
**Staff Analysis of a Proposed Amendment to the *Dane County Water Quality Plan*
Revising the Sewer Service Area Boundary in the
Waunakee Urban Service Area**

1) Existing Conditions

a) Land Use

The requested amendment area is located in the Town of Westport along the boundary between the Village of Waunakee and the Town of Westport (see Map 1). The 2.3 acre site is a single residential lot at 5794 Emerald Grove Lane and is currently developed with a single family house, attached garage, and driveway. The amendment area is immediately south of the sewer service area added in 1988 by Resolution DCRPC No. 482 (DNR Approval Letter DC-58) and north of the sewer service area added in 1993 by Resolution DCRPC No. 657 (DNR Approval Letter DC-110). The amendment would not add any new developable area to the Waunakee Urban Service Area. (See Table 1).

Table 1. Existing and Proposed Land Use

Existing Land Use	Acres
Agriculture	0
Institutional/Governmental	0
Open Land / Woodlands	0
Residential	2.3
Transportation	0
TOTAL	2.3

Proposed Land Use	Proposed Acres	Env. Corridor Acres
Transportation	0	
Commercial Retail and Services	0	
Institutional/Governmental	0	
Parks/ Natural Area / Stormwater	0	
Rural Residential	0	
Low Density Residential	2.3	
Medium Density Residential	0	
High Density Residential	0	
TOTAL	2.3	0

The existing three-bedroom home is currently served by a conventional at-grade septic system with a combination septic/pump chamber that was installed in 1994 during the construction of the original home. The septic system is located in side landscaping, approximately 10 feet west of the existing home and attached two-stall garage and the system is sized for the existing home. Due to planned construction adding additional bedrooms to the home and the close proximity of the septic tank to the home, its expansion and relocation would be required. On the west side of the lot, there are also plans for an additional garage and therefore the existing driveway will also be relocated farther west. Both the existing septic tank and the existing septic absorption field locations would impede this expansion.

b) Natural Resources

The requested amendment area is located within the Six Mile Creek watershed (Map 5). From the amendment area stormwater runoff drains to a culvert within the Emerald Grove Lane cul-de-sac and then travels approximately 1,000 feet before entering into the main branch of Six Mile Creek. The southern lot line contains some minor, non-riparian, steep wooded slopes. There are no wetlands within the amendment area.

Six Mile Creek

Six Mile Creek originates in the Town of Springfield (T8N R8E, Sec. 2), flowing south into the Waunakee Marsh, then east and south through the Village of Waunakee, finally entering the north end of Lake Mendota. Six Mile Creek is 12.0 miles in length with a drainage area of 43 square miles. The third reach of Six Mile Creek includes Woodland Drive downstream to the mouth of Lake Mendota. This reach has characteristics that make it quite different from the two upper sections since its overall width and depth increase, and gradient and velocity decrease. This portion is very turbid and the stream changes from a run/riffle/pool profile to a continuous run. The stream substrate in this section consists of mainly fine sediments. Six Mile Creek has been included with other streams in the Rock River Basin Total Maximum Daily Load (TMDL) project establishing necessary phosphorus and sediment reductions.

Endangered Resources

The DNR 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](#). A screening review of this database conducted by Regional Planning Commission staff did not identify any occurrences of species designated as endangered, threatened, or of special concern.

Soils and Geology

According to the Natural Resource Conservation Service (NRCS) Soil Survey of Dane County, the soils in the central and north part of amendment area are St. Charles Silt Loam (ScB). These soils are deep, well drained, sloping soils to moderately steep soils on glaciated uplands. Soils have high fertility, moderate permeability, and a moderate to severe hazard of erosion. Poses moderate limitations for development due to slopes, shrink/swell potential and low bearing capacity. The NRCS currently rates this soil type as very limited (i.e. unfavorable) for septic tank absorption fields, due to the depth to the saturated zone. Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. The soils in the south part of amendment area are Plano Silt Loam (PnC2). These soils are deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands. The soils have a high fertility, moderate permeability, and a moderate hazard of erosion. The NRCS currently rates this soil type as very limited for septic tank absorption fields. (see Map 5).

