based on wetland classification. The City is the responsible LGU for management of wetlands in Carver, and will administer the Minnesota WCA, Local watershed management organization requirements will be applied to wetlands included in their management plans. Figure W-14 identifies the wetlands and DNR public waters in Carver.

Figure W-14 – Wetlands and DNR Public Waters



Goals and Policies

The following are the City's goals for Surface Water Management. They reflect a commitment by the City to protect its natural resources and sustain a high quality of life for its residents. They are consistent with Minnesota Rules 8410 and local watershed requirements and have been developed to avoid conflict with existing State, Regional, and County goals and policies, and to be generally consistent with the Lower Minnesota River Watershed District (LMRWD) plan. As part of the City's SWMP, policies that support each goal are included. They provide clear guidance to City staff and to developers what is required of them to ensure that the following goals are achieved.

A. Floodplain Management

Goal: Provide adequate storage and conveyance of runoff and manage development in flood prone areas to protect the public safety and minimize property damage.

B. **Water Quality**
Goal: To maintain or improve water quality of surface waters throughout the City by reducing sediment and nutrient loading.

C. **Water Quantity**
Goal: To minimize downstream impacts by maintaining peak runoff discharge rates and providing runoff volume reduction.

D. **Erosion and Sediment Control**
Goal: To prevent erosion and sedimentation to the maximum extent practical through construction site permitting, inspection and good municipal housekeeping.

E. **Wetlands**
Goal: To protect wetland value and ensure conformance with the requirements of the Minnesota Wetlands Conservation Act (WCA), MCWD Rules, and other State and Federal regulations.

F. **Public Ditch Systems**
Comments: There are no known county or judicial public ditch systems within the City.

G. **Groundwater**
Goal: To protect groundwater through prudent management of surface waters and areas of potential contamination.

H. **TMDL and Impaired Waters**
Goal: Address target pollutants identified for impaired waters and those in TMDL studies to improve water quality

I. **Conservation Design**
Goal: Encourage development activities to incorporate conservation design approaches.

J. **Resources Management**
Goal: Protect the City's wetlands, lakes, streams, groundwater, and natural areas to preserve the functions and values of these resources.

K. **Public Education and Outreach**
Goal: Provide educational and outreach opportunities for City residents and business owners, elected officials, City staff, and the development community that address stormwater management and water quality.

L. **Municipal Housekeeping**
Goal: To conduct operations and maintenance of City facilities and infrastructure as necessary to keep systems operating adequately and limit potential for discharge of pollutants. Additional information regarding municipal housekeeping can be found in the City's MS4 Storm Water Pollution Prevention Plan (SWPPP).

Local Implementation Plan/Program

The City's SWMP includes a list of surface water management related activities that the City needs to continue or commence implementation of and their related costs. The following section is taken from the SWMP.

The SWMP provides a plan for expanding and managing the City's surface water system, and protecting key water resources in the City. The real measure of success of the SWMP will be in its implementation. Implementation of the SWMP covers a number of aspects, including:

- Administering official controls and programs
- Operating and maintaining the surface water system
- Managing surface water as redevelopment and new development occur
- Implementing a public education program regarding stormwater management

- Constructing prioritized capital improvements
- Financing projects and programs

Official Controls

Codes and ordinances (official controls) are necessary tools to support the implementation of this surface water management plan. Over time, codes must be updated to remain consistent with City goals, policies and practices. To address the need to review and update City Code, certain goals and policies specifically reference city codes that exist or need to be created. In addition, the City's SWPPP identifies a set of ordinances required to comply with the MS4 permit requirements.

Stormwater System Operation and Maintenance

Carver's existing stormwater management system represents a major investment for the City. The ongoing inspection and maintenance of this system is critical to protecting this investment, as well as the water and natural resources the system is designed to manage. In accordance with the City's SWPPP, City stormwater system operation and maintenance responsibilities and schedule are provided in Table W-9.

Table W-9 | Stormwater System Inspection and Maintenance Schedule

Responsibility	Schedule
Inspect and clean out catch basins, sumps, and structural pollution control devices	Twice Annually
Stormwater pond inspection, including pond slopes, accumulated sediment, inlets, outlets, and identifying illicit discharges	Twice annually, and after heavy rainfalls or large snow melt events
Trunk storm sewer inspection	Twice annually during catch basin inspection and clean out
Remove accumulated sediment in stormwater	5 to 25-year cycle, as needed
Street Sweeping	At least twice annually, or as needed
Repair channel erosion issues	As needed

As new development brings more trunk stormwater facilities for the City to operate and maintain, these duties will require more staff time and a larger maintenance budget. It is important to quantify the extent of this future commitment so that the funds necessary for system maintenance activities can be collected via the City's stormwater utility. Per Policy 5 in Section 7. J, it is recommended that the City regularly review the cost and staff commitment to stormwater system operation and maintenance and evaluate if the current structure needs to be adjusted to accommodate future development.

NPDES Implementation

The MPCA has designated Carver as an NPDES Phase II MS4 community (MN Rules 7090). Carver recently completed a partial audit by the MPCA of the current SWMPP and incorporated the necessary resolutions. The existing permit was extended in 2018 while the MPCA develops the new permit, which is expected to be released in 2019 at which time the City will be required to apply for. A copy of the City's current SWPPP can be viewed at City Hall. Modifications to the City's current SWPPP could include, but are not limited to the following:

- Ordinance updates, specifically the post construction, erosion and sediment control, and illicit discharge and connection ordinances

- Increased public education and public involvement efforts, likely to involve more partnerships with CCWMO and LMRWD
- Stormwater system mapping and inventory updates
- Municipal facilities inventory
- Stormwater system treatment effectiveness evaluation and field assessment

As the City moves through their current SWPPP evaluation process, specific SWPPP update tasks and associated costs will be identified. Until these tasks are identified, only general implementation actions are included in Table W-10.

With the rising cost of the City's SWPPP implementation responsibilities, it is recommended the City regularly evaluate the cost of this implementation to determine if the current funding structure needs to be adjusted.

TMDL Implementation

The City recognizes that the responsibility for completion and implementation of the TMDL studies lies with the primary stakeholders contributing to the impairment. The City intends to cooperate with the watersheds in the development of the TMDL studies, acknowledging that the watersheds will take the lead on these studies. It is the intention of the City to fully implement the actions identified in future TMDL Implementation Plans, funding the implementation actions as necessary. The City also recognizes that as TMDL Implementation Plans to address impaired waters are developed the City's current stormwater management program may need to be revised to reflect the findings in the Implementation Plan.

To date, TMDL Implementation Plans for three of the impaired waters within Carver have been approved. These plans are as follows:

- Lower Minnesota River Dissolved Oxygen TMDL Implementation Plan - The TMDL implementation area for this TMDL does not include the City of Carver.
- Carver, Bevens, and Silver Creek Bacterial TMDL Implementation Plan - The TMDL implementation area for this TMDL includes the western portions of Carver. The City is willing to work with Carver County to work toward the goals identified in this TMDL Implementation Plan; however, no specific urban stormwater management implementation items are identified.
- Carver Creek Turbidity Implementation Plan – This implementation plan states the following: *"Comparing [the current MS4 TSS Loadings – TMDL Implementation Plan Table 3.2] to allowable loadings ([TMDL Implementation Plan] Table 2.2) indicates that no reductions appear to be needed from MS4 areas. The regulated MS4 communities will need to maintain at least the existing level of treatment of their stormwater discharges to ensure continued compliance with the conditions of the MS4 general permit. At the time of permit application, permittees will indicate that a WLA was assigned to them in this TMDL project, they are currently meeting that WLA since no reductions were called for, and they will continue to maintain the current BMPs on the landscape to ensure compliance with their permit."*

  To comply with this statement, the City will implement the following:
  - As development proceeds within the Carver Creek TMDL tributary area, the City will enforce our construction site stormwater runoff control ordinance to control sediment loading during construction.
  - All development activities must meet the City's post-construction stormwater standards. City development standards require significant stormwater rate control, volume control/water quality measures, and the construction of a trunk conveyance system

including a significant stormsewer network and ravine/stream restoration activities to minimize erosion and control sediment transport to Carver Creek.
  - The City will maintain all current City owned and maintained BMPs in accordance with the requirements of the current MS4 permit and City SWPPP.

Project Review and Approval Process

The City has established and fully implemented both a preliminary and final platting process according to Article V of the City of Carver Code of Ordinances. The implementation of applicable Goals and Policies and the City's design standards included in the SWMP is addressed throughout the project review and approval process.

The City will enforce its design standards while incorporating the following documents:

- The City will default to CCWMO Chapter 153 of Carver County Code of Ordinances (approved by County October 15, 2016) within in the CCWMO's jurisdictional boundary.
- Appendix K of the 2018-2027 Lower Minnesota River Watershed District Water Management Plan and the LMRWD Project Review Requirements.

Early in the project review and approval process, typically the concept review stage, the City will coordinate with the jurisdictional watershed as follows:

- <u>Lower Minnesota River Watershed District</u>

  It has been the City's experience that the Lower Minnesota River Watershed District has made a concerted effort to encourage cities within their jurisdiction to adopt local SWMPs and assume the regulatory responsibility for stormwater management and other related issues. The City assumes that with the adoption of this SWMP, the primary regulatory responsibility will rest with the City.

  An existing agreement between the Lower Minnesota River Watershed District and the City of Carver is already in place giving the City the authority to implement the stormwater goals and policies of the LMRWD for the LMRWD, unless otherwise described in the agreement. A copy of this agreement is included in the SWMP Appendices.

- <u>Carver County Watershed Management Organization</u>

  At this time, the City performs development review and approval activities side-by-side with the CCWMO, with both the City and watershed operating their own approval processes. With the adoption of this SWMP, Carver County will assess the ability of the City to implement this plan as it relates to regulatory responsibility. In the future the City may desire to take on principle responsibility for enforcement of the Counties rules. At that time, if the CCWMO deems that the City has performed adequately in implementing the County's rules, an individual agreement between the City and the County could be negotiated to determine principle review and enforcement responsibility. However, at this time, the City will not actively be pursuing this option.

Stormwater Education and Outreach

Stormwater education and outreach plays an important role in any effort to implement the City's stormwater management program, as outlined in the SWMP. The framework for the City's stormwater education and outreach program is provided in the NPDES MS4 permit, and the implementation plan for this program is presented in the City's SWPPP Document.

The objectives of the City's stormwater education and outreach program vary, depending on the target audience, which includes City staff, elected officials, City residents and business owners, and the development community. The program focus for each of these groups is described in the following sections.

A complete list of stormwater related education and outreach activities can be found in the City's SWPPP Document.

City Staff and Elected Officials

City staff and local government officials have a wide range of responsibilities for implementing this plan and the activities identified in the City's SWPPP Document. The City will implement education and outreach activities for City staff and elected officials, including the following:

- Annual stormwater public meeting – this meeting will take place at a City Council meeting and will provide the Council and City staff in attendance with a summary of the prior year's stormwater management program implementation efforts.
- Carver County WMO presentation – every 2-3 years, the City will invite Carver County WMO staff to a special meeting to educate City staff and elected officials on water resources issues with the County.
- Staff training – this City will conduct regular training for new/seasonal staff and on-going staff as is relevant to their job responsibilities. This training could include general all staff training sessions, staff specific training sessions, and the distribution of training materials to staff.
- SWMP Update presentations – Updates to the City's SWMP are presented to both the Planning Commission and City Council prior to adoption of the SWMP. This presentation covers the framework of the plan, plan contents, and the updates to the plan, and would occur on an as-needed basis.
- Periodic stormwater related presentations and training materials – As relevant stormwater related topics emerge (e.g. NOAA Atlas 14, MS4 Permit, Carver County Rule Updates, etc.), the City will take the appropriate measures (e.g. presentations, internal memos, etc.) to educate City staff and elected officials.

City Residents and Business Owners

To meet the requirements of the MS4 permit and the City's goal of improving the quality of Carver water resources, the City will engage residents and business owners in stormwater related education and outreach. The City will implement education and outreach activities for residents and business owners, including the following:

- Annual stormwater public meeting – this meeting provides an opportunity for residents and business owners to hear about the City's efforts to implement our stormwater program. This meeting also provides an opportunity for residents and business owners to provide feedback and input on the City's stormwater program.
- Regular stormwater related publications – include stormwater related information in a minimum of 4 City publications (City newsletter, utility billing mailings, etc.) annually. The content will be derived from both internal City sources and partnerships with other entities, such as the CCWMO or LMRWD.
- Coordination with CCWMO – starting in 2018, the City will seek to formalize an agreement to coordinate public education activities with CCWMO's Education Coordinator, based on the City's available budget. As part of this agreement, the City will provide the CCWMO with the following:
    - City staff contacts responsible for City media communication, along with information on the media communication methods available to the City.

    - A list of stormwater related issues of concern and topics about which the City would like to increase public awareness.
    - The City will annually review their public education and outreach program and determine a focus for the upcoming year. This review will be provided to the CCWMO to coordinate education and outreach opportunities.
- Social media communications – use the City's social media outlets (City blog, Facebook, and Twitter) to notice upcoming stormwater related events, highlight stormwater related happenings in the area, or provide stormwater related educational materials. The City aims for a minimum of 4 stormwater related communications per year via the City's social media outlets.
- Annual Spring cleanup day – City-wide annual curbside cleanup day accepting mixed solid waste and yard waste.

Development Community

The City seeks to engage the development and redevelopment applicants early in the project submittal process to help guide stormwater mitigation efforts for new and redevelopment projects. It is the City's expectation that potential developers will know what is required of them to appropriately assess the site from the beginning. The City will implement education and outreach activities for the development community, including the following:

- Pre-application meeting – The initial guidance related to stormwater mitigation efforts will be provided at the pre-application meeting with developers (see Policy 28). This meeting provides an opportunity to discuss how the project will incorporate Conservation Design practices into the site layout. The City is committed to working with developers to incorporate suitable Conservation Design techniques into site layouts.
- City website – The City makes ordinances and design standards available on our website for developers to review.
- Plan review process – Throughout the plan review process, the City is in communication with developers regarding the implementation of the City's stormwater related policies, stormwater system maintenance requirements, and general site layouts that promote water quality.

Stormwater System Implementation Projects and Activities

Based on the assessment of the City's current stormwater management program and the implementation items in the preceding sections, a list of recommended system improvement projects and activities has been identified. The system improvements identified range from those being driven by regulatory requirements, to others driven by the functionality of the City's stormwater system. Table W-9 presents a summary of recommended stormwater and water resource management projects and activities, listed in no particular order. The budget amounts included in this table should be considered planning-level cost estimates, with more specific cost estimates to be determined as the project or activity approaches.

The items listed in Table W-10 will be used as a reference when the City selects specific stormwater and water resources management projects and activities to be included in the capital improvement planning process. This planning process is updated periodically by city staff and reviewed and approved by the City Council.

Table W-10 | Stormwater System Implementation Projects and Activities

Item Number	Project	Description	Est. Start	Est. Cost ($)
1	6th St Drainage Study	Study best management practices that can be incorporated to provide water quality while managing increasing flow rates	2020	$650,000
2	Ravine stabilization – 4th St & Elm Drive	Repair and stabilize the active gully erosion at this location	2020	$250,000
3	Diedrich Dr & Kirche Hill Dr. Stormwater Improvements	Include structural BMPs including sumps, SAFL Baffle, etc. in the proposed storm sewer system.	2019	$25,000
4	Downtown Water Quality Improvements	Continue to install structural BMPs such as sumps, SAFL Baffle, etc. as reconstruction projects occur	TBD	TBD
5	Spring, Carver, and Timber Creeks stream bank stabilization	As stream rehabilitation funds become available, restore and stabilize selected sections of Spring, Carver, and Timber Creeks.	TBD	TBD
6	6th Street Railroad Embankment Drainage Improvements	Restore functionality of outlet serving upstream drainage area	2019	$100,000
7	Community Park Drainage Improvements	Add BMPs to provide water quality and quantity improvements.	TBD	TBD
8	Dahlgren Road	Construct BMPs to provide water quality and quantity improvements along Dahlgren Road to prevent flooding during heavy rainfall events	TBD	TBD
9	Old Carver Road Stormwater Basin	Construct Stormwater Basin on Parcel #: 02393762, Provide water quality for Mount Hope Road Storm Sewer System	TBD	$200,000
10	Stormwater system inspection and maintenance	Inspection and maintenance of the City's stormwater system	Ongoing	Varies
11	Annual Street sweeping	Sweep streets at least twice annually	Ongoing	$15,000
12	Annual MS4 reporting	Prepare and submit MS4 annual report	Ongoing	Varies
13	Stormwater education and outreach	Stormwater education coordination, outreach events, staff training, website updates, mailings, etc.	Ongoing	Varies
14	Update city code	Review and update as necessary to address new MS4 permit requirements	2014	10,000
15	Develop a Shoreland Ordinance	Prepare a shoreland ordinance compliant with DNR shoreland regulations	2019	10,000

Note: The City may seek partnerships from the CCWMO or LMRWD, or financial assistance from outside sources to implement the activities.

Stormwater Area Charges

The City's proposed surface water system is presented on Map 1 and in Appendices A-D. New surface water facilities will be constructed in conjunction with new development, redevelopment and street reconstruction. One of the basic objectives of the SWMP was to lay out a surface water system to meet the needs of Carver moving forward and to generate a cost for the construction of this system.

A detailed breakdown of the total stormwater system cost (regional conveyance system cost, regional pond construction cost, and regional land costs) is included in the SWMP. However, following the adoption of the 2008 SWMP, the City made the decision to base their stormwater area charge on the regional conveyance system cost amount only. The City assumes that all the costs associated with pond construction (regional pond construction cost) and land cost for onsite ponding (pond land cost) are borne completely by the developer, as these ponding costs are necessary in order to meet the City's stormwater requirements.

Table W-11 below identifies the regional conveyance system cost per developable acre broken up by major land use type. This is the cost the City is using for their stormwater area charge amount. The Table cost per developable acre by major land use in Table W-11 applies a higher cost per acre value for land

uses with more impervious surface than those with less. This is due to the fact that higher impervious land uses require larger, more expensive infrastructure.

The total system cost estimates presented in the SWMP are based on 2013 construction costs and can be related to the value of the Engineering News Record (ENR) Index for Construction Costs of approximately 9,552 (July 2013). Future changes in this index are expected to fairly accurately describe cost changes in the proposed facilities. During interim periods between full evaluation of projected costs, capital recovery procedures can be related to this index. The system cost estimates are assumed to cover construction, legal, engineering, and administrative costs.

Table W-11 | Regional Conveyance System Cost per Developable Acre Summary

Land Use	Developable Acreage (acres)	Runoff Depth 10-yr, 24-hr Event [2] (inches)	Land Use Factor [3]	Equivalent Area [4] (acres)	Cost per Developable Acre [5] ($/acre)
Low Density Residential	1,602	1.75	1	1,602	$3,145
Medium Density Residential	855	2.05	1.2	1,026	$3,775
Mixed Density Residential	487	2.05	1.2	584	$3,775
High Density Residential	162	2.92	1.7	275	$5,347
Commercial / Industrial 1	422	3.11	1.8	760	$5,662
Total	**3,528**			**4,247**	
Total Regional Conveyance System Cost[6]		$13,350,100			
Cost per Equivalent Acre		$3,145			

[1] Commercial/Industrial land use incorporates areas on Figure 7 identified as commercial, commercial/industrial, and mixed commercial/industrial.
[2] Runoff depth from a 10-year storm event used to weigh the amount of runoff generated by each land use (based on City storm sewer design event).
[3] Land use factor is calculated by dividing the 10-year runoff depth for the given land use by the 10-year runoff depth generated by LDR.
[4] Equivalent area calculated by multiplying the developable acreage for a given land use by associated land use factor.
[5] The cost per developable acre is calculated by multiplying the cost per equivalent acre by a specified land use factor.
[6] See SWMP Appendices for details on this cost amount.

Financing

Several methods of financing the implementation items identified in this SWMP are available to the City. Some of the financing methods are as follows:

- Area Charges: These are fees charged to developments on an area (cost per acre) basis. These charges are frequently used in developing communities to ensure that new development pays for facilities required to serve it. Charges could be levied against redevelopment in a similar manner. An area charge calculation could be based on methodologies similar to those presented in Table W-10 above.
- Special Assessments: Assessments against benefiting or responsible properties can be used to finance surface water improvements.

- Stormwater Utility: This is a fee charged to existing properties based on an estimate of runoff generated and discharged to the City's system. The revenues collected are dedicated to the surface water system, frequently used to pay for operation and maintenance of the system.
- Grants: Though subject to budgetary constraints, a number of state and other grant programs are available for surface water management.

