VILLAGE OF OREGON

URBAN SERVICE AREA AMENDMENT REQUEST: AUTUMN RIDGE PHASES 3 AND 5

JUNE 10, 2023

VILLAGE OF OREGON

VANDEWALLE & ASSOCIATES

Table of Contents

Introduction

The Village of Oregon is requesting a 47.2-acre addition to its Urban Service Area to provide sanitary sewer, potable water, and other urban services to a site immediately south of the Village's municipal boundary on the east side of CTH MM. As depicted on Map 1 in Section 3.1, this would include 25 acres currently within the Town of Rutland, 21.2 acres in the Town of Oregon, and 1 acre of CTH MM right-of-way, immediately adjacent to the Village's current USA boundary.

One portion of the project (56.1 acres) is already located within the Village's Urban Service Area. The other portion of the project (47.2 acres) is not located within the Village's Urban Service Area. Both areas are currently unincorporated and are anticipated to be annexed into the Village this summer.

As part of the Urban Service Area Amendment request (47.2 acres), 21.2 acres are currently in an agricultural/farmhouse use, while the other 25 acres is currently in a golf course use presently owned by "Hofer Living Trust". The remaining area (1 acre) is street right-of-way along CTH MM.

The developer, Glenn Hofer, currently owns all parcels and is proposing to develop a Planned Neighborhood residential area called "Autumn Ridge Phases 3, 4, and 5". It is likely that CTH MM will be annexed along with the subject properties, and the Village is planning jurisdictional transfer of the road to the southern edge of the proposed USA amendment area within the next two years.

On June 1, 2023, the Village of Oregon Plan Commission recommended a Resolution to the Village Board to initiate an Urban Service Area Amendment for the 47.2 acres and that the proposed development within the Urban Service Area Amendment is consistent with the Village Comprehensive Plan. On June 5, 2023, the Village of Oregon Village Board adopted the recommended Resolution (Appendix A).

Plan Consistency and Need

1.1. Document Consistency

With the exception of existing right-of-way on CTH MM, the bulk of the proposed USA addition is depicted as Planned Neighborhood on the Village's Future Land Use Map (Map 3b), which is part of the Village's Comprehensive Plan. This map was most recently amended in 2023 to change the planned Phase 4 (as shown on Map 1a) and the planned Phase 5 (as shown on Map 1a) from Recreational Business to Planned Neighborhood. The 21.2-acre portion of the proposed USA addition area fronting on CTH MM (Phase 3 as shown on Map 1a) has been identified as Planned Neighborhood dating back to the 2004 Comprehensive Plan.

The Village's Planned Neighborhood land use category is described in the Comprehensive Plan as, "A carefully planned mixture of predominantly Single-Family Residential, combined with one or more of the following land use categories: Two-Family Residential, Mixed Residential, Neighborhood Office, Neighborhood Commercial, Institutional, and Parks and Open Space."

The concept plan for the amendment area (Map 1a) is consistent with this description. The site is expected to include primarily single-family residential, some two-family residential, stormwater management areas, and public recreation facilities. The Comprehensive Plan also notes (p. 52) that areas were only depicted as Planned Neighborhood if they could "logically be served by current and planned sanitary sewer facilities." The Village's Future Land Use Map (Map 3b) also depicts a "Potential Urban Service Expansion Area", which includes the requested amendment area in this application.

The planned land use is a logical continuation of the residential neighborhood currently under construction in Autumn Ridge Phase 1 and 2, directly west of the proposed USA Amendment area. It is also a logical continuation of the existing residential neighborhoods in the Village to the north surrounding the golf course. Finally, the proposed amendment is consistent with the single-family residential uses in the Town of Oregon to the south of the proposed amendment area. In total, the proposed development of Phases 3, 4, and 5 serves as a form of infill development between existing Village neighborhoods and utilities (to the north and west), and existing Town neighborhoods (to the south).

Overall, throughout the Comprehensive Plan a wide variety of goals, strategies, and recommendations align with the proposed development related to transportation, housing, land use, utilities, and community character.

Oregon Park and Recreation Plan (2018) (Appendix B):

- Planned park location near the proposed amendment area was established in Phase 2 is shown on the Map 3. No planned parks or trails are located within the proposed amendment area, but one is proposed to serve Phase 5.
- Overall, the proposed development aligns with the community goals, helps meet the projected future needs and demands, and implements the recommendations for future park and trail locations.

Beginning in early 2023, the Village started an update of both the Comprehensive Plan and Park and Recreation Plan. Significant public input was done at the forefront of this process in January – March. Below is a summary of key related input to the proposed USA amendment:

- Expand housing options, parks, trails, and open space, promote a small town feel and grow sustainably, optimize land use growth opportunities, grow efficiently on public utilities, and mitigation of flooding through proper stormwater management.

It is anticipated that both plans will be completed and adopted by the end of 2023, incorporating several of these key ideas and topics, which also align with the proposed USA amendment.

As noted above, approximately half of the proposed USA Amendment area is in the Town of Oregon and the other half is in the Town of Rutland. To note, the entire amendment area is within the Village's Extraterritorial Jurisdiction (Map 3b).

- Town of Rutland Comprehensive Plan (2007) (Appendix C)
    - Proposed Phase 5 parcel shown as Residential – Medium Density (1 acre lots) on the Town's 2017 Amended Future Land Use Map.
- Town of Oregon Comprehensive Plan (2010) (Appendix C)
    - Proposed Phase 3 and 4 parcels shown as Agricultural Preservation Area on the Town's Future Land Use Map.
    - Proposed Phase 3 and 4 parcels shown as Agricultural Transition Area on the Town's Farmland Preservation Plan Map.

Finally, the Village's Comprehensive Plan and Park and Recreation Plan are consistent with CARPC's 2050 Regional Development Framework. In addition, the Village's recent housing projects as documented in Section 1.3 below are consistent with the framework.

While the proposed USA Amendment and conceptual plans don't align perfectly with the Regional Development Framework's goals and objectives, the Village-wide approach to urban development patterns and housing do reflect the framework's overarching goals and objectives more closely. In the broader perspective, these include providing walkable neighborhoods, diversity in housing, increasing infiltration of stormwater runoff, generating new housing supply to meet demands, enhancing stewardship areas, and ensuring good connectivity among developments.

On June 1, 2023, the Village of Oregon Plan Commission recommended a Resolution to the Village Board to initiate an Urban Service Area Amendment for the 47.2 acres and that the proposed development within the Urban Service Area Amendment is consistent with the Village Comprehensive Plan. On June 5, 2023, the Village of Oregon Village Board adopted the recommended Resolution (Appendix A).

1.2. Applicable Neighborhood Plan or Studies

In 2017, the landowner and developer, Glenn Hofer, originally developed the neighborhood plan, which included Autumn Ridge Phases 1, 2, and 3. The original plan is nearly identical to what is currently being completed in Phase 1 and 2, and the concept plan for Phases 3 (in the proposed amendment area). In 2022, Glenn Hofer purchased the Foxboro Golf Course and then developed the neighborhood plans for Phase 4 and 5, in addition to a golf course reconfiguration plan (Appendix D).

The concept plan for the proposed amendment area includes mostly mid-sized single-family lots, with some two-family residential lots (Map 1a and Attachment E), consistent with the Planned Neighborhood land use category described in Section 1.1. The concept plan also includes increased bicycle and pedestrian accommodations throughout each phase, in addition to a park for increased outdoor recreational opportunities in this area of the Village.

As part of the plan, utility and infrastructure connectivity is significantly improved. This includes:

- Foxfield Road extension across CTH MM to serve as the main connection to Phase 3, 4, and 5.
- Foxboro Drive extension south from its existing terminus at the golf course club house to serve Phase 4 and 5.
- Interconnected stormwater infrastructure between Phase 3, 4, and 5 with improved stormwater management on the golf course.
- Interconnected sewer and water infrastructure between Phase 1, 2, 3, 4, and 5 and the existing Village neighborhoods to the north.

1.3. Need for the Addition to the USA

Historically, Oregon has grown in three directions from downtown: to the northeast between CTH MM and the USH 14 Bypass, to the west along both sides of Jefferson Street between Netherwood Road and Lincoln Road, and to the southeast along both sides of Janesville Street and Wolfe Street between Union Road and the USH 14 Bypass. The Village has a very low inventory of developable lots on its southeast side, with the remaining 4 unsold lots in Autumn Ridge Phase 2 as the only currently available supply. All other vacant lots in the community are located on either the northeast side or west side of the Village. In total, there are approximately 134 vacant platted residential parcels in the Village as of 2022. The majority of these parcels are zoned for single-family development. See Appendix F from the Village's 2022 Housing Affordability Report Map.

Autumn Ridge Phase 2

Sold to Home Builders	27 out of 31 Lots
Not Yet Under Construction	17 out of 31 Lots
Under Construction	7 out of 31 Lots
Sold to Homeowner	13 out of 31 Lots

Source: Glen Hoffer, Developer
To note, all lots have been sold and developed as part of Autumn Ridge Phase 1.

With the addition of new lots and homes in Autumn Ridge Phases 3, 4, and 5, some turnover in the existing housing stock could take place as existing residents move into the proposed development. While the new single-family homes will not be considered affordable housing by Dane County area median income standards, some of the existing housing stock vacated by residents moving to the new development could provide availability of more affordable housing units within the existing municipal boundaries. Furthermore, the planned new two-family units within the proposed development (Phase 3) also provides some additional housing diversity in the Village, in addition to new affordable units.

Other ongoing or near-term residential housing projects in the Village that are recently completed or under construction include:

- 153 workforce and senior apartments (Prairie Brook Apartments)
  - Completed in 2022
- 49 market rate apartments (Rosewood Apartments)
  - Completed in 2021
- 133 mixed housing units (Highlands of Netherwood Neighborhood)
  - Completed in 2022: Phase 1 and 2

    - Ongoing construction: Phase 3 and The Villas
    - To be constructed in the future: Phase 4
- 210 mixed housing units (Veridian Greenview Preserve Neighborhood)
    - To be constructed in the future: 104 single-family units, 78 carriage single-family units, and 28 twin homes
- 31 single-family housing units (Autumn Ridge Phase 2)
    - Ongoing construction: 31 units
- 25 single-family housing units (Bergamont Phase 5D)
    - Ongoing construction: 25 units
- 70 workforce apartments (Northpointe CC Lane)
    - To be constructed in the future: anticipated completion in 2024/2025
- 49 market rate apartments (Coyle N. Main Street Apartments)
    - To be constructed in the future: anticipated completion in 2024/2025

In the 2013 Comprehensive Plan, it was projected that by 2030 the Village would have a total population of 13,943 residents (increase of 4,712 from 2010) and 5,530 total housing units (an increase of 1,755 from 2010). It was also projected, to support this growth, the Village would need an additional 440 acres of residential land. While the Village's Comprehensive Plan analysis is dated, the Village's actual population in 2022 (11,815 residents) was not far from the 2020 projected population total in the 2013 plan (11,587 projected total population). A more up to date population projection for the Village was recently done as part of the Comprehensive Plan update in early 2023. It projects a population total of 13,639 by 2030 and 15,919 by 2040.

CARPC's Regional Development Framework also provides population projections for the Village of Oregon, which show the Village's population increasing by 58% or 5,962 residents between 2020 and 2050 (Table 3). Household projections for the Village of Oregon show a 51% increase or 2,063 new households over that same time period (Table 4).

The only significant recent Village annexations have been Autumn Ridge Phase 1 (17 acres) and Phase 2 (20 acres) and the Highlands of Netherwood (75 acres). In order to support the projected population increase over the next 10 years, the USA addition of 47.2 acres and 118 new housing units in Autumn Ridge Phases 3, 4, and 5 are needed to meet demand and continue to diversify the community's available housing stock.

In total, the Village is actively working to meet residential housing demand through a mix of housing styles, types, and affordability levels, all of which are either under construction today or ready to be constructed to meet the community's residential demand in the near future. The Village had a 2.8% housing vacancy rate in 2021, well below a healthy community's housing vacancy rate of 5%.

