March 1, 2023

Staff Analysis of Proposed Amendment to the *Dane County Water Quality Plan*, Revising the Sewer Service Area Boundary and Environmental Corridors in the Central Urban Service Area (Middleton / Redtail Ridge)

History of Middleton Amendments to the Central Urban Service Area

The Central Urban Service Area (USA) was established in 1971 with the adoption of the first sewer service plan and originally included about 29,000 acres. The first Middleton amendment to the Central Urban Service Area occurred in 1987. There have been 117 amendments to this service area since its creation totaling roughly 12,400 acres of developable land and 4,800 acres of Environmental Corridor. Middleton has applied for 16 amendments totaling 900 developable acres and 500 acres of Environmental Corridor. The most recent amendment of the service area was recommended by the Commission and approved by the Wisconsin DNR (WDNR) in 2022.

Planning in Middleton

The *Middleton Comprehensive Plan* received a major rewrite in 2021. The Plan shows the requested amendment area as "Planned Neighborhood" developing prior to 2035. The City is facilitating significant growth within designated centers and corridors along Airport Road, Century Avenue, Parmenter Street, and University Avenue, which is a key recommended growth strategy identified in the *Regional Development Framework* (RDF). The City's residential development continues to shift toward multi-family, helping to increase overall density, which is another RDF objective. The Village's comprehensive plan is generally consistent with the RDF with respect to meeting housing demand with a range of housing types, promoting affordable housing, providing transportation choices that increase access to opportunities, planning areas for quality business growth, and preserving protected natural resources.

Existing Conditions

Land Use

The City of Middleton is requesting amendment to the Central USA. The requested amendment area is in the northwestern corner of the Central USA and partially contiguous along two sides to the existing USA. The area is mostly surrounded by the Town of Springfield and has recently been annexed into the City. It is bounded by High Road to the west and Pheasant Branch Road (and the Pheasant Branch Conservancy) to the east. Land north and south of the amendment area is currently in agricultural uses. Planned land use for those areas continues the patterns of residential and commercial use established in the proposed amendment area. The amendment area is approximately128 acres, 36 of which will be placed in Environmental Corridor.

Land use in the requested amendment area is predominantly agricultural. The development plan for the area is primarily single-family detached, small single-family units with shared common space, and multi-family residential mixed with commercial space.

Surrounding Planned Land Uses Include:

- North: Mixed Commercial and Residential
- West: Residential
- South: Conservancy, Mixed Commercial and Residential
- East: Conservancy

Table 1
Existing and Planned Land Use

Land Use Category	Existing Land Use Acres (see Map 3)	Proposed Land Use Acres (see Map 4)
Agriculture	123.2	
Mixed Commercial/Residential		1.2
Open Land	1.6	36.4
Low-Density Residential	2.0	44.8
Medium-Density Residential		16.7
Transportation	1.1	28.8
Total	**127.9**	**127.9**

Cultural and Historic Sites

The Wisconsin Historical Society (WHS) has been contacted regarding the presence of any known archaeological sites or cemeteries within the amendment area. According to the State Archeologist, no known sites or cemeteries are indicated in WHS records. Under Wisconsin law, Native American burial mounds, unmarked burials, and all marked and unmarked cemeteries are protected from intentional disturbance. If anyone suspects that a Native American burial mound or an unmarked or marked burial is present in an area, the Wisconsin Historical Society should be notified. If human bone is unearthed during any phase of a project, *all work must cease*, and the local authorities must be contacted.

Natural Resources

The proposed amendment area is in the Pheasant Branch watershed (HUC 12: 070900020603; see Map 5). There are delineated wetlands but no mapped floodplains within the amendment area.

Wastewater from the amendment area will be treated at the Madison Metropolitan Sewerage District (MMSD) Wastewater Treatment Facility. The treated effluent is discharged to Badfish Creek and Badger Mill Creek, bypassing the Yahara chain of lakes.

Wetlands

DNR's Wisconsin Wetland Inventory (WWI) does not show any wetlands within the amendment area. A wetland delineation (link to report) was conducted within the amendment area by Heartland Ecological Group, Inc., a DNR-qualified assured delineator, in April 2022. The site investigation and field delineation determined that there was one wetland totaling 3.9 acres (see Map 11). Wetland 1 (W-1) is described as a farmed wet meadow in the southern portion of the amendment area. There is a potential connection to Pheasant Branch via nearby WWI-mapped wetland areas. The dominant vegetation observed in this wetland was fall panic grass (*Panicum dichotomiflorum*), white clover (*Trifolium pratense*), and cursed buttercup (*Ranunculus sceleratus*). This wetland with a minimum 75' vegetated buffer is required to be designated as Environmental Corridor per the adopted policies and criteria for environmental corridors (link to document).

In addition to the delineated wetlands within the amendment area, there are also other wetlands near the amendment area. According to the WWI, the wetland area directly to the south is classified as palustrine persistent emergent broad-leaved deciduous forest that are

partly drained/ditched and seasonally saturated. The wetland complex to the southeast is associated with Pheasant Branch Creek and classified as palustrine persistent emergent wet meadow and broad-leaved deciduous scrub-shrub that is continuously to seasonally saturated.

Pheasant Branch Creek

Pheasant Branch Creek (WBIC 805900 / WATERSID 11696) is 9.1 miles long and flows through the northwestern portion of the City of Middleton, ultimately draining east into Lake Mendota. The 22.7 square mile watershed encompasses predominantly agricultural lands until its confluence with the South Fork at the western edge of the City of Middleton and Highway 12. The existing biological use of the first mile of Pheasant Branch between Lake Mendota and the Pheasant Branch Marsh is designated a warmwater sport fishery. Above the confluence with the channel coming in from the west, the Marsh is designated as a coldwater fishery. Pheasant Branch is included on the 2022 state 303d list of impaired waters for chronic toxicity due to chloride, degraded habitat due to sediment, and low dissolved oxygen due to phosphorus. It is also included in the Rock River Basin Total Maximum Daily Load (TMDL) project for sediment and phosphorus. Pheasant Branch Creek has cool-cold and cool-warm headwater natural communities.

There has been a Rock River Coalition / Yahara WINs monitoring location on Pheasant Branch Creek at the County Highway M east bridge (Station ID 133313) since 2015. Field measurements from 2022 indicated dissolved oxygen levels of 3.5 to 8.33 mg/L, and transparency of 29 to 120 cm. Laboratory analysis of samples from 2022 showed ammonia (NH3) levels from no detect to 0.27 mg/L, total phosphorus (P) from no detect to 0.19 mg/L, and total suspended solids (TSS) from no detect to 6.6 mg/L. The active USGS baseflow monitoring station (USGS 05427948) in this watershed indicated chloride levels ranging from 99.9 to 116 mg/L in 2018.

Springs

Springs represent groundwater discharge visible to the casual observer. The Wisconsin Geological and Natural History Survey (WGNHS) maintains an inventory of springs in Dane County, and throughout the state. There are no known springs in the proposed amendment area. From 2014 and 2017, the WGNHS surveyed springs statewide that were expected to have flow rates at least 0.25 cubic feet per second (cfs). The Lake Mendota-Yahara River Watershed contains one inventoried spring located within Pheasant Branch Conservancy—Dane County Spring #7 (see Map 5). This spring is well known locally as Frederick Springs and has been studied by the USGS (link to report). It was surveyed in 2014 with a discharge rate of 2.72 cfs, specific conductance of 881 µS/cm, temperature of 50° F, and a pH of 5.81.

Groundwater

Groundwater modeling, using the 2016 Groundwater Flow Model for Dane County developed by the WGNHS (link to website), shows that baseflow in Pheasant Branch Creek at Century Avenue (see location on Map 5) has decreased from 12.3 cfs during pre-development conditions (no well pumping) to 7.2 cfs in 2010 (refer to Table 4). This decrease is primarily due to the combined impacts of high-capacity well groundwater withdrawals contributing to reduced stream baseflow.

In 2012, the WGNHS published a report, *Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model,* (link to report) estimating the existing groundwater recharge rates in Dane County based on the soil water balance method. The study estimates that the existing groundwater recharge rate in the proposed amendment area ranges from 9 to 10 inches per year.

Endangered Resources

The WDNR Bureau of Endangered Resources maintains a database representing the known occurrences of rare plants, animals, and natural communities that have been recorded in the Wisconsin Natural Heritage Inventory (link to website). A screening review of this database conducted by Regional Planning Commission staff for species designated as endangered, threatened, or of special concern identified several special concern species, including one

mammal, one fish, one amphibian, two reptile, one insect, and one plant species; one threatened mammal species; one endangered insect and one endangered plant species; and five natural communities within a 1 to 2-mile radius of the amendment area. A 1-mile buffer was considered for terrestrial and wetland species and a 2-mile buffer for aquatic species. Therefore, it is recommended that a formal Endangered Resources Review for potential impacts to endangered resources be conducted by WDNR staff or one of their certified reviewers and habitat protection measures be implemented if species are found.

The amendment area is within the High Potential Zone (species likely present) for the federally endangered Rusty Patched Bumble Bee (link to web map). Section 7 of the Endangered Species Act requires consultation with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service when any action that is carried out, funded, or permitted by a federal agency may affect a federally listed endangered or threatened species. The WDNR typically recommends that projects within the High Potential Zone include native trees, shrubs, and flowering plants; plants that bloom spring through fall; and the removal and control of invasive species in any habitat used for foraging, nesting, and overwintering. The USFWS developed a list of plants favored by Rusty Patched Bumble Bee (link to list). Implementing these conservation measures should be coordinated with the WDNR Endangered Resources Review Program, as needed.

Soils and Geology

The amendment area is located within the Waunakee Moraines and West Johnstown-Milton Moraines Land Type Associations of Wisconsin. The Waunakee Moraines Association classifies the surficial geology of this area as rolling till plain and irregular drumlins with scattered bedrock knolls, lake plains, and outwash plains. The West Johnstown-Milton Moraines Association classifies the surficial geology of this area as rolling hummocky moraine and outwash plain complex with scattered bedrock knolls.

Surface elevations within the amendment area range from around 867 feet to 951 feet. There are several small, isolated areas of steep (> 12%) and very steep (>20%) slopes. These areas are associated with small hills in the southern and eastern portions of the amendment area (see Map 6). These small areas of steep slopes are not riparian and do not require inclusion in Environmental Corridor.

According to the Natural Resource Conservation Service (NRCS) Soil Survey of Dane County, the soils in the amendment area are in the Batavia – Houghton - Dresden association. These soils are well drained and poorly drained, deep and moderately deep silt loams and mucks that are underlain by silt, sand, and gravel. Table 2 shows detailed classification for soils in the amendment area (see Map 7), and Table 3 shows important soil characteristics for the amendment area.

There is one hydric soil within the amendment area—the Orion soil (the Os map units) which makes up 0.4% of the area (see Map 7). Hydric soils are good indicators of existing and former (drained) wetlands.

According to the Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service (link to web soil survey), the Batavia and Troxel soils (the BbB, BbA and TrB map units) are not hydric, but they do have a seasonal (April to June) zone of water saturation within 5 feet of the ground surface. These soils are all classified as moderately well drained or well drained, and therefore, do not pose a limitation for buildings with basements.