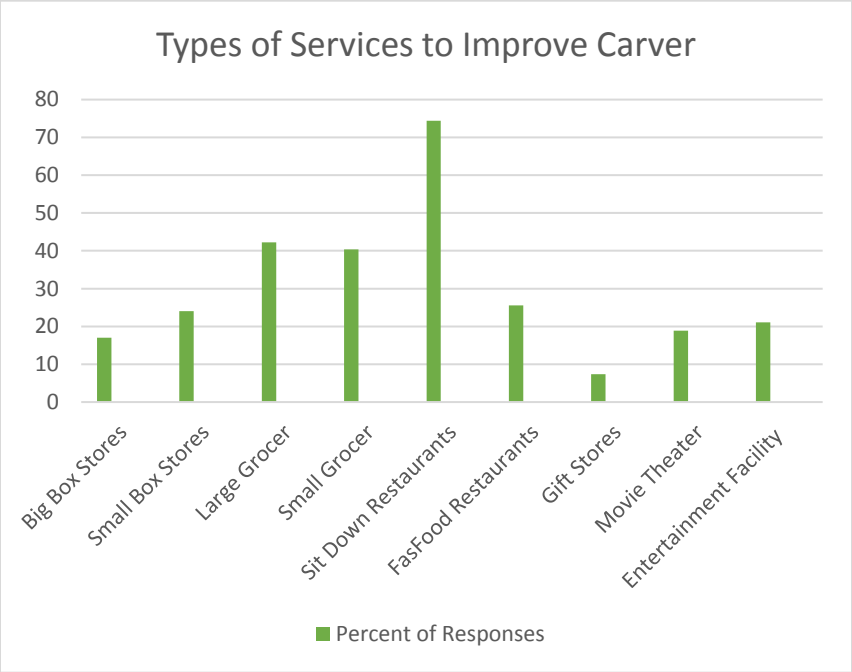
Typically, an area charge is the most effective way of financing new stormwater trunk system improvements driven by development.

The other financing mechanisms mentioned above are generally more appropriate for the retrofit improvements within developed portions of the City identified in the SWMP Appendices.

ECONOMIC DEVELOPMENT

Existing Conditions

Recent development in the City of Carver primarily has been of single family homes which will require greater diversity of the tax base to create a vibrant community for the future of the community. This was heavily reflected in the community survey that was distributed as part of the Design Carver Plan. When asked what would improve the quality of life in Carver, 220 of 270 respondents indicated that more services/shopping would be the largest contributor to quality of life. Additionally, 58 of 270 responded that an increase in employment options would create greater quality of life.



When asked top priorities for future growth in Carver, 206 of 207 responses indicated that commercial/retail development should be at the top of the list for the community. From survey results, it indicates residents in the City are eager for greater ability to access goods and services in the community.

Data suggests a greater mix of land uses desired by the community. In response, Carver will work to diversify land uses and employment opportunity throughout the community via land use guidance and the City Code. The future land use map of the Design Carver plan allows for several areas of retail, trade and office users. Carver will continue to be open for economic development to include both large scale users as well as small businesses throughout both Carver's Historic Downtown as well as areas projected for new development.

ECONOMIC DEVELOPMENT

In general, residents of Carver have high rates of education including 49% of the population having earned a bachelor's degree or post graduate degree. The median household income in Carver is higher than the overall average of Carver County. Reasonable housing prices attracted many residents to Carver with 157 of 270 responding that the amount of house available for the cost was a driving factor of their decision to live in Carver.

Median Household Income	
Carver County	$93,095
City of Carver	$109,938

American Fact Finder

Though the City of Carver has a higher median household income of Carver County collectively, residents must commute to adjacent Carver County communities and beyond for employment, goods and services. Expansion of Highway 212 and Jonathan Carver Parkway will continue to foster an environment that allows economic development and activity. With an increasing population, it is anticipated Carver will see an increase of retail and commercial users as significant population milestones continue to occur.

The City of Carver will continue to work to attract users that will provide goods and services for the community but additionally allow for employment within the City of Carver. According to American Fact Finder, the average commute time for residents from Carver is 28 minutes. With greater employment opportunities within the City of Carver, daytime outmigration will decrease which would lead to greater commerce during typical working hours.

The City will additionally continue to explore and research flood mitigation techniques to ensure the Historic Downtown is able to flourish without the constraints of costly flood insurance for greater economic vitality and development. Dependent on location, redevelopment Carver's downtown will continue to be reviewed by the City's Historic Preservation Commission to ensure continuity throughout the downtown.

Economic Development Actions

- The Carver Business Alliance which includes City staff, elected officials and local business owners has allowed the City to cultivate and build strong relationships with throughout Carver. The City will work to continue the Carver Business Alliance to maintain and build relationships both with the City as well as other business owners throughout the community.
- Ensure land uses and zoning regulations are compatible for businesses interested in development. The zoning ordinance should be updated to reflect broader allowable land uses in areas including the commercial and industrial land uses categories. Panning for the highest and best land use for property will ensure quality services.
- The City of Carver will actively research and pursue funding related to infrastructure and business development for the community.
- Increase social media and marketing of the City of Carver as development friendly and open to commerce. Outreach should additionally include benefits of living in Carver.
- The City of Carver will continue to be supportive of surrounding communities and their economic development goals recognizing that development throughout Carver County is advantageous for development in the City of Carver.
- Create and retain jobs that span the spectrum for people of all ages, abilities and interests.

IMPLEMENTATION

Overview

The Comprehensive Plan creates a vision for the city, and guides land use and infrastructure improvements to meet the needs of the community in the future. But, the vision of the plan can only be realized if the plan is used. The Implementation chapter describes some of the many tools that may be used to assemble the pieces of the puzzle and achieve the city's vision. Implementation tools will vary in that some will be reactive, such as zoning and subdivision ordinances that guide private developments, and others will be proactive, such as the city's Capital Improvement Program (CIP) for undertaking public improvement projects.

Official Controls

To achieve the goals and objectives of this Comprehensive Plan, the City of Carver has adopted a code of ordinances to establish regulations for zoning, subdivision of land, shoreland, floodplain and bluffs, as well as other development or sensitive areas. Official controls, specifically zoning requirements, will be reviewed and updated within nine months of adoption of the 2040 Comprehensive Plan to remove conflicts and inconsistencies.

Zoning

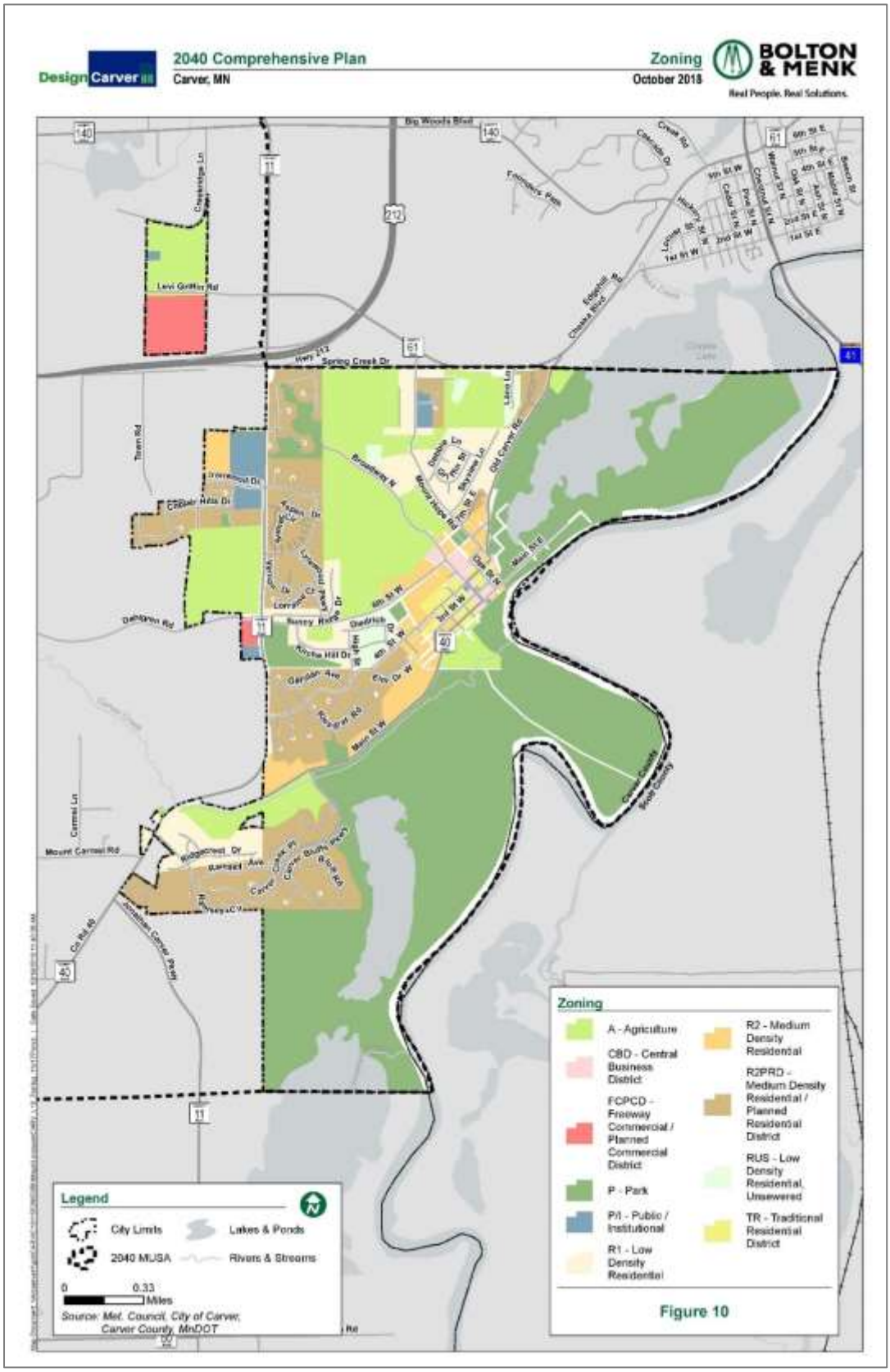
Zoning codes regulate land use to promote the health, safety, order, convenience, and general welfare of all citizens. They regulate location, size, use and height of buildings, the arrangement of buildings on lots, and the density of population within the city. The city's zoning districts effectively guide development in Carver.

The City of Carver is divided into several zoning districts, outlined below and shown in Figure I-1. The zoning ordinance specifies the permitted and allowed accessory uses in each district as well as procedures for permitting conditional uses or obtaining variances in special situations. The zoning ordinance contains performance standards and lot dimensional standards in order to assure compatible land uses in the community.

- Agriculture (AG) – This district is intended to provide for a smooth and orderly transition of the city from rural to urban in character. Specifically, the AG district is intended to prevent premature, scattered urban development until the necessary public facilities, such as streets, municipal water and sanitary sewer, are available. The district is also intended to retain as much genuinely rural area and agriculture land as can be accommodated and encouraged until urbanization is considered necessary.
- Low Density Residential Unsewered (RUS) – The RUS district is intended to provide areas for low density housing in areas of the city without municipal services.
- Low Density Residential (R-1) – The R-1 district is intended accommodate low density, single family homes and accessory uses.
- Medium Density Residential (R-2) – This district allows one and two-family dwellings on smaller lots. Multifamily dwellings are permitted as part of Planned Unit Developments. This district is typically located adjacent to the original core of the city.
- High Density Residential (R-3) – This district allows multifamily dwellings at a density of 8 units per acre or higher.

- Traditional Residential District (TR) – The TR district recognizes the unique development pattern associated with properties within the original plat and townsite of the city encompassed by the Carver Historic District.
- Planned Residential District (PRD) – These districts allow for the development of residential areas under a flexible regulatory process as compared to the more rigid development regulations common to traditional zoning districts. The planned residential district provides for a joint planning design effort by developers and city officials rather than the city establishing minimum limits within which developers must perform. Benefits include an opportunity to protect and preserve valuable natural resources and amenities, to assure a higher quality living environment, and to allow the development of a variety of housing types and densities as a single planned entity.
- Central Business District (C-1) – The C-1 district recognizes the historic downtown area of the city and serves as the focal point of community interest, commercial, financial, office, entertainment and government activity. Certain areas of the C-1 district are regulated by historic preservation regulations.
- Freeway Commercial District (FC) – This district provides land for development of commercial activities adjacent to Trunk Highway 212.
- General Commercial (GC) – The GC district is intended to provide for development of commercial activities in areas other than those adjacent to Trunk Highway 212 or within the Carver Historic District.
- Planned Commercial Development Overlay District (PCD) - A planned commercial development is intended to allow variation from the strict literal provisions of this chapter, including, but not limited to, requirements relating to setbacks, height, zoning lot area, width, depth, and yards.
- Industrial (I-1) – The I-1 district is intended to provide land for development of light industrial activities which can be accommodated in a value enhancing park-like setting. Uses include those which generate a minimum of noise, glare, dust, odor, vibration, air and water pollution, fire and safety hazard, and obtrusive views. Development of these areas is characterized by an overall visual appearance reasonably compatible with the predominant historical and residential character of the city and with the desired positive visual image of the industrial community.
- Public Open Space (P) – This district is intended to preserve significant natural features and amenities such as lakes, rivers, marshes, steep hills and extensive woodlands in their natural state in order to assure continuation of the existing natural drainage system, to prevent harmful soil erosion, to maintain ecological balance and to assure their permanent use for their natural functions as well as for enjoyment by the general public. Uses are limited to public parks, conservation areas and essential services.
- Public/Institutional District (P/I) – The P/I district is intended to encourage the provision of a wide range of social, cultural, recreational and infrastructure services to city residents and businesses that are compatible with adjacent land uses yet accessible to the public, and to provide space for public, semi-public and public service uses and facilities that provide benefit to the community.

Figure I-1 – Zoning Map



Zoning Ordinance Updates

The zoning ordinance must be in compliance with the comprehensive plan. Any change in the community vision as a result of comprehensive plan updates should also be incorporated into the zoning ordinance. To ensure compliance with this 2040 Comprehensive Plan, the following zoning ordinance changes will need to be implemented:

- Update zoning map based on future land use plan
- Reconcile inconsistencies between current zoning ordinance and intended future land uses

Subdivision of Land

The Subdivision Ordinance regulates the subdivision and platting of land within the city providing for the orderly, economic, and safe development of land and facilitating the adequate provision for transportation, water, sewage, storm drainage, electric utilities, streets, parks, and other public services and facilities essential to any development. City controls to regulate subdivision of land include an application process, legal notice and public hearings by the Planning Commission, and approval by the City Council. The process includes imposing applicable fees, a development agreement prescribing the standards for the development and imposing penalties for the violation of its provisions. The subdivision of land promotes the public health, safety and general welfare of the people and helps achieve the vision of this comprehensive plan by providing for standards in the development of land.

Water Supply

Describe relevant official controls for water supply

Private Sewer Systems

Describe relevant official controls for private sewer systems

Capital Improvement Program

Capital improvement projects are major projects that benefit the city, including the construction or reconstruction of roads and sidewalks, sewer and water utilities, trails, and park and recreation facilities, as well the purchase of new or replacement equipment and buildings. A capital improvement program (CIP) is a budgeting plan, which lists five years of needed capital improvements, their order of priority, and the means of financing.

The City of Carver's 2018-2023 CIP lists a wide variety of projects intended to meet the city's goals. The CIP is reviewed and updated annually by the City Council to ensure the proper priorities and funding. Table I-1 below details the city's five-year CIP.

Capital Improvement Plan

The City's long-term plan will be included as an appendix to this plan.

Timeline

The timeline or schedule for the various implementation programs is divided into three categories:

- Short-term actions, specifically changes to official controls, will begin within nine months of approval of the comprehensive plan.
- Annual actions are activities the city undertakes each year, such as adoption of the city budget and CIP.
- Ongoing actions are the decisions made in response to development applications or other requests.

Table I-2 | Implementation Tools and Timeline

Plan Goal	Primary Tools (Policy, Fiscal, and Programs)	Timeline for Implementation
Land Use		
Growth management	Zoning Ordinance; Subdivision Ordinance	Short term: Zoning changes to be in conformance with comprehensive plan Ongoing: Decisions in response to development applications
Redevelopment		
Suburban development	Zoning Ordinance; Subdivision Ordinance	Short term: Zoning changes to be in conformance with comprehensive plan Ongoing: Decisions in response to development applications
Natural Resources		
Protect and preserve natural resources	State and Federal Environmental Regulations	Ongoing: City conformance with environmental standards
Community Facilities		
Provide range of public services and facilities	City Budget; Capital Improvement Plan; Cooperative agreements with other jurisdictions; Regional & state grant funding	Annual: City Budget, Capital Improvement Plan updates and approvals Ongoing: Provision of basic city services, such as police, fire, parks, administration, etc.
Economic Competitiveness		
Business and job growth	Partnership with Carver County; Tax abatements, TIF, and other fiscal incentives	Ongoing: Response to business investment opportunities
Housing		
Range of housing options for all residents	*See details in Housing Implementation Plan*	Ongoing: Response to housing development opportunity or request for assistance from residents

Plan Goal	Primary Tools (Policy, Fiscal, and Programs)	Timeline for Implementation
Parks and Trails		
	City Budget; Capital Improvement Plan; Partnership with Carver County; Regional and state grant funding	Annual: Evaluate need for improvements as part of annual budget and CIP preparation. Ongoing: Decisions in response to development applications; maintenance and operations of park facilities; review potential grant application opportunities.
Transportation		
Safe and efficient transportation system	Capital Improvement Plan; Partnerships with Carver County and MnDOT; Regional and state grant funding	Annual: Evaluate need for improvements to city roadways; cooperate with County & MnDOT on country, state, and federal improvements Ongoing: Respond to developer plans for extension of roads to new development
Public Utilities		
Efficient meet needs of development	Capital Improvement Plan; Partnerships with Carver County and MnDOT; Regional and state grant funding; State and federal regulations	Annual: Evaluate need for improvements to city utilities; cooperate with County and State on county and regional improvements Ongoing: Respond to developer request for extension of utilities to new development

Updating the Comprehensive Plan

To keep the Comprehensive Plan current, it may be necessary to make amendments from time to time. As the foundational document guiding development, most amendments should occur through a comprehensive effort to address changes to the community overtime.

The provisions of the zoning ordinance will be maintained and preserved through the term of the Comprehensive Plan, unless formally amended. Amendments to the local zoning ordinance will be consistent with the Comprehensive Plan.

A Comprehensive Plan Amendment request should meet the following criteria:

1. The proposed change is consistent with City goals and policies.
2. The proposed change will not adversely impact adjacent property owners. The proposed change should mitigate buffering or landscape to allow adjacent properties to continue with current or proposed use without impact.
3. The proposed change allows for unique or desirable development for the community as determined by City goals and policies.

4. The proposed change is a result of an error or omission in the adopted plan.

Appendix B

County Well Index Well Logs

Timber Creek Residential Development EAW, Carver
Carver County, Minnesota

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Minnesota Unique Well Number

672321

County Carver
Quad Victoria
Quad ID 105C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/24/2002
Update Date 08/10/2007
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SONG,	115	24	W	13	DBBABC

Elevation 971 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 5225 212 HY CHASKA MN 55318
Contact 7025 GALPIN BL EXCELSIOR MN 55331

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	32	BROWN	SOFT
CLAY SAND	32	199	GRAY	SOFT
CLAY	199	230	GRAY	SOFT
CLAY SAND	230	402	GRAY	MEDIUM
SAND ROCK	402	438	WHITE	MEDIUM

Remarks

Well Depth 438 ft. **Depth Completed** 438 ft. **Date Well Completed** 05/15/2002

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 408 ft.	11 lbs./ft.	8.5 in. To 30 ft.
		6.5 in. To 406 ft.
		4 in. To 438 ft.

Open Hole From 408 ft. To 438 ft.

Screen? ☐ **Type** **Make**

Static Water Level
220 ft. land surface Measure 05/15/2002

Pumping Level (below land surface)
252 ft. 1 hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
high solids bentonite	3	Sacks	0 ft.	30 ft.

Nearest Known Source of Contamination
75 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/10/2002
Manufacturer's name AIR MOTOR
Model Number HP 2 Volt 220
Length of drop pipe 272 ft Capacity 20 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Jordan-St.Lawrence Aquifer Jordan-St.
Last Strat Jordan-St.Lawrence Depth to Bedrock 402 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 448441 Y 4957469
Unique Number Verification Address verification Input Date 05/15/2007

Angled Drill Hole

Well Contractor

Braunwarth Well Co.	10068	SCHMIEG, K.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

400785

County Carver
Quad Victoria
Quad ID 105C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/26/1988
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
FINKEL,	115	24	W	13	DCCCCD

Elevation 850 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 5200 DAHLGREN RD MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & SAND	0	12	BROWN	SOFT
GRAVEL & SAND	12	61	BROWN	SOFT
SAND	61	124	BROWN	SOFT
SAND & CLAY	124	165	BROWN	SOFT
SAND	165	180	BROWN	HARD

Remarks

W.OF CARVER.

Well Depth 180 ft. **Depth Completed** 180 ft. **Date Well Completed** 12/07/1983

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
4 in. To 175 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	10	5 ft.	175 ft.	180 ft.

Static Water Level
127 ft. land surface Measure 12/07/1983

Pumping Level (below land surface)
ft. hrs. Pumping at 35 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 12/00/1983
Manufacturer's name PIONEER
Model Number HP 0.75 Volt 220
Length of drop pipe 147 ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 448346 Y 4956713
Unique Number Verification Name on mailbox Input Date 05/15/2007

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Leuthner Well Co.	10125	SCHMIEG, K.