According to the [Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service](#), both the Plano and St. Charles soils (the PnC2 and ScB map units) are not hydric, but they can have a seasonal (April to June) zone of water saturation within 5 feet of the ground surface, which limits their suitability for septic tank absorption fields.

According to Wisconsin Geological and Natural History Survey mapping, the bedrock in the amendment area is in the Trempealeau Group, which 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. The depth to bedrock is from 10 to 50 feet in the amendment area.

2) Proposed Urban Services

a) Public Water System

The subject property within the requested amendment area maintains and operates a private onsite well and does not intend to connect to a public water supply. It is not feasible to connect the Village of Waunakee public water system due to the distance to the existing water main.

b) Wastewater

Sanitary sewer service would be provided to the requested amendment area by a private pumped lift system from the residence to an existing 10" Village of Waunakee sewer located south of the residential lot (see Map 6). The existing sanitary sewer connects to MMSD's Northeast Interceptor Waunakee Extension along Six Mile Creek. The property owner will obtain an easement and will own and maintain the sewer line connection from the south edge of the residential lot to the Waunakee sanitary sewer. It is anticipated that the existing residence will generate the typical amount of wastewater per day associated with a single family residential unit. Both Waunakee's and MMSD's systems are capable of handling this additional flow.

Wastewater Treatment Facility

MMSD will provide wastewater treatment for the amendment area. The Nine Springs Treatment Facility has a design capacity of 50 million gallons per day (mgd) and received an average of 40.7 mgd in 2016, including infiltration and inflow. It is expected to reach 90 percent of current hydraulic design capacity around 2026 based on current projected growth rate assumptions. MMSD has completed a long-range plan that evaluated various options for expanded treatment capacity to serve its current and future service area. For the 20-year planning period, service to this area is expected to remain at the existing wastewater treatment facility location with expanded capacity of the system as the need is foreseen.

Wastewater treatment at the district's Nine Springs Treatment Facility does not remove chloride and the concentration of chloride that arrives at the Nine Springs Plant can exceed the water quality standard. In 2015, AECOM completed a study for MMSD which determined that while possible, treatment would be cost-prohibitive, energy intensive, and involve other environmental impacts¹. MMSD's Wisconsin Pollutant Discharge Elimination System (WPDES) permit which requires pollution prevention and source reduction initiatives for chlorides, such as the [Wisconsin Salt Wise Partnership](#). MMSD has not had any issues meeting its WPDES permit limits for the quality of effluent discharged to Badger Mill Creek according to their [2016 Annual Report](#). In 2016, the effluent monthly average Total Suspended Solids ranged from 3.4 to 7.5 mg/L, below the 10 to 16 mg/L permit limit for Badger Mill Creek. The effluent monthly average ammonia ranged from 0.07 to 0.43 mg/L, below the 1.1 to 3.8 mg/L permit limit for Badger Mill Creek. The effluent monthly average total phosphorus ranged from 0.26 to 0.46 mg/L, below the current 1.5 mg/L permit limit but not low enough to meet future water quality based effluent limits (WQBEL) for phosphorus. The total phosphorus monthly limit of 1.5 mg/L is an interim limit and will be reduced to 0.075 mg/L on a six month average and 0.225 mg/L on a monthly average. MMSD has implemented a Watershed Adaptive Management approach, leading a diverse group of partners called [Yahara Watershed Improvement Network \(Yahara WINs\)](#) in implementing phosphorus reducing practices in the watershed.

¹ [Chloride Compliance Study Nine Springs Wastewater Treatment Plant Final Report, AECOM, 2015](#)

c) Stormwater Management System

The current total impervious area on the lot is approximately 9,000 square feet. The roof downspouts are disconnected from impervious surfaces and the lot site is presently approximately 90 percent pervious lawn. Runoff generated from the lot currently drains to the southeast to a culvert within the Emerald Grove cul-de-sac, then north, and finally to Six Mile Creek. There are no existing stormwater management facilities for this area since it was construction prior to stormwater management regulations. Any future development or redeveloping within the amendment area will be subject to any applicable Village, County and State stormwater ordinances. The threshold for applicability of the Dane County stormwater ordinance requirements is the cumulative addition of 20,000 square feet of impervious area.

d) Environmental Corridors

Within the requested amendment area, there are no Environmentally Sensitive Areas (i.e. wetlands, waterbodies, floodplains, riparian steep (> 12% slopes, etc.) requiring placement in environmental corridors according to the adopted policies and criteria of the *Dane County Water Quality Plan*.