Intergovernmental Cooperation

2.1. Document Notification of Adjacent Local Governmental Units

The developer and Village staff hosted a public neighborhood meeting in 2022 to discuss the proposed golf course reconfiguration and neighborhood plan for Phases 3, 4, and 5. Several neighbors within the Town of Oregon attended the meeting and provided feedback on the proposed plans.

Additionally, the developer and Village staff attended a Town of Oregon meeting on July 18, 2023 where the proposed amendment, development, and eventual Village annexation was discussed.

Finally, the developer and Village staff also contacted Town of Rutland staff about the project, but have not yet received any feedback.

All documentation related to these initiatives will be provided to CARPC once completed.

2.2. Adjacent Local Governmental Unit(s) Objections or Support

During the various Town meetings that took place, Town residents asked questions and provided feedback on the proposed plans. Comments generally centered on stormwater management in and around the proposed development. Any documented letter of support, neutrality, or opposition from the Towns will be provided to CARPC.

Land Use

3.1. Proposed USAA Boundary and Existing Rights-of-Way Map

See Map 1. The proposed addition to the USA is comprised of two existing parcels and one portion of road right-of-way.

One parcel, totaling 21.2 acres, is currently being farmed with one existing farmhouse on-site (Phase 3). One parcel, totaling 25 acres, is currently being used as part of Foxboro Golf Course (Phase 5). Both are owned by Hofer Living Trust, the intended developer of Phases 3, 4, and 5, Glenn Hofer. One continuous piece of road right-of-way along CTH MM constitutes the rest of the proposed amendment area. CTH MM is a collector road that links the Village to existing residential development in the Town of Oregon. Any future access onto CTH MM will need to be approved by Dane County.

While not part of the proposed USA amendment area, the proposed development also includes 24.6 acres in Phase 4, which is currently being used as part of the Foxboro Golf Course.

3.2. USA Amendment Area Data

Existing Land Use Within Proposed USA Amendment Area (Phases 3 and 5)

	Existing Total Acres	Existing Developed Acres On-Site	Existing Enviro Corridor Acres	Existing Housing Units
Existing Land Use				
Agriculture/Farming/Farmhouse	21	2.0	0.0	1
Golf Course	25.1	0.8	0.0	0
Street Right-of-Way	1.1	1.1	0.0	0
Total	**47.2**	**3.9**	**0.0**	**1**

Existing Land Use Within Proposed Neighborhood (Phase 3, 4, and 5)

	Existing Total Acres	Existing Developed Acres On-Site	Existing Enviro Corridor Acres	Existing Housing Units
Existing Land Use				
Agriculture/Farming/Farmhouse	21	2.0	0.0	1
Golf Course	49.6	2.8	24.6*	0
Street Right-of-Way	1.3	1.3	0.0	0
Total	**71.9**	**6.2**	**24.6**	**1**

**The existing portion of the Golf Course that makes up Phase 4 of the planned neighborhood (already located within the Village's USA boundary) is proposed to be developed into residential homes. The Village requests that CARPC amend the existing Environmental Corridor shown in this area where Phase 4 is planned.*

Planned Land Use Within Proposed USA Amendment Area (Phase 3 and 5)

	Total Acres	Existing Developed Acres On-Site	Future Enviro Corridor Acres	Projected Housing Units
Planned Land Use Phase 3				
Planned Neighborhood	10.8	2.0		42
Street Right-of-Way	4.8	1.1		
Park and Open Space/Stormwater Management	6.4		6.4	
Phase 3 Total	**22.0**	**3.1**	**6.4**	**42**
Planned Land Use Phase 5				
Planned Neighborhood	10.7			34
Street Right-of-Way	3.4			
Park and Open Space/Stormwater Management	1.9		1.9	
Other Outlot	0.6			
Golf Course	8.6	0.8	8.6	
Phase 5 Total	**25.2**	**0.8**	**10.5**	**34**
Planned Land Use Totals (Phase 3 and 5)				
Planned Neighborhood	21.5	2		76
Street Right-of-Way	8.2	1.1		
Park and Open Space/Stormwater Management	8.3		8.3	
Other Outlot	0.6			
Golf Course	8.6	0.8	8.6	
Total	**47.2**	**3.9**	**16.9**	**76**

Note: Totals may not match subtotals exactly due to rounding.

Note: Conceptual parcels that straddle the border between Phases 4 and 5 were presumed for this analysis to be located within Phase 5.

Planned Land Use Within Proposed Neighborhood (Phase 3, 4, and 5)

	Total Acres	Existing Developed Acres On-Site	Future Enviro Corridor Acres	Projected Housing Units
Planned Land Use Phase 4 (not part of proposed USA amendment)				
Planned Neighborhood	13.5			42
Street Right-of-Way	4.6			
Park and Open Space/Stormwater Management				
Other Outlot	**0.2**			
Golf Course	**6.3**	**2**	**6.3**	
Phase 4 Total	**24.6**	**2**	**6.3**	**42**
Planned Land Use Totals (Phase 3, 4, and 5)				
Planned Neighborhood	35			
Street Right-of-Way	12.8			
Park and Open Space/Stormwater Management	8.3			
Other Outlot	0.8			
Golf Course	14.9			
Total	**71.8**	**5.9**	**24.9**	**118**

Note: Totals may not match subtotals exactly due to rounding.

Note: Conceptual parcels that straddle the border between Phases 4 and 5 were presumed for this analysis to be located within Phase 5.

3.3. Existing and Planned Land Use Map

Map 2 depicts Existing Land Use for the amendment area and Map 1a the conceptual parcels for planned development. See Introduction and Section 3.1 for more information.

Map 3 and 3a depict Planned Land Use.

Within the proposed USA amendment area, approximately 19.6 acres of the site is planned for detached single-family dwelling units on lots averaging 0.3 acres (+/- 13,000 square feet) in size. Approximately 1.9 acres is planned for two-family attached dwelling units on lots averaging 0.2 acres (+/- 8,712 square feet in size). Additionally, two stormwater management areas are planned. A large detention area is planned for the northern portion of Phase 5 and a greenway with detention areas is planned to run through Phase 3. These two areas will be connected through the proposed park space in Phase 5. More detail is provided in Section 5.9. Further, one park in Phase 5, totaling 1.9 acres, is also planned. Finally, 7.1 acres of right-of-way are anticipated, primarily to serve the planned residential homes and park. The 1.1 acres of right-of-way along CTH MM running between Phases 2 and Phase 3 will remain in right-of-way use following completion of the development and be expanded to 1.46 acres following replatting.

Following the CARPC and WisDNR approval process, the developer will seek annexation of all three existing parcels into the Village. Zoning and subdivision review will occur following annexation. It is anticipated that the lots that make up Phases 3, 4, and 5 will be zoned SR-4 (less than 12,000 sf) or TR-6 (duplex).

It is likely that CTH MM will be annexed along with the subject property, and the Village is open to accepting a jurisdictional transfer of the road to the southern edge of the proposed USA amendment area.

3.4 Proposed Quantity and Type of Housing Units

Within the proposed USA amendment area, 76 lots are proposed for single-family dwelling units (66 dwelling units) and 8 lots are proposed for two-family duplexes (10 dwelling units). For the entire proposed neighborhood (Phase 3, 4, and 5), there is anticipated to be 118 total units. All phases of the project will reflect the scale and type of housing currently being constructed in Autumn Ridge Phase 1 and 2 to the west and the existing Village neighborhood to the north. Additionally, the new neighborhood is proposed to be significantly smaller lots than the existing Town development to the south.

3.5 Land Use Phasing

Although the requested amendment is under 100 developable acres, and thus does not require a 10-year staging map for this application, a preliminary 3-part phasing plan has been devised by the developer. Phase 3 is anticipated to begin construction immediately following CARPC and WisDNR approval and Village annexation, platting, and zoning processes in 2023. Phases 4 and 5 are anticipated to begin following the build out of Phase 3 in preceding years.

Natural Resources:

4.1. Natural Features

See Map 4. There are no wetlands, floodplains, woodlands, unique flora or fauna, or surface water on the site. There is one area of steep slopes above 12% running through a small portion of Phase 3. There is also hydric soil in the far northwest corner of the amendment area and a portion of area also has karst and carbonate bedrock. There are also some areas of “Highly Erodible Soils” as defined by the USDA on the site in the proposed Phases 3 and 5.

Additionally, there are small portions of both Phase 3 and 5 within CARPC’s Stewardship Areas. CARPC recommends these areas be planned for parks, conservancy, and stormwater management. Generally, much of the recommended future environmental corridor is planned for a greenway, stormwater management area, and recreational space within the preliminary plans (Map 4). Site grading during the construction process will ensure a safe transition and gentle slope between future recreational park space and stormwater management and greenway areas. Detailed site grading plans will be reviewed during the required Village Site Plan, Zoning, and Subdivision processes.

The existing portion of the Golf Course that makes up Phase 4 of the planned neighborhood (already located within the Village's USA boundary) is proposed to be developed into residential homes. The Village requests that CARPC amend the existing Environmental Corridor shown in this area where Phase 4 is planned.

The Wisconsin DNR Bureau of Natural Heritage Conservation for Endangered Resources Review Preliminary Assessment (completed April 28, 2023) indicates that a formal Endangered Resources Review letter is not needed (Appendix G). However, the location of the proposed amendment area overlaps with the Rusty Patched Bumble Bee High Potential Zone. This means that any project within the zone should take steps to determine if suitable habitat is present for the bee. The proposed development within the amendment area may include some areas in Phase 5 that are suitable habitat.

The Village recognizes the recommendations of the DNR in respect to suitable active season and suitable overwintering habitat for the Rusty Patched Bumble Bee. Through the development review process, the Village and developer will further explore inclusion of this type of habitat within the parks, stormwater management areas, and greenways. Applicable to this site and the proposed development, this would mean the inclusion of prairies, marshes/wetlands, non-compact soils, or sandy soils. Additionally, it is recommended that the parks, stormwater management areas, and greenways include native trees, shrubs, and flowering plants, plants that bloom spring through fall, and the removal and control of invasive plants in any habitat used for foraging, nesting, or overwintering.

Map 4a depicts the proposed amendment area overlaid on the Natural Features Map from the Village's Comprehensive Plan. The only environmental constraints depicted within the amendment area on this map are the 12% to 20% slopes running through both parcels. It is anticipated that during the site grading process of both phases, these steep slopes will be graded to be non-steep.

4.2. Parks and Stormwater Management Facilities Map

See Map 3a. One Neighborhood Park is planned for the amendment area as part of Phase 5. Park access will be provided through sidewalks on both sides of all proposed new streets. These sidewalks will connect to the existing sidewalks to the west and the larger Village-wide networks as well. Additionally, the existing Golf Course is planned to be configured and residents of the new development will benefit from the private green space to the north of both Phase 4 and 5.

Additionally, two stormwater management areas are planned. A large detention area is planned for the northern portion of Phase 5 and a greenway with detention areas is planned to run through Phase 3. These two areas will be connected through the proposed park space in Phase 5. A preliminary Stormwater Management and Erosion Control Report has been prepared for Phase 3 by the developer's engineer (Appendix H). Village staff are currently working with the developer's engineer to fine tune the stormwater plans and report. The final version is planned to be included with the subdivision plat. Both will require approvals by the Village and meeting all requirements of Dane County and the state of Wisconsin.

The stormwater areas are described in greater depth in Section 5.9.

4.3. Environmental Corridors

Within the proposed USA amendment area (Phase 3 and 5), there are a total of 16.9 acres proposed as Environmental Corridor, which comprise the planned parks, stormwater management areas, and the remnant portion of the golf course. The proposed corridor contains approximately 35% of the total amendment area, a significant increase from today.