Minnesota Unique Well Number

505918

County Carver
Quad Victoria
Quad ID 105C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/19/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
FINKEL, BRUCE	115	24	W	13	DCDCBC

Elevation 896 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 5080 DAHLGREN RD MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
YELLOW CLAY	0	24	BROWN	SOFT
CLAY & SAND	24	72	BROWN	SOFT
CLAY	72	146	GRAY	SOFT
SAND	146	190	BROWN	SOFT
SAND & CLAY	190	240	BROWN	HARD
GRAVEL	240	247	BROWN	SOFT

Remarks

Well Depth 247 ft. **Depth Completed** 247 ft. **Date Well Completed** 10/23/1989

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
4 in. To 242 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	15	5 ft.	242 ft.	247 ft.

Static Water Level
172 ft. land surface Measure 10/23/1989

Pumping Level (below land surface)
ft. hrs. Pumping at 35 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination
50 feet South Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name AERMOTOR
Model Number HP 1 Volt 230
Length of drop pipe 189 ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☒ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger)-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 448531 Y 4956751
Unique Number Verification Address verification Input Date 05/15/2007

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Leuthner Well Co.	10125	SCHMIEG, K.

Minnesota Unique Well Number

467140

County Carver
Quad Victoria
Quad ID 105C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/13/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WEGNER,	115	24	W	13	CCADDC

Elevation 910 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 5320 DAHLGREN RD MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	28	BROWN	SOFT
CLAY	28	92	GRAY	SOFT
CLAY & SAND	92	168	GRAY	SOFT
SAND & CLAY	168	231	BROWN	SOFT
SAND	231	246	BROWN	SOFT

Remarks

NEAREST SOURCE OF POSS CONTAMINATION: INDOOR PLUMBING

Well Depth 246 ft. **Depth Completed** 246 ft. **Date Well Completed** 08/30/1991

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 241 ft.	11 lbs./ft.	8.5 in. To 20 ft.
		6.2 in. To 246 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	12	4 ft.	ft.	ft.

Static Water Level

180 ft. land surface Measure 08/30/1991

Pumping Level (below land surface)

185 ft. 1 hrs. Pumping at 35 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model SU 45.5

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination

50 feet Southwes Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/03/1991

Manufacturer's name AERMOTOR

Model Number HP 1.5 Volt 220

Length of drop pipe 210 ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 447877 Y 4956876

Unique Number Verification Address verification Input Date 05/15/2007

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Leuthner Well Co.	10125	SCHMIEG, K.

Minnesota Unique Well Number

495529

County Carver
Quad Victoria
Quad ID 105C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/10/1992
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
LUND, DANNY	115	24	W	13	CDCCBC

Elevation 913 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 5340 DAHLGREN RD MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
YELLOW CLAY	0	27	BROWN	SOFT
BLUE CLAY	27	96	GRAY	SOFT
CLAY & SAND	96	178	GRAY	SOFT
SAND & CLAY	178	210	BROWN	SOFT
SAND & GRAVEL	210	225	BROWN	SOFT

Remarks

Well Depth 225 ft. **Depth Completed** 225 ft. **Date Well Completed** 12/17/1991

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 220 ft.	11 lbs./ft.	8.5 in. To 20 ft.
		6.2 in. To 225 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	18	5 ft.	220 ft.	225 ft.

Static Water Level
180 ft. land surface Measure 12/17/1991

Pumping Level (below land surface)
185 ft. 1 hrs. Pumping at 35 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model PS 45
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination
25 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 12/20/1991
Manufacturer's name AERMOTOR
Model Number HP 1.5 Volt 220
Length of drop pipe 210 ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand +larger-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 447917 Y 4956726
Unique Number Verification Address verification Input Date 05/15/2007

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Leuthner Well Co.	10125	LEUTHNER, R.

Minnesota Unique Well Number

718312

County Carver
Quad Victoria
Quad ID 105C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 03/22/2006
Update Date 08/10/2007
Received Date 01/05/2006

Well Name	Township	Range	Dir	Section	Subsection
LENZEN, JOHN	115	24	W	13	BCDACA

Elevation 973 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 5435 212 HY CHASKA MN 55318

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
YELLOW CLAY	0	24	BROWN	SOFT
BLUE CLAY	24	101	GRAY	SOFT
CLAY & SAND	101	241	GRAY	SOFT
SAND & CLAY	241	261	GRAY	SOFT
SAND (MUDDY)	261	275	GRAY	SOFT
SAND & CLAY	275	290	GRAY	SOFT
SAND	290	315	BROWN	SOFT

Remarks

Well Depth 315 ft. **Depth Completed** 315 ft. **Date Well Completed** 12/15/2005

Drill Method Non-specified Rotary **Drill Fluid** Qwik gel

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 295 ft.	1.9 lbs./ft.	8.5 in. To 30 ft.
		6.2 in. To 315 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** plastic **Make** CRESLINE

Diameter	Slot/Gauze	Length	Set
4 in.	15	20 ft.	295 ft. 315 ft.

Static Water Level
235 ft. land surface Measure 12/15/2005

Pumping Level (below land surface)
240 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU45.5
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
high solids bentonite	3 Sacks	ft.	30 ft.

Nearest Known Source of Contamination
60 feet West Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name STA-RITE
Model Number HP 1 Volt 220
Length of drop pipe 252 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☒ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 447844 Y 4957618
Unique Number Verification Address verification Input Date 05/15/2007

Angled Drill Hole

Well Contractor
Leuthner Well Co. 10125 LEUTHNER, M.
Licensee Business Lic. or Reg. No. Name of Driller

Appendix C

DNR Natural Heritage Database Search

Timber Creek Residential Development EAW, Carver
Carver County, Minnesota

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Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

October 7, 2019
Correspondence # ERDB 20200060

Mr. Jacob Schaffer
Westwood Professional Services, Inc
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

RE: Natural Heritage Review of the proposed Song Residential Development,
T115N R24W Sections 13 & 24; Carver County

Dear Mr. Schaffer,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, rare features have been documented within the search area (for details, please visit the Rare Species Guide Website for more information on the biology, habitat use, and conservation measures of these rare species). Please note that the following rare features may be adversely affected by the proposed project:

Ecologically Significant Areas

- A portion of the project is within an area Minnesota Biological Survey (MBS) has identified a Site of *High* Biodiversity Significance. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as *High* contain very good quality occurrences of the rarest species, high quality examples of the rare native plant communities, and/or important functional landscapes. This particular Site contains Sugar Maple – Basswood – (Bitternut Hickory) Forest and Red Oak – Sugar Maple – Basswood – (Bitternut Hickory) Forest native plant communities. These communities are identified as critically imperiled and vulnerable to extirpation, respectively, in Minnesota. (See attached map; GIS shapefiles of MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be downloaded from the MN Geospatial Commons.) This particular Site also contains a state-listed plant species of special concern on the north-facing slope of the ravine. As such, we encourage you to consider project alternatives that would avoid disturbance to this ecologically significant site. Actions to minimize disturbance may include, but are not limited to, the following recommendations:

- Minimize vehicular disturbance in the area (allow only vehicles/equipment necessary for construction activities);
- Bridge all stream and wetland crossings;
- Do not park equipment or stockpile supplies in the area;
- Do not place spoil within MBS Sites or other sensitive areas;
- If possible, conduct the work under frozen ground conditions;
- Use effective erosion prevention and sediment control measures;
- Inspect and clean all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species;
- As much as possible, operate within already-disturbed areas;
- Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible; and
- Use only weed-free mulches, topsoils, and seed mixes. Of particular concern are birdsfoot trefoil (Lotus corniculatus) and crown vetch (Coronilla varia), two invasive species that are sold commercially and are problematic in prairies and disturbed open areas.

Listed Species

- Northern long-eared bat (*Myotis septentrionalis*), federally listed as threatened and state-listed as special concern and little brown bat (*Myotis lucifugus*), also state-listed as special concern, have been documented in the vicinity of the proposed project, but outside of the one mile search radius. During the winter these species typically hibernate in caves and mines. During the active season (approximately April-October) they roost underneath bark, in cavities, or in crevices of both live and dead trees; and in human structures such as buildings and bridges. Pup rearing is during June and July. Activities that may impact this species include, but are not limited to, wind farm operation, any disturbance to hibernacula, and destruction/degradation of habitat. As such, we recommend avoiding tree removal during pup rearing season, June 1st though July 31st.

Environmental Review and Permitting

- The Environmental Assessment Worksheet should address whether the proposed project has the potential to adversely affect the above rare features and, if so, it should identify specific measures that will be taken to avoid or minimize disturbance. Sufficient information should be provided so the DNR can determine whether a takings permit will be needed for any of the above protected species.

- Please include a copy of this letter in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no

records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. If needed, please contact your DNR Regional Environmental Assessment Ecologist to determine whether there are other natural resource concerns associated with the proposed project. Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

Sincerely,

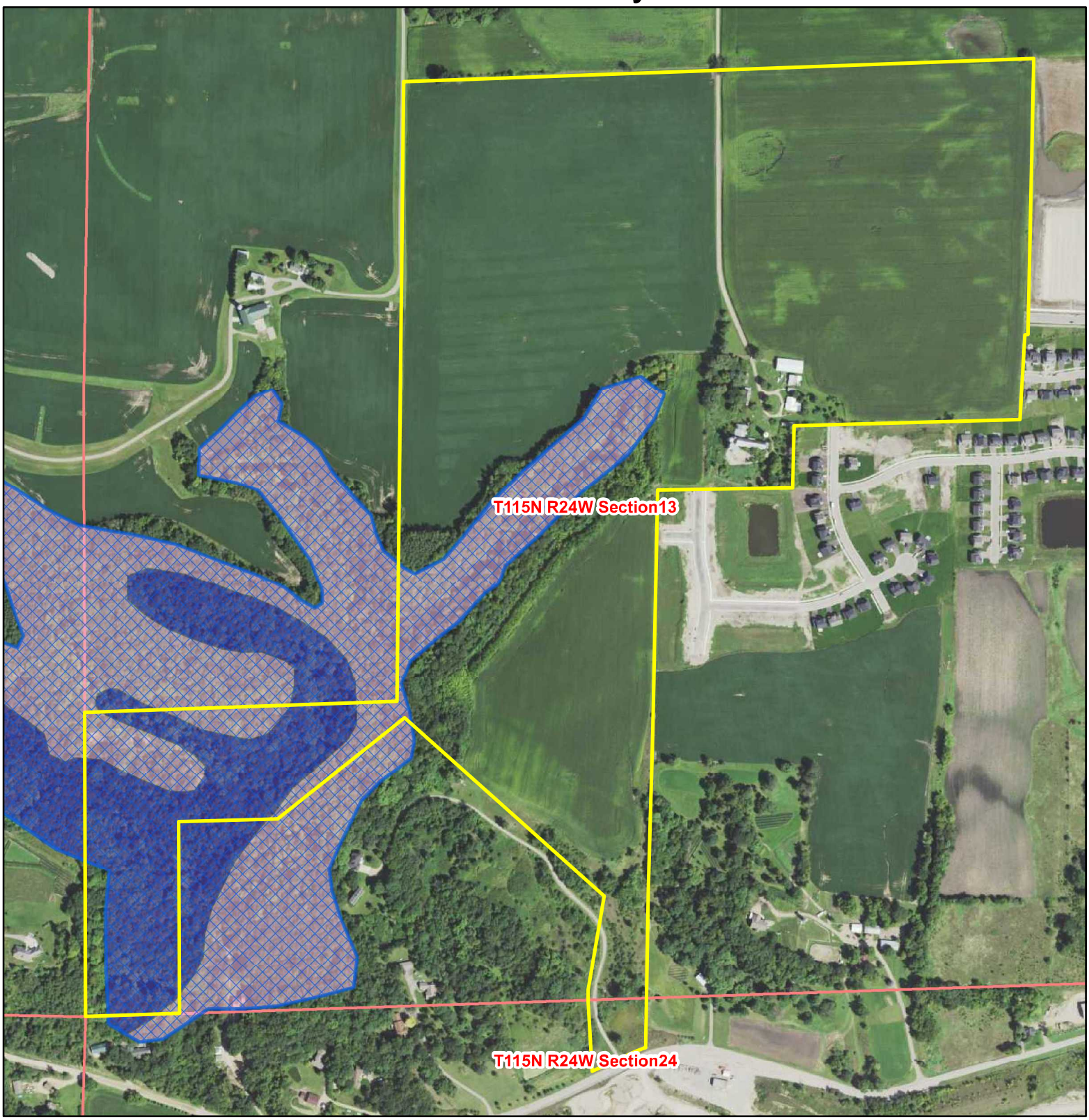
Samantha Bump
Natural Heritage Review Specialist
Samantha.Bump@state.mn.us

Enc. Map

Links: Rare Species Guide
http://www.dnr.state.mn.us/rsg/index.html
DNR Regional Environmental Assessment Ecologist Contact Info
http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html
MBS Sites of Biodiversity Significance
http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html
DNR Native Plant Communities
http://www.dnr.state.mn.us/npc/index.html
MN Geospatial Commons
https://gisdata.mn.gov/
BWSR Native Vegetation/Seed Mixes
http://www.bwsr.state.mn.us/native_vegetation/

Cc: Leslie Parris

ERDB# 20200060
T115N R24W Sections 13 & 14
Carver County



Song Residential Development

MBS Sites of Biodiversity Significance

- Outstanding
- High
- Moderate
- Below

DNR Native Plant Communities

- Red Oak - Sugar Maple - Basswood - (Bitternut Hickory) Forest
- Sugar Maple - Basswood - (Bitternut Hickory) Forest
- PLS Section

0 0.05 0.1 0.2 Miles

DEPARTMENT OF NATURAL RESOURCES

Copyright 2019, State of Minnesota, Department of Natural Resources (DNR). Data was provided by State of Minnesota. These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present.

Appendix D

State Historic Preservation Office Correspondence

Timber Creek Residential Development EAW, Carver
Carver County, Minnesota

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From: MN_MNIT_Data Request SHPO <DataRequestSHPO@state.mn.us>
Sent: Tuesday, September 10, 2019 2:43 PM
To: Ryan Grohnke
Subject: RE: Database Request - Song
Attachments: CarverHistoric5.xls; CarverArchaeology5.xls

Hello Ryan,

Your requested reports are attached.

Jim

DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

SHPO Data Requests
Minnesota State Historic Preservation Office
50 Sherburne Avenue, Suite 203
Saint Paul, MN 55155
(651) 201-3295
datarequestshpo@state.mn.us

Notice: This email message simply reports the results of the cultural resources database search you requested. The database search is only for previously known archaeological sites and historic properties. **IN NO CASE DOES THIS DATABASE SEARCH OR EMAIL MESSAGE CONSTITUTE A PROJECT REVIEW UNDER STATE OR FEDERAL PRESERVATION LAWS –** please see our website at https://mn.gov/admin/shpo/protection/ for further information regarding our Environmental Review Process.
Because the majority of archaeological sites in the state and many historic/architectural properties have not been recorded, important sites or properties may exist within the search area and may be affected by development projects within that area. Additional research, including field surveys, may be necessary to adequately assess the area's potential to contain historic properties or archaeological sites.
Properties that are listed in the National Register of Historic Places (NRHP) or have been determined eligible for listing in the NRHP are indicated on the reports you have received, if any. The following codes may be on those reports:
NR – National Register listed. The properties may be individually listed or may be within the boundaries of a National Register District.
CEF – Considered Eligible Findings are made when a federal agency has recommended that a property is eligible for listing in the National Register and MN SHPO has accepted the recommendation for the purposes of the Environmental Review Process. These properties need to be further assessed before they are officially listed in the National Register.
SEF – Staff eligible Findings are those properties the MN SHPO staff considers eligible for listing in the National Register, in circumstances other than the Environmental Review Process.
DOE – Determination of Eligibility is made by the National Park Service and are those properties that are eligible for listing in the National Register, but have not been officially listed.
CNEF – Considered Not Eligible Findings are made during the course of the Environmental Review Process. For the purposes of the review a property is considered not eligible for listing in the National Register. These properties may need to be reassessed for eligibility under additional or alternate contexts.
Properties without NR, CEF, SEF, DOE, or CNEF designations in the reports may not have been evaluated and therefore no assumption to their eligibility can be made. Integrity and contexts change over time, therefore any eligibility determination made ten (10) or more years from the date of the current survey are considered out of date and the property will need to be reassessed.

If you require a comprehensive assessment of a project's potential to impact archaeological sites or historic/architectural properties, you may need to hire a qualified archaeologist and/or historian. If you need assistance with a project review, please contact Kelly Gragg-Johnson, Environmental Review Specialist @ 651-201-3285 or by email at kelly.graggjohnson@state.mn.us.
The Minnesota SHPO Archaeology and Historic/Architectural Survey Manuals can be found at https://mn.gov/admin/shpo/identification-evaluation/.
MN SHPO research hours are **8:30 AM – 4:00 PM Tuesday-Friday**. Please call ahead at 651-201-3295 to ensure staff is available to assist you, if necessary. Thank you.

From: Ryan Grohnke <Ryan.Grohnke@westwoodps.com>
Sent: Friday, September 6, 2019 11:45 AM
To: MN_MNIT_Data Request SHPO <DataRequestSHPO@state.mn.us>
Subject: Database Request - Song

Hello,

Could you please do a database review for the following areas:

Township 115, Range 23, Sections: 7, 18, 19
Township 115, Range 24, Sections: 11, 12, 13, 14, 23, 24, 25

Thank you,
Ryan

Ryan Grohnke
CULTURAL RESOURCES MANAGER
ryan.grohnke@westwoodps.com

Direct (952) 906-7403
Main (952) 937-5150
Cell (612) 209-3352

Westwood
Multi-Disciplined Surveying & Engineering
12701 Whitewater Drive, Suite 300 | Minnetonka, MN 55343

westwoodps.com
(888) 937-5150

COUNTY	SITENUM	SITENAME	TOW	RAN	SEC	XQUARTERS	ACR
Carver							
	21CR0003		115	23	19	SE-SE-NW	1
	21CR0004		115	23	19	NE-SE-SW	10
	21CR0020	Gestach	115	24	11	SW-SW-NE	2
	21CR0138	Chaska Heights	115	23	7	NE-NE-NE-SE-SE-SE	0.5
	21CR0139	Chaska Heights II	115	23	7	SE-SE-NE-SE	0.5
	21CR0142		115	23	18	SE-SE-NE-NE	0.6

WORI	DESCRIPT	TRADI	CONTE	ReportNum	Natı	CEF	DOE
1	EW	W-1					
1	EW	W-1					
1	LS						
1	LS						
1	LS						
1	AS						

COUNTY	CITYTWP	PROPNAME
Carver		
	Benton Twp.	
		Kloos Farmstead
	Carver	
		Railroad Water Tower
		Railroad Water Tower
		Anton Knoblach Grain Elevator (razed)
		Anton Knoblach Grain Elevator (razed)
		Pesek House
		Roger Dauwalter House
		John Hebeison House (The Gables)
		Thaemart House
		Thaemart House
		Levi Griffin House
		Golnick House
		Golnick House
		Springside
		Springside
		Walter Anderson House
		M. Dauwalter House
		M. Dauwalter House
		Larson House
Carver		
	Carver	
		Claesson House
		Tholen House
		Tholen House
		R. A. Johnson House
		Earl Dauwalter House
		St. Nicholas Church
		Swedish Methodist Church
		Duncan House
		M. Goetz House
		Drazen House
		Wiebe House
		Phillips House
		Swanson House
		Old Fire Station
		John Funk House
		Oesterich House
		Buetow House
		Houghton/Skoog House
		Anton Knoblach House
		Anton Knoblach House
		Floyd Holtz House
		Floyd Holtz House
		Finkel House
Carver		
	Carver	

		Christian Bristle House
		Christian Bristle House
		Lenzen House
		Meuwissen House and Barn
		D. Swanson House
		G. Reisgraf House
		G. Reisgraf House
		Roger Dauwalter House
		Roger Dauwalter House
		Cordrary House/Carver County Printing
		Cordrary House/Carver County Printing
		Hilldale
		Salem Lutheran Church
		Poppitz House
		Lund House
		Lund House
		Dragotis House
		John Hebeisen Hardware Store
		Goetze House
		Double House
		Presbyterian Church
		Dikeside
		Read House
Carver		
	Carver	
		Luthy House
		Olaf Hanson House
		Plekkenpol House
		P. Swenson House
		Greek Revival House
		Tengblad House
		East Lake House
		Dennin House
		Dennin House
		Kling House
		Moldenhauer House
		Moldenhauer House
		Carver Mill/Masonic Hall (razed)
		Temperance Hotel
		Riverside Bar
		Mobil Oil Gas Station
		Mobil Oil Gas Station Office
		commercial building
		Gehl's Meat Market & Ice House
		Post Office/Harvey's Bar
		Post Office
		Barber Shop and Saloon
		Nelson Drugstore
Carver		

	Carver	
		Funk Bank
		Village Hall
		house
		house
		Woodman Hall
		Woodman Hall
		house
		house
		house
		house
		Sexton House
		Carver Cottage
		Carver Creamery and Ice House
		Rev. Raedeke House
		Trinity Evangelical Lutheran Church
		Dauwalter Garage/Blacksmith
		Charles Dauwalter House
		Funk Hardware Store
		Johnson General Store (razed)
		The Sunflower (razed)
		drugstore
		Anton Knoblach Bank
		Drugstore and Post Office
Carver		
	Carver	
		Kings Arms Company
		house
		George DuTroit Bank
		Carver Fire Department
		Carver School
		Bridge No. L2526 (replaced by Bridge 10J27)
		Bridge No. L2722 (razed)
		Bridge No. L2783 (replaced by Bridge 10J18)
		Bridge No. L2799
		farmhouse
		Carver Historic District
		St. Nicholas School
		St. Nicholas Church Activity Hall
		Bridge No. L4967
		house
		house
		house
		house
		house
		house
		house
		house

house

Carver

Carver

house
house
house
house
house
house
house
house
house
house
house
commercial building
house
Meyer House
house
commercial building
house
house
house
house
house
house

Carver

Carver

house
house
house
house
house
house
house
commerical Building
Minneapolis & St. Louis Railroad - Carver Segment
commercial building
house
house
house
house
house
house
house
house
house
farmstead
Carver Plow Works

Carver

Chaska

Riedele House (same as CR-CKC-009)
Souerbrey Farmstead
Bade House
Dettborn Barn
Mount Hope Cemetery
house
farmstead
farmstead

Dahlgren

Bridge No. L2797
farmhouse
farmhouse
farmhouse
farmhouse
farmhouse

Dahlgren Twp.