Table 2
Soils Classification

Soil	% of Area	General Characteristics
Dresden Silt Loam; DsC2	17.7	Well drained, gently sloping to steep slopes on benches in stream valleys. Soils have medium fertility, low permeability, and a moderate to severe hazard of erosion. Poses slight to moderate limitations for development due to slope.
Plano Silt Loam; PoB	17.1	Deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses slight to moderate limitations for development due to low bearing capacity.
Kegonsa Silt Loam; KeB	15.8	Well drained, nearly level and gently sloping, moderately deep soils on benches on outwash plains. Soils have medium fertility, moderate to rapid permeability, and moderate hazard of erosion. Poses no limitations for development.
Batavia Silt Loam, BbB	15.4	Deep, well drained, nearly level to sloping soils on high benches. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate limitations for development due to shrink/swell potential.
Boyer Sandy Loam; BoC2	7.7	Well drained, gently sloping to moderately steep soils on benches in valleys. Soils have low fertility, moderately rapid to rapid permeability, and a severe hazard of erosion. Poses moderate limitations for development due to slope.
Dresden Silt Loam; DrD2	5.6	Well drained, gently sloping to steep soils on benches in stream valleys. Soils have medium fertility, moderate permeability, and a very severe hazard of erosion. Poses severe limitations for development due to slope.
Wacousta Silty Clay Loam; Wa	5.0	Deep, poorly drained, nearly level soils on low benches in old lake basins. Soils have low fertility, moderately slow permeability, and no hazard of erosion. Poses severe limitations for development due to ponding and depth to saturated zone.
Boyer Sandy Loam; BoD2	4.8	Well drained, gently sloping to moderately steep soils on benches in valleys. Soils have low fertility, moderately rapid to rapid permeability, and a severe hazard of erosion. Poses severe limitations for development due to slope.
Batavia Silt Loam, BbA	4.6	Deep, well drained, nearly level to sloping soils on high benches. Soils have high fertility, moderate permeability, and no hazard of erosion. Poses moderate limitations for development due to shrink/swell potential.
Troxel Silt Loam, TrB	4.0	Deep, well-drained and moderately well drained, gently sloping soils in draws, on fans, and in drainageways. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses severe limitations for development due to low bearing capacity.
Gravel Pit; GP	1.6	Poorly graded gravels and sandy gravel mixtures with little or no fines.

Source: Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service

Table 3
Soils Characteristics

Characteristic	Soil Map Symbols (see Map 7)	% of Area
Prime Agricultural Soils	PoB, KeB, BbB, BbA, TrB	57.0
Hydric Soils (Indicates Potential / Restorable Wetlands)	Wa, Os	5.2
Poorly Drained Soils with Seasonal High Water Table (< 5')	Os, RaA, Wa	5.3
Soils Associated with Steep Slopes (> 12%)	DrD2, BoD2	10.4
Soils Associated with Shallow Bedrock (< 5')	None	0
Best Potential for Infiltration in Subsoils	DsC2, PoB, KeB, BbB, BoC2, DrD2, BoD2, BbA	88.6

Source: Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service

According to WGNHS data, bedrock within most of the amendment area is in the Tunnel City Group. Bedrock in the Tunnel City Group is medium to very fine-grained quartz sandstone, locally very glauconitic, and consists of two formations including the Lone Rock and Mazomanie Formations. Thickness is up to 150 feet. Small areas in northwestern corners of the amendment area are in the Trempealeau Group. Bedrock in the Trempealeau Group is quartz sandstone, dolomitic siltstone, silty dolomite, and sandy dolomite, consists of two formations including the Jordan and underlying St. Lawrence Formations, which were combined as one mapping unit. Thickness is about 75 feet, where not eroded. According to WGNHS data, the depth to bedrock in the amendment area ranges from 0 feet to 78 feet, with the shallowest depths (0 to 10 feet) being in the northwestern portion and deepest depths (50 to 78 feet) being in the southeastern portion of the amendment area (see Map 8).

As is common throughout much of the upper Midwest, karst features such as enlarged bedrock fractures are prevalent in the local dolomite uplands. Karst features such as vertical fractures and conduits provide primary pathways for groundwater movement and can dramatically increase groundwater susceptibility when present. The location of karst features is difficult to predict, and the thickness and type of the overlying soil greatly affects how much water drains into them. Where clay soils are thick, infiltration rates are likely to be very low. However, where bedrock fractures are near the surface infiltration rates can be very high. Based on the WGNHS karst potential data, karst features are unlikely to be encountered in the amendment area. Stormwater management practices are not proposed in areas of shallow karst potential. Nonetheless, the WDNR Conservation Practice Standard 1002 - Site Evaluation for Stormwater Infiltration requires field verification for areas of the development site considered suitable for infiltration. This includes a site assessment for karst features in the area. If shallow karst features are found, adequate protection measures are required to address any potential for groundwater contamination.

Dane County ordinance requires infiltration practices receiving runoff from all source areas containing impervious surfaces to be located so that the separation distance between the bottom of the infiltration system and the elevation of seasonal high groundwater, or the top of bedrock, is at least 5 feet, along with certain soil filtering characteristics, except that there is no minimum separation distance for roofs draining to surface infiltration practices. Soil test pits are required as part of the stormwater management plan to assure that infiltration practices are sited in locations that will not adversely affect groundwater quality.

Proposed Urban Services

Parks and Open Space

There are two neighborhood parks, recreational open spaces, and trail connections proposed as part of the amendment area, totaling 27.2 acres. There are three large, regional stormwater management areas, totaling 5 acres, proposed in the amendment area (see Map 4).

Wastewater

Sanitary sewer service will be provided to the amendment area by connection to the City's sanitary sewer collection system. The majority of proposed lots will be served by individual sewer laterals and gravity sanitary sewer main. A pumping station and force main is being proposed due to grade restrictions and would serve approximately 90 parcels in the southeast corner of the amendment area. The proposed sanitary sewer will connect to an existing 12-inch sewer located at the intersection of High Road and Belle Fontaine Boulevard. This sewer runs west along Belle Fontaine Boulevard and connects to the City-owned Pheasant Branch Interceptor (PBI). From there, wastewater will flow via the Madison Metropolitan Sewerage District's (MMSD's) West Interceptor sewer to Pumping Station 15, then eventually to the MMSD Nine Springs Wastewater Treatment Facility (WWTF). In 2022, the City conducted a formal assessment of anticipated impacts the proposed Redtail Ridge development will have on the existing water distribution and sewer collection systems. The results of the assessment are documented in the report titled *Redtail Ridge Development—Impacts to the Water and Sewer Utility Systems*, prepared by Strand Associates, Inc., dated January 18, 2023 (hereinafter, *2023 Impacts Report*). The report is a reassessment of the *Utility Master Plan Update for the City of Middleton*, prepared by Strand Associates, dated October 2019 (hereinafter, *2019 Master Utility Plan*).

The proposed development within the amendment area consists of approximately 61.5 acres of residential lots (detached, attached, and multi-family totaling 867 housing units) and 1.2 acres of commercial/mixed-use contributing to wastewater flows. Based on the 2023 *Impacts Report*, the City estimates that the amendment area will generate an annual average of 216,000 gallons per day (gpd) of wastewater, or approximately 150 gallons per minute (gpm). This assumes 3.0 persons per single-family dwelling unit, 2.5 persons per duplex, 2.1 persons per multi-family dwelling unit, and an average wastewater generation rate of 100 gallons per capita per day (gpcd) for residential land uses, and an average generation rate of 550 gpd/ac for commercial/mixed-use land uses. Given the relatively small amount of commercial/mixed-use land uses, the City estimated peak loading using a peaking factor of 4 for all areas (typically associated with residential areas). Based on this peaking factor, it is estimated that the amendment area will generate a daily peak flow of 605 gpm. This estimate is consistent with typical design wastewater generation rates for the proposed land uses.

The proposed sewer main sizes within the amendment area have not been determined at this time. However, it can be assumed that local branch sewer mains within the amendment area will be 8-inch-diameter, providing a capacity of 332 gpm based on a design slope of 0.40% (minimum allowable per NR 110) and Manning's value (n) of 0.013. Local interceptors will need to be sized larger to handle the full wastewater flows of the proposed development. Additionally, according to the *2023 Impacts Report*, possible future development to the north (currently outside of the urban service area) could be served by the proposed infrastructure within the current proposed amendment area and will need to be accounted for in the design of the wastewater collection system. Lastly, there is consideration for directing some of the flow from the amendment area to existing sewer along Pheasant Branch Road in order to divert some of the flows away from the existing sewer on Belle Fontaine Boulevard.

The limiting section of the PBI is reported to have a capacity of 4,219 gpm and receives current flows of 1,100 gpm, which includes forecasted flows from the recent Belle Farms development proposal (link to 2103 Middleton USAA Staff Report). It is anticipated to easily serve the proposed development. However, the receiving 12-inch sewer along Belle Fontaine Blvd has an available capacity of approximately 605 gpm (714 gpm design capacity minus 109 gpm existing flows), equal to the anticipated flow from the proposed development area. The City's application

acknowledges the proposed amendment would put the receiving sewer at pipe-full capacity at full build-out, and that it may need to be upsized in the future. If the southeast portion of the amendment area is directed to existing sewer on Pheasant Branch Road, it is estimated this would divert approximately 67 gpm away from this limiting section of sewer on Belle Fontaine Boulevard. Consideration for the available capacity of the existing sewer will be needed with the final design, however it appears the City's sewer collection system can accommodate the anticipated peak flows from the amendment area.

Wastewater Treatment Facility

Madison Metropolitan Sanitary District (MMSD) will provide wastewater treatment for the amendment area. The Nine Springs Wastewater Treatment Facility (WWTF) is located on Moorland Road, Madison, and discharges treated effluent to Badfish Creek within the Badfish Creek Watershed (Lower Rock River Basin) and Badger Mill Creek within the Upper Sugar River Watershed (Sugar-Pecatonica Basin). The rated monthly design flow capacity of the facility is 56.0 million gallons per day (MGD) and the maximum daily design flow capacity is 68.6 MGD. In the year 2021, the facility received an average monthly influent hydraulic loading of 36.4 MGD (65% of the 56.0 MGD design capacity), including infiltration and inflow, according to the 2021 Compliance Maintenance Annual Report (CMAR) (link to 2021 CMAR). It is expected to reach 90% of current hydraulic design capacity around 2026 based on current projected growth rate assumptions. This already occurs on occasion, although average flows did not exceed 90% design capacity for any month in 2021. MMSD has completed a long-range plan that evaluates various options for expanded treatment capacity to serve its current and future service area. For the 20-year planning period, treatment for this area is expected to remain at the existing wastewater treatment facility location with expanded capacity of the system as the need is foreseen.

MMSD did not have issues meeting its WPDES permit limits for the quality of effluent discharged to Badfish Creek and Badger Mill Creek, according to their 2021 CMAR. Permit limits are specific to each outfall; however, effluent sampling is performed upstream of the flow split to each outfall. Effluent quality summarized here refers to Badfish Creek, where approximately 95% of discharge is released. Below is a summary of the major effluents reported on in the 2021 CMAR for the Badfish Creek outfall:

- The biological oxygen demand (BOD) effluent quality for 2021 was well below the monthly average limit, with a monthly average of 2.9 mg/L (15% of the limit) and a maximum concentration of 4 mg/L (21% of the limit) for the month of February and November.
- The total suspended solids (TSS) effluent quality for 2021 was below the monthly average limit, with a monthly average of 4.9 mg/L (25% of the limit) and a maximum concentration of 7 mg/L (35% of the limit) for the month of November.
- The ammonia (NH3) effluent quality for 2021 was below the monthly average limits (limits vary by month), with a monthly average of 0.370 mg/L (2-30% of the limit) and a maximum concentration of 0.774 mg/L (19% of the limit) for the month of March.
- The phosphorus (P) effluent quality for 2021 was below the monthly average limit, with a monthly average of 0.33 mg/L (21-55% of the limit) and a maximum concentration of 0.55 mg/L (55% of the limit) for the month of August.

Badfish Creek is a tributary to the Rock River, and thus the WPDES permit for MMSD includes phosphorus and TSS limits for effluent to Badfish Creek to comply with the Total Maximum Daily Load (TMDL) developed for the Rock River Basin to protect and improve water quality. In addition to the TMDL limits, future water quality-based effluent limits (WQBEL) have been considered in the WPDES permit. The interim limit for phosphorus discharged to Badfish Creek is a 1.0 mg/L monthly average required beginning May 2020 (previous limit was 1.5 mg/L), with a final WQBEL of 0.225 mg/L. Additionally, an interim limit of 0.6 mg/L, expressed as a six-month average (May through October and November through April) is required beginning May 2020, with a final WQBEL of 0.075 mg/L. To meet the WQBEL for phosphorous, MMSD has implemented a Watershed Adaptive Management (WAM) approach, leading a diverse group

of partners called Yahara Watershed Improvement Network (Yahara WINs) in implementing phosphorus reducing practices in the Yahara Watershed (link to Yahara WINs website).

