# Staff Analysis of Proposed Amendment to the Dane County Water Quality Plan, Revising the Sewer Service Area Boundary and Environmental Corridors in the Waunakee Urban Service Area

# History of the Amendments to the Waunakee Urban Service Area

The Waunakee Urban Service Area was established in 1971 with the adoption of the first sewer service plan. Environmental Corridors were delineated in 1985. The first amendment occurred in 1988. There have been 16 amendments to this service area since its creation totaling 1,562 acres of developable land and 674 acres of Environmental Corridor. The most recent amendment of the service area by the Village was recommended by the Commission and approved by the Wisconsin DNR (WDNR) in the spring of 2022, adding roughly 63 acres in the northeast corner of Waunakee (WDNR Project Number DC-0216).

# **Planning in Waunakee**

The Waunakee/Westport Joint Comprehensive Plan received its last major update in 2017. The requested amendment area is identified in that plan as future "community residential" development. The land use category is described in the plan as "urban and suburban-style residential use, including smaller lots and multi-family formats, and typically with public sewer and water service." The 2050 development scenario proposed by the <u>Regional Development</u> <u>Framework</u> (RDF) shows development matching what is indicated in the application for the proposed amendment area. However, development densities in the 2050 scenario model were higher than those currently proposed. Nonetheless, Village planning is generally consistent with the RDF and both pattern and locations of future development are consistent with the 2050 development scenario, especially in efforts toward redevelopment and infill along the community's two primary transportation axes: Main Street and South Century Avenue.

# **Existing Conditions**

## Land Use

The Village of Waunakee is requesting amendment to the Waunakee USA. The amendment area is west of Highway Q/South Century Avenue and south of Woodland Drive and the Waunakee Intermediate School. It is contiguous to planned residential development to the east and south. The areas to the north and east are within the current urban service area (see Map 3). The amendment area will be a continuation of the Kilkenny Farms-West development, which is currently planned for the area to the east and northeast (see Maps 9A and 9B). The planned future land use for the area is a mixture of residential and open space.

Surrounding Planned Land Uses Include (see Map 4):

- North: Institutional
- West: Agriculture
- South: Residential
- East: Residential

| Table 1<br>Existing and Planned Land Use |   |   |  |  |  |
|--|---|---|--|--|--|
| Land Use Category                        | Existing Land Use<br>Acres<br>(see Map 3) | Proposed Land Use<br>Acres<br>(see Map 4) |  |  |  |
| Agriculture                              | 23.1                                      |   |  |  |  |
| Parks / Open Space                       | 17.0                                      | 9.6                                       |  |  |  |
| Residential, Low-Density                 |   | 20.1                                      |  |  |  |
| Rights-of-Way / Transportation           |   | 5.4                                       |  |  |  |
| Stormwater Management                    |   | 5.0                                       |  |  |  |
| Total                                    | 40.1                                      | 40.1                                      |  |  |  |

## Cultural and Historic Sites

The Wisconsin Historical Society (WHS) has been contacted regarding the presence of any known archaeological sites or cemeteries within the proposed amendment area. During a prior amendment (#1705 in fall of 2017) WHS identified two previously recorded sites in the vicinity of the current amendment request area: a "lost" cemetery that is not well documented in the record and no longer visible on the land as well as an American Indian campsite/village. These sites are located to the northeast of the currently requested amendment area. In 2017, WHS recommended an archaeological survey be completed by a qualified archaeologist. WHS is requesting an archaeological survey of areas bordering any wetlands in the current amendment area prior to development construction, as these areas have the highest likelihood of archeological resources being found (see Attachment 1).

#### Natural Resources

The proposed amendment area is in the Sixmile Creek watershed (HUC 070900020602; see Map 5). A 10-acre wetland was delineated in the amendment area. No floodplains occur in 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) shows one wetland complex within the amendment area that is classified as palustrine persistent emergent narrow-leaved grazed wet meadow, palustrine broad-leaved deciduous forest, and palustrine broad-leaved grazed forested and scrub/shrub. This wetland complex is associated with Dorn Creek.