Olson Dairy Farm
Haegerle Farmstead
Jacobs Farmstead
Eichmiller Farmstead
Preiss Farmstead
Kloos Farmstead

Carver

Dahlgren Twp.

Wolff Farmstead
Plackner Farmstead
Preiss Cemetery
Morschen Farmstead
farmstead

Laketown Twp.

farmhouse

ADDRESS	TOWN	RANGE	SEC	QUARTER	USGS	REPORTNUM	NRHCE
12460 CR 147	115	24	12	SE-SE	Victoria	CR-2008-1H	
off Co. Hwy. 40	115	23	18	NE-SE-SE	Shakopee	CR-2007-1H	Y
	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
217 4th St.	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
209 4th St.	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
201 4th St. E	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
121 4th St. E	115	23	18	NE-SE-SE	Shakopee	CR-2014-2H	Y
	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
113 4th St. E	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
109 4th St. E	115	23	18	NE-SE-SE	Shakopee	CR-2014-2H	Y
	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
113 4th St.	115	23	18	SW-SE-SE	Victoria	CR-2014-2H	Y
	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
117 4th St. E	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
121 4th St. W	115	23	18	SW-SE-SE	Victoria		Y
	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
201 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
209 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
213 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
	115	23	18	SW-SE-SE	Victoria	CR-2014-2H	Y
221 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
4th St. & Ash St.	115	23	19	NE-NW-NE	Victoria	CR-78-1H	Y
412 4th St. W	115	23	18	SE-SW-SE	Victoria	CR-78-1H	Y
4th St. & Ash St.	115	23	18	SE-SW-SE	Victoria	CR-78-1H	Y
216 4th St. W	115	23	18	SE-SW-SE	Victoria	CR-78-1H	Y
212 4th St. W	115	23	18	SE-SW-SE	Victoria	CR-78-1H	Y
200 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
116 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
112 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
108 4th St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
108 4th St. E	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
112 4th St. E	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
400 Oak St. N	115	23	18	NE-SE-SE	Shakopee	CR-78-1H	Y
200 3rd St. E	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
120 3rd St. E	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
112 3rd St. E	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
	115	23	18	SE-SE-SE	Shakopee	CR-2014-2H	Y
116 3rd St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
	115	23	18	SW-SE-SE	Victoria	CR-2014-2H	Y
120 3rd St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y

200 3rd St. W	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
	115	23	18	SW-SE-SE	Victoria	CR-2014-2H	Y
208 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
220 3rd St.	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
212 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
300 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-2014-2H	Y
	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
308 3rd St. W	115	23	19	NE-NW-NE	Victoria	CR-2014-2H	Y
	115	23	19	NE-NW-NE	Victoria	CR-78-1H	Y
316 3rd St. W	115	23	19	NE-NW-NE	Victoria	CR-78-1H	Y
	115	23	19	NE-NW-NE	Victoria	CR-2014-2H	Y
412 3rd St. W	115	23	19	NE-NW-NE	Victoria	CR-78-1H	Y
221 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
217 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
209 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-2014-2H	Y
	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
201 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
109 3rd St. W	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
117 3rd St. W	115	23	19	SE-SE-SE	Shakopee	CR-78-1H	Y
121 3rd St. W	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
109 3rd St. W	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
121 3rd St. W	115	23	19	NE-NE-NE	Shakopee	CR-78-1H	Y
201 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
209 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
217 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
301 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
309 3rd St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
401 Main St. W	115	23	19	SW-NE-NE	Victoria	CR-78-1H	Y
220 Main St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
208 Main St. W	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
200 Main St. W	115	23	19	NW-NE-NE	Victoria	CR-2014-2H	Y
	115	23	19	NW-NE-NE	Victoria	CR-78-1H	Y
120 Main St. W	115	23	18	NW-NE-NE	Victoria	CR-78-1H	Y
116 Main St. W	115	23	18	SE-SE-SE	Shakopee	CR-2014-2H	Y
	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
200 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-77-1H	Y
100 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
120 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
200 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
204 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
208 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
212 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
220 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
300 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
304 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y

308 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
316 Broadway N	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
404 Broadway N	115	23	18	SW-SE-SE	Victoria	CR-2014-2H	Y
	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
408 Broadway N	115	23	18	SW-SE-SE	Victoria	CR-2014-2H	Y
	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
416 Broadway N	115	23	18	NW-SE-SE	Victoria	CR-2014-2H	Y
	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
420 Broadway N	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
	115	23	18	NW-SE-SE	Victoria	CR-2014-2H	Y
100 5th Ave.	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
121 6th St. W	115	23	18	NE-SW-SE	Victoria	CR-78-1H	Y
Broadway & 5th St.	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
501 Oak St. N	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
417 Oak St. N	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
421 Broadway N	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
401 Broadway N	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
317 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
xxx Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
313 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
309 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
221 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
213 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
205 4th St. N	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
205 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
117 Broadway N	115	23	18	SE-SE-SE	Shakopee	CR-78-1H	Y
420 Oak St. N	115	23	18	NW-SE-SE	Victoria	CR-78-1H	Y
4th St. over Carver Spring	115	23	18	SW-SE-SE	Victoria	CR-78-1H	Y
6th St. over Carver Spring	115	23	18	NE-SW-SE	Victoria	CR-77-1H	Y
Main St. over Carver Spring	115	23	19	NE-NE-NE	Shakopee	CR-77-1H	Y
off Co. Rd. 147	115	23	18	SE-NW-SE	Victoria		
1849 Spring Creek Dr.	115	23	18	NW-NW-NW	Victoria	CR-2005-2H	
vicinity of 3rd. St. & 4th St.	115	23	19	SE	Victoria	CR-78-1H	Y
412 4th St. W	115	23	18	SE-SW-SE	Victoria	CR-78-1H	Y
5th St. & Ash St.	115	23	19	SE-SW-SE	Victoria	CR-78-1H	Y
Third Street over Carver Spring	115	23	19	NE-NE-NE	Shakopee		
301 6th St. E	115	23	18		Shakopee	XX-2006-3H	
312 6th St. E	115	23	18	NE-SE	Shakopee	XX-2006-3H	
316 6th St. E	115	23	18		Shakopee	XX-2006-3H	
317 6th St. E	115	23	18	NE-SE	Shakopee	XX-2006-3H	
208 5th St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
212 5th St. E	115	23	18		Shakopee	XX-2006-3H	
200 4th St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
208 4th St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	

212 4th St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
220 4th St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
205 3rd St. E	115	23	18	SE-SE	Shakopee	CR-2014-2H	
	115	23	18	SE-SE	Shakopee	XX-2006-3H	
208 3rd St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
213 3rd St. E	115	23	18	SE-SE	Shakopee	CR-2014-2H	
	115	23	18	SE-SE	Shakopee	XX-2006-3H	
108 Main St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
116 Main St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
121 Main St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
204 Main St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
205 Main St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
430 Lime St.	115	23	18	SE-SE	Shakopee	XX-2006-3H	
490 CR 40	115	23	18	NE-SE	Shakopee	XX-2006-3H	
504 Lime St. N	115	23	18		Shakopee	XX-2006-3H	
409 Oak St. N	115	23	18				
112 6th St. W	115	23	18	SW-SE	Victoria	XX-2006-3H	
421 Broadway	115	23	18	SE-SE	Victoria	XX-2006-3H	
100 5th St. W	115	23	18		Shakopee	CR-2014-2H	
	115	23	18		Shakopee	XX-2006-3H	
108 5th St. W	115	23	18	SE-SE	Victoria	XX-2006-3H	
112 5th St. W	115	23	18	SE-SE	Victoria	CR-2014-2H	
	115	23	18	SE-SE	Victoria	XX-2006-3H	
309 3rd St. W	115	23	19	NE-NE	Victoria	XX-2006-3H	
321 3rd St. W	115	23	19	NE-NE	Victoria	XX-2006-3H	
220 Hickory St.	115	23	19	NW-NE	Victoria	XX-2006-3H	
417 3rd St. W	115	23	19	NW-NE	Victoria	XX-2006-3H	
300 Main St. W	115	23	19	NE-NE	Victoria	XX-2006-3H	
308 Main St. W	115	23	19	NE-NE	Victoria	XX-2006-3H	
316 Main St. W	115	23	19	NE-NE	Victoria	XX-2006-3H	
216 4th St. E	115	23	18	SE-SE	Shakopee	XX-2006-3H	
100 Main St. E	115	23	18		Shakopee	XX-2006-3H	
	115	23	18	SE-SE	Shakopee		Y
113 3rd St. E	115	23	18	SE-SE	Shakopee		
317 4th St. W	115	23	19	NW-NE	Victoria		
513 4th St. W	115	23	19	NW-NE	Victoria		
101 Elm Dr.	115	23	19	NW-NE	Victoria		
506 CR 40	115	23	19	NW-NE	Victoria		
600 CR 40	115	23	19	NW-NE	Victoria		
700 CR 40	115	23	19	SW-NE	Victoria		
740 CR 40	115	23	19	SW-NE	Victoria		
1600 CR 40	115	23	19	NW-SW	Victoria		
1100 CR 40 W	115	23	19	NE-SW	Victoria		
313 Skyview Ln.	115	23	18	NE-SE	Victoria		
412 Lime St. N	115	23	18	SE-SE	Shakopee		

122 W. 6th St.	115	23	18				Y
4245 CR 140	115	23	7		Shakopee	XX-2006-3H	
104 Lano Lane	115	23	18		Shakopee	XX-2006-3H	
1115 Mount Hope Rd.	115	23	18		Shakopee	XX-2006-3H	
1557 Mount Hope Rd.	115	23	18		Shakopee	XX-2006-3H	
112 Forner Ln.	115	23	18		Shakopee	XX-2006-3H	
4250 Highway 212	115	23	7		Shakopee	XX-2006-3H	
12120 Jonathan Carver Pkwy.	115	24	12	SE-SE-NE	Victoria	CR-2010-3H	
CNTY 140 over stream	115	24	12		Jordan West		
14305 CR 43	115	24	23		Jordan West	CR-2005-2H	
13140 CR 147	115	24	13		Jordan West	CR-2005-2H	
5850 Highway 212	115	24	11		Jordan West	CR-2005-2H	
14181 CR 40	115	24	25		Jordan West	CR-2005-2H	
12380 CR 40	115	24	24		115	CR-2005-2H	
off Co. Hwy. 40	115	24	25	SW-NW-SW	Jordan West		
4875 U.S. Hwy. 212	115	24	13	NE-NE-NE	Victoria	CR-2005-4H	Y
5280 U.S. Hwy. 212	115	24	12	SE-SW	Victoria	CR-2008-1H	Y
6055 U.S. Hwy. 212	115	24	14	NE-NE-NW	Victoria	CR-20080-1H	
6175 U.S. Hwy. 212	115	24	14	NE-NW-NW	Victoria		
12460 CR 147	115	24	12	SE-SE	Victoria		
5120 Hwy 212	115	24	12	SW-SE	Victoria	CR-2008-1H	
5725 Hwy 212	115	24	14	NE-NE	Victoria	CR-2008-1H	
6079 Hwy 212	115	24	14	NE-NW	Victoria	CR-2008-1H	
5730 Hwy 212	115	24	11	SE-SE	Victoria	CR-2008-1H	
6080 Hwy 212	115	24	11	SE-SW	Victoria	CR-2008-1H	
960 78th	115	24	12		Victoria	CR-2005-2H	

DOI INVENTNUM

CR-BNT-153

CR-CVC-001
CR-CVC-001
CR-CVC-002
CR-CVC-003
CR-CVC-004
CR-CVC-005
CR-CVC-006
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CR-DHL-034

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CR-DHL-011
CR-DHL-012
CR-DHL-042

CR-DHL-043
CR-DHL-044
CR-DHL-050
CR-DHL-051
CR-DHL-052

CR-LKT-057

Appendix E

Traffic Impact Study

Timber Creek Residential Development EAW, Carver
Carver County, Minnesota

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Timber Creek

Traffic Impact Study

Carver, MN

October 15, 2019

Prepared By:

Westwood

Prepared For:

SUMMERGATE

Westwood

Traffic Impact Study for

Timber Creek

A Residential Development in Carver, MN

Prepared for:
Mr. Casey Wollschlager
Summergate Development
17305 Cedar Avenue S., #200
Lakeville, MN 55044

Prepared by:
Stephen J. Manhart, P.E., PTOE, PTP
Westwood Professional Services
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343
(952) 937-5150

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

(Signature) 10/15/2019 (date)

Minnesota Professional Engineering License 22428 Exp: 06/30/2020

Project Number: R0022250.00
Date: 10/15/2019

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EXECUTIVE SUMMARY

The Timber Creek residential development is proposed on approximately 91.4 acres of primarily agricultural land in the western portion of Carver, MN. The project is projected to consist of 74 townhomes and 270 single family homes. Approximately 70.0 acres of open space is also planned, which will include park, trails, wetlands, and stormwater basins.

Summergate Development is proposing construction of the residential development. It is anticipated that the project will be constructed in seven phases, with the first phase expected to begin in spring 2020. Full build-out is anticipated by 2027; however, construction timing will ultimately depend upon market conditions.

The project will also include construction of a collector roadway oriented east to west through the northern portion of the site, as well as several local residential streets to access planned residential housing. The collector roadway (Monroe Drive extension) is planned east to west along the northern border of the site, which will be a public improvement project. Impacts related to public improvements directly associated with the proposed development project are discussed throughout this document.

A 6.1-acre community park is proposed for the eastern portion of the project area, adjacent to Carver Elementary School. The park is proposed as an active-use park for public enjoyment.

INTRODUCTION

Westwood Professional Services has conducted a traffic impact study for a proposed Timber Creek residential development in Carver, Minnesota. This traffic impact study is part of an Environmental Assessment Worksheet (EAW) being completed for the development. According to the EAW Guidelines compiled by the Minnesota Environmental Quality Board (EQB), "Regardless of location, if the peak hour traffic generated by the project exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW."[1]

The proposed residential land use comprises 344 dwelling units to be built in seven phases. The design year proposed for analysis is 2028 – one year after proposed build out. Figure 1 shows the study area for this analysis. Figure 2 shows the proposed site plan for the development.

[1] EAW Guidelines, Preparing Environmental Assessment Worksheets, prepared by the Minnesota Environmental Quality Board, Saint Paul, MN, October 2013, p. 41.

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0' 400' 800'

Timber Creek Residential Development

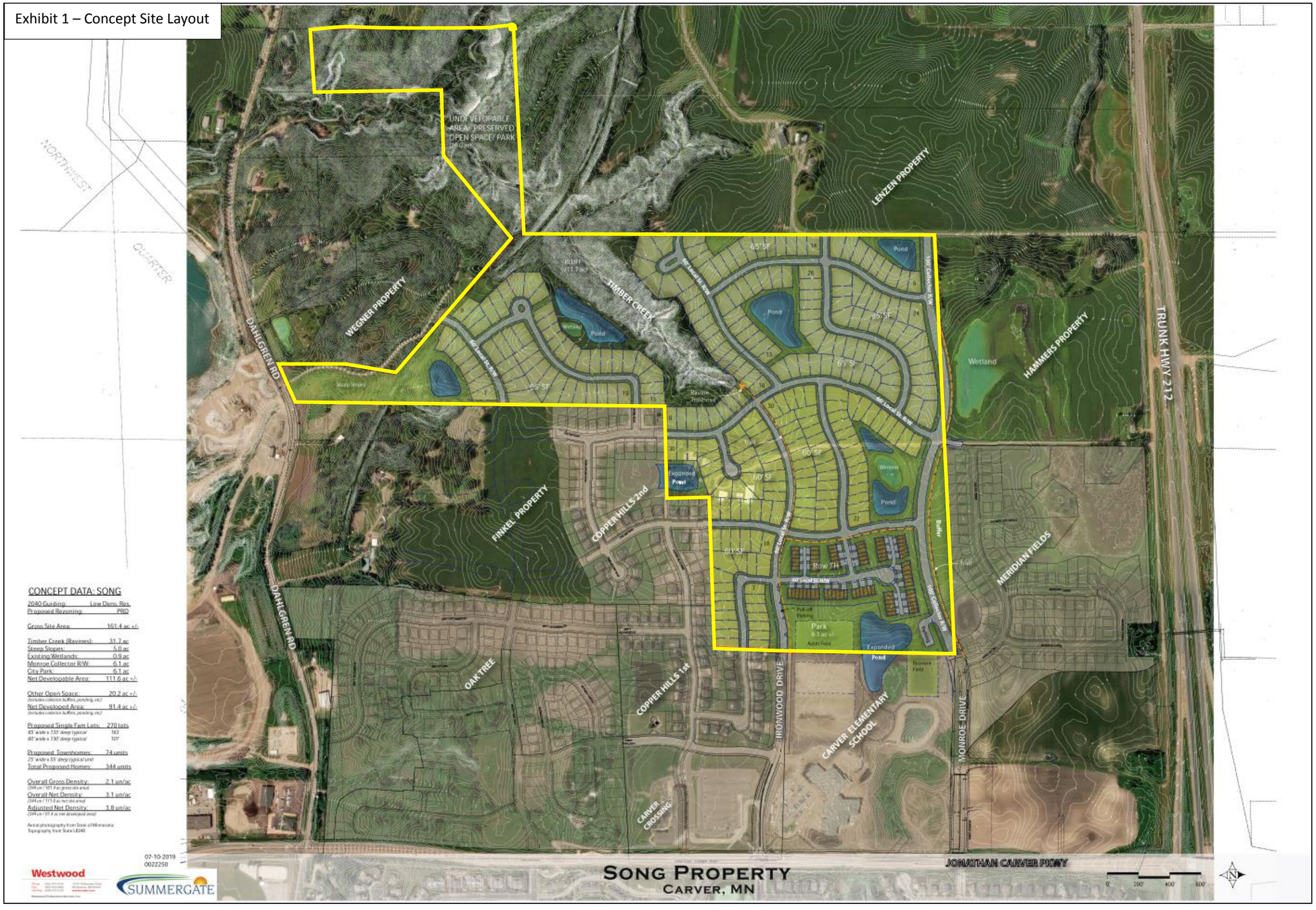
Carver, MN

Site Layout

Figure 1

Date: 10/9/19

Exhibit 1 – Concept Site Layout



The project is subject to the City of Carver 2040 Comprehensive Plan – Design Carver. The Comprehensive Plan includes the Future Land Use, which typically captures traditional single family neighborhoods and developments on large, executive lots. As described in the Comprehensive Plan, the goals and policies have been instituted that will lead to a place allowing residents to live, work and play while respecting diverse natural and historical resources present in the community.

The average density for low density residential ranges from 2 to 5 units per acre. Low density will primarily offer development potential of single family homes but attached housing units may be included to protect sensitive environmental resources. Low density residential largely conforms to an R-1 zoning district.

Medium density residential development allows for a range of housing types to be included. Small lot single-family homes, alley loaded developments, townhomes, twinhomes may be developed in the medium density residential category. Medium density allows for different housing intensities to have transition areas. Densities will range between 5 to 12 units per acre. This category closely aligns with a typical R-2 (Medium Density Residential) and TR (Traditional Residential) zoning districts.