3) Impacts and Effects of Proposal

a) Surface Water and Groundwater Impacts

The requested amendment area is an existing low density single family home. There is currently no stormwater management being provided due to the age of the existing development. The existing development is a minor contributor to the impairment of water resources, like other areas built before our current stormwater management standards. However, since the site is approximately 90 percent pervious lawn, and the roof downspouts are disconnected from impervious surfaces, surface water quality impacts are expected to be minimal. The proposed building additions will add additional impervious area, but will most likely be below the threshold that would require stormwater management practices under the Dane County Ordinance. The installation of a rain garden by the property owner would help to more effectively manage the stormwater runoff from the property.

As the lot currently has a private water well, the existing conditions offer a benefit to groundwater resources as the septic field infiltrates water back into the ground. Transitioning from the septic field to a piped connection that is treated at the MMSD treatment plant eliminates that localized groundwater recharge benefit.

Like wastewater treatment plants, on-site septic systems provide some nutrient (nitrogen and phosphorus) removal, but not complete treatment. Neither system removes chlorides from home water softening. Septic system discharges can also contain bacteria and viruses that can be harmful to humans and aquatic habitat. While it does not appear to be the case here, improperly designed, located, or maintained septic systems can discharge inadequately treated sewage that may contaminate groundwater or surface waters. In these cases, excess nitrogen and phosphorus from the untreated wastewater can lead to excessive aquatic plant growth that depletes the dissolved oxygen needed by fish and other aquatic species. Eliminating the septic system by providing public sanitary sewer service to this property could protect or improve surface and/or groundwater quality by eliminating a potential source of contamination in the future.

Even well-functioning septic systems release some level of nitrates into the groundwater. Nitrates are highly soluble in water and can seep easily through the soil and into the groundwater. The health standard for nitrate in drinking water is 10 mg/l. High levels of nitrate in drinking water (> 10 mg/L) can cause health problems, particularly for babies under 6 months of age. Bacteria that live in the digestive tracts of infants convert nitrate into nitrite, which transforms hemoglobin to methemoglobin, preventing transport of oxygen and producing symptoms of asphyxiation (blue baby syndrome). The U.W. Stevens Point Center for Watershed Science and Education's [WI Well Water Quality Interactive Viewer](#) is a good resource for private well testing data, based on private well samples that have been voluntarily submitted. While this data is only an indication of groundwater

quality in the area, it suggests that nitrate levels presently average between 5.1 and 10 mg/L in this section of the Town of Westport.

4) Cost-effectiveness Analysis

NR121 requires cost-effectiveness analysis when alternative wastewater disposal systems are compared or considered. The existing septic system is proposed to be relocated to accommodate building expansion. The estimated cost to move and increase the capacity of the existing system to accommodate the larger building is \$15,000. Ongoing maintenance costs will be required to service the relocated septic system. The estimated cost to extend a private sanitary sewer line and provide service to the building will be approximately \$14,300, which includes MMSD connection fees and excavation. Connection of the lateral to the Village sanitary sewer service will incur an estimated service charge of \$300 per year but infrastructure maintenance costs will be minimal. Thus sanitary sewer connection is a cost-effective option.

5) Comments Received and Unresolved Issues

A public hearing before the Capital Area Regional Planning Commission is scheduled for June 11, 2018. No comments have been received and no controversies have been noted to date.

6) Conclusions and Staff Water Quality Recommendations

The requested amendment area is adjacent to the existing urban service area. There is also sufficient existing wastewater collection system capacity to serve the proposed amendment area. There is also sufficient existing treatment plant system capacity at MMSD to serve the proposed amendment area. Proximity of the onsite conventional at-grade septic system with a combined septic/pump chamber to the existing building and planned expansion of the building footprint require either that the system be expanded and relocated or the building sanitary lateral be connected to a public sanitary sewer system. The public sanitary sewer system is located along the rear lot line of the requested amendment area making installation very practical and financially cost effective compared to relocation of the onsite system.