Within the proposed total project area (Phase 3, 4, and 5), there are a total of 24.9 acres proposed as Environmental Corridor, which comprise the planned parks, stormwater management areas, and the remnant portion of the golf course. The proposed corridor contains approximately 35% of the total project area, a significant increase from today.

4.4. Proposed Environmental Corridors Map

See Map 4.

4.5. Environmental Corridors Requirements

The proposed corridor contains planned park space, the greenway, and stormwater retention/groundwater recharge areas. Exact locations of stormwater areas and park land may be refined through the platting process and the corridor may need to be adjusted accordingly prior to plat approval.

The proposed corridor achieves the intended goals outlined for Environmental Corridors in the Water Quality Plan for Dane County. It protects water quality and public health by including the groundwater recharge area as part of the corridor, as well as an additional planned stormwater retention area. It also provides and encourages outdoor recreation options by including planned neighborhood park space.

Utilities and Stormwater Management

5.1. Proposed Sanitary Sewer

No new interceptor will be installed to facilitate the proposed development. Instead, wastewater will be handled by existing sanitary sewer mains in the area. The downstream sanitary sewer is 8" PVC to match the proposed main size within the USA amendment area. Sanitary sewer infrastructure will be connected to the north (Lexington Street), looped through Phases 3, 4, and 5, and connect to the west (Foxfield Road). The 2023 Sewer Study confirmed that there is sufficient downstream capacity for the contemplated development for Phases 3, 4, and 5. See Appendix I and Map 4b.

5.2. USAA Average Daily and Peak Wastewater Flow

Within the proposed USA amendment area (Phase 3 and 5): each housing unit in the proposed development is expected to contribute an additional 250 gallons per day, amounting to approximately 18,750 gallons total per day for the 75 dwelling units in the amendment area. Peak flow is estimated to be a total of 75,000 gallons per day.

Within the proposed total project area (Phase 3, 4, and 5): each housing unit in the proposed development is expected to contribute an additional 250 gallons per day, amounting to approximately 30,750 gallons total per day for the 123 dwelling units in the development area. Peak flow is estimated to be a total of 123,000 gallons per day.

These values assume 2.5 persons per home and 100 gallons per person per day. A peaking factor of 4 was provided by the developer's engineer.

5.3. Average Wastewater Treatment Plant Daily Flow

Per the 2020 Facilities Plan for the Village of Oregon Wastewater Treatment Plant (Appendix K), the average daily flow is 1.32 million gallons per day.

No new interceptor will be installed to facilitate the proposed development. Instead, wastewater will be handled by existing sanitary sewer mains in the area. The downstream sanitary sewer is 8" PVC to match the proposed main size within the USA amendment area. Sanitary sewer infrastructure will be connected to the north (Lexington Street), looped through Phases 3, 4, and 5, and connect to the west (Foxfield Road). The 2023 Sewer Study indicates that the existing sanitary sewer at Lexington Street sees a total daily flow of 4,752 gpd and a peak flow of 16 gpm. The study confirmed that there is sufficient downstream capacity for the contemplated development for Phases 3, 4, and 5. See Appendix I.

5.4. Wastewater Treatment Plant Capacity

Per the 2020 Facilities Plan (Appendix K), the existing Village wastewater treatment plant's rated capacity is 1.8 million gallons per day, with a reserve capacity of 0.48 million gallons per day. The Park Street interceptor will be experiencing additional flow from the proposed Autumn Ridge Phase 3, 4, and 5 development. Sewer flows from these areas travel the Park Street interceptor prior to being discharged into the pumping stion at the Wastewater Treatment Plant. A map of this flow path, analysis, and capacity can all be found in Appendix I.

As noted in Section 5.3, daily flow rates for the interceptor sewer were 4,752 gpd and a peak flow of 16 gpm. Sufficient capacity was identified and confirmed by the 2023 Sewer Study.

As described in Section 5.2, the average daily flow expected at build-out for the total project area is approximately 30,750 gallons per day, with a peak load of approximately 120,000 gallons per day, indicating the Village's treatment plant has ample capacity to support the planned development.

5.5. Proposed USAA Public Water Supply

The Village's 2015 Water System Master Plan calls for 12" main along the east-west extension of Foxfield Road to eventually complete a loop and connect to a future elevated storage tank. Also, per the Master Plan, an 8" main would be included on the north-south running portion of CTH MM. To note, the Village's Water System Master Plan is currently being updated.

There is an existing 12" water main under Foxfield Road and 8" water main under Lexington Street that will be connected and looped through the proposed development. The new connection will be a 12" water main. See Map 4b.

5.6. Estimated USAA Daily and Peak Hourly Water Demand

Within the proposed USA amendment area (Phase 3 and 5): at build-out, the 75 anticipated housing units would be expected to use an average water total of 18,750 gallons per day, with a peak daily demand of 63,750 gallons per day. Peak hourly demand is estimated at 43 gallons per minute.

These totals assume 100 gallons per person per day, 2.5 persons per housing unit, 75 housing units, 15% water loss, and a peaking factor of 4 (18,500 gallons per day x 85% accounting for water loss x 4 peaking factor).

Within the proposed total project area (Phase 3, 4, and 5): at build-out, the 123 anticipated housing units would be expected to use an average water total of 30,750 gallons per day, with a peak daily demand of 104,550 gallons per day. Peak hourly demand is estimated at 43 gallons per minute.

These totals assume 100 gallons per person per day, 2.5 persons per housing unit, 123 housing units, 15% water loss, and a peaking factor of 4 (30,750 gallons per day x 85% accounting for water loss x 4 peaking factor).

5.7. Average Daily and Peak Hourly Water Demand

Per the Village Public Works Department, the current average daily water demand is approximately 770,000 gallons, with an average demand of 535 gpm. The current average peak hourly water demand is 1,900 gpm. To note, the Village's Water System Master Plan is currently being updated.

5.8. Water Supply System Capacity

The Village currently operates three groundwater wells (3, 4, and 5) for water supply. Each well yields between 800 and 1,000 gallons per minute (gpm). The current well pumping capacity with all three wells operating simultaneously is 2,650 gpm. Additionally, the Village also has an existing 1.268 million gallons of water storage capacity in standpipes, ground storage reservoirs, and water towers.

This translates to a capacity of 2.38 million gallons per day and an estimated unused capacity of 1.610 million gpd with all 3 wells in operation. If one of the Village's largest wells is out of services (1,000 gpm), the firm capacity is 1,650 gpm or 2.376 million gallons per day. The Village utilized its existing water storage capacity daily to fluctuate with demand and keep water in the storage system fresh. The additional estimated demand from the total proposed project (Phase 3, 4, and 5) is 30,750 gpd, with peak demand of 104,550 gpd, well within the Water System's capacity.

The Village has drilled a fourth well (Well #6) in the Highlands of Netherwood neighborhood. Construction of a well house and booster station for Well #6 is scheduled to begin in 2024, with an estimated online date of mid-2025. When Well #6 is integrated into the Village's system, it will increase the system capacity by 1,000 gpm (estimated).

5.9. Proposed Stormwater Management Standards

The Village of Oregon has taken a proactive approach to addressing stormwater management needs. The Village recognizes the necessity for properly managing stormwater runoff from existing and new development because of its location in an area of poorly defined stormwater flow, leading to the Oregon Branch of the Badfish Creek.

In 1998-99 the Village conducted a comprehensive stormwater management study. The study divided the Village in sub-watersheds, and modeled stormwater runoff, and conveyance capacities for each system. Also, where capacity problems were identified, the study analyzed alternative management approaches, and recommendations were developed. An implementation plan prioritized the recommendations and established a schedule. At this point in time, the Village has expended over $1,000,000 in stormwater management projects.

The Village enforces a policy of stormwater management on all new development and redevelopment. The requirements of the policy addressed both stormwater quantity and quality. In 2016, the Village updated this policy, as well as other Dane County storm water and erosion control requirements, into Chapter 22 of the Oregon Municipal Code of Ordinances.

The Village's standards, as documented in Chapter 22 of their ordinance, includes:

- Except for redevelopment projects, all stormwater management facilities shall be designed, installed, and maintained to effectively accomplish the following under post—development conditions:
    - Maintain pre—development peak runoff rates for the 2-year, 24-hour storm event (2.85 inches over 24-hour duration).
    - Reduce the peak runoff rates for the 10-year, 24-hour storm event (4.10 inches over 24-hour duration) to pre-development peak runoff rates for the 2- year, 24-hour storm event (2.85 inches over 24-hour duration).
    - Reduce the peak runoff rates for the 100-year, 24-hour storm event (6.63 inches over 24-hour duration) to pre-development peak runoff rates for the 10-year, 24-hour storm event (4.10 inches over 24-hour duration).

Map 3a depicts the stormwater management areas provided within the proposed development.

5.10. Stormwater Management Plan

A combination of dry infiltration beds, detention ponds, and a greenway make up the stormwater management areas planned within Phases 3, 4, and 5, depicted as such on Map 3a.

Generally, Phases 3, 4, and 5 drain to the northeast where the largest stormwater detention area is planned. The infiltration areas, detention ponds, and greenway function to hold and slow stormwater on-site during large precipitation events. Overall, the goal of the proposed development is to maximize stormwater volume retention on-site to lessen downstream runoff. This will be accomplished by reducing peak runoff rates for 2-

year, 10-year, and 100-year event in accordance with the Village's stormwater standards as noted in Section 5.9 above.

During an event in which stormwater leaves the proposed amendment area, it is planned to travel to the northeast. Today, the drainage pattern within the Foxboro Golf Course is ill-defined. The improved drainage pattern in Phase 5 will assist in limiting off-site stormwater events from occurring. Eventually, the golf course drains through the US-14 right-of-way, under US-14 through existing culverts, into properties owned by L&S Investments east of US-14, and finally lands within the Oregon Branch of the Badfish Creek. The developer, Glenn Hofer, has discussed the conceptual development plans with the downstream property owners potentially affected by the drainage pattern prior to ending up in Badfish Creek. He is currently in the process of discussions with both.

To note, stormwater management in Autumn Ridge Phase 1 and 2 (west side of Foxfield Road) drains into the existing stormwater detention areas in both phases. Runoff is controlled by wet and dry ponds to meet and exceed the Village's requirements as noted in Section 5.9. See Appendix L for previous Stormwater Reports completed for Phase 1 and 2. Phase 1 stormwater is collected at a wet pond on the NW corner of Phase 1. This discharges to an outlet structure, pipe, and system to the north. It is in no way connected to the system for Phase 2. Phase 2 can overflow to the SE during extreme events. If/when this occurs, there are culverts under CTH MM and then under Harding where it will pass by the planned Phase 3 stormwater basins.