The present land use on the property is cultivated cropland and upland forest areas. The 2040 Carver Comprehensive Land Use Plan indicates that the project area falls within the City of Carver Ultimate Growth Boundary. The City of Carver and Dahlgren Township agreed to an orderly annexation agreement in 2009. The Project Area and adjacent lands are designated for Low Density Residential (2-5 units per acre) according to Figure L-5 of the 2040 Comprehensive Plan – Design Carver.[2] City staff found that the project area meets the proposed land use designation of Low Density Residential.

The project conforms to the future land use plan by providing residential development consistent with density guidelines and by incorporating objectives of the 2040 plan, such as extending trail access along Ironwood Drive and Monroe Drive. A portion of the project is proposed as a community park, which is consistent with acceptable land use for the area and the recommendations of the Parks and Trails chapter of the 2040 Comprehensive Plan.

[2] 2040 Comprehensive Plan – Design Carver, City of Carver, MN, 2019.

EXISTING CONDITIONS

The three parcels that constitute the project are approximately 96.75, 61.37, and 3.24 acres in size, respectively. The proposed project is located in Sections 13 and 24 of T115, R24, Dahlgren Township, Carver County, Minnesota, and is generally located west of Jonathan Carver Parkway, south of US Highway 212, and north of Dahlgren Road. The development is sited in close proximity to the City of Carver and will be annexed into the City once the Project is developed.

1. STREET NETWORK

The following list describes the street network within the study area:

County State Aid Highway 11 (Jonathan Carver Parkway) is currently classified functionally as an "A- Minor Arterial-Connector", according to the Carver County 2040 Roadway Systems Plan Existing and Planned Functional Class Map.[3]

Jonathan Carver Parkway exists generally as a two-lane undivided roadway with a 50 mph posted speed limit. There is also an additional southbound travel lane from 400 feet south of the eastbound US Highway 212 ramp and CH 61. Center medians have been installed at the intersections with Ironwood Drive and CH 61. Dedicated right and left turn lanes as well as bypass lanes have been installed at several intersections as part of adjacent land development projects. Paved shoulder widths of 4 to 13 feet vary throughout the corridor. A school speed zone exists near the Ironwood Drive intersection to accommodate Carver Elementary School which opened in the fall of 2017.

Average daily traffic volumes on Jonathan Carver Parkway vary between 6,000 and 8,000 trips per day south of 6th Street. Daily volumes between 6th Street/Dahlgren Road and US Highway 212 are over 13,000, and north of US Highway 212 daily volumes are over 9,000. The Jonathan Carver Parkway Corridor Study also lists the projected 2040 daily volumes along the segment of the parkway north of Ironwood as between 25,000 and 30,000 veh/day.[4]

There is a multiuse trail located between Carver Bluffs Parkway and Spring Creek Drive on the east side of the corridor. On the west side, trails exist from north of White Pine Way to Spring Creek Drive/Monroe Drive and from the US Highway 212 exit ramp to CH 61. Traffic signals are located at the intersections with Ironwood Drive, US Highway 212 interchange ramps, and CH 61.

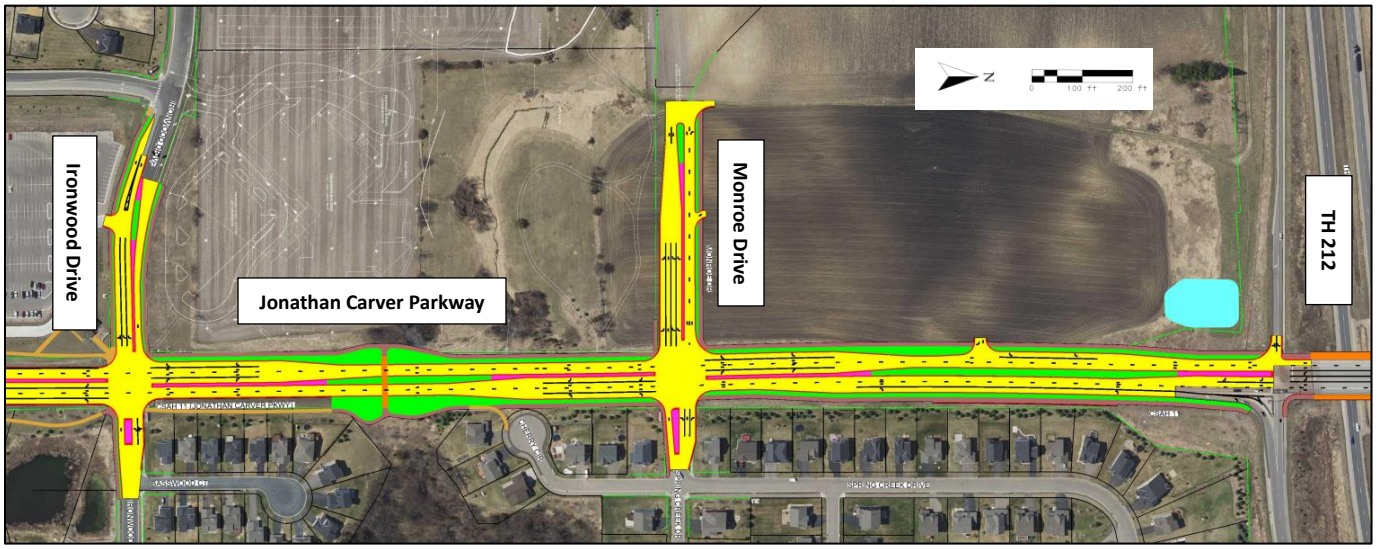
[3] Existing and Planned Functional Class, Carver County 2040 Roadway Systems Plan, Carver County, MN, Created April 27, 2018.
[4] Jonathan Carver Parkway County Highway 11 Corridor Study, Carver County, City of Carver, MN, July 2019.

Carver County and the City of Carver have partnered on the Jonathan Carver Parkway County Highway 11 Corridor Study along Jonathan Carver Parkway (CSAH 11) between Highway 40 (south leg) and US Highway 212.[5] The purpose of the study has been to identify the short-, mid-, and long-term improvements along the corridor to address the transportation needs of the community and region for the next 20 years.

According to the study, the corridor has been experiencing incremental growth over the years, and residential and commercial developments are anticipated to intensify over the next 10 years. Traffic demands on the corridor are expected to continue to increase significantly, prompting a need to expand Jonathan Carver Parkway between CH 40 (south leg) and US Highway 212. The corridor study identified the need for reconstruction to four lanes divided from TH 212 to Dahlgren Road within zero to five years. It further identified the long-term need for a potential six-lane divided roadway alignment along the segment from TH 212 to Monroe/Spring Creek Drive.

The exhibit below shows a long-term concept layout of Jonathan Carver Parkway and its intersections with Ironwood Drive and Monroe Drive.

Exhibit 2: Long-Term Concept for Jonathan Carver Parkway (CSAH 11)



(Source: Jonathan Carver Parkway County Highway 11 Corridor Study, WSB, July 2019)

Ironwood Drive is functionally classified currently as a "Local Street" to the west of Jonathan Carver Parkway, according to the Design Carver – 2040 Comprehensive Plan.[6] Ironwood Drive provides access to Carver Elementary School, to the Carver Station Park-and-Ride, and to several residential subdivisions. Ironwood Drive is primarily a single lane

[5] Jonathan Carver Parkway County Highway 11 Corridor Study, Carver County, City of Carver, MN, July 2019.
[6] Existing Functional Class, Draft Dakota County Comprehensive Plan, DC2040, Dakota County, MN, Adopted June 18, 2019.

roadway in each direction with turn lanes at CSAH 11 and at Hartwell Drive. There is a raised median along Ironwood Drive between CSAH 11 and Hartwell Drive. With no speed limit posted, the statutory speed limit of 30 mph prevails. The 2040 Comprehensive Plan–Design Carver does not list existing daily traffic volumes, but does list a year 2040 projected daily volume of 2,300 trips/day along Ironwood Drive west of CSAH 11.[7] The Jonathan Carver Parkway Corridor Study also lists the projected 2040 daily volumes along the segment of Ironwood west of Jonathan Carver Parkway as between 2,500 and 5,260 veh/day.[8] The intersection with Ironwood Drive is signalized, while all other intersections are controlled by side-street stop signs.

Monroe Drive is functionally classified as a future "Minor Collector" west of Jonathan Carver Parkway. The roadway is currently under construction to provide access to the proposed commercial retail center and to Meridian Fields subdivision. Eventually, it is anticipated that Monroe Drive will provide connectivity two miles to the west to County Road 43. As with Ironwood Drive, Monroe Drive will have one lane in each direction with turn lanes at the eastbound approach to Jonathan Carver Parkway and at the entrance to the commercial retail center. A median will extend along this segment, as well. The Jonathan Carver Parkway Corridor Study also lists the projected 2040 daily volumes along the segment of Monroe west of Jonathan Carver Parkway as between 700 and 18,000 veh/day.[9] With no speed limit yet posted, the statutory speed limit of 30 mph will prevail. The intersection of CSAH 11 & Monroe Drive is projected to be signalized as development occurs. (It is noted that Spring Creek Drive is aligned with Monroe Drive on the east side of Jonathan Carver Parkway and serves a residential subdivision.)

There are three local streets in Timber Creek that are proposed to intersect with Monroe Drive. All three are proposed with a single inbound and single outbound lane.

2. DATA COLLECTION

Peak hour turning movement traffic counts were taken at the study area intersection of Jonathan Carver Parkway & Monroe Drive/Spring Creek Drive on Tuesday, September 17, 2019. Figure 2 illustrates the existing weekday a.m. and p.m. peak hour turning movement volumes recorded at these intersections.

[7] Existing Functional Class, Draft Dakota County Comprehensive Plan, DC2040, Dakota County, MN, Adopted June 18, 2019.
[8] Jonathan Carver Parkway County Highway 11 Corridor Study, Carver County, City of Carver, MN, July 2019.
[9] Jonathan Carver Parkway County Highway 11 Corridor Study, Carver County, City of Carver, MN, July 2019.

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Legend

LANE DESIGNATION	
AM PEAK HOUR VOLUME	XX
PM PEAK HOUR VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 400' 800'

Timber Creek Residential Development

Carver, MN

Existing Conditions

Figure 2

Date: 10/9/19

For this study, Westwood utilized counts utilized in two previous studies – Meridian Fields Traffic Impact Study and Kwik-Trip – Carver Creek Commons Traffic Impact Study.[10] These counts were conducted in 2017, and were grown at the County's background growth rate to reflect year 2019 conditions for existing traffic volumes.

3. TRANSIT

Built in 2015 and having space for 400 vehicles, the Carver Station Park-and-Ride was built with the intention of spurring nearby residential development. Within walking distance of Timber Creek Residential Development, Carver Station is served by two SouthWest Transit routes. Route 697 operates a total of 10 trips during weekdays (five trips eastbound in the morning between 6:01 and 7:31 a.m.; and five trips in the afternoon arriving between 4:34 and 6:17 p.m.). Route 698 operates a total of 6 westbound (arrival only) trips during weekdays (arriving between 3:02 p.m. and 7:09 p.m.).[11]

According to the SouthWest Transit website, in the first two years of operation, Carver Station only saw about 5% utilization but this is expected to grow as more development continues near the Park-and-Ride. So far, both single family homes and multi-family homes have been built near Carver Station.

SouthWest Transit also operates a transit service called SW Prime. SW Prime is a transit service throughout Eden Prairie, Chaska, Chanhassen, Carver, and Victoria (daily except Sundays). SW Prime also offers Southdale service on Saturdays.

SW Prime is an on-demand ride service. As a modern local service, a rider may request a ride through SouthWest Transit's smartphone app or phone, and then indicate the pick-up and drop off locations. A shared ride will be sent to pick up the rider.

SW Prime vehicles are also ADA compliant and can accommodate a wheelchair, walker, or bike when a rider requests a ride. The SW Prime service operates from 6:30 a.m. to 7:00 p.m. Monday through Friday, and then 10:00 a.m. through 4:00 p.m. on Saturdays.

4. LEVEL OF SERVICE

Traffic engineers quantify traffic operation and performance of intersections in terms of "Levels of Service" (or LOS). Traffic operations for the peak hour conditions at intersections within the study area were analyzed using the industry-standard *Synchro/SimTraffic Version*

[10] Meridian Fields Traffic impact Study, prepared for H.R. Horton, Inc., 06/30/2018; and, Kwik-Trip – Carver Creek Commons Traffic Impact Study, prepared for United Properties, 01/31/2019; both prepared both Westwood Professional Service, Minnetonka, MN.
[11] https://swtransit.org/

10 software package, which uses the data and methodology contained in the Highway Capacity Manual, Sixth Edition (2016 HCM), published by the Transportation Research Board. The software model was calibrated to replicate existing conditions as accurately as possible before being used to assess future conditions. A full discussion of the methodology used to assess traffic operation appears in the Appendix of this report.

Westwood utilized this software to determine the level of delay of the existing peak hour traffic at the intersection. For this analysis, Westwood was asked to review a.m. peak hour and p.m. peak hour conditions. Table 1 summarizes the intersection levels of service recorded for the existing intersections within the study area. All study intersections perform acceptably (i.e., LOS-D or better) in the a.m. and p.m. peak hours. These intersection levels of service provide a baseline of the operation and performance of the traffic, but they do not necessarily hint at every movement at the intersection operating acceptably.

Table 1 - Existing Peak Hour Levels of Service

Intersection	Lane Assignment	Intersection Traffic Control	Existing Conditions							
			AM PEAK				PM PEAK			
			Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)	Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)
Jonathan Carver Pkwy & Ironwood Dr	EB Left	S	12.2 sec/veh = LOS B	**D**	**46.4**	165	8.9 sec/veh = LOS A	**D**	**41.4**	118
	EB Thru			**A**	**1.3**	34		**D**	**36.8**	61
	EB Right			**A**	**3.6**	34		**B**	**17.8**	61
	WB Left			**-**	**0.0**	n.a.		**B**	**10.8**	9
	WB Thru			**E**	**55.9**	102		**A**	**5.4**	39
	WB Right			**C**	**24.6**	102		**A**	**4.3**	39
	NB Left			**A**	**5.8**	41		**C**	**21.5**	44
	NB Thru			**A**	**9.2**	253		**A**	**3.2**	77
	NB Right			**A**	**3.1**	8		**A**	**0.3**	n.a.
	SB Left			**B**	**18.4**	16		**A**	**7.9**	3.7
	SB Thru			**A**	**5.9**	111		**A**	**7.7**	148
	SB Right			**A**	**2.1**	53		**A**	**3.8**	47
Jonathan Carver Pkwy & Spring Creek Dr	EB Left	N	3.8 sec/veh = LOS A	**-**	**0.0**	n.a.	2.1 sec/veh = LOS A	**-**	**0**	n.a.
	EB Thru			**-**	**0.0**	n.a.		**-**	**0.0**	n.a.
	EB Right			**-**	**0.0**	n.a.		**-**	**0.0**	n.a.
	WB Left			**E**	**39.8**	15		**F**	**57.4**	31
	WB Thru			**-**	**0.0**	n.a.		**-**	**0.0**	n.a.
	WB Right			**B**	**15.0**	59		**A**	**4.2**	34
	NB Left			**-**	**0.0**	n.a.		**-**	**0.0**	n.a.
	NB Thru			**A**	**4.3**	n.a.		**A**	**2.0**	18
	NB Right			**A**	**2.5**	n.a.		**A**	**0.6**	18
	SB Left			**B**	**11.4**	24		**A**	**3.9**	68
	SB Thru			**A**	**0.9**	24		**A**	**3.3**	68
	SB Right			**-**	**0.0**	n.a.		**-**	**0.0**	n.a.

Source: Westwood Professional Services, 2019

It is noted that the peak hour level of service is LOS-D for certain westbound movements approaching Jonathan Carver Parkway at both Ironwood Drive and Spring Creek Drive. These are primarily due to the effect of low side street volumes and the intersection is side-street stop controlled.

Full listings of levels of service by movement at each intersection, as well as SimTraffic operations and performance output appear in the Appendix. These will be compared with the intersection operations under the future No-Build and Build conditions.

NO-BUILD SCENARIO

To measure the traffic impacts that could result from the Timber Creek development, Westwood first tested the performance and operation of the study intersections with only the projected background traffic volumes for the future design years. For this analysis, it was assumed that there would be one design year (2028), which would correspond to one year after anticipated full build out of the Timber Creek subdivision.

Westwood reviewed the traffic growth anticipated in the Jonathan Carver Parkway Corridor Study. By year 2040, traffic will have grown at approximately 3% per year along Jonathan Carver Parkway. Therefore, Westwood utilized this rate to interpolate the year 2028 design year volumes within the study area (see Figure 3).

It was assumed that by 2028, the intersection of Jonathan Carver Parkway & Monroe Drive/Spring Creek Drive would be signalized. In addition, it was assumed that both the Meridian Fields residential development and the commercial retail development in the northwest corner of Jonathan Carver Parkway & Monroe Drive would be built out. Traffic projections from these developments were added to the 2028 No-Build network. Signal timings were optimized to be responsive to traffic conditions.

Westwood created a *Synchro/SimTraffic* model using these projected volumes. Table 2 shows the results of the 2028 No-Build condition.

As with the Existing peak hour analysis, acceptable levels of service are projected in 2028 at each of the study intersections. A detailed listing of levels of service for the No-Build scenario is found in the Appendix.

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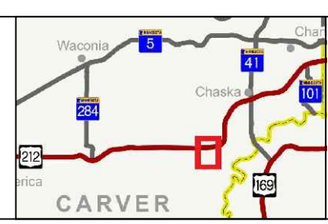

Legend

LANE DESIGNATION	
AM PEAK HOUR VOLUME	XX
PM PEAK HOUR VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 400' 800'

Timber Creek Residential Development

Carver, MN

2028 Peak Hour No Build Conditions

Figure 3

Date: 10/9/19

Table 2 - 2028 No-Build Peak Hour Levels of Service

Intersection	Lane Assignment	Intersection Traffic Control	2028 No Build Conditons							
			AM PEAK				PM PEAK			
			Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)	Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)
Jonathan Carver Pkwy & Ironwood Dr	EB Left	S	15.8 sec/veh = LOS B	**D**	**36.6**	172	11.3 sec/veh = LOS B	**C**	**27.9**	141
	EB Thru			**C**	**24.1**	37		**C**	**27.4**	69
	EB Right			**A**	**4.6**	37		**B**	**10.8**	69
	WB Left			**-**	**0.0**	n.a.		**C**	**33.8**	16
	WB Thru			**D**	**41.7**	118		**D**	**54.1**	47
	WB Right			**C**	**21.9**	118		**A**	**7.5**	47
	NB Left			**B**	**13.1**	61		**B**	**14.9**	49
	NB Thru			**B**	**14.1**	254		**A**	**7.0**	118
	NB Right			**A**	**2.3**	n.a.		**A**	**0.9**	n.a.
	SB Left			**C**	**21.9**	54		**B**	**12.5**	56
	SB Thru			**B**	**13.5**	147		**B**	**11.8**	177
	SB Right			**A**	**8.9**	83		**A**	**8.2**	71
Jonathan Carver Pkwy & Monroe Drive/Spring Creek Dr.	EB Left	S	37.8 sec/veh = LOS D	**D**	**35.2**	271	19.7 sec/veh = LOS B	**C**	**25.8**	167
	EB Thru			**C**	**26.2**	16		**A**	**7.4**	8
	EB Right			**A**	**7.2**	73		**C**	**28.8**	328
	WB Left			**D**	**52.8**	38		**D**	**37.6**	51
	WB Thru			**D**	**35.2**	38		**D**	**35.7**	51
	WB Right			**C**	**21.7**	47		**A**	**7.3**	21
	NB Left			**D**	**36.3**	338		**C**	**26.7**	142
	NB Thru			**D**	**52.7**	936		**B**	**13.1**	210
	NB Right			**C**	**29.6**	317		**A**	**4.5**	6
	SB Left			**C**	**21.2**	14		**B**	**15.1**	39
	SB Thru			**C**	**29.2**	231		**C**	**21.6**	270
	SB Right			**A**	**6.4**	75		**A**	**8.0**	128

Source: Westwood Professional Services, 2019

BUILD SCENARIO

Public and private infrastructure improvements will need to be constructed in association with this development. These include but are not limited to: internal roadways, trails and public utility systems.

Specifically, these infrastructure improvements include construction of a local street that will serve as a neighborhood collector oriented east-to-west as an extension of Ironwood Drive. Two local streets will provide neighborhood access and connectivity between the Copper Hills subdivision and Timber Creek. Three local streets will be built out provide connectivity to Monroe Drive to the north. Impacts related to public improvements directly associated with the proposed development project are discussed throughout this document.

1. PROJECTED LAND USE

The project proposes 74 town homes and 270 single-family homes. Approximately 70.0 acres of open space is also planned, which will include parks, buffers, woodlands, wetlands, and stormwater basins.

The proposed site development is consistent with Carver's comprehensive future land use plans, which guide the area for residential development. The City's Future Land Use Map identifies the site as Low Density Residential, which corresponds to a typical R-1 Zoning District.

2. TRIP GENERATION

The Institute of Transportation Engineers (ITE) has collated trip generation studies for a variety of land uses in their Trip Generation Manual, Tenth Edition.[12] Westwood has calculated the trip generation for this site using the ITE Land Use Code 210 for "Single-Family Detached Housing" and Land Use Code 220 for "Multi-Family Housing (Low Rise.