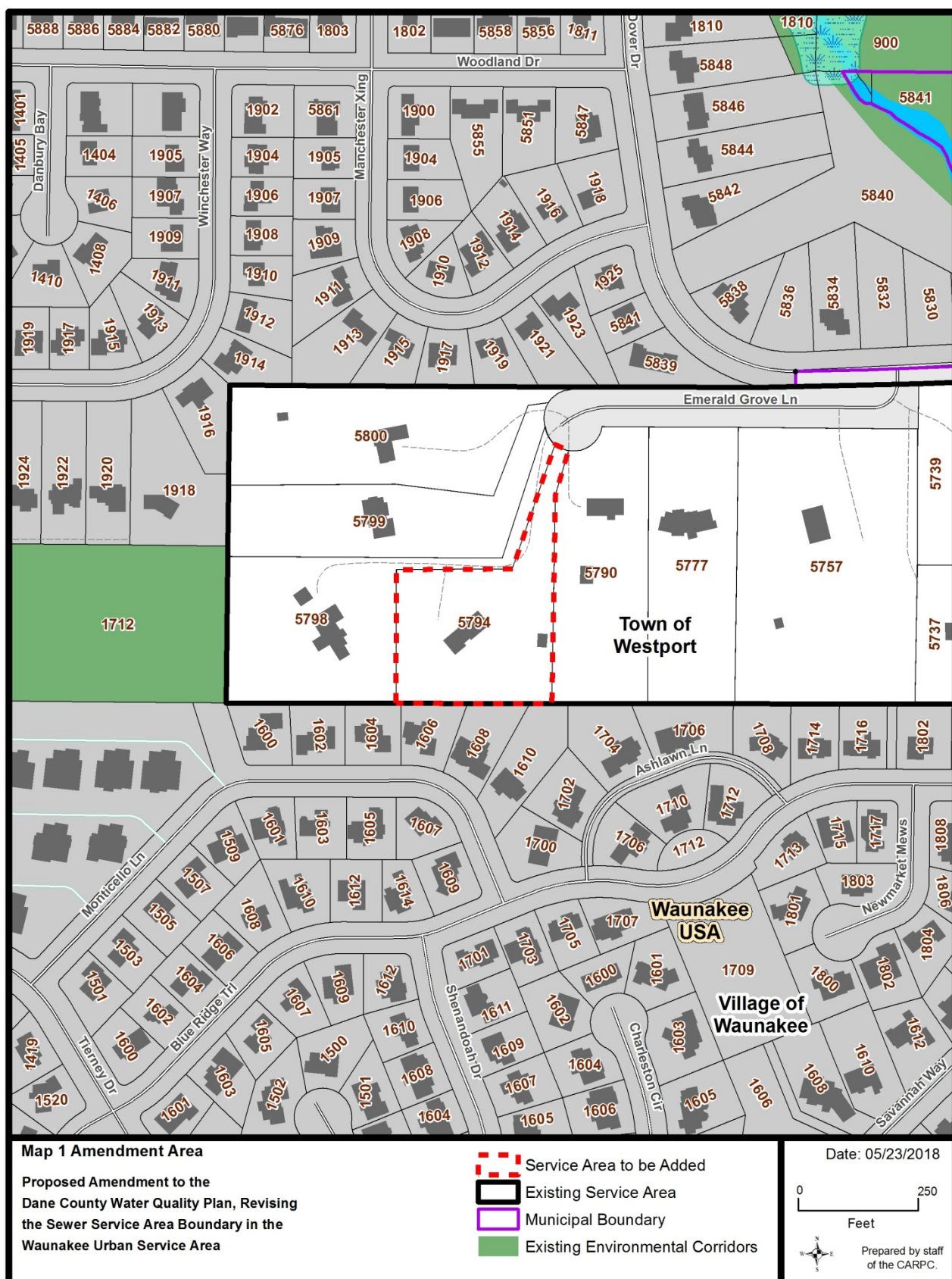
Eliminating the existing septic system by providing public sanitary sewer service to this property could protect or improve surface and/or groundwater quality by eliminating a potential source of contamination but will reduce local groundwater recharge from septic field infiltration. The existing single family home has a minor impacting water resources because it is not served by any stormwater management facilities, but it has a low percentage of imperviousness overall and disconnected downspouts. Stormwater management practices cannot be required for individual, existing developments under current regulations. However, the voluntary installation of a rain garden by the property owner would help to more effectively manage the stormwater runoff from the property, particularly in light of the proposed building addition.