The Nine Springs WWTF does not remove chloride from influent. A 2015 study completed by AECOM determined that while possible, treatment would be cost-prohibitive, energy intensive, and involve other environmental impacts (link to report). MMSD has been granted a variance from the chronic water quality standard for chloride of 395 mg/L required by NR 105. With this variance, the WPDES permit sets interim (variance) monthly limits above the chronic water quality standard and requires MMSD to implement chloride source reduction measures. One such source reduction initiative which MMSD participates in is the Wisconsin Salt Wise Partnership (link to Salt Wise website).

Water System

Water will be provided to the amendment area by connection to the City's municipal water system. Middleton Municipal Water Utility provides municipal water through a public water distribution system which includes approximately 493,657 lineal feet of water main, 11 booster pumps, and six active high-capacity groundwater wells within the City. Three of the wells pump directly into the distribution system and three pump into reservoirs. The active wells are at depths ranging from approximately 330 to 856 feet with an average capacity of 350 to 1,550 gallons per minute (gpm). In total, the gross capacity of the municipal wells is 6,975 gpm (10.04 million gallons per day, MGD). The firm capacity (with the largest well assumed to be out of service) is approximately 5,425 gpm (7.81 MGD), although the City also maintains backup equipment on standby in the event of failure. The City has two ground-level reservoirs and two elevated tanks, with a combined storage capacity of 2.35 million gallons.

According to the 2021 Annual Report to the Public Service Commission of Wisconsin (link to 2021 Annual Report), the City pumped an average of 1,437 gpm or 2,069,422 gpd (2.07 MGD) in 2020, approximately 27% of its firm pumping capacity. The City sells a portion of the total water pumped to customers outside of the distribution system—this accounted for 1,091,000 gallons, or an average of 2,989 gpd in 2021. In 2021, the maximum amount pumped in any one day was 3.90 MGD. The City estimates the 2021 average daily water demand within the system is 1,640 gpm or 2.36 MGD, with an estimated peak hourly demand of 4,560 gpm, based on historical information and as reported in the *2023 Impacts Report*.

Water losses in the City's distribution system was an average of 80,827 gpd (0.08 MGD) in 2021, which accounted for 4% of the net water supplied in 2021. Approximately 59% of this was due to unreported and background leakage, with the remaining due to reported leaks. In 2021, there were 7 main breaks and 4 service break which were repaired. Water losses in the City's distribution system was 4% in 2020 and 4% in 2019. The Wisconsin Administrative Code PSC 185.85(4)(b) requires a utility with more than 1,000 customers to submit a water loss control plan to the Public Service Commission (PSC) if the utility reports its percentage of water losses exceeds 15%.

Water supply within the amendment area will be provided by connection to an existing 10-inch water main located at the intersection of High Road and Belle Fontaine Boulevard. The *2023 Impacts Report* also recommends providing a secondary water source by connecting to existing water main on Pheasant Branch Road. As described in the report, the second connection would create a looped system and increase redundancy, whereas a single connection would put the development (containing as many as 2,000 residents) reliant on a single water source. Additionally, the looped connection would improve the available fire flow capacity from approximately 1,274 gpm to 1,813 gpm. Based on the applicant's presentation to the Commission at the February 9, 2023, CARPC meeting, the secondary water main connection will be installed during construction of the plat. Water main will be extended throughout the development and individual service connections will be provided to each proposed lot (see Map 9a).

The annual average daily water demand for the amendment area is anticipated to be 216,000 gallons per day (gpd) or approximately 150 gpm. This assumes 3.0 persons per single-family

dwelling unit, 2.5 persons per duplex, 2.1 persons per multi-family dwelling unit, and an average total water demand of 100 gallons per capita per day (gpcd) for residential land uses, and an average demand of 550 gpd/ac for commercial/mixed-use land uses. The estimated peak daily demand is 431,000 gpd or 300 gpm (0.43 MGD), based on a peak daily factor of 2.0. The estimated peak hourly demand is 417 gpm, based on the City's peak hourly demand factor (ratio of maximum hour to average hour) of 2.78. This peak hourly demand factor is based on the *2019 Utility Master Plan* and is derived from the maximum hourly water usage data from the maximum daily demand in 2018. The estimated average daily water demand and peak hourly demand represent an increase of approximately 11% and 10%, respectively, of the current demands on the system; however, the water distribution system appears to have sufficient capacity to handle the additional demand from the proposed amendment area. Furthermore, based on the analysis reported on in the *2022 Impacts Report*, the application reports that available pressure and fire flow will meet the Middleton Fire District goal of 1,000 gpm at a residual pressure of 20 psi and a static pressure of 40 psi, as well as the WDNR's minimum pressure and fire flow requirements.

Stormwater Management System

The City of Middleton stormwater management and performance standards are contained within Chapter 26 of the City of Middleton Code of Ordinances. Dane County stormwater management and performance standards are contained in Dane County Code of Ordinances, Chapter 14. WDNR stormwater regulations are contained in Administrative Code Chapters NR 151 and NR 216. Additionally, the City of Middleton has a Stormwater Utility Board and a Water Resources Management Commission to oversee stormwater management activities within the City and provide recommendations for specific development proposals. Development within the amendment area will be required to follow the more protective standards contained within the respective ordinances.

The proposed amendment area (approximately 126 acres) represents 5.0% of the 2,519-acre Pheasant Branch subwatershed (HUC 12) and 0.9% of the 13,363-acre Lake Mendota-Yahara River watershed (HUC 10). There is a ridge which runs northeast-southwest through the amendment area, resulting in runoff leaving the site in three general directions, including to the north/northwest, to the west toward High Road, and to the south/southeast toward Pheasant Branch Road. Additionally, there is approximately 76 acres (acreage based on the applicant's presentation) of offsite area which runs onto and through the western half of the amendment area. Ultimately, all site runoff makes its way to Pheasant Branch Creek and then to Lake Mendota. Along the way, runoff enters the Town of Springfield and is collected either within a mapped intermittent stream to the east or within a mapped intermittent stream to the south. The stream to the south is within the Town of Middleton. The two intermittent streams re-enter the City of Middleton and combine to form a perennial stream within Pheasant Branch Conservancy. The perennial stream flows south through a large wetland complex and ultimately connects with Pheasant Branch Creek approximately 2,900 feet to the southeast of the amendment area, as depicted in Figure 1. Pheasant Branch Creek discharges to Lake Mendota within the City of Middleton.

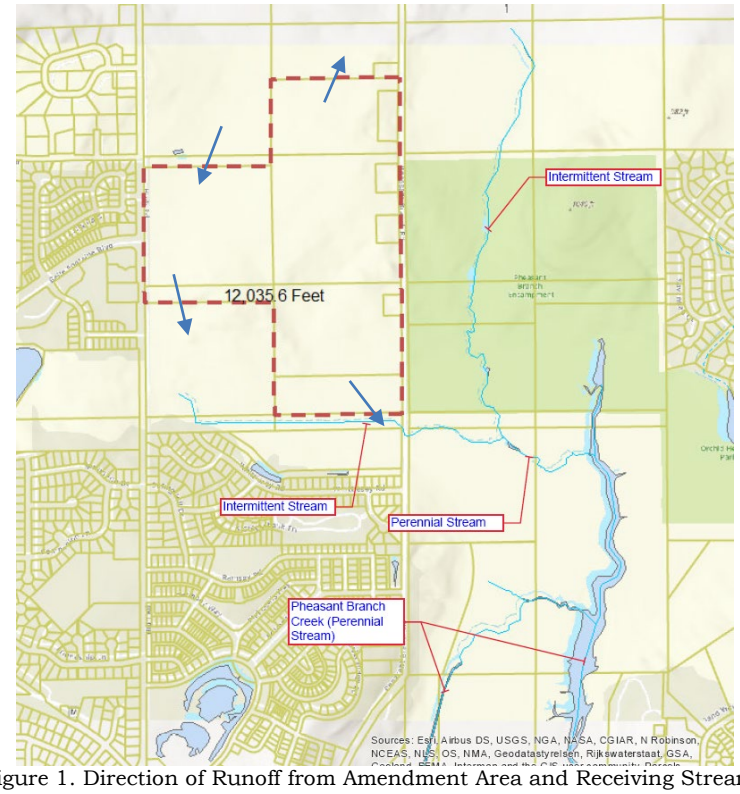


Figure 1. Direction of Runoff from Amendment Area and Receiving Streams

The entire amendment area is within a thermally sensitive watershed. Appropriate thermal control practices will need to be implemented and are included as part of the stormwater management plan. There are wetlands contained within the amendment area along the south/southeastern edge. Pretreatment of stormwater runoff (for Total Suspended Solids, TSS, and Peak Rate Control) will be required prior to entering the wetlands in accordance with NR 151 regulations, which will be provided by the proposed stormwater management facilities.

The proposed development will meet all current stormwater management regulations and exceed current regulations for infiltration. This includes performance standards for water quality (TSS, thermal control, oil/grease control), peak attenuation (peak rate control), and infiltration/stay-on (volume control). Dane County ordinances require infiltrating (or otherwise keeping from running off) a minimum 90% of the pre-development infiltration volume in the post-development conditions, for the average annual rainfall (defined as the 1981 rainfall record for Madison, WI). Additionally, the Middleton Water Resources Management Commission (WRMC) passed a motion at their March 16, 2022, meeting recommending that the site be designed to achieve 100% infiltration and that infiltration practices be distributed throughout the site. The conceptual stormwater management plan provided with the application, titled *Redtail Ridge – Preliminary Stormwater Management Report*, prepared by SmithGroup and dated September 2022, demonstrates how the full amendment area will meet these requirements.

In the proposed conditions, the amendment area will generally match existing flow paths and continue to drain to the intermittent streams which drain to Pheasant Branch Creek. To meet all stormwater management requirements, the conceptual stormwater management plan for the eastern two-thirds of the amendment area consisting of low- to medium-density land uses will include a range of decentralized green infrastructure treatment practices as well as three pairs of regionalized wet detention and infiltration basins corresponding to the three general discharge locations (see Map 9b). Additionally, disturbed soils will be deep-tilled at the end of mass grading to reduce construction-related compaction and restore the natural soil structure, and disconnection of impervious surfaces (e.g., direct downspouts to vegetated areas) will be implemented to the extent feasible. The proposed mixed-use and high-density land uses along the western edge of the amendment area have been accounted for in the conceptual stormwater

planning and modeling, however specific management practices will be designed and implemented on a site-level basis. The decentralized green infrastructure practices are anticipated to include bioretention/infiltration basins, bioswales, rain gardens, soil conditioning (e.g., deep-tilling), and native plantings. These types of practices are particularly beneficial for capturing rainwater from smaller storm events at the source and providing water quality treatment and infiltration (groundwater recharge), while also addressing climate and conservation goals established in the Regional Development Framework. Runoff will generally flow through a combination of storm sewer pipe and overland through these decentralized practices, forming a treatment train on its way to the regional basins where additional water quality treatment, infiltration, and peak rate control will occur to mitigate downstream flooding concerns. All proposed stormwater management facilities will be owned and maintained privately by individual property owners or the Homeowners Association, through provisions outlined in recorded maintenance agreements, covenants, and deed restrictions.