A wetland delineation (link to report) was conducted within the amendment area by Taylor Conservation, LLC, a DNR-qualified assured delineator in May 2022. The site investigation and field delineation determined there was one sedge/wet meadow wetland within the amendment area, totaling approximately 10 acres (see Map 11). This wetland has a surface water connection to Dorn Creek. The dominant vegetation was tussock sedge (*Carex stricta*), lake sedge (*Carex lacustris*), cattails (*Typha angustifolia*), jewel weed (*Impatiens capensis*), reed canary grass (*Phalaris arundinacea*), pussy willow (*Salix discolor*), red osier dogwood (*Cornus alba*), and cottonwood (*Populus deltoides*). This wetland, including a minimum 75' buffer, is required to be designated as environmental corridor per the adopted policies and criteria for environmental corridors (link to document).

The WWI also shows a continuation of the wetland complex identified above, downstream of the amendment area (see Map 5). Wetlands within the larger wetland complex are hydrologically connected to Dorn Creek.

### Dorn Creek

The proposed amendment area is within the Dorn Creek subwatershed. Dorn Creek, also referred to as Spring Creek (<u>WBIC 805600</u> / WATERSID 11694), flows approximately 6.5 miles through agricultural lands and ends in Governor Nelson State Park where it combines with Six Mile Creek and subsequently flows into Lake Mendota. The watershed covers 12.7 square miles and includes a few springs that contribute to the creek's base flow. Dorn Creek is approximately 0.4 miles southwest of the proposed amendment area boundary. Dorn Creek is listed as impaired by the WDNR for elevated water temperature, degraded biological integrity and recreational restrictions due to pathogens. These impairments stem from E. coli, Total Phosphorus, and Sediment/Total Suspended Solids.

There has been a WDNR monitoring location on Dorn Creek at the County Highway Q bridge (Station 133065) since 1995. Field measurements from 2019 indicated dissolved oxygen levels of 7.73 mg/L and a macroinvertebrate score of 4.2. The WDNR does not have any chloride monitoring data for Dorn Creek. The United States Geological Survey (USGS) baseflow monitoring station (USGS 05427930) indicated chloride levels of 35.4 to 36.4 mg/L in 2020. Chronic and acute toxicity levels are 395 mg/L and 797 mg/L, respectively. The creek is considered to have cool-cold headwater, macroinvertebrate, and cool-warm headwater natural communities.

## Sixmile Creek

The proposed amendment area is also within the Sixmile Creek watershed. Sixmile Creek (or Six Mile Creek) (WBIC 805500 / WATERSID 11691) is approximately 12.1 miles long and flows through the Village of Waunakee, ultimately draining into Lake Mendota. The 43-square-mile watershed encompasses predominately agricultural lands and the growing community of Waunakee. The creek is listed as an Exceptional Resource Water by the WDNR. The creek provides spawning areas for Lake Mendota's fish and offers a warm water sport fishery. Sixmile Creek is impaired for Total Phosphorus. There is a WDNR monitoring station at the confluence of Dorn Creek and Sixmile Creek (Station ID 10042332). Summer/fall 2017 field measurements indicated dissolved oxygen of 6.1 to 11.1 mg/L, an average transparency of 102.1 to 117.5 cm, and a macroinvertebrate index scores of 2.0 to 2.7. Limited chloride monitoring results from a station east of the amendment area at Mill Rd Bridge (Station ID 133063) indicated that chloride levels averaged 97 mg/L in 2011. There are no active USGS baseflow monitoring stations on Sixmile Creek downstream of the amendment area. Sixmile Creek has cool-cold and cool-warm main stem natural communities.

#### Springs

The Wisconsin Geological and Natural History Survey (WGNHS) maintains an inventory of springs in Dane County, and throughout the state. From 2014 and 2017, the WGNS surveyed springs statewide that were expected to have flow rates at least 0.25 cubic feet per second (cfs). There are no known springs in or near the proposed amendment area from that survey.

#### Groundwater

Groundwater modeling, using the 2016 Groundwater Flow Model for Dane County developed by the WGNHS (<u>link to website</u>), shows that baseflow in Sixmile Creek at the confluence with Dorn Creek (see location on Map 5) has decreased from 21.8 cfs during pre-development conditions (no well pumping) to 18.9 cfs in 2010 (Table 4). This decrease is 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 did not identify any within a one-mile radius of the amendment area. A one-mile buffer was considered for terrestrial and wetland species and a two-mile buffer for aquatic species. One federal reptile species of concern was identified within a two-mile radius. Additional review by the WDNR Bureau of Endangered Resources is not required.