It is the Regional Planning Commission staff's opinion that the proposed amendment is consistent with water quality standards under Wis. Stat. § 281.15. Regional Planning Commission staff recommends approval of this amendment, based on the land uses and services proposed. Additional actions have also been recommended below to further improve water quality and environmental resource management.

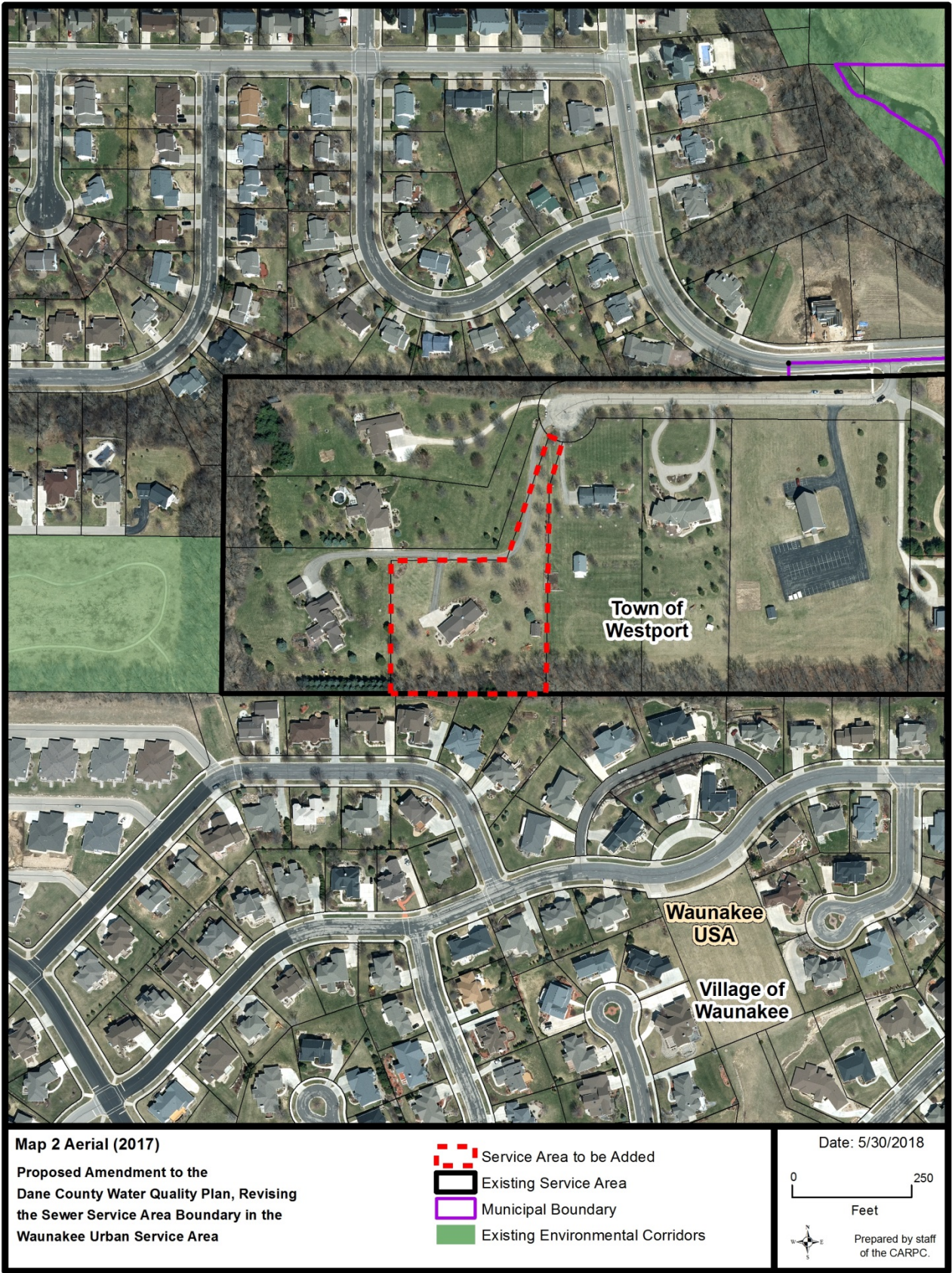
a) Recommendations

The property owner should consider installation of a rain garden to more effectively manage the stormwater runoff from the property. [Information about rain gardens is available from the Madison Area Municipal Stormwater Partnership.](#)