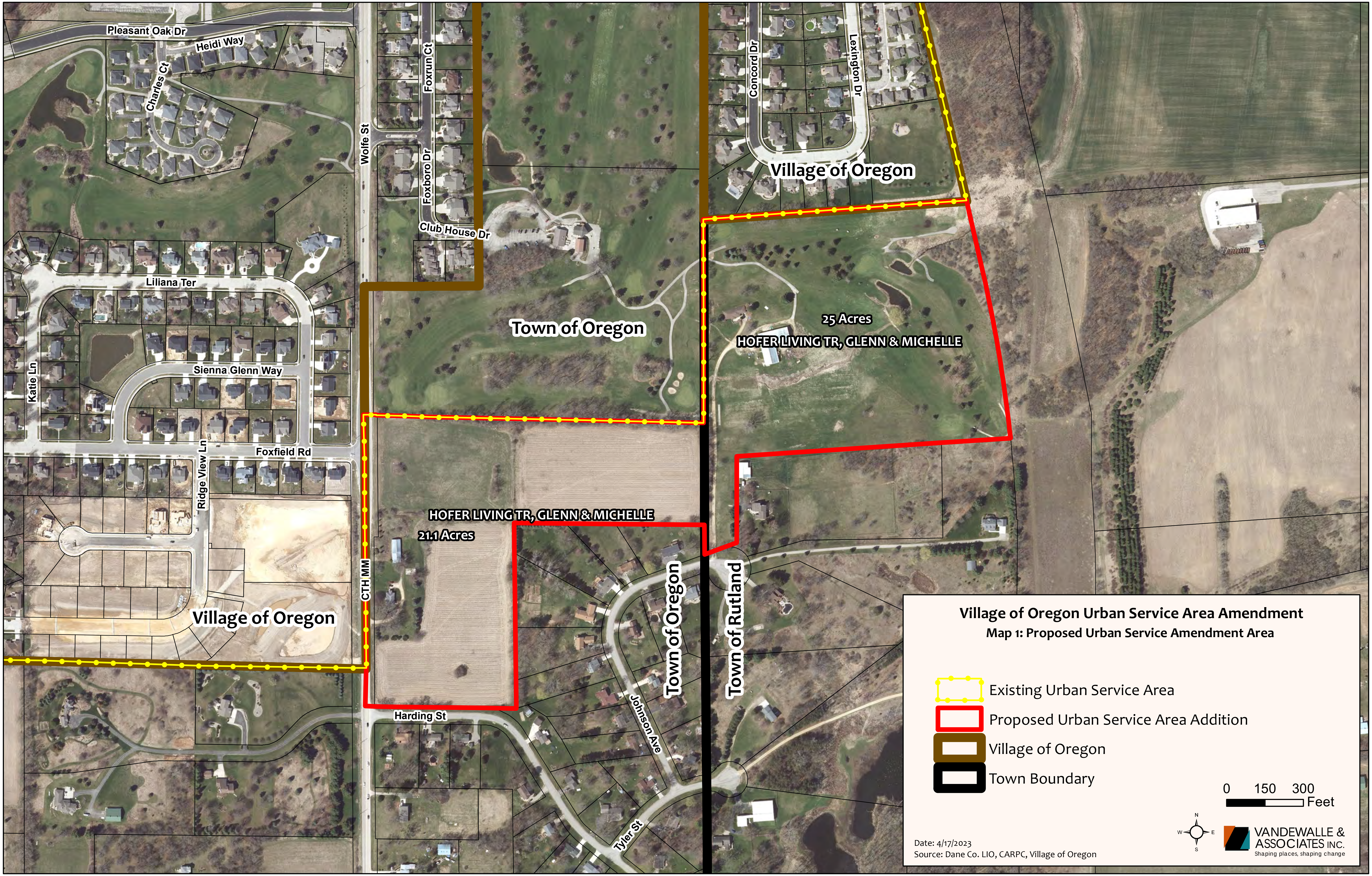
The Village ultimately assumes ownership and maintenance of stormwater detention ponds and collection systems. Prior to taking over the facilities, the developer must demonstrate that the systems are clean, built as designed, operating satisfactorily, and have full capacity for sediment retention. This typically does not occur until 80+% of homes are built in the development. Overall, prior to any activity occurring, Dane County will have to review and approve any stormwater plans for Phases 3, 4, and 5.

5.11. Engineering Reports

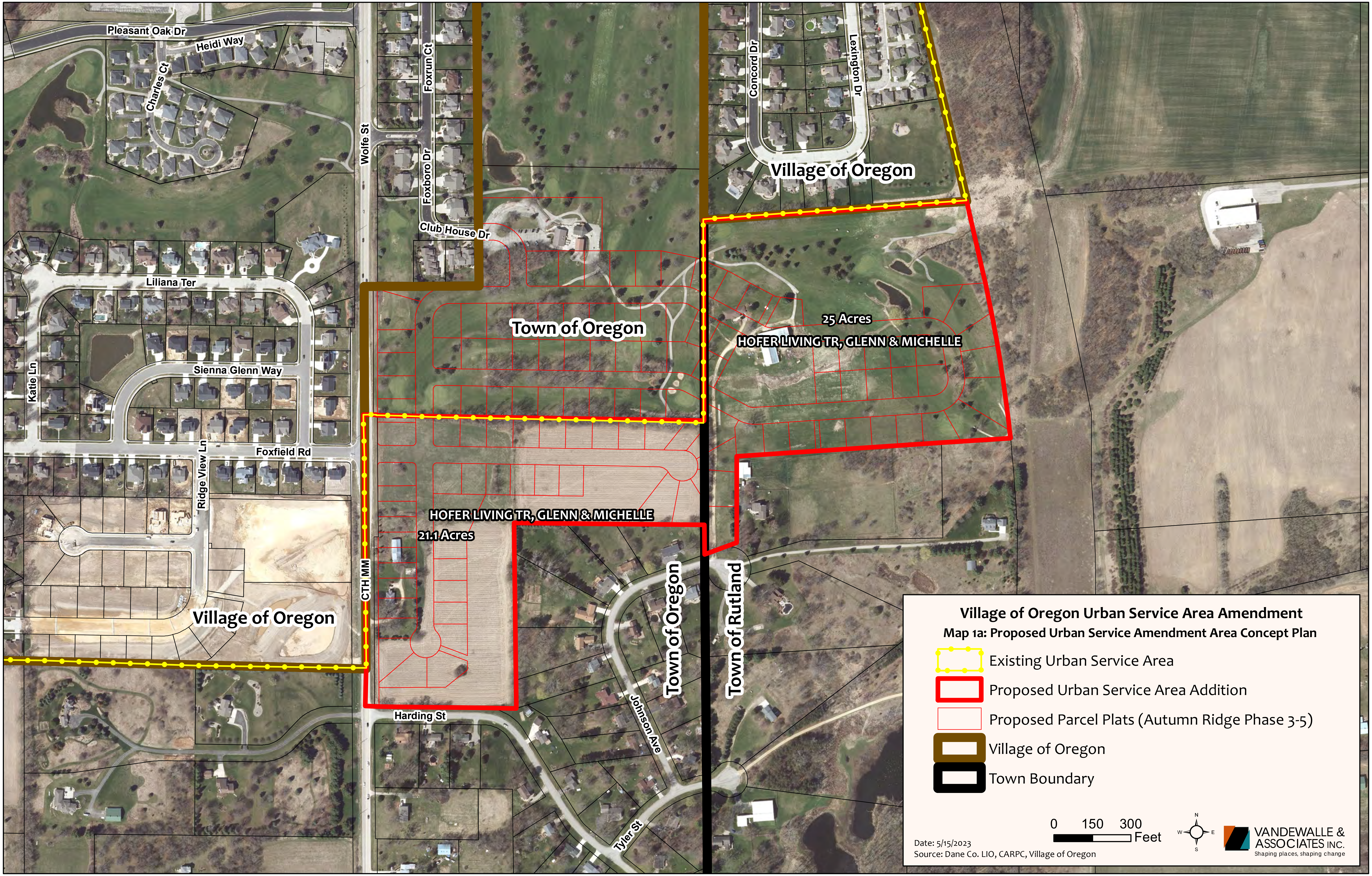
As indicated above, the Village completed a Sewer Capacity Study in 2021. However, due to proposed changes associated with Phases 3, 4, and 5 now planned to connect to the existing sanitary sewer system to the north (instead of west), the study was updated in 2023. All updated study results have been included within this application and the full study can be found in Appendix I.

Additionally, in response to the proposed development, the Village completed an Intersection Control Evaluation on Wolfe Street (CTH MM) and Foxfield Road in 2023. The results of the study found that the proposed Phases 3, 4, and 5 will not negatively impact traffic operations on the CTH MM corridor. The intersection is anticipated to operate acceptably through 2033. Recommended intersection improvements included turning lanes along CTH MM and stop signs and turning lanes along Foxfield Road at the future 4-way intersection. All study results have been included within this application and the full study can be found in Appendix J.

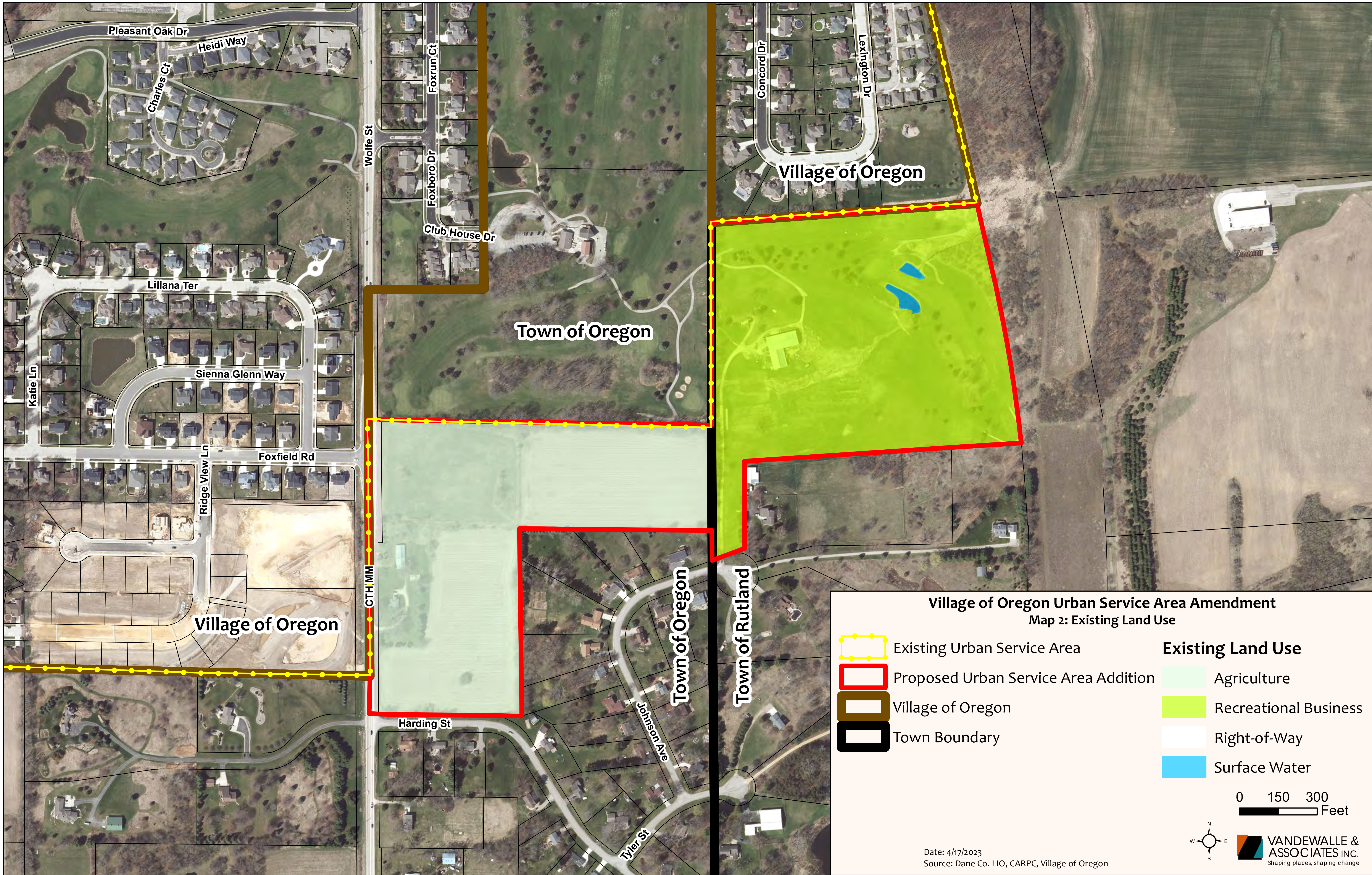
Map 1: Proposed Amendment Area


Village of Oregon Urban Service Area Amendment
Map 1: Proposed Urban Service Amendment Area
Existing Urban Service Area
Proposed Urban Service Area Addition
Village of Oregon
Town Boundary
0 150 300
Feet
Date: 4/17/2023
Source: Dane Co. LIO, CARPC, Village of Oregon
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change
Pleasant Oak Dr
Heidi Way
Charles Ct
Foxrun Ct
Foxboro Dr
Wolfe St
Club House Dr
Concord Dr
Lexington Dr
Village of Oregon
Liliana Ter
Town of Oregon
25 Acres
HOFER LIVING TR, GLENN & MICHELLE
Sienna Glenn Way
Katie Ln
Foxfield Rd
Ridge View Ln
HOFER LIVING TR, GLENN & MICHELLE
21.1 Acres
CTH MM
Village of Oregon
Town of Oregon
Town of Rutland
Johnson Ave
Harding St
Tyler St