The amendment area was reviewed for the High Potential Zone (species likely present) for the federally endangered Rusty Patched Bumble Bee. None of the proposed amendment area falls within the High Potential Zone.

#### Soils and Geology

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

Surface elevations within the amendment area range from around 900 feet to 976 feet. There is one ridge of steep (12-20%) slopes running southwest to northeast through the center of the amendment area (see Map 6). This area of steep slopes is not riparian and does not require inclusion in environmental corridors.

According to the USDA Natural Resource Conservation Service (NRCS) Soil Survey of Dane County, the soils in the amendment area are in Dodge – St. Charles – McHenry and Plano – Ringwood – Griswold associations. The Dodge – St. Charles – McHenry soils are moderately well drained and well drained, deep silt loams. The Plano – Ringwood – Griswold soils are moderately well drained and well drained, deep silt loams and loams. 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.

Hydric soils are good indicators of existing and former (drained) wetlands. There are four hydric soils within the amendment area – the Wacousta, Elvers, and Houghton soils (the Wa, Ev, and Ho map units) (see Map 7). Hydric soils also extend to the south/southwest, coinciding with the wetland complex described above, and to the northeast. The area to the northeast is a former wetland that has been drained through the installation of drain tile.

According to the Soil Survey Geographic data for Dane County developed by the NRCS (<u>link to</u> <u>web soil survey</u>), the Troxel, Plano and Elburn soils (the TrB, PnB, PnC2, and EfB 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. The Troxel and Plano soils are classified as well drained and moderately well drained, and therefore, do not pose a limitation for buildings with basements. The Elburn soil is classified as somewhat poorly drained and poses severe limitations for buildings with basements.

#### Table 2 Soils Classification

| Soil                            | % of Area | General Characteristics   |  |
|---------------------------------|-----------|---|--|
| Griswold Loam;<br>GwD2          | 15.4      | Deep, well-drained gently sloping to moderate steep soils on glaciated uplands. Soils have medium fertility, moderate permeability, and a very severe hazard of erosion. Poses severe limitations due to slope.   |  |
| Wacousta Silty Clay<br>Loam; Wa | 11.6      | 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.  |  |
| Elvers Silt Loam; Ev            | 11.1      | Poorly drained, nearly level soils on low benches and bottoms in stream valleys. Soils have medium fertility, moderately slow permeability, and no hazard of erosion. Poses very severe limitations for development due to bearing capacity, compressibility, and seasonal high water table.            |  |
| Houghton Muck; Ho               | 10.0      | Deep, very poorly drained, nearly level soils on low benches and bottoms in stream valleys. Soils have medium fertility, moderately rapid permeability, and no hazard of erosion. Poses very severe limitations for development due to compressibility, bearing capacity and seasonal high water table. |  |
| Troxel Silt Loam;<br>TrB        | 9.8       | 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 slight limitations for development due to depth to saturated zone and shrink-swell potential     |  |
| Plano Silt Loam; PnB            | 9.4       | Deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands.<br>Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses slight<br>limitations for development due to shrink/swell potential and low bearing capacity.          |  |
| Kidder Soils; KrD2              | 9.3       | Deep, well-drained, gently sloping to very steep soils on glaciated uplands. Soils have medium fertility, moderate permeability, and a very severe hazard of erosion. Poses severe limitations for development due to slope.  |  |
| Edmund silt loam;<br>EdC2       | 9.0       | Shallow, well drained gently sloping to moderately steep soils on uplands. Soils have low fertility, moderately slow permeability, and a very severe hazard of erosion. Poses severe limitations for development due to depth to bedrock, shrink-swell potential, and slope.                            |  |
| Plano Silt Loam. PnC2           | 8.4       | Deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands.<br>Soils have high fertility, moderate permeability, and a severe hazard of erosion. Poses slight<br>limitations for development due to depth to saturated zone, slope, and shrink-swell potential. |  |
| Sogn Silt Loam;<br>SoD          | 5.0       | Very shallow, excessively drained, gently sloping to very steep soils on dolomite-controlled uplands.<br>Soils have very low fertility, moderate permeability, and a very severe hazard of erosion. Poses<br>severe limitations for development due to slope and depth to bedrock.                      |  |