Runoff from the offsite lands upstream from the amendment area (described above) which drain onto the site will be routed through the proposed stormwater management facilities, rather than diverted around the site. Offsite runoff is typically diverted around a site since this water is generally not allowed to be counted toward meeting stormwater performance goals. In particular, water from offsite sources is not typically allowed to be credited toward meeting infiltration/stay-on volume goals since there is typically little to guarantee that water will always flow onto the site (e.g., it could be diverted away with future development and no longer captured for infiltration). The Development team met with CARPC, DNR, City of Middleton, and Dane County staff to discuss this issue on January 27, 2023. In this case, given the typography and general flow patterns of the area, there is relative certainty that this water will always flow onto the site; and therefore, it was agreed, pending review by WRMC, that this water be allowed to be credited toward the infiltration/stay-on goal. At their February 15, 2023, meeting, the WRMC passed a motion to recommend allowing this offsite water to be credited toward meeting the 100% infiltration/stay-on goal. With this, the site is achieving approximately 101.2% infiltration/stay-on, whereas without this offsite water the site achieves approximately 97.4% infiltration/stay-on. In addition to the added volume of water infiltrated, capturing the offsite water will provide additional water quality treatment of the offsite runoff from predominantly agricultural sources. The additional volume of water passing through the stormwater basins may require additional or more frequent maintenance of the onsite stormwater facilities (e.g., dredging of detention basin); however, this was discussed during the WRMC meeting, and the Developer has committed to putting in place appropriate maintenance measures to ensure continued performance of the basins.

The proposed stormwater facilities for the conceptual development are not within 400 feet of a community water supply well (see Map 10), per NR 811 regulations. The final design of the proposed bioretention facilities along Pheasant Branch Road will need to account for private (non-community) wells associated with the existing residential homes and maintain proper setbacks in accordance with NR 812 regulations. Existing onsite private wells will need to be abandoned and sealed in accordance with applicable DNR and local requirements.

The amendment area is outside of the recommended 5,000-foot separation distance from an airport serving piston-powered aircraft described in *Advisory Circular 150/5200-33C: Hazardous Wildlife Attractants on or near Airports*, published by the US Federal Aviation Administration (hereinafter, referred to as FAA *Advisory Circular Guidance;* link to document here), but is within the recommended 10,000-foot separation distance from an airport serving turbine-powered aircraft. It is understood that the Middleton Municipal Airport, located approximately 7,300 feet away from the edge of the amendment area, primarily serves piston-powered aircraft but does sell Jet-A fuel and, therefore, is capable of also serving turbine-powered aircraft. The FAA *Advisory Circular Guidance* provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. Per the guidance publication, land uses applicable to this proposed amendment area and considered to be a potential attractant include bodies of open water with a permanent pool of water and emergent and submergent vegetation. The FAA *Advisory Circular Guidance* recommends that these practices be avoided or mitigated to reduce the likelihood of wildlife-aircraft strikes. The

three proposed wet detention basins may be considered an attractant by this guidance. There are many other potential attractants within the recommended separation distance, including Graber Pond nearby to the west, the expansive wetlands to the south and southeast within Pheasant Branch Conservancy, as well as other natural and manmade bodies of water. CARPC Staff is not aware of any issues caused by existing stormwater management basins, and by comparison to the extensive natural attractants within the recommended separation distances to the airport, the proposed wet detention basins are not considered to have a significant impact on wildlife movement. The Advisory Circular also identifies several mitigation strategies that could be incorporated into the stormwater management plan design including the use of riprap-edged ponds or narrow/linear geometry of ponds.

Performance Standards

The City of Middleton proposes stormwater management performance measures to meet or exceed standards required by the State of Wisconsin (NR 151), Dane County (Chapter 14), and City of Middleton (Chapter 26) stormwater regulations, as follows:

1. Require post-construction sediment control (reduce total suspended solids leaving the site by at least 80%, with a minimum of 60% of that control occurring prior to infiltration for residential land uses and a minimum of 80% occurring prior to infiltration for commercial, industrial, and institutional land uses) for the average annual rainfall period. This is consistent with the standards currently required by Dane County and City of Middleton ordinances.

2. Require post-construction peak runoff rate control for the 1-, 2-, 10-, 100-, and 200-year, 24-hour design storms (using NRCS MSE4 storm distributions) to match pre-development peak runoff rates. This is consistent with the standards currently required by Dane County and City of Middleton ordinances. The City of Middleton ordinance requires using "presettlement" runoff curve numbers, which are more protective than the Dane County ordinance.

3. Require post-development infiltration (stay-on) volume of at least 90% of the pre-development infiltration (stay-on) volume for the average annual rainfall. This is consistent with the standards currently required by Dane County and City of Middleton ordinances.

4. Maintain pre-development groundwater annual recharge rate of 9 to 10 inches per year as estimated by the Wisconsin Geological and Natural History Survey in a 2012 report titled "Groundwater Recharge in Dane County, Wisconsin Estimated by a GIS-Based Water Balance Model." This is consistent with the standards currently required by Dane County and City of Middleton ordinances.

5. Treat the first one-half inch of runoff to provide oil and grease control using the best available technology for commercial or industrial land uses and any other uses where the potential for pollution by oil or grease, or both, exists (such as, potentially, high-density residential). This is consistent with the standards currently required by Dane County and City of Middleton ordinances.

Impacts and Effects of Proposal

Environmental Corridors

The proposed amendment area includes approximately 36.4 acres of Environmental Corridor (See Map 12). This will include the delineated wetland with associated buffer and proposed stormwater management, park, and open space areas in accordance with the Environmental Corridor Policies and Criteria (link to document) adopted in the *Dane Water Quality Plan* (See Map 2). Some of what is proposed as Environmental Corridor also coincides with mapped Stewardship Areas, as described below.

Protection areas required for inclusion in Environmental Corridors when those areas are added to the urban service area. Protection Areas include natural resource features such as the 1% annual chance floodplain; waterbodies, streams and wetlands plus their required vegetative buffers; riparian steep slopes; existing public lands, parks, and conservancy areas; and existing stormwater management facilities. Protection Areas are mapped based on regionally available information, such as the Wisconsin Wetland Inventory data. There are 6.1 acres mapped as Protection Area for the delineated wetland and its required vegetative buffer within the proposed amendment area (see Map 12).

One of the Regional Development Framework (RDF) objectives aimed at achieving the goal of conserving water resources and natural areas. Stewardship areas are advisory areas to consider for inclusion in Environmental Corridors above the minimum requirements. The Stewardship Area recommendations include natural resources features such as the 0.2% annual chance floodplain, potentially restorable wetlands, internally drained areas, hydric soils, current/potential Ice Age Trail Corridor, and Natural Resource Area boundaries identified in the Dane County Parks and Open Space Plan. The proposed amendment area includes 3.9 acres mapped as Stewardship Area, including restorable wetlands, internally drained areas and hydric soil, of which 1.9 acres are proposed to be designated as Environmental Corridor by this amendment (Map 12).

Meeting Projected Demand

Interim CARPC projections for 2050 suggest that an additional 114,000 residents, 59,000 housing units, and 72,000 jobs can be expected in the Central Urban Service Area over the next 30 years. Modeling in Urban Footprint for the RDF placed community centers and a corridor south of the requested amendment area at the intersections of Century Avenue with Parmenter Street and Allen Boulevard with corridors running along Century and Parmenter. While the amendment request does not contribute directly to the strategies of directing growth to centers in corridors as they are currently mapped, the amendment area was modeled in Urban Footprint as it is presented in the application, and it does contribute to meeting projected demand for housing. Additionally, the amendment request exceeds the existing density in Middleton, supporting the suggested strategy in the RDF of increasing residential densities.

Phasing

Development will start adjacent High Road to the south of Belle Fontaine Boulevard with multi-family structures and in the central section of the plan area along Belle Fontaine Boulevard with smaller lot residential and cottage units. The second phase is characterized by smaller lot development to the north. The final phases conclude with larger lot development first in the south and then to the east. Multi-family and commercial development to the west of the site will take place on its own timeline beginning with phase one adjacent Belle Fontaine Boulevard then moving north in a second phase before ending in phase three south of Belle Fontaine. The following Figure 2 illustrates the anticipated phasing plan.

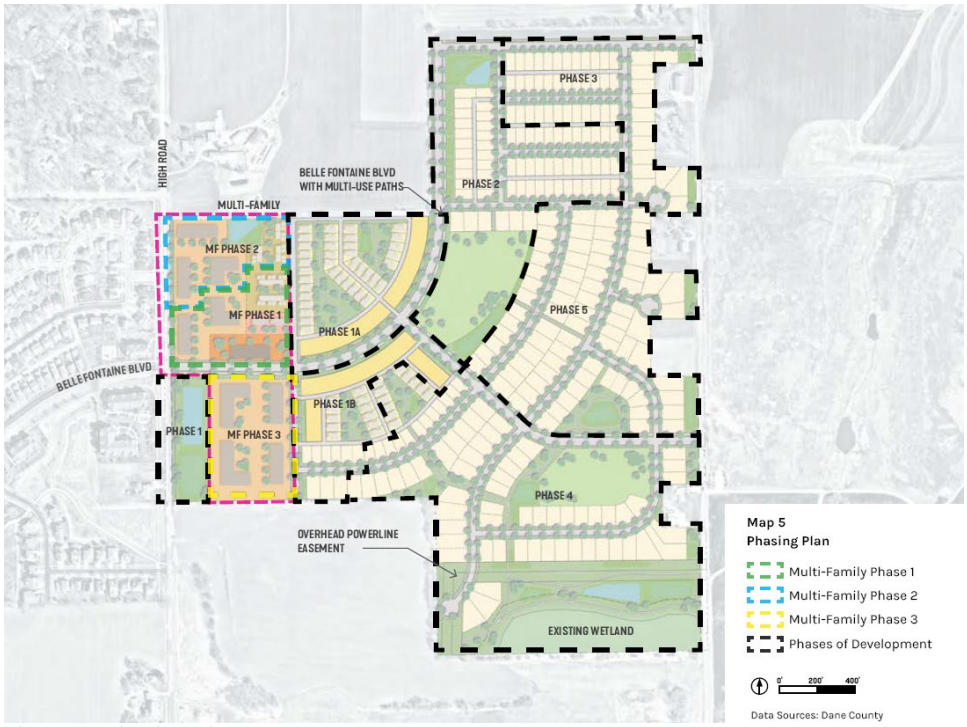


Figure 2. Phasing Plan

Surface Water Impacts

Development creates impervious surfaces (e.g., streets, parking areas, and roofs) and typically alters the natural drainage system (e.g., natural swales are replaced by storm sewers). Without structural best management practices (e.g., detention basins and infiltration basins) this would result in increased stormwater runoff rates and volumes, as well as reduced infiltration. Without structural best management practices for erosion control, development would also cause substantial short-term soil erosion and off-site siltation from construction activities. Scientific research has well documented that without effective mitigation measures, the potential impacts of development on receiving water bodies can include the following:

- Flashier stream flows (i.e., sudden higher peaks)
- Increased frequency and duration of bankfull flows
- Reduced groundwater recharge and stream base flow
- Greater fluctuations in water levels in wetlands
- Increased frequency, level (i.e., elevation), and duration of flooding
- Additional nutrients and urban contaminants entering the receiving water bodies
- Geomorphic changes in receiving streams and wetlands

Natural drainage systems attempt to adapt to the dominant flow conditions. In the absence of mitigation measures, the frequency of bank-full events often increases with urbanization, and the stream attempts to enlarge its cross section to reach a new equilibrium with the increased channel forming flows. Higher flow velocities and volumes increase the erosive force in a channel, which alters streambed and bank stability. This can result in channel incision, bank undercutting, increased bank erosion, and increased sediment transport. The results are often wider, straighter, sediment laden streams, greater water level fluctuations, loss of riparian cover, and degradation of shoreland and aquatic habitat.

Since 2002, there have been stormwater management standards in effect at the state, county, and local level to require stormwater management and erosion control plans and structural best management practices designed to address the impacts of development on water quality, runoff volumes, peak flows, water temperature, and groundwater recharge. In 2011, county and local standards for runoff volume control were increased beyond state standards to further address the potential stormwater impacts of development. Since 2010 many communities

adopted even higher standards for volume control through their own ordinances or as part of USA amendment agreements. In 2017, State statute 281.33(6)(a)(1) was changed to limit the ability of local governments to adopted higher standards for runoff volume through local ordinances. In response to climate change, the City of Madison adopted peak rate control for the 200-year storm event in their ordinance in June 2020. Dane County adopted this same peak rate control requirement as well as requirements for closed basins in November 2021, which made these requirements universal to all communities in Dane County.