Map 1a: Proposed Amendment Area Concept Plans

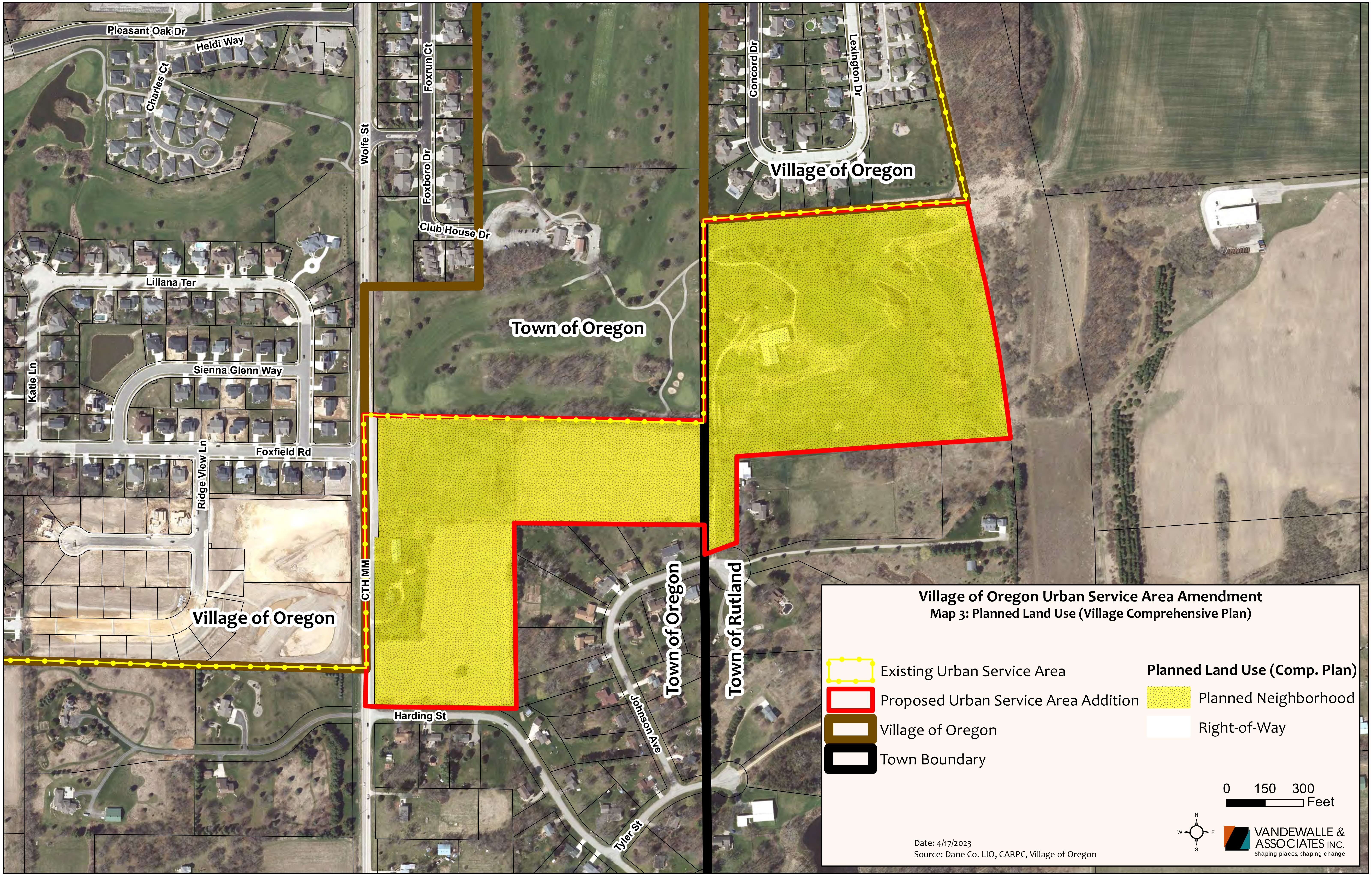

Pleasant Oak Dr
Heidi Way
Charles Ct
Wolfe St
Foxrun Ct
Foxboro Dr
Concord Dr
Lexington Dr
Village of Oregon
Club House Dr
Liliana Ter
Town of Oregon
25 Acres
HOFER LIVING TR, GLENN & MICHELLE
Sienna Glenn Way
Katie Ln
Foxfield Rd
Ridge View Ln
HOFER LIVING TR, GLENN & MICHELLE
21.1 Acres
CTH MM
Village of Oregon
Town of Oregon
Town of Rutland
Johnson Ave
Harding St
Tyler St
Village of Oregon Urban Service Area Amendment
Map 1a: Proposed Urban Service Amendment Area Concept Plan
Existing Urban Service Area
Proposed Urban Service Area Addition
Proposed Parcel Plats (Autumn Ridge Phase 3-5)
Village of Oregon
Town Boundary
0 150 300
Feet
N
W
E
S
Date: 5/15/2023
Source: Dane Co. LIO, CARPC, Village of Oregon
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

Map 2: Existing Land Use

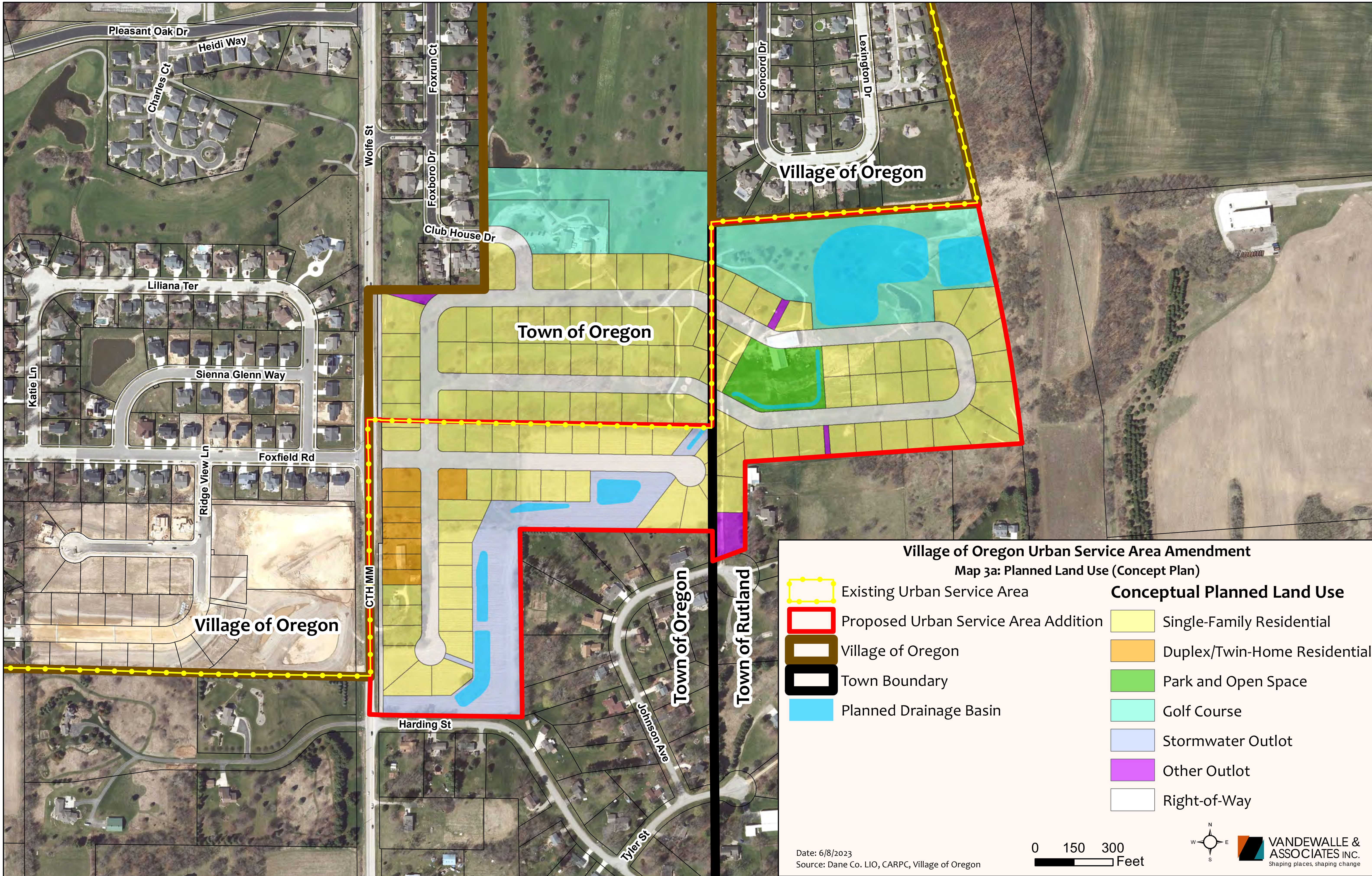


Pleasant Oak Dr
Heidi Way
Charles Ct
Wolfe St
Foxrun Ct
Foxboro Dr
Club House Dr
Concord Dr
Lexington Dr
Village of Oregon
Liliana Ter
Town of Oregon
Sienna Glenn Way
Katie Ln
Foxfield Rd
Ridge View Ln
CTH MM
Village of Oregon
Town of Oregon
Town of Rutland
Johnson Ave
Harding St
Tyler St
Village of Oregon Urban Service Area Amendment
Map 2: Existing Land Use
Existing Urban Service Area
Proposed Urban Service Area Addition
Village of Oregon
Town Boundary
Existing Land Use
Agriculture
Recreational Business
Right-of-Way
Surface Water
0 150 300
Feet
Date: 4/17/2023
Source: Dane Co. LIO, CARPC, Village of Oregon
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