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

| Table 3<br>Soils Characteristics                            |                                 |           |  |  |
|---|---------------------------------|-----------|--|--|
| Characteristic  | Soil Map Symbols<br>(see Map 7) | % of Area |  |  |
| Prime Agricultural Soils                                    | PnB, TrB                        | 19.2      |  |  |
| Hydric Soils<br>(Indicates Potential / Restorable Wetlands) | Wa, Ev, Ho                      | 32.7      |  |  |
| Poorly Drained Soils with Seasonal High Water Table (< 5')  | Wa, Ev, Ho, EfB                 | 33.2      |  |  |
| Soils Associated with Steep Slopes (> 12%)                  | GwD2, KrD2, SoD                 | 29.7      |  |  |
| Soils Associated with Shallow Bedrock (< 5')                | EdC2, SoD                       | 14        |  |  |
| Best Potential for Infiltration in Subsoils                 | GwD2, KrD2, PnB, PnC2, RnC2     | 43.0      |  |  |

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

According to WGNHS data, bedrock within 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. According to WGNHS data, the depth to bedrock in the amendment area ranges from 50-400 feet, with the shallowest depths (50-100 feet) being in the northwest corner and deepest depths (100-400 feet) being in the southeast corner of the amendment area (see Map 8). Bedrock is not expected to be encountered during development of the site.

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. The WDNR Conservation Practice Standard 1002 - Site Evaluation for Stormwater Infiltration. This includes a site assessment for karst features in this area. If shallow karst features are found, adequate protection measures are required to address any potential for groundwater contamination. Given the depth of bedrock, karst features are not expected to be encountered.

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 is a total of approximately 14.6 acres of open space and stormwater management areas proposed in the amendment area (see Map 4). There are four small stormwater management areas, totaling 0.9 acres, proposed in the amendment area. One larger open space area containing stormwater management features and the delineated wetland is also proposed, totaling 13.7 acres.

# Wastewater

Sanitary sewer service will be provided to the proposed amendment area by connection to the Village's existing sanitary sewer collection system. Within the amendment area, the proposed lots will be served by 8-inch and 12-inch sanitary sewer main and individual sewer laterals. The 12-inch sewer main runs through the amendment area to the western edge for possible future extension west. The amendment area and a portion of the currently planned Kilkenny Farms-West development (within the existing Waunakee Urban Service Area) will gravity drain via a 12-inch interceptor sewer main to a local pump station within the amendment area, then be pumped to existing sanitary sewer within CTH Q via forcemain, eventually reaching the Village's Ashlawn Pumping Station (Ashlawn PS). Refer to Map 9A for an overview of proposed sanitary sewer main within the amendment area. Downstream of the Ashlawn PS, wastewater flows within a Village-owned 12-inch interceptor to the Madison Metropolitan Sewerage District system (MMSD). All of Waunakee is served by the Northeast Interceptor-Waunakee Extension sewer pipe and flows to the MMSD Pumping Station 14, then eventually to the Nine Springs Treatment Facility.

The proposed development within the amendment area consists of approximately 59 singlefamily residential units contributing to wastewater flows. Note: there are 3.5 additional lots within the southeast corner of the amendment area which have been omitted from this analysis due to the negligible additional flow generation and proximity to the existing development area already within the USA. The Village's application estimates that the amendment area will generate an annual average of 12,980 gallons per day (gpd) of wastewater, or 9 gallons per minute (gpm). This assumes 2.75 persons per dwelling unit and an average wastewater generation rate of 80 gpcd for residential land uses, per flow metering data contained in the *2018 Sanitary Sewer Comprehensive Plan for the Village of Waunakee*, prepared by Strand Associates, Inc. on behalf of the Village of Waunakee (hereinafter, *2018 Sanitary Sewer Comprehensive Plan*). The Village's application also estimates that infiltration and inflow will contribute an additional 105 gpd/ac and 232 gpd/ac, respectively. Together with the above generation rates, and assuming a peaking factor of 4.0 for the residential loading, the peak daily loading is anticipated to be approximately 65,434 gpd, or 45 gpm.