The ITE Trip Generation Manual, Tenth Edition does provide rates and equations for "Multi-Family Residential" land uses, but specifies each residential building must have four or more units. The townhomes would be defined as row townhomes having six to eight units per building. Therefore, Westwood considered these units under Land Use category 220.

In addition, there is a 6.1 acre park proposed within the development. This has been added to the trip generation.

[12] Trip Generation Manual, Tenth Edition, Institute of Transportation Engineers, Washington DC, 2017.

Table 3 illustrates the projected trip generation for the development in the 2028 Build Condition. This includes the daily trip projection plus projected weekday a.m. and p.m. peak hour inbound and outbound trip generation. Trips for each building type have been calculated separately, but the total unit count remains 344 units.

Table 3 - Gross Trip Generation for Timber Creek – Build Condition (Year 2028)

Land Use	ITE Code	Size		Weekday		AM peak		PM Peak	
				Enter	Exit	Enter	Exit	Enter	Exit
Single Family Housing	210	270	units	1,274	1,274	50	150	168	99
Multifamily Housing (Low-Rise)	220	74.0	units	259	259	8	28	28	17
Public Park	411	6.1	acres	2	2	0	0	0	0
				1,535	1,535	58	178	196	116
				3,070		236		312	

(Source: Institute of Transportation Engineers Trip Generation Manual, Tenth Edition, 2017)

3. DIRECTIONAL DISTRIBUTION

Westwood reviewed the directional distribution that was forecast in the Jonathan Carver Parkway Corridor Study for the 2040 daily traffic. As one would expect, there is a significantly high percentage of trips to and from the north (TH 212).[13] The corridor study projected between 70 – 75% of the trips at the parkway intersections at Monroe and at Ironwood will be directionally distributed to and from the north. Westwood adjusted these percentages slightly in the analysis to reflect the impact of the retail commercial center in the northwest corner of Jonathan Carver Parkway & Monroe Drive.

In addition, the development's internal travelshed was distributed based on proximity to the adjacent roadway network. That is, the trips to and from the northerly and northwesterly portion of the development were assigned to utilize Monroe Drive to access the external street network. Similarly, the southerly and easterly portions of the development were assigned to utilize Ironwood Drive to access the external network.

With a 60%/30% peak hour split of trips being assigned along Jonathan Carver Parkway, the balance will be generated to and from the east along both Spring Creek Drive and Ironwood east of Jonathan Carver Parkway. As Carver County development expands to the west of Timber Creek, there may be trips generated to and from the west, most likely along Monroe Drive. However, for this conservative analysis, background traffic patterns were based on the traffic models from Meridian Fields and the Kwik-Trip traffic study, and did not assume traffic impacts to and from the west. These distributions were applied to the 2028 Build scenario. The peak hour directional distributions for this site are shown on Figure 5.

[13] Jonathan Carver Parkway County Highway 11 Corridor Study, Carver County, City of Carver, MN, July 2019.

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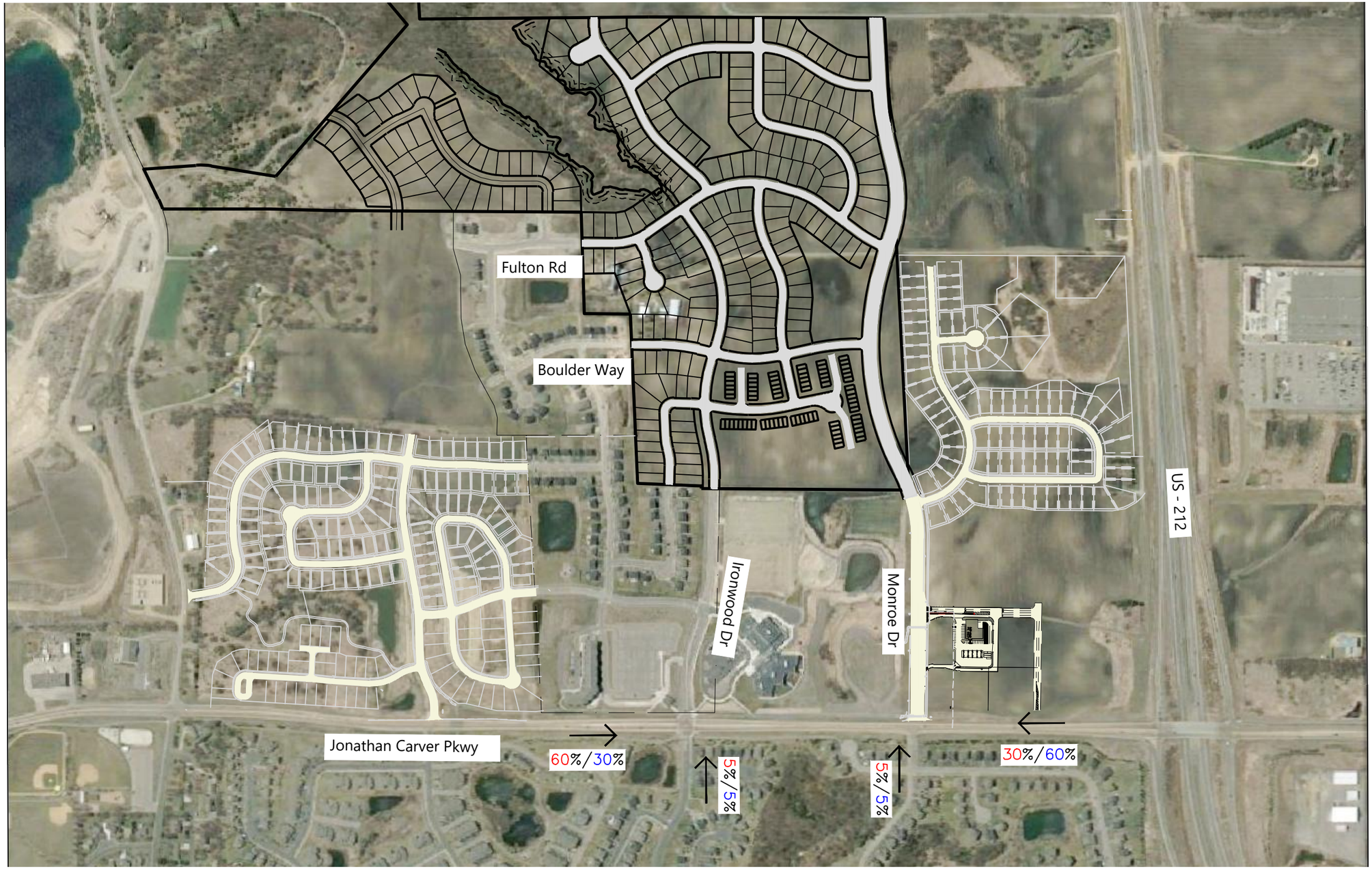

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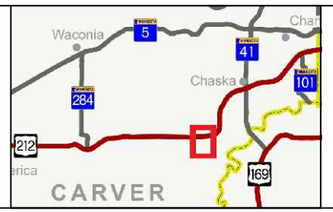

Legend

DIRECTIONAL DISTRIBUTION	→
ENTER PEAK HOUR DISTRIBUTION	XX
EXIT PEAK HOUR DISTRIBUTION	XX

0' 400' 800'

Timber Creek Residential Development

Carver, MN

Directional Distribution

Figure 4

Date: 10/9/19

4. 2028 BUILD SCENARIO - OPERATION AND PERFORMANCE

Westwood has modeled the a.m. and p.m. peak hour Build scenarios using the industry-standard *Synchro/SimTraffic software, Version 10*. This software package provides the ability to perform level-of-service analysis, traffic simulation and optimization. Westwood utilizes this package to model and test roadway capacities by inputting traffic volumes into a defined geometry using existing or proposed traffic controls. The results provide level-of-service capacity analyses and queue lengths for various peak hours tested.

For this analysis, Westwood observed traffic signal operation for the intersection at Jonathan Carver Parkway & Ironwood Drive. Westwood recorded cycle lengths varying between 90 and 140 seconds, with a semi-actuated operation during the course of peak hours. In addition, the signal operation on all four approaches was modeled with protected/ permitted left turns and flashing yellow left phasing.

The intersection of Monroe Drive and Jonathan Carver Parkway is not currently signalized, but is projected for signalization. Timings are currently undefined, but have been modeled and optimized after the signal timings at Ironwood Drive.

Westwood also assigned trips to and from the internal roadway network and then out onto the existing street network. Three local streets will access Monroe Drive direction from the Timber Creek development. Figure 6 illustrates the Trip Assignments projected for the study area.

Westwood recognizes that there is the Carver Station Park-and-Ride at the intersection of Jonathan Carver Parkway & Ironwood Drive. This station serves SouthWest Transit routes primarily during morning and evening peak hours. While alternate modes of transportation are important in reducing traffic throughout the overall network, no mode shift reduction was calculated for this analysis so as to achieve conservative (worst-case) results.

Table 4 lists the intersection levels of service and delay for the study area under the 2028 Build Scenario. The resulting 2028 Build condition appears on Figure 6.

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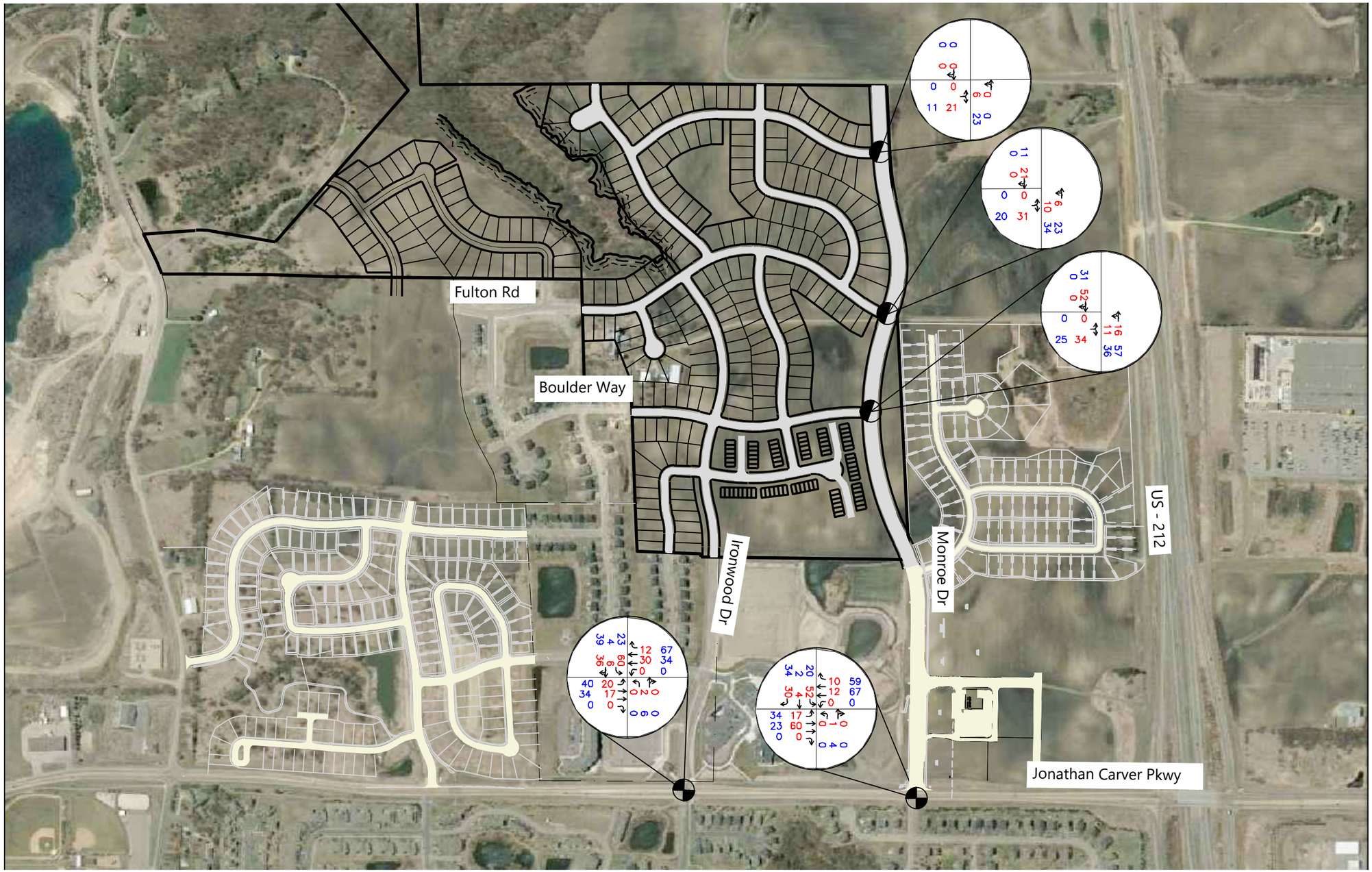

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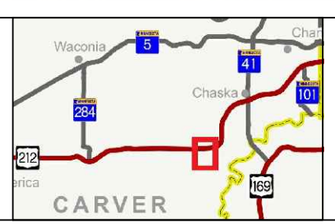

Legend

LANE DESIGNATION	
AM PEAK HOUR VOLUME	XX
PM PEAK HOUR VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 400' 800'

Timber Creek Residential Development

Carver, MN

Trip Assignment

Figure 5

Date: 10/9/19

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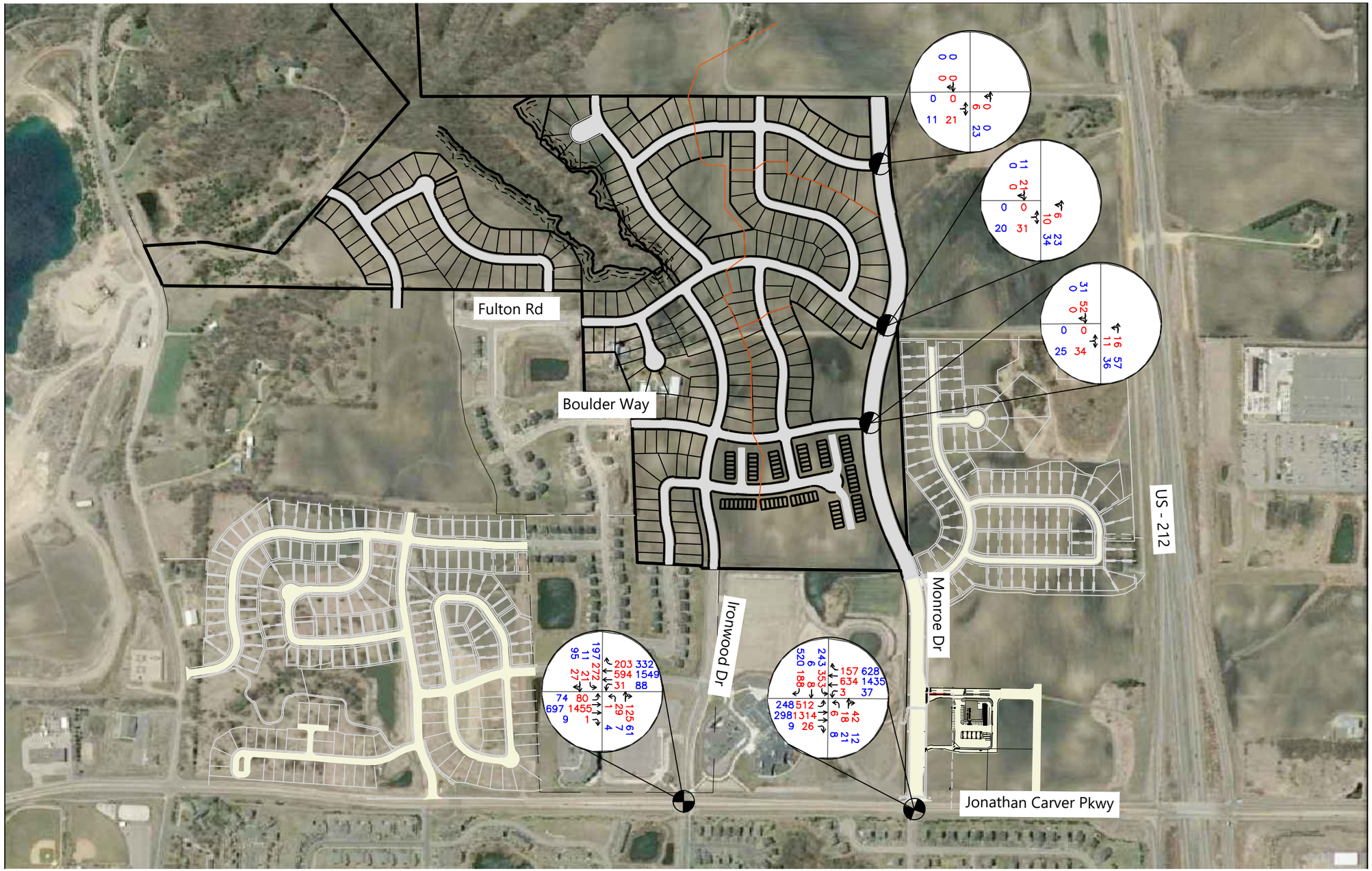

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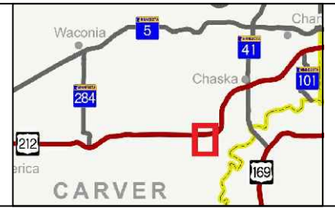

Legend

LANE DESIGNATION	
AM PEAK HOUR VOLUME	XX
PM PEAK HOUR VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 400' 800'

Timber Creek Residential Development

Carver, MN

2028 Peak Hour Build Condtions

Figure 6

Date: 10/9/19

Table 4 - 2028 Build Peak Hour Levels of Service

Intersection	Lane Assignment	Intersection Traffic Control	2028 Build Conditions									
			AM PEAK					PM PEAK				
			Intersection Delay and LOS	Intersection Input	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)	Intersection Delay and LOS	INTERSECTION INPUT	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)
Jonathan Carver Pkwy & Ironwood Dr	EB Left	S	27.2 sec/veh = LOS C	27.2	E	72.3	333	12.6 sec/veh = LOS B	12.6	C	29.4	154
	EB Thru				C	27.6	152			C	21.7	103
	EB Right				A	7.4	152			B	11.8	103
	WB Left				-	0.0	n.a.			B	18.6	15
	WB Thru				D	42.8	144			D	38.1	60
	WB Right				C	33.1	144			A	9.7	60
	NB Left				C	21.0	248			B	18.4	75
	NB Thru				C	23.2	488			A	7.4	123
	NB Right				A	3.7	n.a.			A	2.0	10
	SB Left				D	39.3	65			B	12.8	53
	SB Thru				C	20.9	273			B	13.7	214
	SB Right				B	10.4	84			A	8.4	67
Jonathan Carver Pkwy & Spring Creek Dr	EB Left	S	30.6 sec/veh = LOS C	30.6	D	49.3	328	17.9 sec/veh = LOS B	17.9	C	24.5	184
	EB Thru				D	35.2	22			A	8.7	8
	EB Right				A	8.4	77			C	22.7	295
	WB Left				C	30.5	19			D	36.5	49
	WB Thru				D	41.8	72			D	40.1	49
	WB Right				D	37.0	72			A	8.0	23
	NB Left				D	36.3	228			C	25.8	144
	NB Thru				C	31.4	528			B	14.4	218
	NB Right				B	14.2	129			A	4.2	3
	SB Left				-	0.0	n.a.			B	17.7	44
	SB Thru				C	27.3	361			B	19.1	261
	SB Right				A	6.5	77			A	8.5	141

Source: Westwood Professional Services, 2019

As with Existing and 2028 No Build analyses, a review of the detailed levels of service tables for the 2028 Build scenario (see Appendix) shows movements at the study area intersections perform acceptably. It is noted that signal timings were optimized to improve overall traffic performance along the intersections in the study area.

5. 2040 BUILD SCENARIO - OPERATION AND PERFORMANCE

As a test, Westwood also modeled 2040 Build operations utilizing the recommended roadway network for 2040 described in the Jonathan Carver Parkway Corridor Study. These improvements included widening of the segment of the parkway to six through lanes (three in each direction) between the eastbound TH 212 ramp intersection and Monroe Drive. In addition, these improvements include dual left turn lanes for eastbound approaches to the parkway along Ironwood Drive and along Monroe Drive.

The background traffic volume was extrapolated by 3% annually to achieve the anticipated growth noted in the corridor study, as shown on Figure 7. A review of the detailed levels of service tables for the 2040 Build scenario (see Table 4) shows movements at the study area intersections perform unacceptably due to the vast increase in north-south traffic and the additional green time required to accommodate the heavy directional flows.