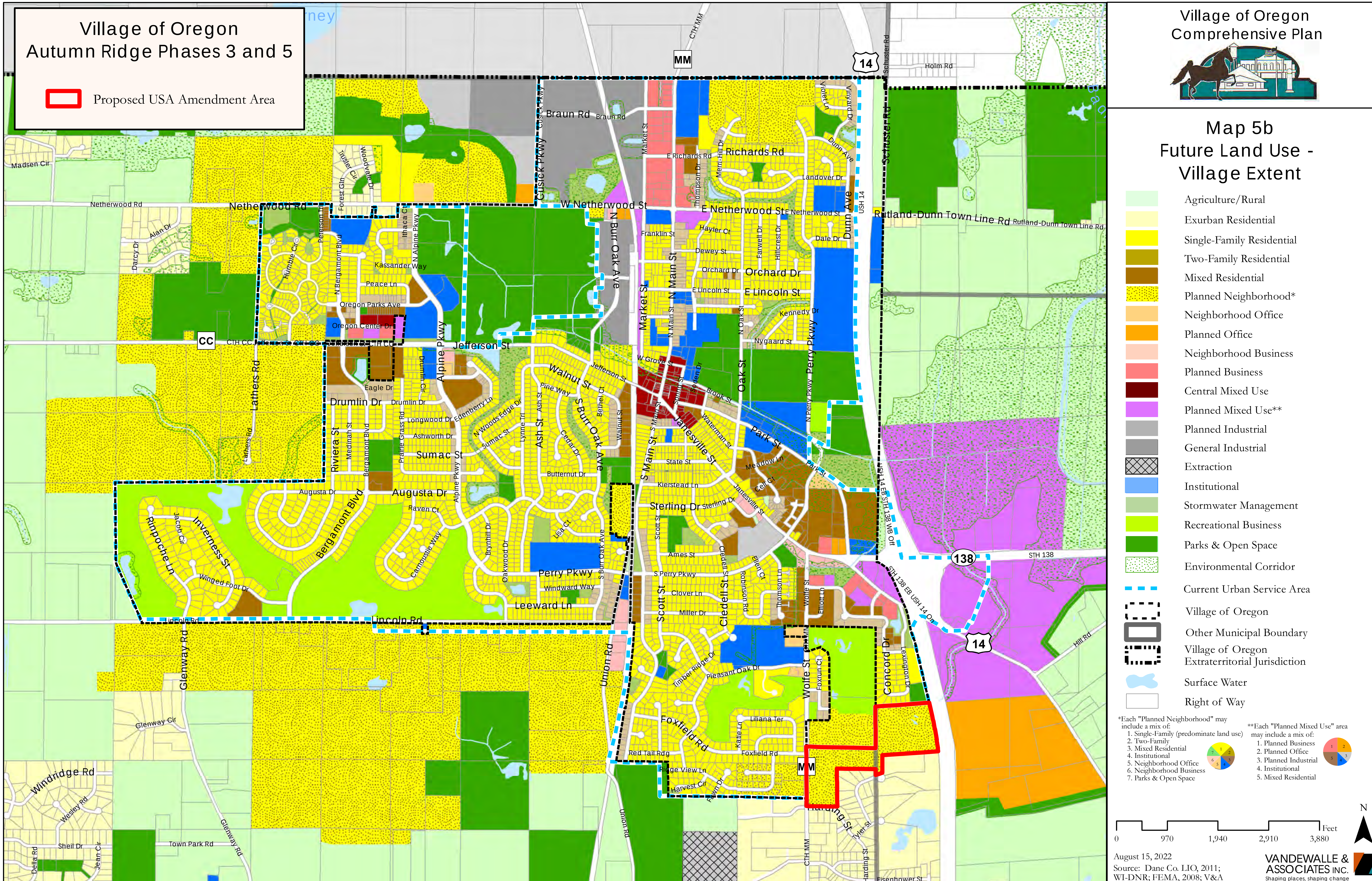
Map 3: Planned Land Use


Pleasant Oak Dr
Heidi Way
Charles Ct
Wolfe St
Foxrun Ct
Foxboro Dr
Club House Dr
Concord Dr
Lexington Dr
Village of Oregon
Liliana Ter
Town of Oregon
Sienna Glenn Way
Katie Ln
Foxfield Rd
Ridge View Ln
CTH MM
Village of Oregon
Town of Oregon
Town of Rutland
Harding St
Johnson Ave
Tyler St
Village of Oregon Urban Service Area Amendment
Map 3: Planned Land Use (Village Comprehensive Plan)
Existing Urban Service Area
Proposed Urban Service Area Addition
Village of Oregon
Town Boundary
Planned Land Use (Comp. Plan)
Planned Neighborhood
Right-of-Way
0 150 300 Feet
Date: 4/17/2023
Source: Dane Co. LIO, CARPC, Village of Oregon
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

Map 3a: Planned Land Use with Concept Plans

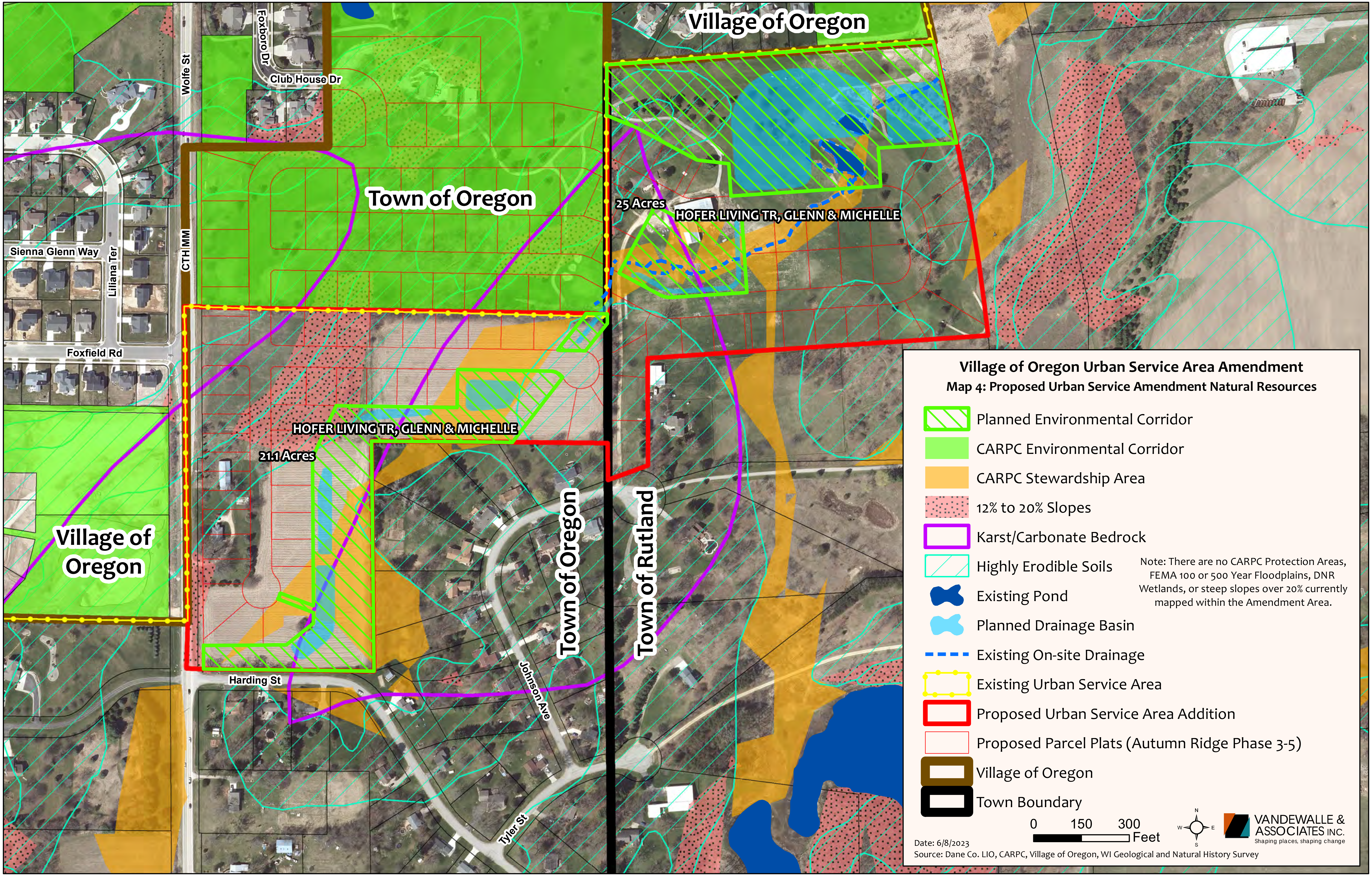

Village of Oregon Urban Service Area Amendment
Map 3a: Planned Land Use (Concept Plan)
Existing Urban Service Area
Proposed Urban Service Area Addition
Village of Oregon
Town Boundary
Planned Drainage Basin
Conceptual Planned Land Use
Single-Family Residential
Duplex/Twin-Home Residential
Park and Open Space
Golf Course
Stormwater Outlot
Other Outlot
Right-of-Way
Town of Oregon
Village of Oregon
Town of Rutland
Pleasant Oak Dr
Heidi Way
Charles Ct
Wolfe St
Foxrun Ct
Foxboro Dr
Club House Dr
Concord Dr
Lexington Dr
Liliana Ter
Sienna Glenn Way
Katie Ln
Foxfield Rd
Ridge View Ln
CTH MM
Harding St
Johnson Ave
Tyler St
0 150 300
Feet
Date: 6/8/2023
Source: Dane Co. LIO, CARPC, Village of Oregon
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

Map 3b: Planned Land Use – Village ETJ Extent



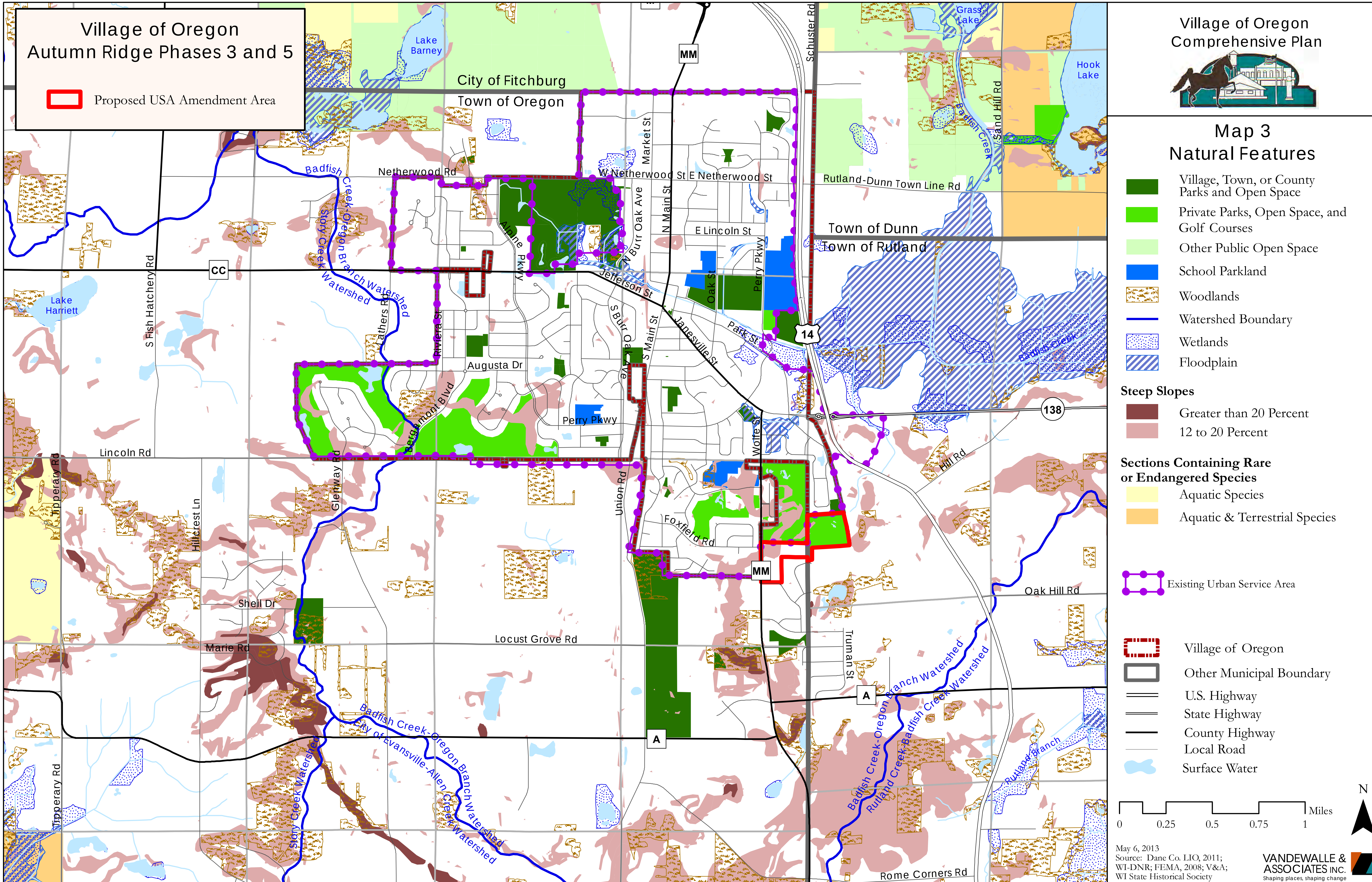
Village of Oregon
Autumn Ridge Phases 3 and 5
Proposed USA Amendment Area
Village of Oregon
Comprehensive Plan
Map 5b
Future Land Use -
Village Extent
Agriculture/Rural
Exurban Residential
Single-Family Residential
Two-Family Residential
Mixed Residential
Planned Neighborhood*
Neighborhood Office
Planned Office
Neighborhood Business
Planned Business
Central Mixed Use
Planned Mixed Use**
Planned Industrial
General Industrial
Extraction
Institutional
Stormwater Management
Recreational Business
Parks & Open Space
Environmental Corridor
Current Urban Service Area
Village of Oregon
Other Municipal Boundary
Village of Oregon
Extraterritorial Jurisdiction
Surface Water
Right of Way
*Each "Planned Neighborhood" may include a mix of:
1. Single-Family (predominate land use)
2. Two-Family
3. Mixed Residential
4. Institutional
5. Neighborhood Office
6. Neighborhood Business
7. Parks & Open Space
**Each "Planned Mixed Use" area may include a mix of:
1. Planned Business
2. Planned Office
3. Planned Industrial
4. Institutional
5. Mixed Residential
0 970 1,940 2,910 3,880 Feet
N
August 15, 2022
Source: Dane Co. LIO, 2011; WI-DNR; FEMA, 2008; V&A
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