The proposed 8-inch sanitary sewer mains within the amendment area are anticipated to have a minimum capacity of 332 gpm, based on a design slope of 0.40% (minimum allowable per NR 110), which will provide sufficient capacity for the anticipated daily peak flows from the amendment area. The proposed 12-inch interceptor sewer within the amendment area is anticipated to have a minimum capacity of 714 gpm, based on a design slope of 0.22% (minimum allowable per NR 110), which will provide sufficient capacity for the anticipated daily peak flows from the amendment area as well as provide for possible future development to the west.

Based on drawdown and flow testing performed by the Village in 2023, the capacity of the Ashlawn PS is 790 gpm and the capacity of the upstream 12-inch interceptor is 929 gpm (value in application corrected to account for actual pipe diameter in calculation). The existing peak flow at the pumping station and upstream 12-inch interceptor is 288 gpm. To assess the remaining capacity, the application includes additional development within the service area of the Ashlawn PS, including the additional loading from the amendment area. Using a 2.5 peaking factor (for >250 ac basin size), the additional peak daily loading on the system is 192 gpm. As such, the receiving interceptor and Ashlawn PS have sufficient capacity for the anticipated daily peak flows from the amendment area.

The existing 12-inch interceptor downstream of the Ashlawn PS is a critical location from a capacity-standpoint to handle the additional flows from the amendment area; however, there remains sufficient capacity. Based on the 2023 flow testing, the capacity of the downstream 12-inch interceptor is 929 gpm (value in application corrected to account for actual pipe diameter in calculation) and the peak flow is 790 gpm (capacity of pumping station). The peak flow already includes the additional flow from the amendment area since the pumping station will regulate the flow, and conservatively, the application includes an additional 40 gpm for additional development to the east. Notwithstanding, the interceptor has sufficient capacity.

#### 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 staff were contacted regarding this amendment and responded that they don't see it as a problem for the District to serve this small additional area. They also noted that they are currently designing a relief sewer to provide additional capacity to the Northeast Interceptor just southeast of the Village.

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 Village's municipal water system. The Waunakee Water and Light Commission provides municipal water through a public water distribution system which includes approximately 391,221 lineal feet of water main, three booster pump stations, and five high-capacity groundwater wells. Four wells pump directly into the distribution system, and one pumps into a reservoir. The active wells are at depths ranging from approximately 420 to 752 feet with a capacity of 650 to 1,200 gallons per minute (gpm). In total, the gross capacity of the municipal wells is approximately 5,050 gpm (7.27 million gallons per day, MGD). The firm capacity (with the largest well

assumed to be out of service) is approximately 3,850 gpm (5.54 MGD). The Village has four elevated storage tanks and one ground-level reservoir, with a combined capacity of 1.35 million gallons.

The Water System Study Update for Waunakee Utilities, prepared by Strand Associates, Inc. in 2018 (hereinafter, 2018 Water System Study), identified this amendment area as an area of future growth and determined that it could generally be served by the existing water distribution system (referred to as "Southwestern Serviceable Area" within report). In general, the report states that the existing water system is adequate for future development projections out to 2030, although development above an elevation of 960' may require booster pumps to provide acceptable pressures. It also identified the Kilkenny Farms-West development as a suitable location for a new high-capacity well and water storage to be constructed as the need arises (proposed site not within this amendment area).

According to the 2021 Annual Report to the Public Service Commission of Wisconsin (2021 Annual Report), the Village pumped an average of 1,050 gpm (1.51 MGD) in 2021, approximately 27% of its firm pumping capacity. In 2021, the peak daily demand (maximum amount pumped in any one day) was 3,005 gpm (3.01 MGD), which was reported to be due to extreme weather conditions. Current average daily demand on the water system is 1,310,200 gpd (1.31 MGD) or 910 gpm, based on water sales (excludes water losses and other non-revenue water). The Village estimates the current peak hourly demand to be 4,550 gpm, based on a peak daily demand factor of 2.5 (ratio of maximum day to average day) and a peak hourly demand factor of 2.0 (ratio of maximum hour to maximum day).