Westwood also tested expansion of Jonathan Carver Parkway to three lanes in each direction southward past Ironwood Drive in order to provide adequate capacity to

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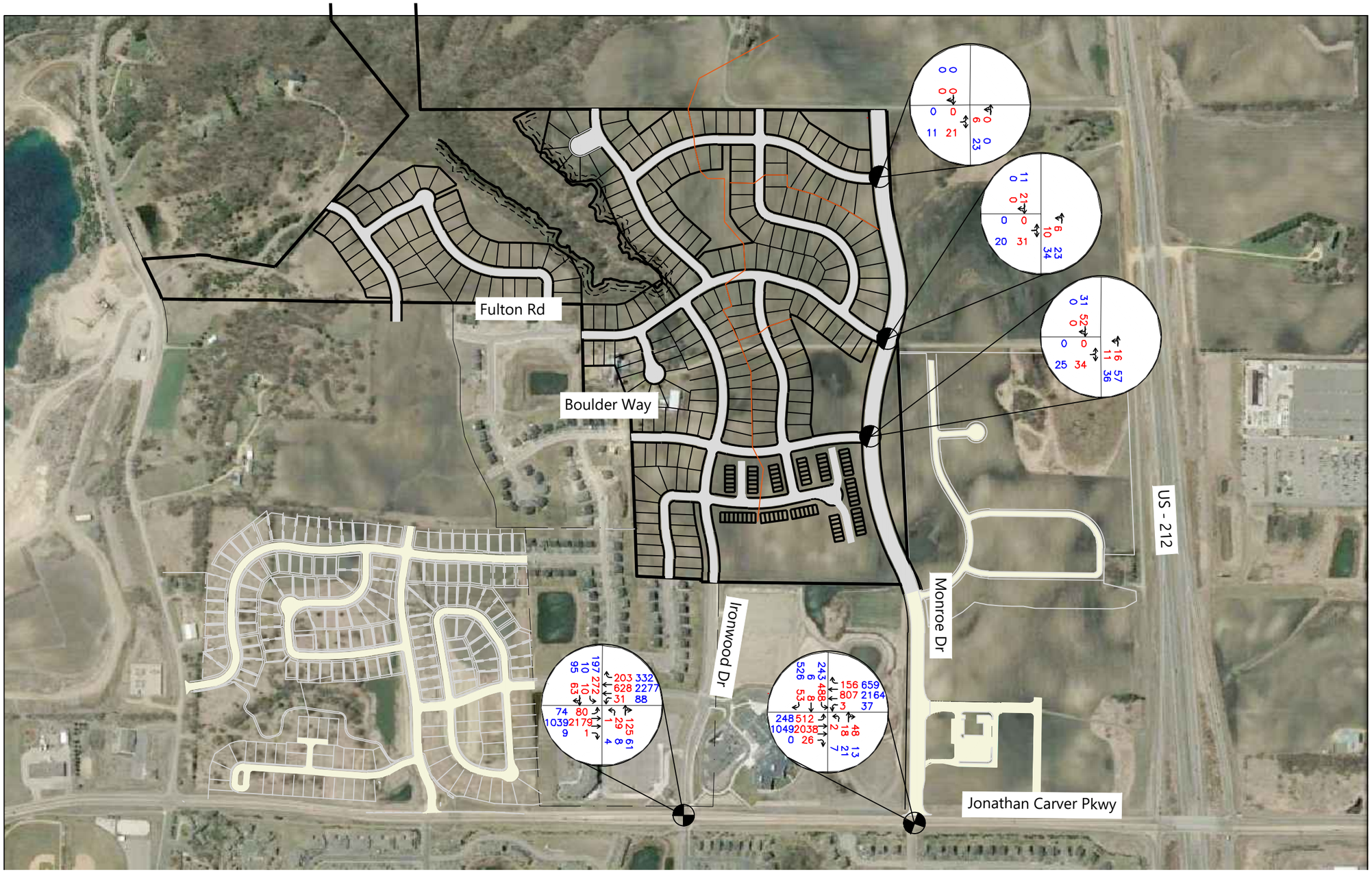

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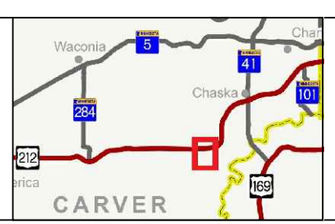

Legend

LANE DESIGNATION	
AM PEAK HOUR VOLUME	XX
PM PEAK HOUR VOLUME	XX
SIGNALIZED INTERSECTION	
UNSIGNALIZED INTERSECTION	

0' 400' 800'

Timber Creek Residential Development

Carver, MN

2040 Peak Hour Build Conditons

Figure 7

Date: 10/9/19

accommodate the vast increases in north/south traffic. These results show improved flow over the scenario with two lanes in each direction south of Monroe Drive, but still show constrained flow from the increased volume.

Table 4 - 2040 Build Peak Hour Levels of Service

Intersection	Lane Assignment	Intersection Traffic Control	2040 Build Condtions							
			AM PEAK				PM PEAK			
			Intersection Delay and LOS		Approach Delay (sec)	95th %ile Queue (ft)	Intersection Delay and LOS	Level of Service	Approach Delay (sec)	95th %ile Queue (ft)
Jonathan Carver Pkwy & Ironwood Dr	EB Left	S	103.4 sec/veh = LOS F	C	27.3	386	13.8 sec/veh = LOS B	D	39.3	131
	EB Thru			B	15.2	187		C	26.1	87
	EB Right			A	5.4	38		B	16.2	87
	WB Left			-	0.0	16		E	71.7	8
	WB Thru			D	43.2	69		C	34.4	52
	WB Right			D	36.3	151		B	11.6	52
	NB Left			F	127.1	627		B	18.3	68
	NB Thru			F	185.4	1617		A	6.9	164
	NB Right			F	118.1	9		A	2.7	15
	SB Left			C	26.4	65		B	16.9	59
	SB Thru			B	14.2	318		B	14.8	220
	SB Right			A	8.7	68		B	10.9	72
Jonathan Carver Pkwy & Spring Creek Dr	EB Left	S	70.4 sec/veh = LOS E	E	65.7	386	55.3 sec/veh = LOS E	C	21.5	122
	EB Thru			B	16.3	187		B	14.6	11
	EB Right			A	9.9	38		C	33.5	308
	WB Left			C	30.0	16		D	40.2	33
	WB Thru			D	38.5	69		D	40.3	54
	WB Right			C	23.2	69		B	15.6	54
	NB Left			F	125.6	616		D	39.4	185
	NB Thru			F	103.8	1287		C	20.6	372
	NB Right			E	72.1	419		-	0.0	n.a.
	SB Left			C	24.2	14		F	91.3	107
	SB Thru			B	20.0	305		F	97.1	842
	SB Right			A	4.6	49		C	28.2	920

Source: Westwood Professional Services, 2019

6. MITIGATION MEASURES

As stated previously, the signal timings for the intersection of Jonathan Carver Parkway & Monroe Drive were assumed under this analysis. Actual signal timings and intersection operation may vary when the signal is placed into operation. It is recommended that all signal operation along the corridor be monitored and updated for improved performance in the Build conditions – both in 2028 and 2040.

The Jonathan Carver Parkway Corridor Study recommends the widening of the parkway to six lanes between the eastbound TH 212 ramps and Monroe Drive in the long-term condition. This analysis indicated that widening to six lanes should be studied and considered from TH 212 southward beyond Monroe Drive to at least Ironwood Drive.

In addition, this analysis agrees with the Jonathan Carver Parkway Corridor Study that recommends adding a second left turn lane for the eastbound from approaches on both Ironwood Drive and Monroe Drive. All internal intersections within the development are recommended for side-street stop control. No additional approach lanes are recommended.

CONCLUSIONS AND RECOMMENDATIONS

- The Timber Creek residential development is proposed on approximately 91.4 acres of primarily agricultural land in the western portion of Carver, MN. The project is projected to consist of 74 townhomes and 270 single family homes. Approximately 70.0acres of open space is also planned, which will include park, trails, wetlands, and stormwater basins.

- Summergate Development is proposing construction of the residential development. It is anticipated that the project will be constructed in seven phases, with the first phase expected to begin in spring 2020. Full build-out is anticipated by 2027; however, construction timing will ultimately depend upon market conditions.

- Public streets will be constructed to serve the development. This includes construction of a neighborhood collector roadway (Ironwood Drive) oriented west to east through the center of the site, as well as several local residential streets to access planned residential housing.

- Westwood collected peak hour turning movement traffic counts at the intersection of Jonathan Carver Parkway & Ironwood Drive. In addition, Westwood utilized intersection turning movement counts for the intersection of Jonathan Carver Parkway & Monroe Drive from the traffic study done for Kwik-Trip earlier this year.

- The Carver Station Park-and-Ride was built with the intention of spurring nearby residential development. Within walking distance of Timber Creek Residential Development, Carver Station is served by two SouthWest Transit routes. While alternate modes of transportation are important in reducing traffic throughout the overall network, no mode shift reduction was calculated for this analysis so as to achieve conservative (worst-case) results.

- Traffic operations for the peak hour conditions at intersections within the study area were analyzed using the industry-standard *Synchro/SimTraffic Version 10* software package. Westwood determined that the existing intersection level of service at Ironwood & Jonathan Carver Parkway operates at LOS-B in the a.m. peak hour, and LOS-A in the p.m. peak hours. This is primarily due to the school arrival traffic at Carver Elementary coinciding with the background a.m. peak hour.

- Westwood assumed a development build-out year of 2027. Thus, the year 2028 was used as the design year for this analysis. Based on assumptions from the Jonathan Carver Parkway Corridor Study, background growth in this area was projected at 3 percent per year.

- Westwood calculated trip generation based on 270 single-family residential units, 74 low rise multi-family units (townhomes), and the 6.1 acre public park. Assuming that level of development, a weekday total of 3,070 trips will be generated. During the a.m. peak hour, 236 trips are projected and in the p.m. peak hour 312 trips are projected. As is typical with residential developments, there is a high weekday commuter flow out of the development in the a.m. peak hour and a high return flow in the p.m. peak hour.

- Westwood observed traffic signal operation for the intersection at Jonathan Carver Parkway & Ironwood Drive. Westwood recorded cycle lengths varying between 90 and 140 seconds during the course of peak hours, with a semi-actuated operation. In addition, the signal operation on all four approaches was protected/ permitted left turns with flashing yellow left phasing. It was assumed that the intersection of Jonathan Carver Parkway & Monroe Drive will operate under similar timings when signalized. Nevertheless, these signal timings may be adjusted once the future traffic patterns materialize.

- All other study area intersections were modeled to operate under side-street stop control. Internal development streets intersecting with Ironwood Drive shall be controlled by side-street stop signs. All internal intersections were assumed to have a single lane approach.

- Based on the existing background traffic volumes, trips to and from the development were directionally distributed throughout the study area intersections. These development trips were assigned on top of the 2028 No-Build network to create the 2028 Build network.

- The resulting 2028 Build network was modeled using the *Synchro/SimTraffic* software. The resulting intersection levels of service showed LOS-D or better at the study area intersections. The some movements along Ironwood Drive and Monroe Drive are challenged in the peak hours, but no movement experienced levels of service below LOS-D.

- Westwood also tested possible year 2040 volumes and levels of service for the study area. As was shown in the Jonathan Carver Parkway Corridor Study, the increases in north-south volumes along Jonathan Carver Parkway will experience capacity constraints. Dual left turn lanes for the eastbound approaches to the parkway along Monroe Drive and along Ironwood Drive will be necessary to improve access to northbound Jonathan Carver Parkway especially in the a.m. peak hour. The addition of the third lane in each direction between TH 212 and Monroe Drive, as recommended in the Jonathan Carver Parkway Corridor Study, is upheld in this study. Further, the City and County may wish to consider

extending the third lane in each direction between Monroe and Ironwood Drives to accommodate the heavy traffic projected for the segment, especially during peak hours.

In summary, the Timber Creek development as proposed will not generate traffic that cannot be handled by the existing or proposed street system, as tested for the 2028 Build conditions. Further, the proposed trip generation of the site will not place an adverse increase of traffic along Jonathan Carver Parkway, or other adjacent roadways bordering the site.

Traffic Impact Analysis – TECHNCIAL APPENDIX

Timber Creek

Appendix 1 – Level of Service Methodology

Appendix 2 – Traffic Counts

Appendix 3 – SimTraffic Operational and Performance Reports

Appendix 1 - Level of Service Methodology

Traffic operations for the peak hour conditions within the study area were analyzed using the industry-standard *Synchro/SimTraffic Version 10* software package, which uses the data and methodology contained in the Highway Capacity Manual, Sixth Edition published by the Transportation Research Board. The software model was calibrated to replicate existing conditions as accurately as possible before being used to assess future conditions.

The operating conditions of transportation facilities, such as traffic signals, stop-controlled intersections and roundabouts, are evaluated based on the relationship of the theoretical capacity of a facility to the actual traffic volumes on that facility. Various factors affect capacity, including travel speed, roadway geometry, grade, number and width of travel lanes, and intersection control. The current standards for evaluating capacity and operating conditions are contained in the Highway Capacity Manual, Sixth Edition (HCM). The procedures describe operating conditions in terms of a Level of Service (LOS). Facilities are given letter designations from A, representing the best operating conditions, to F, representing the worst. Generally, Level of Service D (LOS-D) represents the threshold for acceptable overall intersection operating conditions during a peak hour.

At intersections, Levels of Service are assigned differently for signalized or unsignalized intersections (which include Two-Way Stop Control [TWSC], All-way Stop Control [AWSC] and roundabouts). For signalized intersections, Level of Service is calculated by taking the total Intersection Delay and converting it to a letter grade as shown in the right side of Table A-1. For an unsignalized intersection, Level of Service is calculated by taking the Intersection Delay and converting it to a letter grade, as shown in the left side of Table A-1. While similar, the signalized control delay totals are higher than that of unsignalized intersections. In any condition, when the LOS by Volume to Capacity Ratio exceeds 1.0, the LOS is always F.

Under the HCM, common movements are included into lane groups. Control Delay is then determined for each lane group and Levels of Service are based on this Control Delay. For each lane group, Control Delay is quantified by number of seconds. Control Delay is defined as the difference between the travel time that would have occurred in the absence of the intersection control, and the travel time that results because of the presence of the intersection control. Levels of Service are then based on the control delay per vehicle.

Table A-1 - Level of Service vs. Control Delay - Signalized and Unsignalized Intersections (TWSC, AWSC & Roundabouts)

TWSC, AWSC & Roundabouts	
LOS by Volume to Capacity Ratio (≤ 1)*	Control Delay per Vehicle (Seconds)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Signalized Intersections	
LOS by Volume to Capacity Ratio (≤ 1)*	Control Delay per Vehicle (Seconds)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Per the 2010 Highway Capacity Manual, published by the Transportation Research Board.
* NOTE: When LOS by Volume to Capacity Ratio >1.00, LOS is F.

The acceptable Level of Service threshold for a particular movement at an intersection depends on both the priority assigned to that movement and its traffic volume. In general, the higher the priority and the higher the traffic volume, the more stringent the acceptable threshold will be. For example, the acceptable threshold for a high-priority/high-volume rural movement might be C, while LOS F on a low-priority/low-volume urban movement might be appropriate.

For two-way stop-controlled intersections, a key measure of operational effectiveness is the side street LOS. Since the mainline does not have to stop, the majority of delay is attributed to the side-street/minor approaches. Long delays and poor LOS can sometimes result on the side street, even if the overall intersection is functioning well, making it a valuable design criterion. As the side-street/minor approach delay approaches and exceeds 60 seconds per vehicle, drivers may divert to another route or become impatient and accept gaps in the mainline traffic that are less than acceptable/safe gaps resulting in the potential for traffic safety concerns. Therefore, depending on priority and traffic volume, acceptable side-street LOS can range from D to F. Side streets can operate at LOS F without the intersection warranting a change in traffic control.

A final fundamental component of operational analyses is a study of vehicular queuing, as defined the line of vehicles waiting to pass through an intersection. An intersection can operate with an acceptable Level of Service, but if queues from the intersection extend back to block entrances to turn lanes or accesses to adjacent land uses, unsafe operating conditions could result.

In reporting Levels of Service, the information from the signalized intersection analysis comes directly from the Synchro 10 and SimTraffic 10 reports. Intersection Levels of Service are reported based on the Control Delay calculated for the overall intersection and for each critical movement as determined by SimTraffic 10, and as adjusted for driver behavior.

For queuing, the 95th Percentile and the Maximum Queue Lengths that are generated after five runs. In this report, the 95th Percentile Queue Length is used to discern adequate lengths of turn lanes. The 95th Percentile Queue Length refers to that length of queue that has only a five-percent probability of being exceeded during an analysis period. This is the standard factor used to determine optimal turn lane lengths.

Appendix 2 – Traffic Counts

CSAH 11 (Jonathan Carver Parkway) & Ironwood Drive

	JC PKWY From North				IRNWD From East				JC PKWY From South				IRNWD From West				Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	20	52	0		24	1	0		1	208	9		0	0	21		336
07:15 AM	29	62	0		13	2	0		0	224	9		3	0	26		368
07:30 AM	45	68	1		23	2	0		0	243	12		4	0	25		423
07:45 AM	48	79	2		18	16	1		0	163	16		14	3	62		422
08:00 AM	17	54	4		11	0	1		0	184	6		5	4	55		341
08:15 AM	8	63	0		8	0	0		1	134	5		2	0	13		234
08:30 AM	5	50	3		9	0	0		2	135	1		3	0	16		224
08:45 AM	8	78	3		7	0	1		1	127	2		1	0	7		235
Peak Hour Total	142	261	3		78	21	1		1	838	46		21	3	134		

	JC From North				IW From East				JC From South				IW From West				Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	26	218	4		7	1	2		1	100	5		4	2	18		388
04:15 PM	18	245	17		5	2	0		2	74	5		6	1	15		390
04:30 PM	23	210	10		8	1	1		0	103	4		8	2	21		391
04:45 PM	28	253	10		6	0	1		3	80	3		10	3	16		413
05:00 PM	39	232	7		6	1	2		2	103	3		7	2	23		427
05:15 PM	68	217	13		17	0	0		1	100	15		12	0	35		478
05:30 PM	35	177	16		6	0	0		1	109	5		14	0	36		399
05:45 PM	24	173	8		11	0	0		0	82	1		4	0	9		312
Peak Hour Total	170	879	46		35	1	3		7	392	26		43	5	110		

Appendix 4 - SimTraffic Operational and Performance Reports

1: Jonathan Carver Pkwy. & Ironwood Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	3.5	0.1	0.3	0.1	0.2	3.3	0.9	4.2	0.0	0.0	0.0	0.9
Total Del/Veh (s)	46.4	1.3	3.6	55.9	24.6	5.8	9.2	3.1	18.4	5.9	2.1	12.2

2: Jonathan Carver Pkwy. & Spring Creek Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	39.8	15.0	4.3	2.5	11.4	0.9	3.8

3: Jonathan Carver Pkwy. & South Ramp 212 Performance by movement

Movement	EBL	EBT	EBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.3	0.1	0.1	0.0	0.0	0.2	0.1	0.1
Total Del/Veh (s)	24.5	28.9	2.0	4.0	6.7	7.3	6.0	9.0

4: Jonathan Carver Pkwy. & North Ramp 212 Performance by movement

Movement	NBT	All
Denied Del/Veh (s)	0.0	0.0
Total Del/Veh (s)	0.8	0.8

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	25.5

Intersection: 1: Jonathan Carver Pkwy. & Ironwood

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	TR	L	T	R	L	T	R
Maximum Queue (ft)	184	51	108	51	330	24	30	179	72
Average Queue (ft)	89	11	58	15	116	1	3	41	20
95th Queue (ft)	165	34	102	41	253	8	16	111	53
Link Distance (ft)		1296	388		1466			1208	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	190			257		257	180		180
Storage Blk Time (%)	0				1			0	
Queuing Penalty (veh)	0				0			0	

Intersection: 2: Jonathan Carver Pkwy. & Spring Creek Dr

Movement	WB	WB	SB
Directions Served	L	R	LT
Maximum Queue (ft)	31	71	71
Average Queue (ft)	2	32	2
95th Queue (ft)	15	59	24
Link Distance (ft)	337	337	638
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Jonathan Carver Pkwy. & South Ramp 212

Movement	EB	EB	NB	NB	SB	SB	SB
Directions Served	LT	R	T	T	L	T	T
Maximum Queue (ft)	206	49	47	63	73	118	98
Average Queue (ft)	124	15	10	21	36	59	21
95th Queue (ft)	195	38	32	46	71	106	66
Link Distance (ft)	594	594	617	617			
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Jonathan Carver Pkwy. & North Ramp 212

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd.