Map 4: Natural Features



Village of Oregon Urban Service Area Amendment
Map 4: Proposed Urban Service Amendment Natural Resources
Planned Environmental Corridor
CARPC Environmental Corridor
CARPC Stewardship Area
12% to 20% Slopes
Karst/Carbonate Bedrock
Highly Erodible Soils
Existing Pond
Planned Drainage Basin
Existing On-site Drainage
Existing Urban Service Area
Proposed Urban Service Area Addition
Proposed Parcel Plats (Autumn Ridge Phase 3-5)
Village of Oregon
Town Boundary
Note: There are no CARPC Protection Areas, FEMA 100 or 500 Year Floodplains, DNR Wetlands, or steep slopes over 20% currently mapped within the Amendment Area.
0 150 300 Feet
Date: 6/8/2023
Source: Dane Co. LIO, CARPC, Village of Oregon, WI Geological and Natural History Survey
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change
Village of Oregon
Town of Oregon
Village of Oregon
Town of Oregon
Town of Rutland
25 Acres
HOFER LIVING TR, GLENN & MICHELLE
HOFER LIVING TR, GLENN & MICHELLE
21.1 Acres
Wolfe St
CTH MM
Foxboro Dr
Club House Dr
Sienna Glenn Way
Liliana Ter
Foxfield Rd
Harding St
Johnson Ave
Tyler St

Map 4a: Natural Features From Comprehensive Plan


Village of Oregon
Autumn Ridge Phases 3 and 5
Proposed USA Amendment Area
Village of Oregon
Comprehensive Plan
Map 3
Natural Features
Village, Town, or County Parks and Open Space
Private Parks, Open Space, and Golf Courses
Other Public Open Space
School Parkland
Woodlands
Watershed Boundary
Wetlands
Floodplain
Steep Slopes
Greater than 20 Percent
12 to 20 Percent
Sections Containing Rare or Endangered Species
Aquatic Species
Aquatic & Terrestrial Species
Existing Urban Service Area
Village of Oregon
Other Municipal Boundary
U.S. Highway
State Highway
County Highway
Local Road
Surface Water
N
0
0.25
0.5
0.75
1
Miles
May 6, 2013
Source: Dane Co. LIO, 2011; WI-DNR; FEMA, 2008; V&A; WI State Historical Society
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change
City of Fitchburg
Town of Oregon
Town of Dunn
Town of Rutland
Lake Barney
Lake Harriett
Grass Lake
Hook Lake
Badfish Creek-Oregon Branch Watershed
Story Creek Watershed
Badfish Creek
Badfish Creek-City of Evansville-Allen Creek Watershed
Badfish Creek-Oregon Branch Watershed
Badfish Creek-Rutland Creek Watershed
Rutland Branch
Stony Creek Watershed
Netherwood Rd
W Netherwood St
E Netherwood St
Rutland-Dunn Town Line Rd
Market St
N Main St
N Burr Oak Ave
E Lincoln St
Alpine Pkwy
Jefferson St
Oak St
Perry Pkwy
Park St
Janesville St
S Main St
S Burr Oak Ave
Schuster Rd
Sand Hill Rd
S Fish Hatchery Rd
Hathers Rd
Riviera St
Augusta Dr
Bergamont Blvd
Perry Pkwy
Lincoln Rd
Tipperary Rd
Glenway Rd
Hillcrest Ln
Union Rd
Wolfe St
Foxfield Rd
Hill Rd
Oak Hill Rd
Sheil Dr
Marie Rd
Locust Grove Rd
Truman St
Rome Corners Rd
Tipperary Rd
CC
MM
14
138
MM
A
A

Map 4b: Amendment Area Planned Utilities

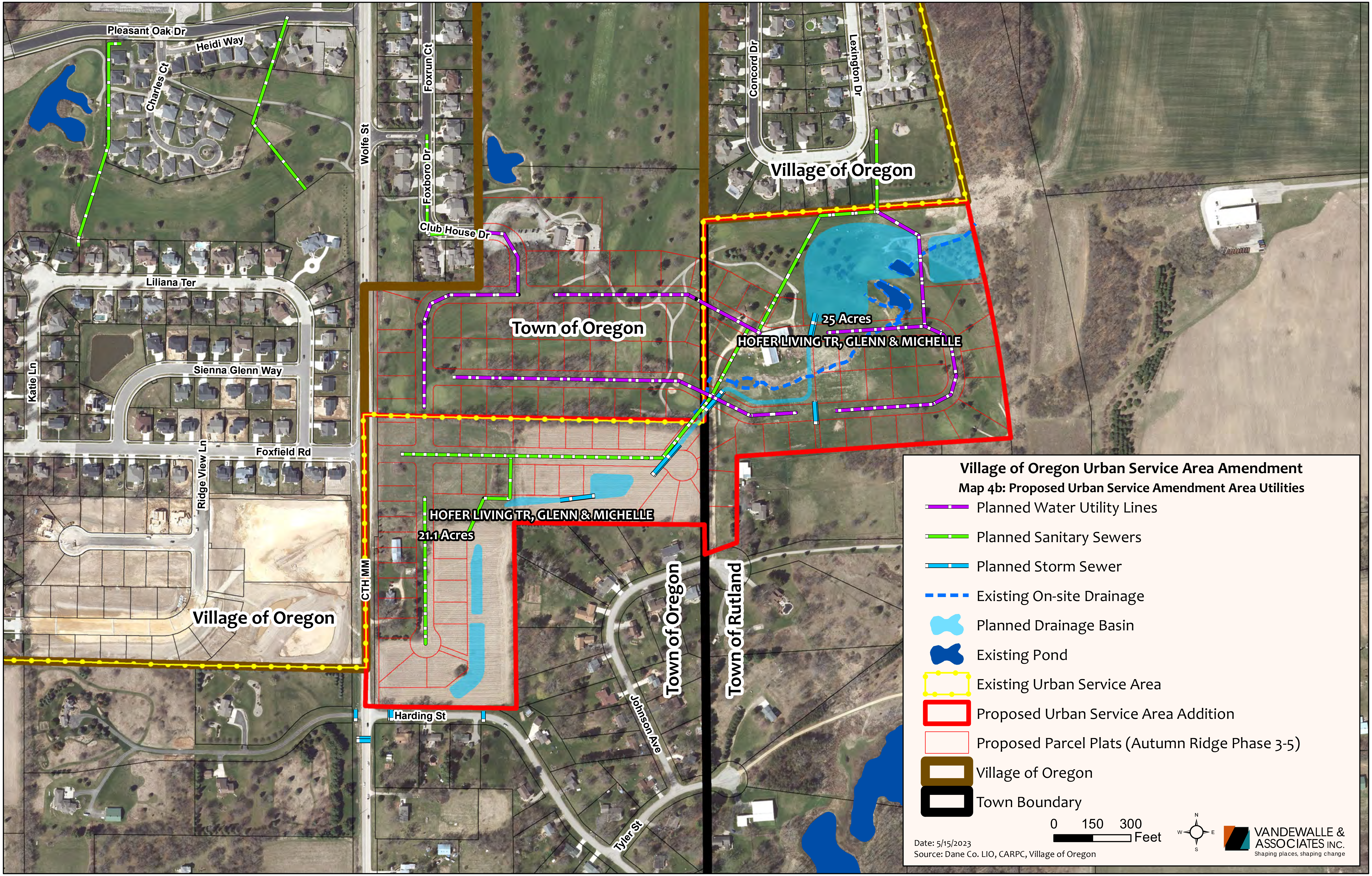

Village of Oregon Urban Service Area Amendment
Map 4b: Proposed Urban Service Amendment Area Utilities
Planned Water Utility Lines
Planned Sanitary Sewers
Planned Storm Sewer
Existing On-site Drainage
Planned Drainage Basin
Existing Pond
Existing Urban Service Area
Proposed Urban Service Area Addition
Proposed Parcel Plats (Autumn Ridge Phase 3-5)
Village of Oregon
Town Boundary
0 150 300 Feet
Date: 5/15/2023
Source: Dane Co. LIO, CARPC, Village of Oregon
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change
Pleasant Oak Dr
Heidi Way
Charles Ct
Wolfe St
Foxrun Ct
Foxboro Dr
Club House Dr
Concord Dr
Lexington Dr
Village of Oregon
Liliana Ter
Town of Oregon
25 Acres
HOFER LIVING TR, GLENN & MICHELLE
Sienna Glenn Way
Katie Ln
Foxfield Rd
Ridge View Ln
HOFER LIVING TR, GLENN & MICHELLE
21.1 Acres
CTH MM
Village of Oregon
Town of Oregon
Town of Rutland
Johnson Ave
Harding St
Tyler St

Table of Attachments

Attachment A: Plan Commission and Village Board USA Amendment Resolutions

RESOLUTION # 23-04
RESOLUTION TO RECOMMEND URBAN SERVICE AREA AMENDMENT
PLAN COMMISSION OF THE VILLAGE OF OREGON

Resolution regarding the recommendation of the Plan Commission to the Village Board to initiate an Amendment to the Oregon Urban Service Area to include 47.2 acres of property owned by Hofer Living Trust located at 969 Johnson Avenue and 958 County Highway MM (Parcel Numbers: 051007385001 and 050913197210), to accommodate the proposed residential development.

WHEREAS, the Village of Oregon has been approached by the property owner to develop the existing agricultural and a portion of the Foxboro Golf Course property located on the southeast side of the Village, on full public water and sanitary sewer services to accommodate a residential development; and,

WHEREAS, the extension of the public water and sanitary sewer lines to serve the proposed residential development will require an amendment of the Oregon Urban Service Area to extend its boundary to include the 2 parcels; and,

WHEREAS, the proposed residential development is consistent with the Village of Oregon Comprehensive Plan, adopted in 2013 and amended in 2023, which depicts the area in the Planned Neighborhood land use category, which allows for a mix of predominantly residential development; and,

WHEREAS, the Capital Area Regional Planning Commission (CARPC), acting as the regional agent of the Wisconsin Department of Natural Resources, requires the Village Board to pass a resolution requesting the amendment of the Oregon Urban Service Area; and,

WHEREAS, the Village of Oregon Plan Commission advises the Village Board on all development-related matters, as consistent with Wisconsin Statutes;

NOW, THEREFORE, the Village of Oregon Plan Commission hereby recommends the Village Board pass the required Resolution to formally-request the Capital Area Regional Planning Commission (CARPC) consider and approve the requested amendment to the Oregon Urban Service Area to include within its boundary the 2 parcels totaling 47.2 acres, located at 969 Johnson Avenue and 958 County Highway MM.

SO RESOLVED by action of the Oregon Plan Commission on June 1, 2023.