Water losses in the Villages' distribution system was an average of 199,033 gpd (0.19 MGD) in 2021, which accounted for 13% of the net water supplied in 2021. Approximately 98% of this was due to unreported and background leakage, with the remaining due to reported leaks. In 2021, there were 0 main breaks and 7 service break which were repaired. Water losses in the Village's distribution system was 11% in 2019 and 12% in 2020. 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%.

The proposed amendment area is a continuation of the proposed Kilkenny Farms-West development adjacent to the east (west of County Rd Q / south of Woodland Dr) and already within the Waunakee USA. The amendment area will be constructed in succession to those lands. According to the application, 12-inch water main will be extended from the east through the amendment area and stubbed at the west end for possible future extension west. Within the amendment area, 8-inch water mains will be extended throughout, and individual service connections will be provided to each proposed lot. Refer to Map 9A for an overview of proposed water main.

The Village's application estimates the annual average daily water demand for the approximately 59 single-family residential units within the amendment area to be 13,366 gallons per day (gpd), or 9 gallons per minute (gpm). Note: there are 3.5 additional lots within the southeast corner of the amendment area which have been omitted from this analysis due to the negligible additional flow generation and proximity to the existing development area already within the USAA. This assumes an average demand of 82 gallons per person per day (gpdc), based on the average water usage in the Village over the past five years, and 2.75 persons per unit based on 2020 Census data. The estimated peak daily demand is 33,415 gpd or 23 gpm (0.03 MGD), based on a peak daily factor of 2.5 (ratio of maximum day to average day). The estimated peak hourly demand is 46 gpm, based on a peak hourly demand factor of 2 (ratio of maximum hour to maximum day). The Village's application also includes a "sales to pumping ratio" of 88%, based on the 2018 *Water System Study*. Using this, the application estimates the additional peak hourly pumping necessary to meet the demand from the amendment area to be 53 gpm. These estimates are reasonable based on typical land use demands and the 2021 Annual Report.

The estimated average daily water demand and peak daily demand represent an increase of approximately 1% of the current demands on the pumping system. During peak hourly times, water demand may exceed pumping capacity and may need to be taken from storage; however, there is adequate storage capacity to handle this. The anticipated total demand remains well below the available firm capacity of the water supply system. Therefore, it is anticipated that the existing water supply system will support the additional demand from the proposed amendment area.

## Stormwater Management System

The Village of Waunakee stormwater management and performance standards are contained within Chapter 109 of the Village of Waunakee Code of Ordinances. The Village contracts with Strand Associates for stormwater management plan review. 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. Development within the amendment area will be required to follow the more protective standards contained within the respective ordinances.

The proposed amendment area is comprised of approximately half natural areas (wooded slopes and wetlands) and half active agricultural land uses. The 40-acre area represents 1.5% of the 2,755-acre Sixmile Creek subwatershed (HUC 12) and less than 1% of the 13,363-acre Lake Mendota-Yahara River watershed (HUC 10). There is a high point and ridge in the northern third of the amendment area, which splits the existing drainage into two general subwatersheds and discharge locations, where runoff from the northern third flows northwest and offsite and runoff from the southern two-thirds flows to the wetlands onsite and then offsite. The wetland is within a larger drainageway that also receives significant flow from the eastern portion of Kilkenny Farms-West and upstream areas, a portion of which is former wetlands that have been drained. After leaving the amendment area, runoff flows through offsite lands within the Town of Westport and concentrates within mapped perennial streams or constructed drainageways, then enters Dorn Creek approximately 2,000 feet south of the amendment area. In both cases, the runoff flows through a large wetland complex (refer to the *Natural Resources* section of this report for additional information).

The amendment area is not within a thermally sensitive watershed. The wetlands contained within the amendment area will require pretreatment of stormwater runoff (for total suspended solids (TSS) and Peak Rate Control) prior to entering the wetlands in accordance with NR 151 regulations. This will need to be provided by the proposed stormwater management facilities.

A detailed stormwater management plan for the amendment area has not been prepared yet, however the Village's application includes a conceptual layout of proposed stormwater management locations which includes a series of stormwater basins across the amendment area (see Map 9B). Within the amendment area, runoff will be collected and conveyed within a network of storm sewers to one of the stormwater basins prior to discharge to the onsite wetlands. In the proposed conditions, a portion of the northern third area which currently drains to the northwest will be routed to the south for treatment. Otherwise, the post-development drainage conditions generally match the predevelopment conditions. The application states that all requirements for water quality treatment, volume control and infiltration, and peak flow attenuation will be met. The proposed stormwater management facilities are anticipated to be located within public outlots and will ultimately be owned and maintained by the Village.