The City of Middleton proposes to mitigate the urban nonpoint source impacts of the proposed development by requiring the implementation of various stormwater best management practices that are designed and constructed to meet, or exceed, current Dane County standards for pollutant reduction, runoff volumes, peak flows, water temperature, and groundwater recharge to address the potential water quality impacts of stormwater runoff from the proposed development on the receiving waters.

Regional partners are actively working to address chlorides through the Wisconsin Salt Wise Partnership. Participation in the chloride reduction trainings provided by WI Salt Wise is open to any municipality and private winter maintenance professional in the region. City of Middleton staff have regularly attended salt certification class for winter road maintenance.

The City of Middleton is also a participant in the Madison Area Municipal Storm Water Partnership (MAMSWaP), which is a coalition of Dane County municipalities and organizations working together to promote practices that reduce and improve stormwater runoff into Dane County lakes, rivers, and streams. The MAMSWaP Information and Education (I&E) Committee works to develop and implement projects and plans through regional outreach and consistent messaging throughout the communities, including maintaining the www.ripple-effects.com website, distributing tools and articles to municipalities, community groups, and neighborhood associations, and providing presentations to focused audiences. Specific goals include promoting beneficial onsite reuse of leaves and grass clippings, proper use of lawn and garden fertilizers and pesticides, and promoting infiltration of residential stormwater runoff from rooftops, driveways and sidewalks.

Groundwater Impacts

Without effective mitigation practices, as natural areas are converted to urban development, the ground/surface water balance in streams and wetlands shifts from a groundwater-dominated system to one dominated more and more by surface water runoff. This can result in subsequent reductions in stream quality and transitions to more tolerant biological communities.

Groundwater modeling indicates that the cumulative effects of well withdrawals have resulted in a 5.1-cfs decrease in baseflow in Pheasant Branch Creek at Century Avenue (see location Map 5) from pre-development conditions (no pumping) to 2010 conditions (refer to Table 4). An additional 0.2-cfs decline compared to 2010 conditions is anticipated for the year 2040, according to modeling, reducing the baseflow to 7.0 cfs.

Table 4
Modeled Baseflow Results
Due to Current and Anticipated Future Municipal Well Water Withdrawals
(All Municipal Wells)

Stream	No Pumping	2010	2040
Pheasant Branch Creek	*12.3 cfs*	*7.2 cfs*	*7.0 cfs*

The loss of baseflow from the cumulative effects of well water pumping is a regional issue, beyond the boundaries of a single USA Amendment or even a single municipality. This issue is discussed along with potential management options in the updated *Dane County Groundwater Protection Planning Framework* (link to report). Maintaining pre-development groundwater recharge by infiltrating stormwater runoff helps to replenish groundwater, maintain baseflow, and mitigate this impact.

Comments at the Public Hearing

A public hearing was held on the proposed amendment at the February 9, 2023, meeting of the Capital Area Regional Planning Commission. Representatives of City of Middleton and the development team registered in favor of the amendment. There were no comments from the public and no registrants opposed to the amendment. Commissioners asked questions about the proposed stormwater management plan and how potential impacts to Pheasant Branch Creek were being mitigated. Commissioner Richson also raised a concern about the proximity of wet detention basins to the City of Middleton airport.

Conclusions and Staff Water Quality Recommendations

There is sufficient existing treatment plant system capacity at MMSD to serve the proposed amendment area. There is also sufficient existing or planned wastewater collection system capacity to serve the proposed amendment area.

Since 2002, there have been stormwater management standards in effect at the state, county, and local level to require stormwater management and erosion control plans and structural best management practices designed to address the impacts of development on water quality, runoff volumes, peak flows, water temperature, and groundwater recharge. In 2011, county and local standards for runoff volume control were increased beyond state standards to further address the potential stormwater impacts of development. Since 2010 many communities adopted even higher standards for volume control through their own ordinances or as part of urban service area amendment agreements. In 2017, State statute 281.33(6)(a)(1) was changed to limit the ability of local governments to adopted higher standards for runoff volume through local ordinances. In response to climate change, the City of Madison adopted peak rate control for the 200-year storm event in their ordinance in June 2020. Dane County adopted this same peak rate control requirement as well as requirements for closed basins in November 2021, which made these requirements universal to all communities in Dane County.

The City of Middleton proposes to mitigate the urban nonpoint source impacts of the proposed development by requiring the implementation of stormwater best management practices that are designed and constructed to meet or exceed current Dane County standards for pollutant reduction, runoff volumes, peak flows, water temperature, and groundwater recharge to address the potential urban nonpoint source impacts of the proposed development on the receiving waters.

It is the Regional Planning Commission staff's opinion that the proposed amendment is consistent with water quality standards under Wis. Stat. § 281.15, and the adopted Policies and Criteria for the Review of Sewer Service Area Amendments to the *Dane County Water Quality Plan*, with the existing state and local requirements identified below. Additional actions have also been recommended below to further improve water quality and environmental resource management.

State and Local Requirements

Regional Planning Commission staff recommends approval of this amendment, based on the land uses and services proposed, and in recognition of the state and local requirements for the following:

1. State and local review and approval of stormwater management plan(s) is required, including Regional Planning Commission staff review and approval as part of the sewer extension review process.

    a. Stormwater and erosion control practices are required to be installed prior to other land disturbing activities. Infiltration practices are required to be protected from compaction and sedimentation during land disturbing activities.

    b. Peak rates of runoff are required to be controlled for the 1-, 2-, 10-, 100-, and 200-year, 24-hour design storms to, in accordance with the City of Middleton and Dane County Stormwater Ordinances. The City of Middleton Ordinance requires the use of lower "pre-settlement" runoff curve numbers.

    c. Sediment control is required that achieves at least 80% sediment control for the amendment area based on the average annual rainfall, with a minimum of 60% of that control occurring prior to infiltration for residential land uses, and a minimum of 80% occurring prior to infiltration for commercial, industrial, and institutional land uses, in accordance with the City of Middleton and Dane County Stormwater Ordinances.

    d. Runoff volume control is required that maintains the post-development stay-on volume to at least 90% of the pre-development stay-on volume for the average annual rainfall period, in accordance with the City of Middleton and Dane County Stormwater Ordinances.

    e. Oil and grease control are required that treats the first 0.5 inches of runoff using best management practices at commercial and industrial sites and any other uses where the potential for pollution by oil or grease, or both, exists, in accordance with the City of Middleton and Dane County Stormwater Ordinances.

    f. Maintaining pre-development groundwater recharge rates from the Wisconsin Geological and Natural History Survey's 2012 report, *Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model* (a range of 9 to 10 inches/year for the amendment area or by a site-specific analysis, when required by the City of Middleton and Dane County Stormwater Ordinances.

2. Easements and perpetual legal maintenance agreements with the City, to allow the City to maintain stormwater management facilities if owners fail to do so, are required for any facilities located on private property.

3. Environmental Corridors are required to be delineated to meet the Environmental Corridor Policies and Criteria adopted in the *Dane County Water Quality Plan*.

Additional Agreements for the Amendment Area

In addition to the existing state and local requirements, the City of Middleton and the development team have agreed to pursue the following water resource management measures for the amendment area:

1. Provide runoff volume control that maintains the post-development stay-on volume to 100% of the pre-development stay-on volume for the average annual rainfall period.

Recommendations

It is recommended that the City of Middleton pursue the following to further improve water quality and environmental resource management:

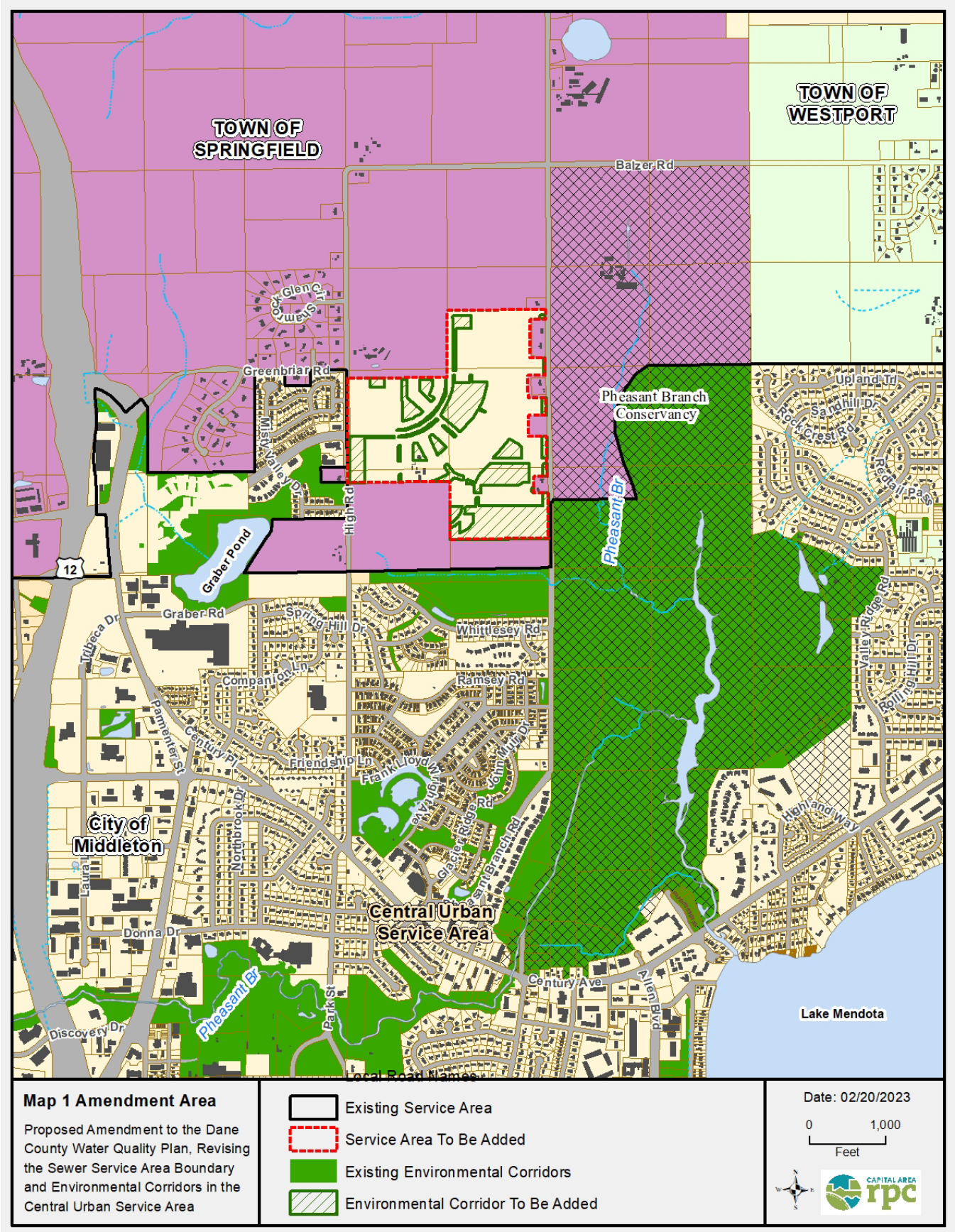
1. Continue to foster the responsible use of chlorides by collaborating with Wisconsin Salt Wise and encouraging public and private winter maintenance professionals to attend the winter salt certification classes offered by Wisconsin Salt Wise.

2. Request a formal Endangered Resources Review by the WDNR or one of their certified reviewers for potential impacts to endangered resources like rare plants, animals and natural communities and take necessary habitat protection measures if species are found.