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

1: Jonathan Carver Pkwy. & Ironwood Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	3.3	1.0	0.4	0.1	0.1	0.1	3.1	0.3	4.2	0.0	0.0	0.0
Total Del/Veh (s)	41.4	36.8	17.8	10.8	5.4	4.3	21.5	3.2	0.3	7.9	7.7	3.8

1: Jonathan Carver Pkwy. & Ironwood Performance by movement

Movement	All
Denied Del/Veh (s)	0.4
Total Del/Veh (s)	8.9

2: Jonathan Carver Pkwy. & Spring Creek Dr Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	57.4	4.2	2.0	0.6	3.9	3.3	3.1

3: Jonathan Carver Pkwy. & South Ramp 212 Performance by movement

Movement	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.2	0.1
Total Del/Veh (s)	4.2	0.4	3.6	1.6	1.9

4: Jonathan Carver Pkwy. & North Ramp 212 Performance by movement

Movement	NBT	All
Denied Del/Veh (s)	0.0	0.0
Total Del/Veh (s)	0.0	0.0

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	18.7

Intersection: 1: Jonathan Carver Pkwy. & Ironwood

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	L	T	R
Maximum Queue (ft)	130	70	26	59	51	91	51	204	74
Average Queue (ft)	72	30	1	17	18	28	11	75	15
95th Queue (ft)	118	61	9	39	44	77	37	148	47
Link Distance (ft)		1296	388	388		1466		1208	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	190				257		180		180
Storage Blk Time (%)								0	
Queuing Penalty (veh)								1	

Intersection: 2: Jonathan Carver Pkwy. & Spring Creek Dr

Movement	WB	WB	NB	SB	B17	B17
Directions Served	L	R	TR	LT	T	
Maximum Queue (ft)	31	53	53	129	18	22
Average Queue (ft)	9	11	2	20	1	1
95th Queue (ft)	31	34	18	68	6	7
Link Distance (ft)	337	337	1208	621	634	634
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 3: Jonathan Carver Pkwy. & South Ramp 212

Movement	EB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	51	52	31
Average Queue (ft)	22	6	2
95th Queue (ft)	40	29	15
Link Distance (ft)	594		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Jonathan Carver Pkwy. & North Ramp 212

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd.

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 1

1: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd. Performance by movement

Movement	EBR	WBL	NBL	NBT	NBR	SBT	All
Denied Del/Veh (s)	4.1	4.0	0.0	0.0	0.0	0.2	1.1
Total Del/Veh (s)	2.8	22.9	5.1	2.4	0.7	2.8	6.4

2: Jonathan Carver Pkwy. & Spring Creek Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	35.2	26.2	7.2	52.8	35.2	21.7	36.3	52.7	29.6	21.2	29.2	6.4

2: Jonathan Carver Pkwy. & Spring Creek Dr Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	37.8

3: Jonathan Carver Pkwy. & North Ramp 212 Performance by movement

Movement	WBL	NBL	NBT	SBT	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.1
Total Del/Veh (s)	25.1	6.3	3.7	3.5	12.3

4: Jonathan Carver Pkwy. & South Ramp 212 Performance by movement

Movement	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	2.5	7.8	9.5	6.9	8.3

5: Jonathan Carver Pkwy. & Ironwood Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.2	2.4	0.5	3.0	0.0	0.0	0.0	0.3
Total Del/Veh (s)	36.6	24.1	4.6	41.7	21.9	13.1	14.1	2.3	21.9	13.5	8.9	15.8

7: Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	5.3	0.3	1.1	1.2	21.3	4.3	3.2

22: Jonathan Carver Pkwy. Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.4	9.7	3.8	2.3	7.7

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	68.1

Intersection: 1: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB
Directions Served	R	R	L	L	L	L	T	R	T
Maximum Queue (ft)	23	44	28	93	44	57	33	28	48
Average Queue (ft)	3	23	4	47	6	23	4	2	10
95th Queue (ft)	15	41	21	86	24	49	15	10	32
Link Distance (ft)							792		801
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	190	190	230	230	400	400		185	
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Jonathan Carver Pkwy. & Spring Creek Dr

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	358	22	87	46	64	399	963	996	400	25	200	274
Average Queue (ft)	143	3	40	15	22	190	367	509	72	3	121	154
95th Queue (ft)	271	16	73	38	47	338	876	936	317	14	177	231
Link Distance (ft)		559	559	312	312		1194	1194			742	742
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300					300			300	300		
Storage Blk Time (%)	4					2	1	31				
Queuing Penalty (veh)	0					10	4	8				

Intersection: 2: Jonathan Carver Pkwy. & Spring Creek Dr

Movement	SB
Directions Served	R
Maximum Queue (ft)	73
Average Queue (ft)	42
95th Queue (ft)	75
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Jonathan Carver Pkwy. & North Ramp 212

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	LT	L	T	T	T	T
Maximum Queue (ft)	150	193	28	52	40	67	61
Average Queue (ft)	87	81	11	21	1	16	17
95th Queue (ft)	131	145	30	51	13	42	40
Link Distance (ft)	813	813	365	365	217	217	217
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							0
Queuing Penalty (veh)							0

Intersection: 4: Jonathan Carver Pkwy. & South Ramp 212

Movement	EB	NB	NB	SB	SB
Directions Served	R	T	T	T	T
Maximum Queue (ft)	60	23	211	113	159
Average Queue (ft)	18	7	46	58	73
95th Queue (ft)	39	23	112	108	143
Link Distance (ft)	594	500	500	365	365
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)			0		
Queuing Penalty (veh)			2		

Intersection: 5: Jonathan Carver Pkwy. & Ironwood

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	TR	L	T	T	L	T	T	R
Maximum Queue (ft)	210	43	133	93	223	277	72	158	156	110
Average Queue (ft)	101	14	68	25	124	147	22	57	70	37
95th Queue (ft)	172	37	118	61	228	254	54	139	147	83
Link Distance (ft)		522	375		1456	1456		1194	1194	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	190			257			180			180
Storage Blk Time (%)	2					1				
Queuing Penalty (veh)	1					0				

Intersection: 7:

Movement	EB	SB	SB
Directions Served	LT	L	R
Maximum Queue (ft)	31	139	31
Average Queue (ft)	6	56	10
95th Queue (ft)	27	105	34
Link Distance (ft)	612	438	438
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Jonathan Carver Pkwy.

Movement	EB
Directions Served	R
Maximum Queue (ft)	64
Average Queue (ft)	31
95th Queue (ft)	51
Link Distance (ft)	480
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 25

1: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd. Performance by movement

Movement	EBR	WBL	NBL	NBT	NBR	SBT	All
Denied Del/Veh (s)	3.8	3.8	0.0	0.0	0.0	0.2	1.6
Total Del/Veh (s)	3.5	19.9	8.1	3.4	1.0	5.0	8.5

2: Jonathan Carver Pkwy & Spring Creek Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	25.8	7.4	28.8	37.6	35.7	7.3	26.7	13.1	4.5	15.1	21.6	8.0

2: Jonathan Carver Pkwy & Spring Creek Dr Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	19.7

3: Jonathan Carver Pkwy. & North Ramp 212 Performance by movement

Movement	WBL	NBL	NBT	SBT	All
Denied Del/Veh (s)	352.1	0.0	0.0	0.0	213.8
Total Del/Veh (s)	199.7	17.6	3.9	6.4	114.1

4: Jonathan Carver Pkwy. & South Ramp 212 Performance by movement

Movement	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.3	7.8	5.2	12.6	10.2

5: Jonathan Carver Pkwy & Ironwood Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.2	3.2	0.3	3.2	0.0	0.0	0.0
Total Del/Veh (s)	27.9	27.4	10.8	33.8	54.1	7.5	14.9	7.0	0.9	12.5	11.8	8.2

5: Jonathan Carver Pkwy & Ironwood Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	11.3

7: Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	2.5	0.2	0.0	0.0	0.2	0.1	0.1
Total Del/Veh (s)	6.4	0.3	1.1	1.1	50.0	6.1	4.6

22: Jonathan Carver Pkwy./Jonathan Carver Pkwy Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.3	3.9	7.0	4.8	5.6

Total Network Performance

Denied Del/Veh (s)	122.7
Total Del/Veh (s)	103.9

Intersection: 1: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB
Directions Served	R	R	L	L	L	L	T	R	T
Maximum Queue (ft)	25	71	50	136	44	58	34	28	65
Average Queue (ft)	6	33	14	73	11	22	7	3	22
95th Queue (ft)	23	55	41	114	34	48	27	12	53
Link Distance (ft)							792		801
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	190	190	230	230	400	400		185	
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Jonathan Carver Pkwy & Spring Creek Dr

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	244	23	397	64	20	168	141	328	10	47	247	264
Average Queue (ft)	92	1	202	20	7	96	33	109	1	16	160	176
95th Queue (ft)	167	8	328	51	21	142	92	210	6	39	254	270
Link Distance (ft)		931	931	311	311		1152	1152			626	626
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300					300			300	300		
Storage Blk Time (%)								0				
Queuing Penalty (veh)								0				

Intersection: 2: Jonathan Carver Pkwy & Spring Creek Dr

Movement	SB
Directions Served	R
Maximum Queue (ft)	150
Average Queue (ft)	81
95th Queue (ft)	128
Link Distance (ft)	626
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Jonathan Carver Pkwy. & North Ramp 212

Movement	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	T	T	T	T
Maximum Queue (ft)	851	876	865	65	52	43	86	88
Average Queue (ft)	812	819	744	15	24	3	40	46
95th Queue (ft)	915	906	1160	44	49	21	69	87
Link Distance (ft)	813	813	813	365	365	217	217	217
Upstream Blk Time (%)	59	89	77					
Queuing Penalty (veh)	0	0	0					
Storage Bay Dist (ft)								
Storage Blk Time (%)								1
Queuing Penalty (veh)								0

Intersection: 4: Jonathan Carver Pkwy. & South Ramp 212

Movement	EB	NB	NB	SB	SB
Directions Served	R	T	T	T	T
Maximum Queue (ft)	52	56	105	285	224
Average Queue (ft)	18	10	58	124	145
95th Queue (ft)	43	34	101	200	202
Link Distance (ft)	594	670	670	365	365
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Jonathan Carver Pkwy & Ironwood

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	L	T	T	R
Maximum Queue (ft)	178	114	26	66	52	114	118	73	174	216	88
Average Queue (ft)	86	32	3	22	23	45	67	31	82	95	33
95th Queue (ft)	141	69	16	47	49	93	118	56	171	177	71
Link Distance (ft)		647	376	376		1467	1467		1152	1152	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	190				257			180			180
Storage Blk Time (%)	0								0	1	
Queuing Penalty (veh)	0								0	3	

Intersection: 7:

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	31	136	31
Average Queue (ft)	5	75	11
95th Queue (ft)	25	133	35
Link Distance (ft)		315	315
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	300		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Jonathan Carver Pkwy./Jonathan Carver Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 3

2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	49.3	35.2	8.4	30.5	41.8	37.0	36.3	31.4	14.2	27.3	6.5	30.6

5: Jonathan Carver Pkwy & Ironwood Dr Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.1	2.3	0.6	2.2	0.0	0.0	0.0	0.4
Total Del/Veh (s)	72.3	27.6	7.4	42.8	33.1	21.0	23.2	3.7	39.3	20.9	10.4	27.2

Total Zone Performance

Denied Del/Veh (s)	0.6
Total Del/Veh (s)	645.9

Intersection: 2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	R	T	T	R
Maximum Queue (ft)	359	22	82	26	84	380	505	681	368	400	366	135
Average Queue (ft)	209	6	43	4	35	228	254	330	20	228	197	39
95th Queue (ft)	328	22	77	19	72	350	450	528	129	361	311	77
Link Distance (ft)		566	566	531	531		1196	1196		699	699	699
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300					200			200			
Storage Blk Time (%)	3					11	9	21		3		
Queuing Penalty (veh)	0					77	46	5		0		

Intersection: 5: Jonathan Carver Pkwy & Ironwood Dr

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	TR	L	T	T	L	T	T	R
Maximum Queue (ft)	355	279	176	436	499	504	96	280	291	133
Average Queue (ft)	229	47	80	74	273	277	27	127	134	37
95th Queue (ft)	333	152	144	248	488	474	65	273	264	84
Link Distance (ft)		788	388		1466	1466		1196	1196	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	190			257			180			180
Storage Blk Time (%)	27				10	11		4	5	
Queuing Penalty (veh)	19				8	0		1	10	

Zone Summary

Zone wide Queuing Penalty: 167

1: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd. Performance by movement

Movement	EBR	WBL	NBL	NBT	NBR	SBT	All
Denied Del/Veh (s)	4.0	3.8	0.0	0.0	0.0	0.2	1.6
Total Del/Veh (s)	3.6	20.0	8.2	3.4	1.5	5.6	8.5

2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Dr Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	24.5	8.7	22.7	36.5	40.1	8.0	25.8	14.4	4.2	17.7	19.1	8.5

2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Dr Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	17.9

3: Jonathan Carver Pkwy. & North Ramp 212 Performance by movement

Movement	WBL	NBL	NBT	SBT	All
Denied Del/Veh (s)	385.9	0.0	0.0	0.0	227.8
Total Del/Veh (s)	200.5	14.7	4.8	6.8	108.8

4: Jonathan Carver Pkwy. & South Ramp 212 Performance by movement

Movement	EBR	NBT	NBR	SBT	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.5	8.4	5.6	13.0	10.6

5: Jonathan Carver Pkwy & Ironwood Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	2.8	0.3	2.3	0.0	0.0	0.0
Total Del/Veh (s)	29.4	21.7	11.8	18.6	38.1	9.7	18.4	7.4	2.0	12.8	13.7	8.4

5: Jonathan Carver Pkwy & Ironwood Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	12.6

7: Monroe Dr Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	3.5	0.2	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	4.7	0.3	1.1	0.9	59.9	6.7	5.0

22: Jonathan Carver Pkwy./Jonathan Carver Pkwy Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.2	4.1	7.0	5.8	5.7

Total Network Performance

Denied Del/Veh (s)	130.4
Total Del/Veh (s)	99.9

Intersection: 1: Jonathan Carver Pkwy. & Levi Griffin Rd./Chaska Blvd.

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB
Directions Served	R	R	L	L	L	L	T	R	T
Maximum Queue (ft)	61	90	51	132	42	60	35	69	69
Average Queue (ft)	9	34	12	78	8	27	6	5	21
95th Queue (ft)	33	60	37	121	31	52	24	27	50
Link Distance (ft)							792		801
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	190	190	230	230	400	400		185	
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Dr

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	R	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	220	23	361	68	20	185	192	242	10	49	265	327
Average Queue (ft)	113	1	180	22	9	79	36	125	0	20	163	172
95th Queue (ft)	184	8	295	49	23	144	105	218	3	44	240	261
Link Distance (ft)		931	931	311	311		1152	1152			626	626
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300					300			300	300		
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Dr

Movement	SB
Directions Served	R
Maximum Queue (ft)	170
Average Queue (ft)	87
95th Queue (ft)	141
Link Distance (ft)	626
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Jonathan Carver Pkwy. & North Ramp 212

Movement	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	L	T	T	T	T
Maximum Queue (ft)	852	865	865	50	73	44	107	122
Average Queue (ft)	819	826	748	18	31	4	45	60
95th Queue (ft)	906	881	1168	42	57	24	90	102
Link Distance (ft)	813	813	813	365	365	217	217	217
Upstream Blk Time (%)	55	92	81					
Queuing Penalty (veh)	0	0	0					
Storage Bay Dist (ft)								
Storage Blk Time (%)								2
Queuing Penalty (veh)								0

Intersection: 4: Jonathan Carver Pkwy. & South Ramp 212

Movement	EB	NB	NB	SB	SB
Directions Served	R	T	T	T	T
Maximum Queue (ft)	73	44	129	216	262
Average Queue (ft)	26	11	62	128	169
95th Queue (ft)	65	34	109	189	240
Link Distance (ft)	594	670	670	365	365
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Jonathan Carver Pkwy & Ironwood

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	T	R
Maximum Queue (ft)	186	166	26	87	93	124	135	22	70	204	238	75
Average Queue (ft)	97	45	3	31	35	46	67	1	27	114	114	35
95th Queue (ft)	154	103	15	60	75	94	123	10	53	214	204	67
Link Distance (ft)		647	376	376		1467	1467			1152	1152	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	190				257			257	180			180
Storage Blk Time (%)	0									2	1	
Queuing Penalty (veh)	0									1	4	

Intersection: 7: Monroe Dr

Movement	EB	SB	SB
Directions Served	L	L	R
Maximum Queue (ft)	31	204	31
Average Queue (ft)	5	82	10
95th Queue (ft)	25	162	32
Link Distance (ft)		315	315
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	300		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Jonathan Carver Pkwy./Jonathan Carver Pkwy

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 5

2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	1.4	1.4	0.0	0.0	0.0	0.0
Total Del/Veh (s)	65.7	16.3	9.9	30.0	38.5	23.2	125.6	103.8	72.1	24.2	20.0	4.6

2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Drive Performance by movement

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	70.4

5: Jonathan Carver Pkwy & Ironwood Dr Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	551.0	582.4	214.4	0.2	0.0	0.3	358.2
Total Del/Veh (s)	27.3	15.2	5.4	43.2	36.3	127.1	185.4	118.1	26.4	14.2	8.7	103.4

Total Zone Performance

Denied Del/Veh (s)	475.7
Total Del/Veh (s)	1194.4

Intersection: 2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Drive

Movement	EB	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB
Directions Served	L	L	T	R	L	TR	L	T	T	R	L	T
Maximum Queue (ft)	374	449	546	41	31	74	480	1210	1197	480	21	309
Average Queue (ft)	169	202	23	14	3	42	389	1093	1113	101	3	203
95th Queue (ft)	349	386	187	38	16	69	616	1287	1269	419	14	305
Link Distance (ft)			567	567	531	531		1184	1184			710
Upstream Blk Time (%)								2	2			
Queuing Penalty (veh)								30	32			
Storage Bay Dist (ft)	300	300					300			300	300	
Storage Blk Time (%)	7	16					27	10	57			0
Queuing Penalty (veh)	1	1					279	53	15			0

Intersection: 2: Jonathan Carver Pkwy & Monroe Dr/Spring Creek Drive

Movement	SB	SB
Directions Served	T	R
Maximum Queue (ft)	331	52
Average Queue (ft)	180	29
95th Queue (ft)	300	49
Link Distance (ft)	710	710
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Jonathan Carver Pkwy & Ironwood Dr

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	TR	L	T	T	L	T	T	R
Maximum Queue (ft)	115	130	66	196	479	1525	1525	72	233	244	116
Average Queue (ft)	67	74	25	81	118	1478	1485	20	83	75	35
95th Queue (ft)	107	117	50	162	425	1683	1651	52	215	184	77
Link Distance (ft)			839	376		1462	1462		1184	1184	
Upstream Blk Time (%)						57	64				
Queuing Penalty (veh)						0	0				
Storage Bay Dist (ft)	190	190			300			300			300
Storage Blk Time (%)						54	65				
Queuing Penalty (veh)						44	1				

Zone Summary

Zone wide Queuing Penalty: 456

2: Jonathan Carver Pkwy. & Monroe Dr/Spring Creek Drive Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	52.7	411.0	48.6	192.9
Total Del/Veh (s)	21.5	14.6	33.5	40.2	40.3	15.6	39.4	20.6	91.3	97.1	28.2	55.3

5: Jonathan Carver Pkwy. & Ironwood Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.2	0.1	2.7	0.4	2.2	0.0	0.0	0.0
Total Del/Veh (s)	39.3	26.1	16.2	71.7	34.4	11.6	18.3	6.9	2.7	16.9	14.8	10.9

5: Jonathan Carver Pkwy. & Ironwood Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	13.8

Total Zone Performance

Denied Del/Veh (s)	502.2
Total Del/Veh (s)	511.3

Intersection: 2: Jonathan Carver Pkwy. & Monroe Dr/Spring Creek Drive

Movement	EB	EB	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	T	R	L	TR	L	T	T	L	T	T
Maximum Queue (ft)	82	130	21	357	32	75	193	381	402	200	824	825
Average Queue (ft)	36	76	2	216	10	19	117	140	212	25	783	788
95th Queue (ft)	67	122	11	308	33	54	185	295	372	107	839	842
Link Distance (ft)			567	567	251	251		1184	1184		772	772
Upstream Blk Time (%)											21	25
Queuing Penalty (veh)											200	240
Storage Bay Dist (ft)	300	300					200			100		
Storage Blk Time (%)							0	3	9		61	
Queuing Penalty (veh)							1	7	0		23	

Intersection: 2: Jonathan Carver Pkwy. & Monroe Dr/Spring Creek Drive

Movement	SB
Directions Served	R
Maximum Queue (ft)	820
Average Queue (ft)	721
95th Queue (ft)	920
Link Distance (ft)	772
Upstream Blk Time (%)	1
Queuing Penalty (veh)	10
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Jonathan Carver Pkwy. & Ironwood

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	TR	L	T	T	R	L	T	T
Maximum Queue (ft)	99	193	131	25	63	73	213	157	22	73	286	264
Average Queue (ft)	52	75	40	1	26	36	79	71	3	32	105	106
95th Queue (ft)	96	131	87	8	52	68	164	120	15	59	220	218
Link Distance (ft)			769	376	376		1462	1462			1184	1184
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	190	190				257			257	180		
Storage Blk Time (%)		0									2	2
Queuing Penalty (veh)		0									2	8

Intersection: 5: Jonathan Carver Pkwy. & Ironwood

Movement	SB
Directions Served	R
Maximum Queue (ft)	73
Average Queue (ft)	36
95th Queue (ft)	72
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	180
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 490