The application states there are no anticipated impacts to downstream drainage patterns. South of the amendment area, Dorn Creek flows beneath Meffert Road through an existing culvert. The size of culvert is unknown; however, based on current FEMA floodplain mapping for the 1%-annual-chance and 0.2%-annual chance flood events, it appears the culvert acts as a flood control device and water backs up behind it. During a very large storm event exceeding the capacity of the culvert, stormwater will overtop Meffert Road at the location of the culvert at approximately elevation 895.5'. Based on a desktop review of these conditions and the relative size of the amendment area to the contributing watershed, it appears this additional development will have a negligible impact on these downstream drainage conditions.

The final stormwater management plan is anticipated to be designed to include both the current proposed amendment area and the eastern portion of Kilkenny Farms-West (within the existing Waunakee Urban Service Area, subject to Resolution 2017-21). A preliminary soil investigation completed by the development design team indicated variable infiltration potential across the site, including areas of high groundwater and poor soil conditions for infiltration. The final location and design of stormwater management practices will need to account for these conditions and should consider green infrastructure practices such as dispersed rain gardens, porous pavement, green roofs, and stormwater trees, along with alternative volume control practices such as rainwater harvesting and reuse to meet the respective stormwater requirements on a site-wide basis.

#### Performance Standards

The Village of Waunakee proposes stormwater management performance measures for the amendment area to meet applicable standards required by the State of Wisconsin (NR 151), Dane County (Chapter 14), and Village of Waunakee (Chapter 109) stormwater regulations at the time of the stormwater management plan approval, which currently include:

- 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 in a retention pond 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 1-year, 24-hour design storm. This is consistent with the standards currently required by Dane County and Village of Waunakee ordinances.
- 2. Require post-construction peak runoff rate control for the 1-, 2-, 10-, 100-, and 200year, 24-hour design storms (using NRCS MSE4 storm distributions) to match predevelopment peak runoff rates. This is consistent with Dane County and Village of Waunakee ordinances.
- 3. Require post-development infiltration (stay-on) volume of at least 90% of the predevelopment infiltration (stay-on) volume for the average annual rainfall series. This is consistent with the standards currently required by Dane County and Village of Waunakee ordinances.
- 4. Maintain predevelopment 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 Village of Waunakee ordinances.

# **Impacts and Effects of Proposal**

## **Environmental Corridors**

The proposed amendment area includes 16.4 acres of Environmental Corridor (see Map 2). This will include the delineated wetland with associated buffer, proposed stormwater management areas, and proposed open space in accordance with the Environmental Corridor Policies and Criteria (link to document) adopted in the *Dane County Water Quality Plan.* Some of what is proposed as Environmental Corridor also coincides with mapped Stewardship Areas, as described below.

Protection Areas are 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 14.5 acres within the proposed amendment area mapped as Protection Area for the delineated wetland and its required vegetative buffer (see Map 12).

One of the <u>Regional Development Framework</u> (RDF) objectives is aimed at achieving the goal of conserving water resources and natural areas. Stewardship Areas are advised to be considered for inclusion in Environmental Corridors, above the minimum requirements, to address these objectives of the RDF. 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 contains 1.6 acres mapped as Stewardship Area, including potentially restorable wetlands and hydric soil, of which 0.3 acres are proposed to be designated as Environmental Corridor by this amendment (see Map 12).

# Meeting Projected Demand

Interim CARPC projections for 2050 suggest that an additional 9,000 residents, 2,800 housing units, and 4,100 jobs can be expected in the Waunakee Urban Service Area over the next 30 years. Modeling in Urban Footprint for the <u>Regional Development Framework (RDF</u>) suggests that future development of the square mile (640 acres) southwest of the intersection of Woodland Drive and South Century Avenue (Highway Q) will accommodate 230 new jobs and 960 additional housing units.

# Phasing

The requested amendment is less than 100 acres. A phasing plan is not required.