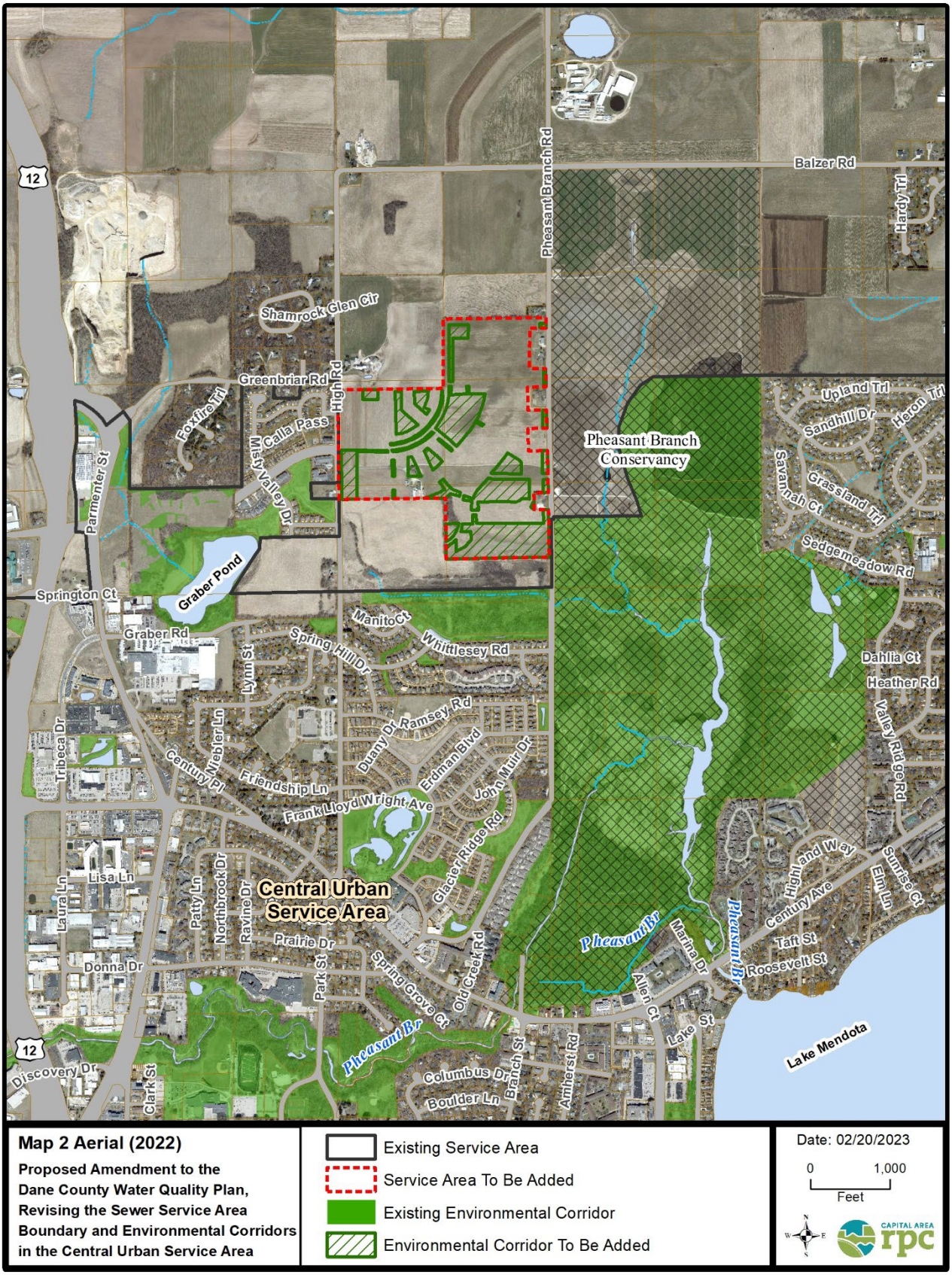
3. Encourage the use of native flora favored by the Rusty Patched Bumble Bee in landscaping to provide suitable habitat for this pollinator, where appropriate.

4. Coordinate the design of the final stormwater management plan between the development team and the City of Middleton Water Resources Management Commission in a manner that considers the recommendations in *Advisory Circular 150/5200-33C: Hazardous Wildlife Attractants on or near Airports*, published by the US Federal Aviation Administration, while meeting all state and local stormwater management requirements.

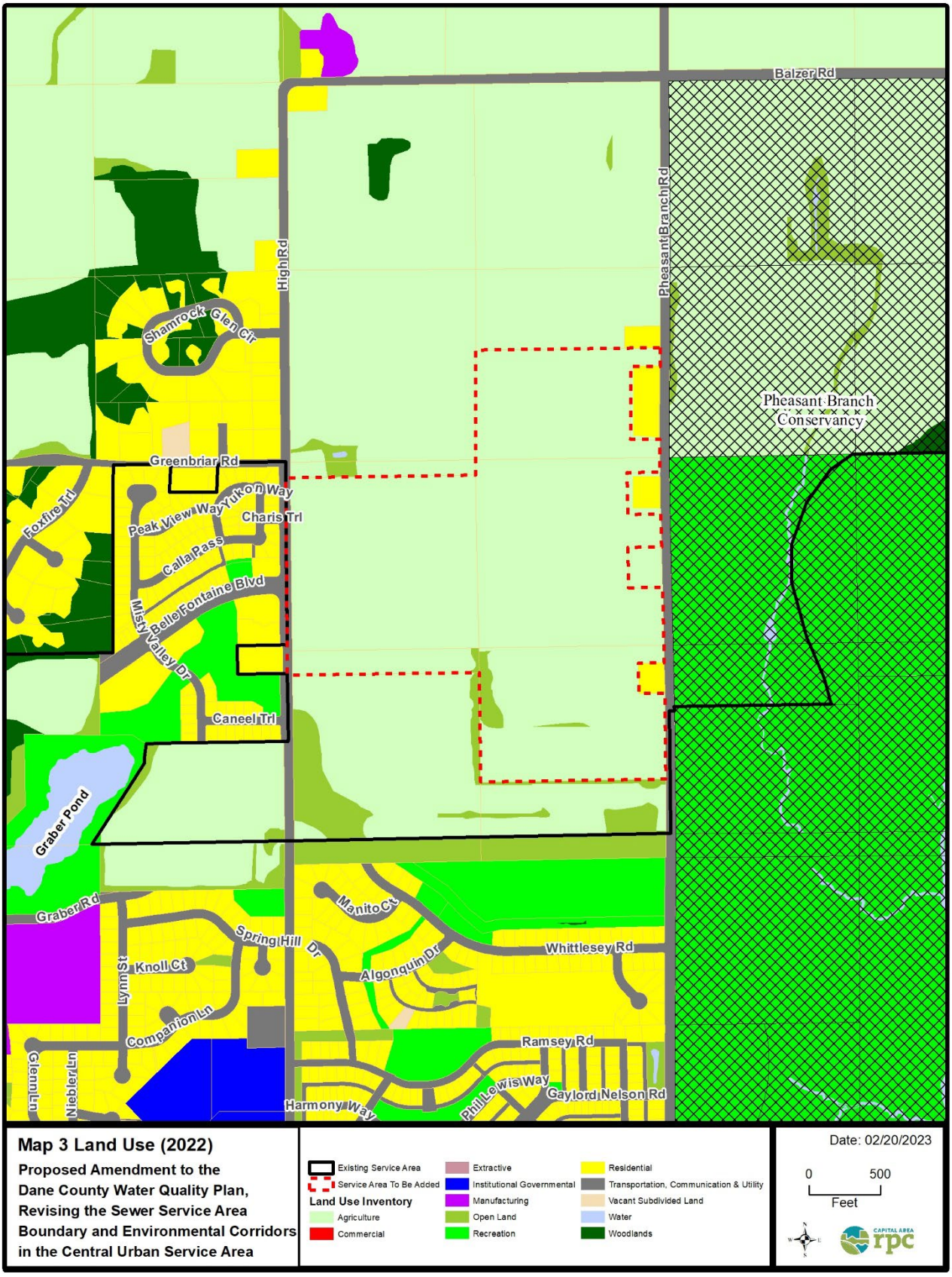
Map 1 - Amendment Area



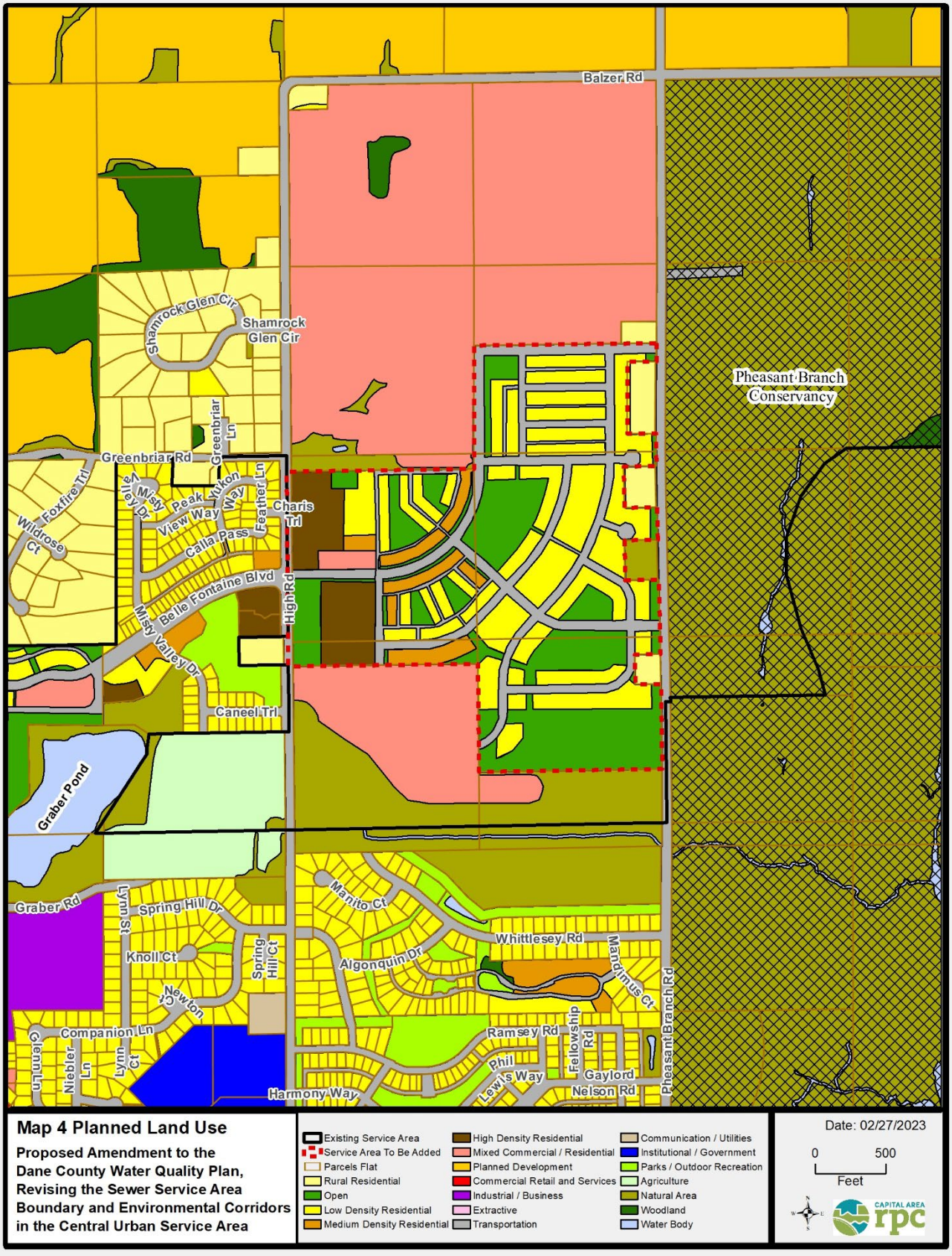
Map 2 – Aerial


Balzer Rd
Pheasant Branch Rd
Hardy Trl
Shamrock Glen Cir
Greenbriar Rd
High Rd
Foxfire Trl
Calla Pass
Misty Valley Dr
Parmenter St
Pheasant Branch Conservancy
Upland Trl
Sandhill Dr
Heron Trl
Savannah Ct
Grassland Trl
Sedgemeadow Rd
Graber Pond
Springton Ct
Graber Rd
Manito Ct
Spring Hill Dr
Whittlesey Rd
Lynn St
Dahlia Ct
Heather Rd
Valley Ridge Rd
Tribeca Dr
Webler Ln
Century Pl
Friendship Ln
Duany Dr
Ramsey Rd
Erdman Blvd
John Muir Dr
Frank Lloyd Wright Ave
Glacier Ridge Rd
Central Urban Service Area
Lisa Ln
Laura Ln
Patty Ln
Northbrook Dr
Ravine Dr
Prairie Dr
Donna Dr
Park St
Spring Grove Ct
Old Creek Rd
Pheasant Br
Marina Dr
Allen Ct
Lake St
Highland Way
Century Ave
Taft St
Roosevelt St
Elm Ln
Sunrise Ct
Lake Mendota
Discovery Dr
Clark St
Columbus Dr
Boulder Ln
Branch St
Amherst Rd
12
Map 2 Aerial (2022)
Proposed Amendment to the Dane County Water Quality Plan, Revising the Sewer Service Area Boundary and Environmental Corridors in the Central Urban Service Area
Existing Service Area
Service Area To Be Added
Existing Environmental Corridor
Environmental Corridor To Be Added
Date: 02/20/2023
0
1,000
Feet
CAPITAL AREA rpc