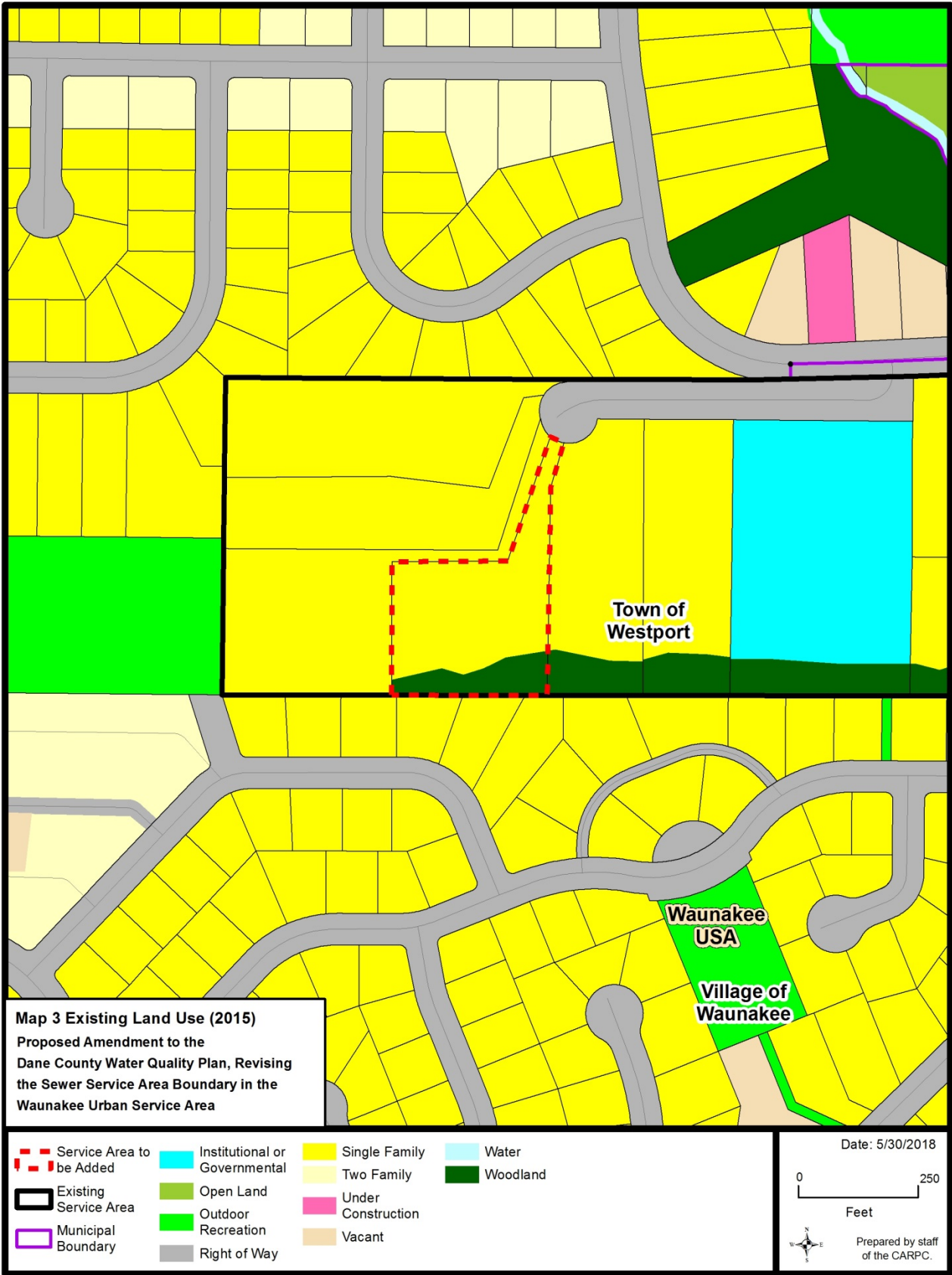
Map 1 - Amendment Area



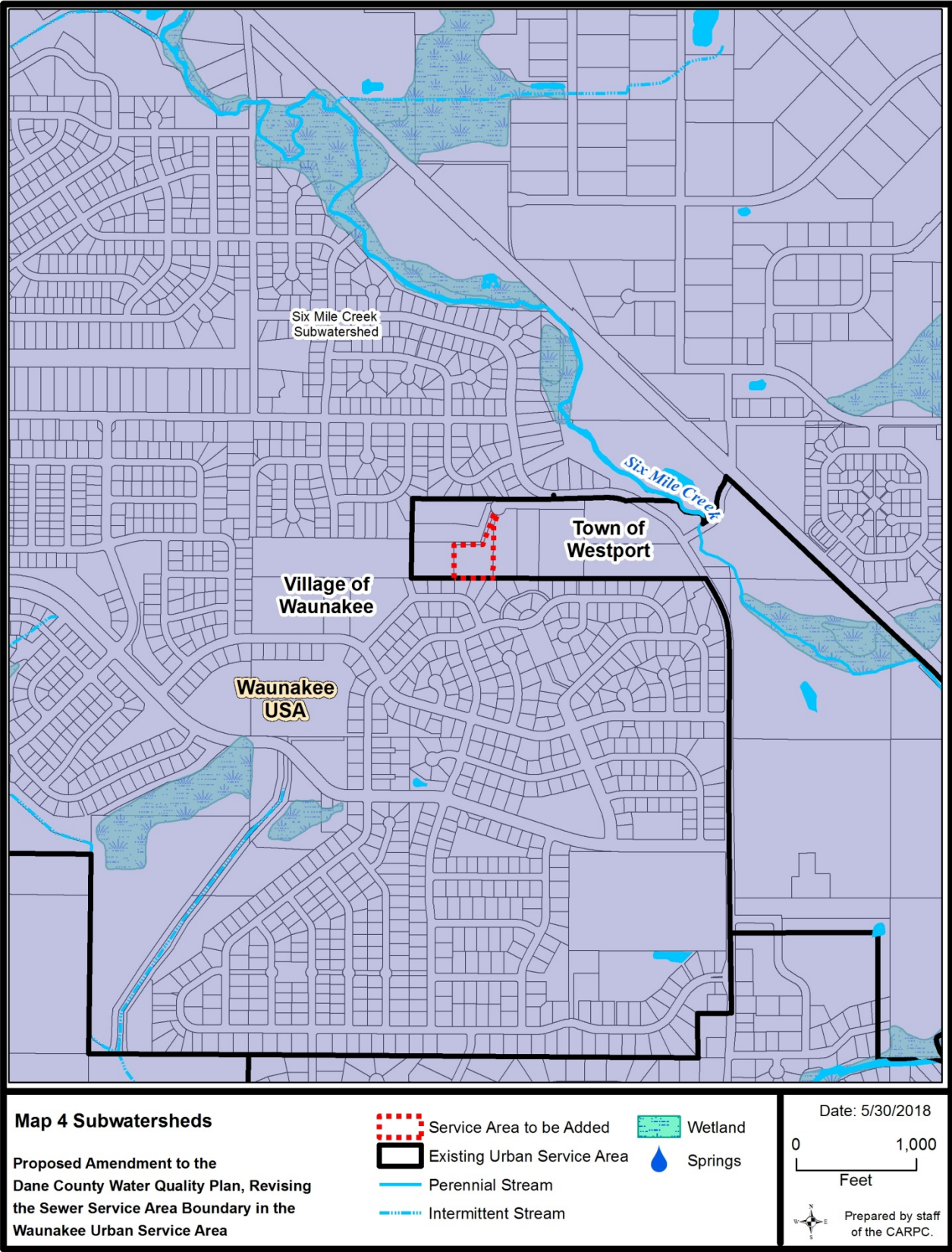
Map 2 – Aerial



Map 3 – Existing Land Use



Map 4 – Subwatersheds



Map 5 – Soil Types



Map 6 – Sanitary Sewer Service