# 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 adopt 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 Village of Waunakee 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 applicable 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. Village of Waunakee staff attended winter salt certification class for winter road maintenance in 2017. Since then, they have instituted annual calibration of all salt-spreading equipment. They spot salt as needed on hills, curves, and intersections, typically at a rate of 100lb/lane mile. Three of their seven trucks have pre-wet capabilities. In 2023, they purchased a 500-gallon skidmounted sprayer tank for anti-icing. It is recommended that Village of Waunakee Department of Public Works staff attend a Smart Salting class in 2023 and/or utilize other continuing education opportunities through WI Salt Wise (classes, open house events, webinars) or Wisconsin APWA (Winter Maintenance Certification classes, etc.) to remain current on best practices.

The Village of Waunakee 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 groundwaterdominated 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 2.9 cfs decrease in baseflow in Sixmile Creek at the confluence with Dorn Creek (see location Map 5) from predevelopment (no pumping) to 2010 (Table 4). An additional 1.0 cfs decline compared to 2010 conditions is anticipated for the year 2040, according to modeling, reducing the baseflow to 17.9 cfs.

| Table 4Modeled Baseflow ResultsDue to Current and Anticipated Future Municipal Well Water Withdrawals (All<br>Municipal Wells) |            |          |          |  |  |  |
|--|------------|----------|----------|--|--|--|
| Stream   | No Pumping | 2010     | 2040     |  |  |  |
| Sixmile Creek  | 21.8 cfs   | 18.9 cfs | 17.9 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 April 13, 2023, meeting of the Capital Area Regional Planning Commission. The Village of Waunakee Community Development Director, consulting engineer for the village, and the engineering consultant for the proposed development gave an overview and spoke in favor of the amendment. There were no registrants opposed to the amendment. Several Commissioners inquired about complete neighborhoods, community gardens, and transit for the proposed development.

# **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 adopt 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 Village of Waunakee 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 applicable 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 applicable 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 "pre-development" levels, in accordance with the Village of Waunakee and Dane County Stormwater Ordinances.
  - 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), in accordance with the Village of Waunakee 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 Village of Waunakee and Dane County Stormwater Ordinances.
  - e. 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 Village of Waunakee and Dane County Stormwater Ordinances.
- 2. Easements and perpetual legal maintenance agreements with the Village, to allow the Village 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*.

## Recommendations

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

- 1. Continue to participate in regional water quality initiatives including Wisconsin Salt Wise, the Madison Area Municipal Storm Water Partnership, and Yahara WINs.
- 2. Require an archaeological survey be performed by a qualified archaeologist for the amendment area as recommended by the Wisconsin Historical Society and take necessary protection measures if artifacts are found.







Map 3 – 2022 Land Use













Map 7 - Soil Type











Map 9A - Proposed Sanitary Sewer and Water Main



Map 9B – Proposed Stormwater Management







## Map 12 - Proposed Environmental Corridor





April 28, 2023

Mr. Sean Higgins Capital Area Regional Planning Commission 100 State St, Ste 400 Madison WI 53703-2573

RE: Proposed Amendments to Waunakee (Dane County) Urban Service Area

Dear Mr. Higgins:

No previously recorded archaeological sites have been recorded in the parcel delineated in the amendment. However, the proposed Service Area is in proximity to a wetland and is adjacent to an area where cultural resources have been reported in the past. We recommend that phase I archaeological survey take place along the margins of the wetland area, in the areas of highest potential for archaeological resources.

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 <u>local</u> <u>authorities must be contacted</u>. The police or sheriff will determine if the burial is a criminal matter or if it should be referred to the Wisconsin Historical Society at 1-800-342-7834 to be in compliance with Wis. Stat. § 157.70 which provides for the protection of all human burial sites. Work cannot resume until the Wisconsin Historical Society gives permission.

This letter does not constitute a Wisconsin Historical Society review for any project that may be governed by Federal or State Compliance laws, e.g. Section 106, Wis Stat. §44.40, Wis Stat. §66.1111, or Wis Stat. §157.70

If you have any questions, or if you need additional information, please feel free to contact me.

Sincerely; & Koselso anis

Amy L. Rosebrough, PhD Interim State Archaeologist State Archaeology and Maritime Preservation 608-264-6494 Amy.Rosebrough@wisconsinhistory.org

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