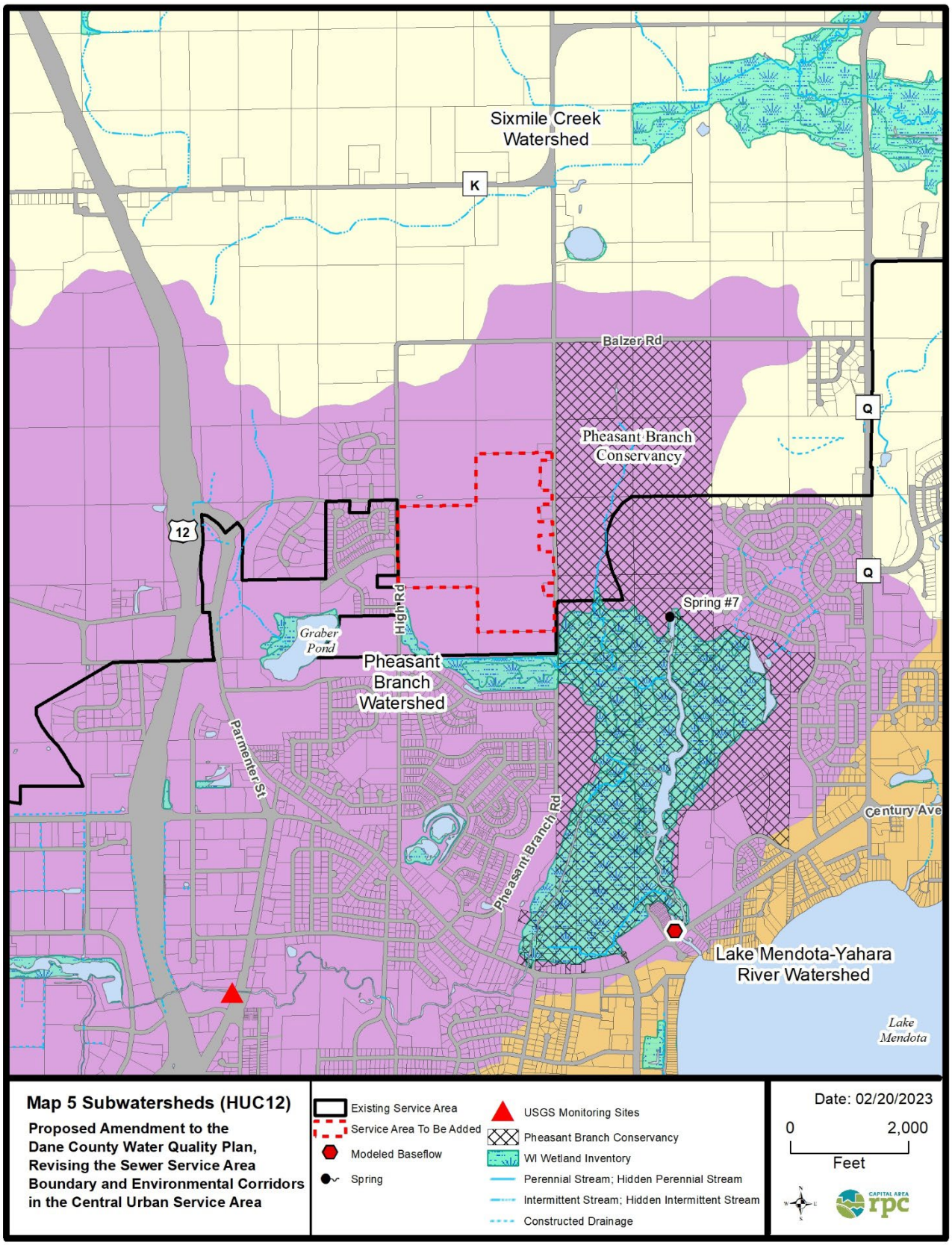
Map 3 – 2022 Land Use



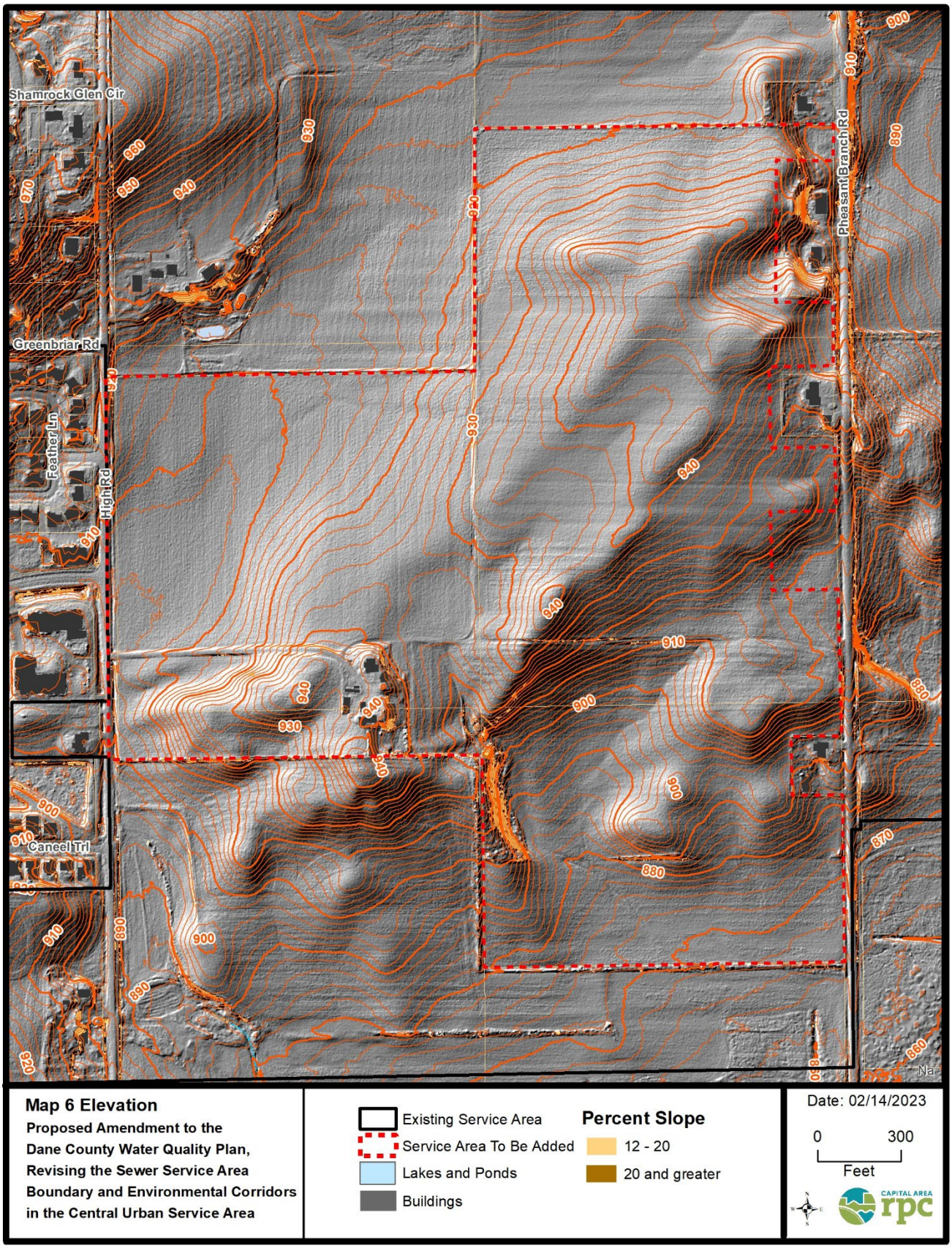
Map 4 – Planned Land Use



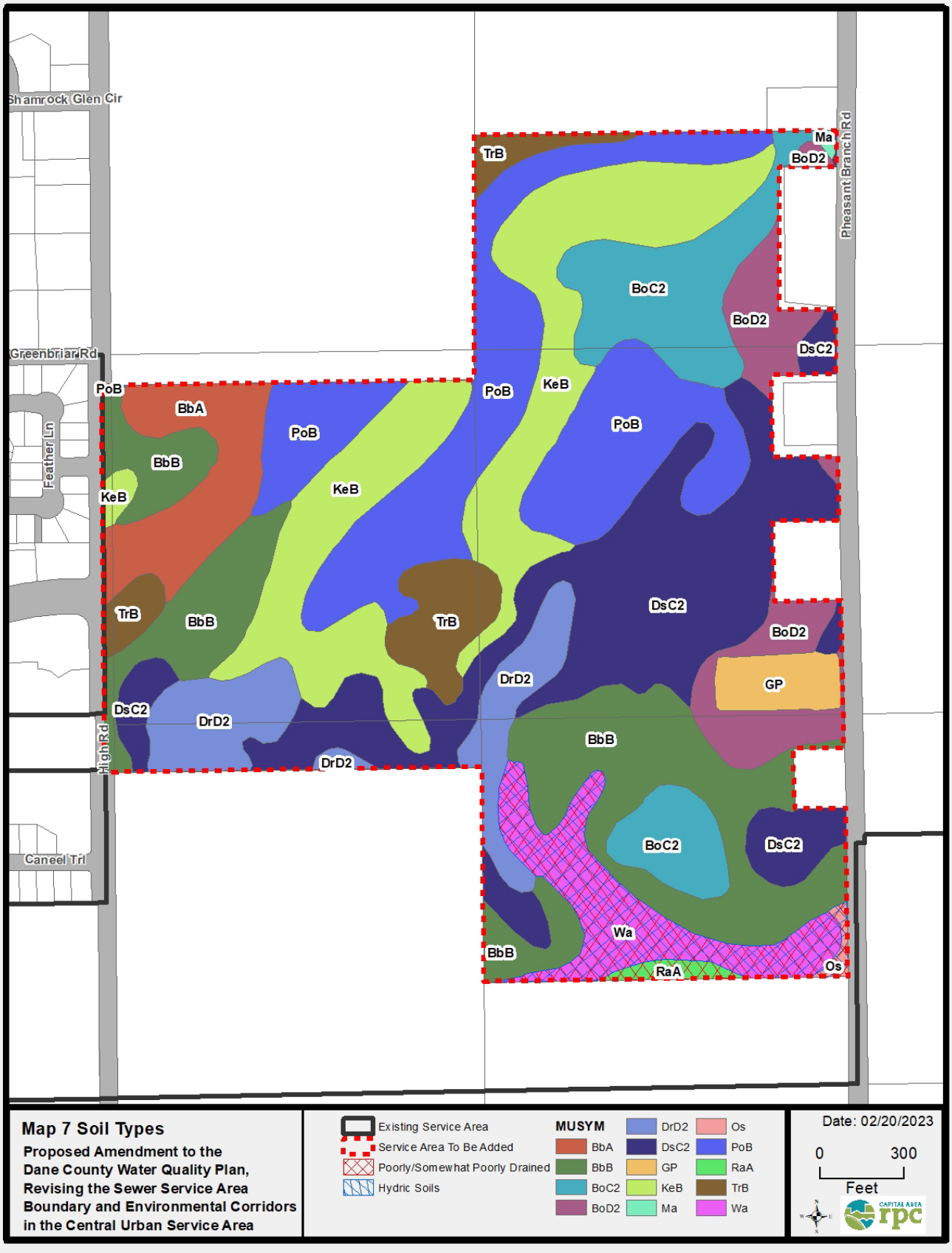
Map 5 – Subwatersheds



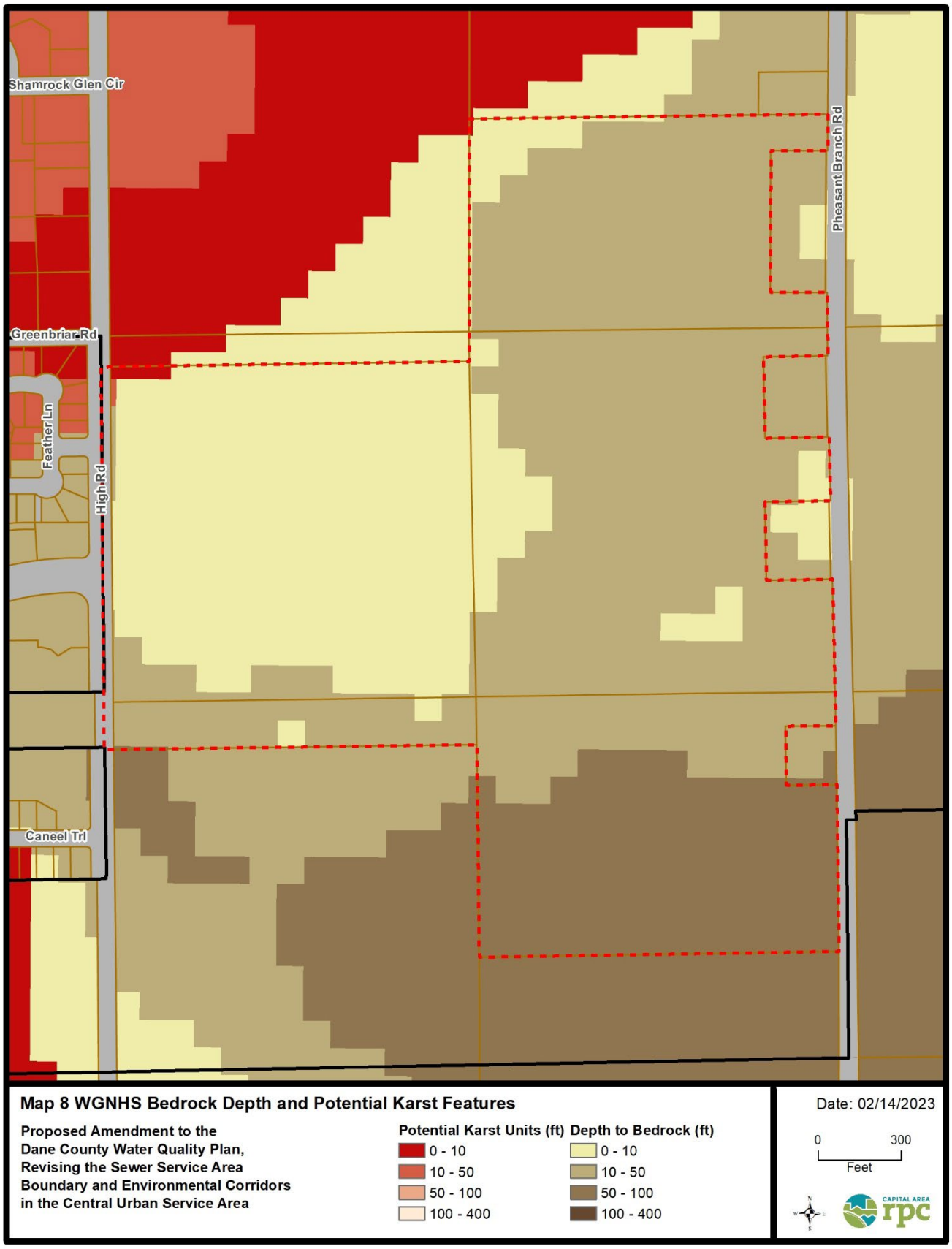
Map 6 – Elevations



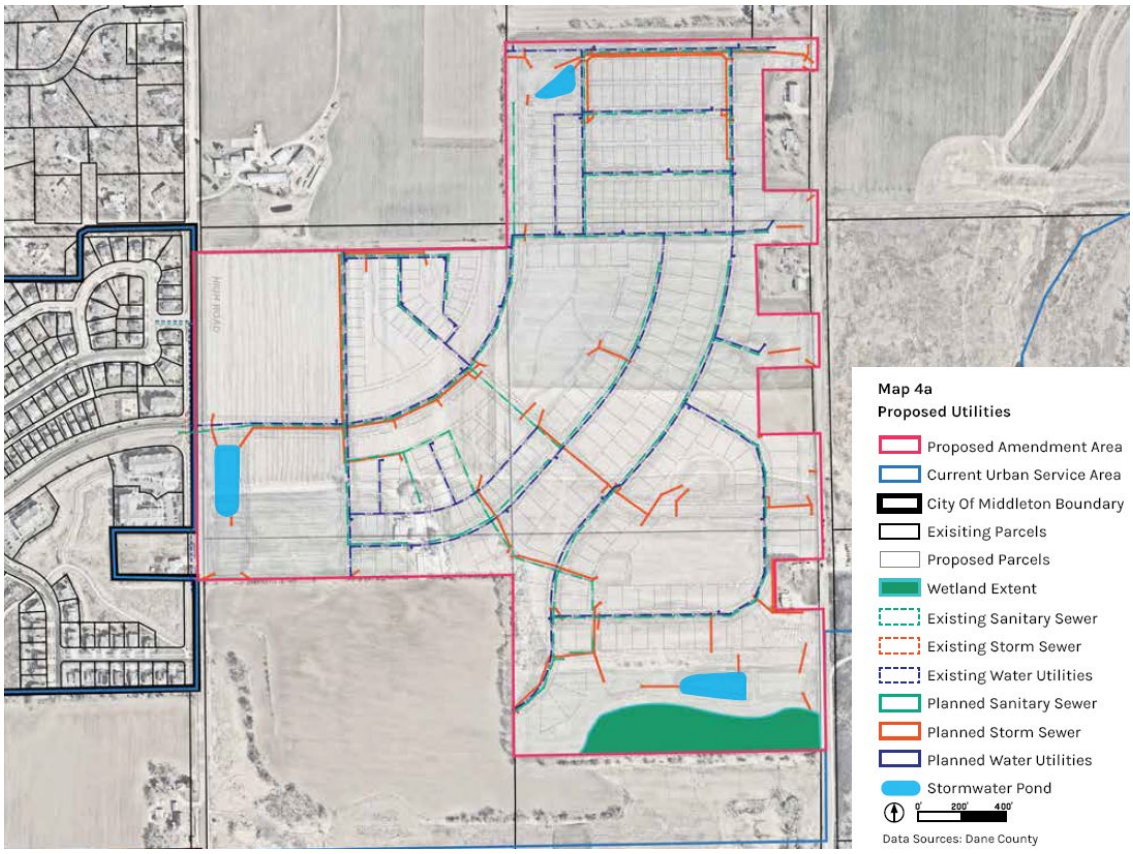
Map 7 – Soil Type



Map 8 – WGNHS Bedrock Depth and Potential Karst Features

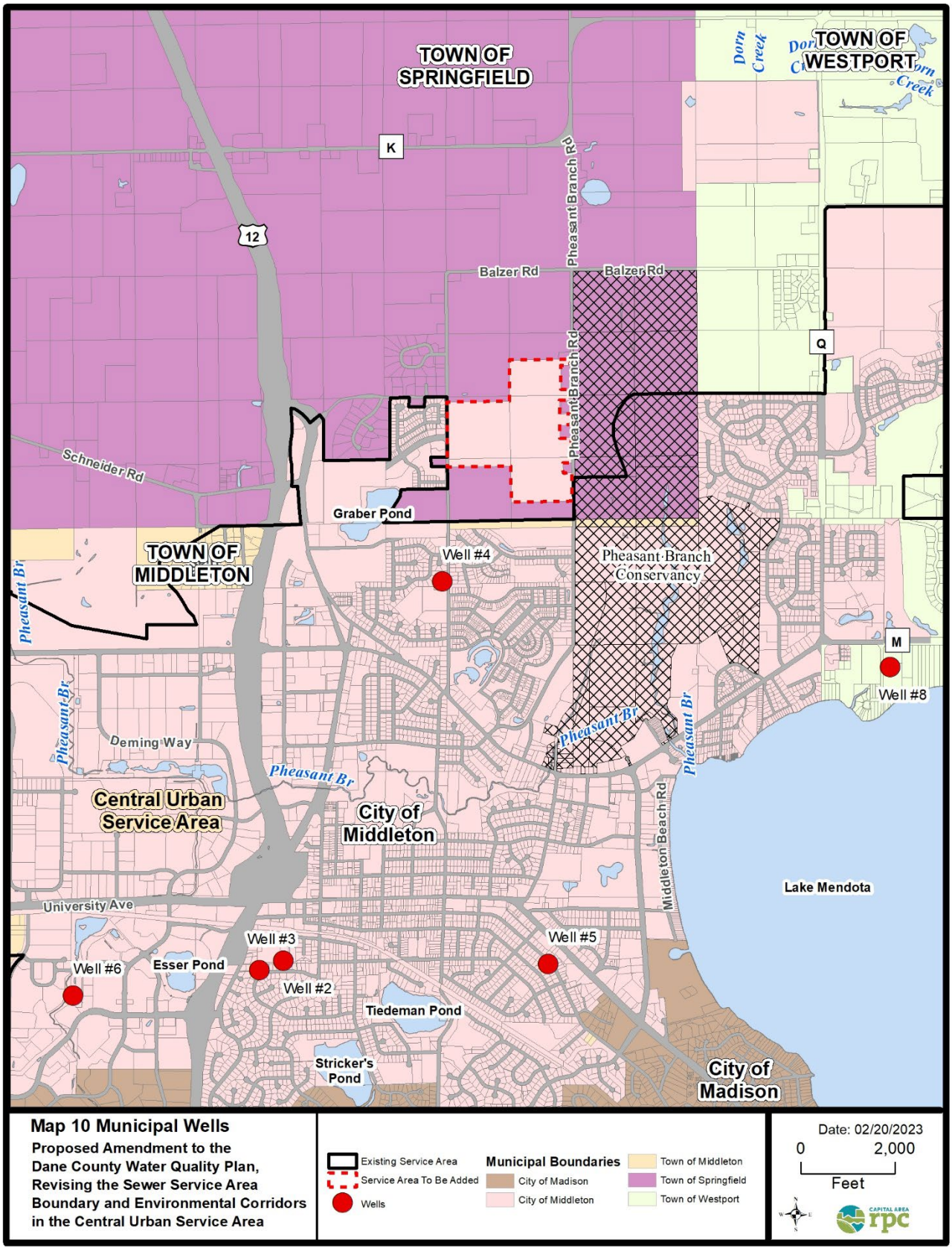


Map 9a – Proposed Utilities



Map 9b – Proposed Stormwater Management

Map 10 – Municipal Wells



Map 11 – Wetland Delineation

Map 12 – Proposed Environmental Corridor