Greg Schnelle, Plan Commission Chair

VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

RESOLUTION NO. 23-23

INITIATING AN AMENDMENT TO THE OREGON URBAN SERVICE AREA TO INCLUDE 47.2 ACRES OF PROPERTY OWNED BY HOFER LIVING TRUST LOCATED AT 969 JOHNSON AVENUE AND 958 COUNTY HIGHWAY MM (PARCEL NUMBERS: 051007385001 AND 050913197210), TO ACCOMMODATE PROPOSED RESIDENTIAL DEVELOPMENT

WHEREAS, the Village of Oregon has been approached by the property owners to develop the existing agricultural and a portion of the Foxboro Golf Course property located on the southeast side of the Village, on full public water and sanitary sewer services to accommodate a residential development; and,

WHEREAS the extension of the public water and sanitary sewer lines to serve the proposed residential development will require an amendment of the Oregon Urban Service Area to extend its boundary to include the 2 parcels; and,

WHEREAS, the proposed residential development is consistent with the Village of Oregon Comprehensive Plan, adopted in 2013 and amended in 2023, which depicts the area in the Planned Neighborhood land use category, which allows for a mix of predominantly residential development; and,

WHEREAS, the Capital Area Regional Planning Commission (CARPC), acting as the regional agent of the Wisconsin Department of Natural Resources, requires the Village Board to pass a resolution requesting the amendment of the Oregon Urban Service Area; and,

WHEREAS, the Village of Oregon Plan Commission advises the Village Board on all development-related matters, as consistent with Wisconsin Statutes; and

WHEREAS, the Village of Oregon Plan Commission adopted Resolution Number 23-04 on June 1, 2023, recommending the Village Board pass the required resolution.

NOW, THEREFORE, the Village of Oregon Village Board hereby adopts Resolution Number 23-23 to formally-request the Capital Area Regional Planning Commission (CARPC) consider and approve the requested amendment to the Oregon Urban Service Area to include within its boundary the 2 parcels totaling 47.2 acres, located at 969 Johnson Avenue and 958 County Highway MM.

Adopted by the Oregon Village Board on this 5th day of June 2023.

Phil Van Kampen
Village President

Countersignature:

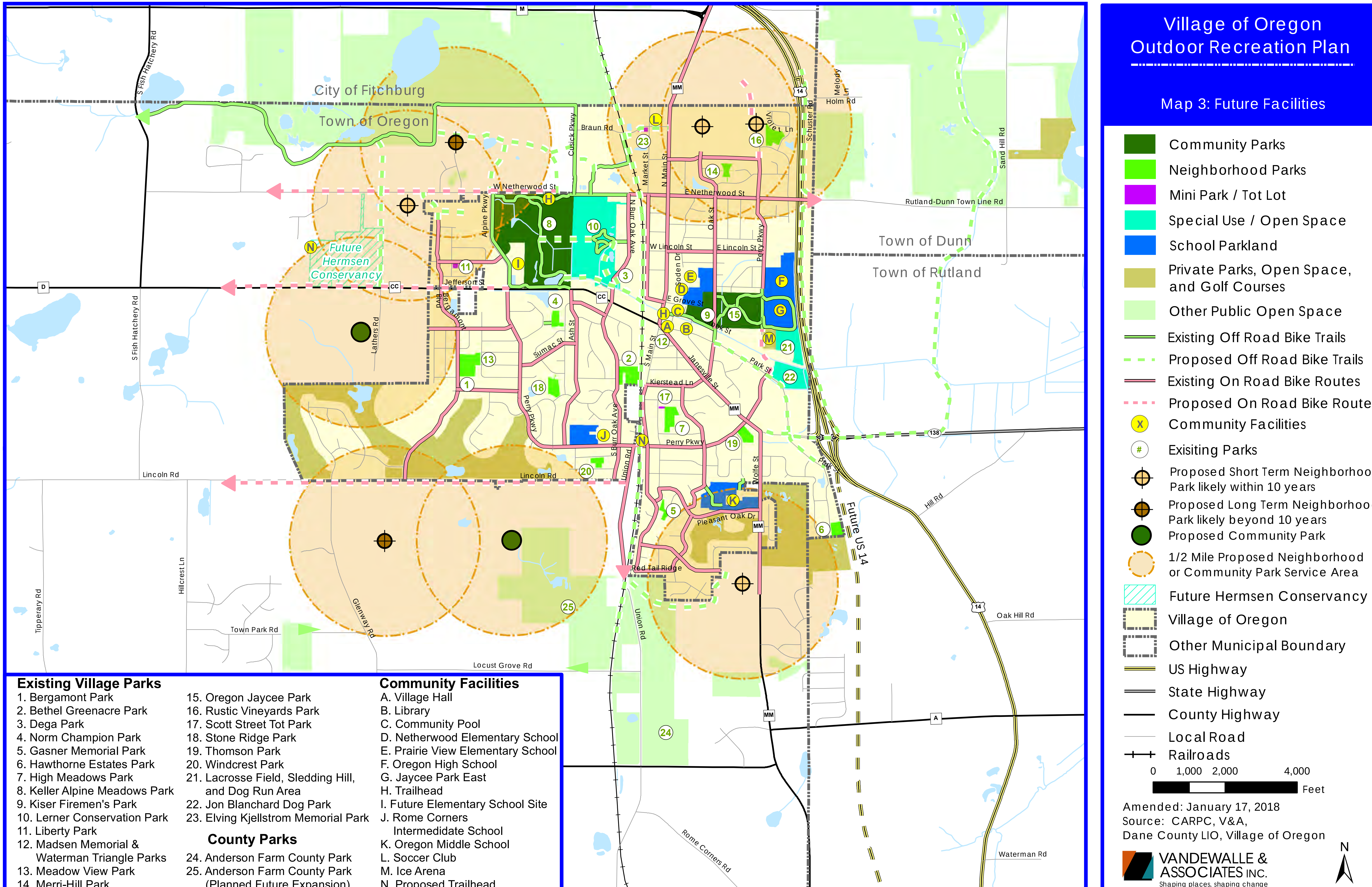
Candie Jones
Village Clerk

G:\Admin\Agenda\2023\Village Board\2023-06-05\7(a)(3) 2 #23-23 VB Urban Service Area Amendment Resolution.docx

Attachment B: Future Park Facilities Map from Park and Open Space Plan

Village of Oregon Outdoor Recreation Plan

Map 3: Future Facilities



Existing Village Parks

1. Bergamont Park
2. Bethel Greenacre Park
3. Dega Park
4. Norm Champion Park
5. Gasner Memorial Park
6. Hawthorne Estates Park
7. High Meadows Park
8. Keller Alpine Meadows Park
9. Kiser Firemen's Park
10. Lerner Conservation Park
11. Liberty Park
12. Madsen Memorial & Waterman Triangle Parks
13. Meadow View Park
14. Merri-Hill Park
15. Oregon Jaycee Park
16. Rustic Vineyards Park
17. Scott Street Tot Park
18. Stone Ridge Park
19. Thomson Park
20. Windcrest Park
21. Lacrosse Field, Sledding Hill, and Dog Run Area
22. Jon Blanchard Dog Park
23. Elving Kjellstrom Memorial Park

County Parks

24. Anderson Farm County Park
25. Anderson Farm County Park (Planned Future Expansion)

Community Facilities

A. Village Hall
B. Library
C. Community Pool
D. Netherwood Elementary School
E. Prairie View Elementary School
F. Oregon High School
G. Jaycee Park East
H. Trailhead
I. Future Elementary School Site
J. Rome Corners Intermediate School
K. Oregon Middle School
L. Soccer Club
M. Ice Arena
N. Proposed Trailhead

Amended: January 17, 2018
Source: CARPC, V&A, Dane County LIO, Village of Oregon

VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

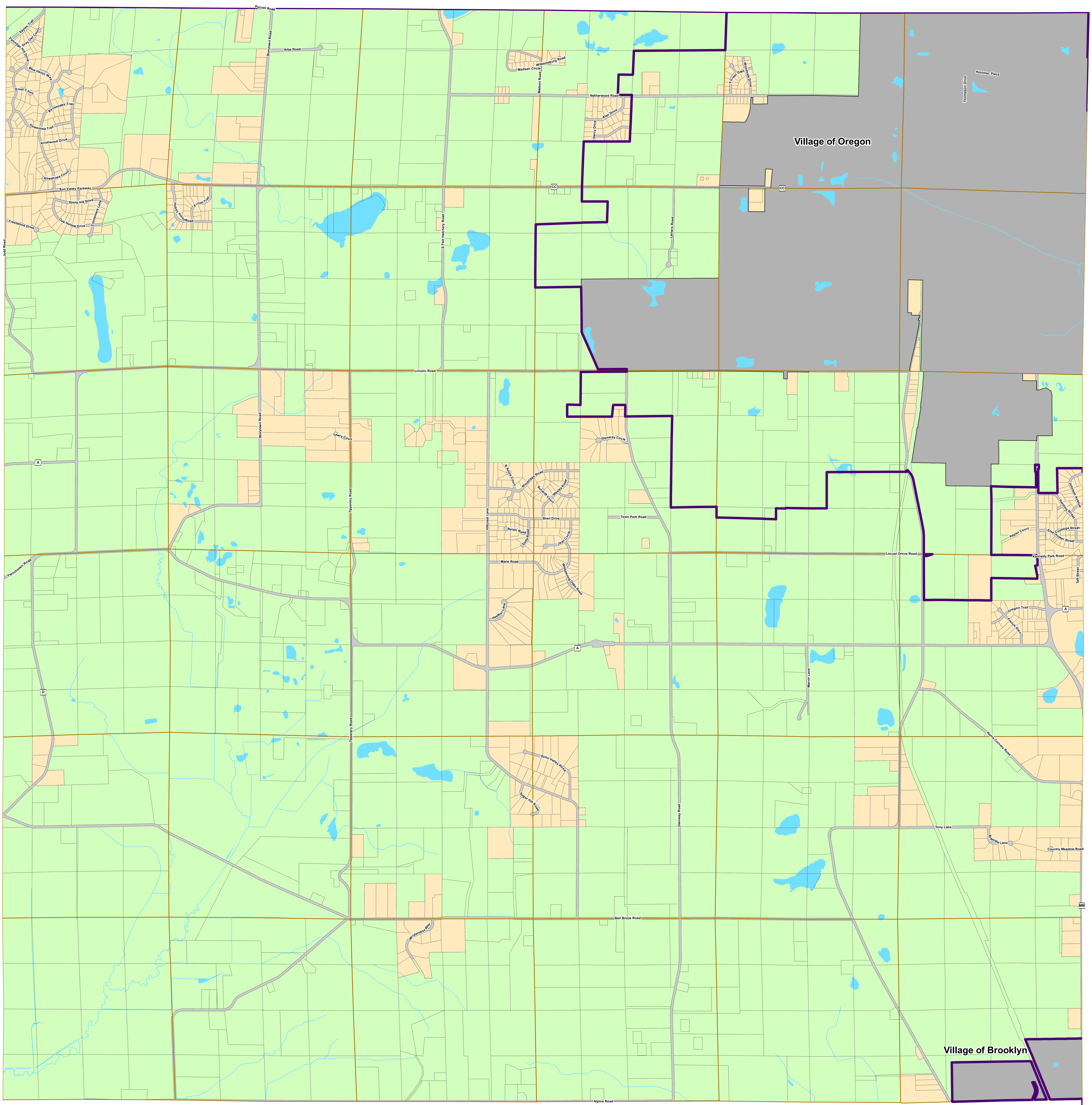
Attachment C: Town of Oregon and Town of Rutland Future Land Use and Farmland Preservation Maps

Dane County Comprehensive Plan Town of Orgeon Planned Land Use

Map created July 2010 by
Dane County Planning and Development
608-267-4115

Farmland Preservation Categories

- AGRICULTURAL PRESERVATION AREAS
- RURAL DEVELOPMENT/TRANSITIONAL
- City and Village Plans
- Section Boundary
- Parcel Boundary
- Water
- Village Boundary



Farmland Preservation Plan Map for Town of Oregon, Dane County WI

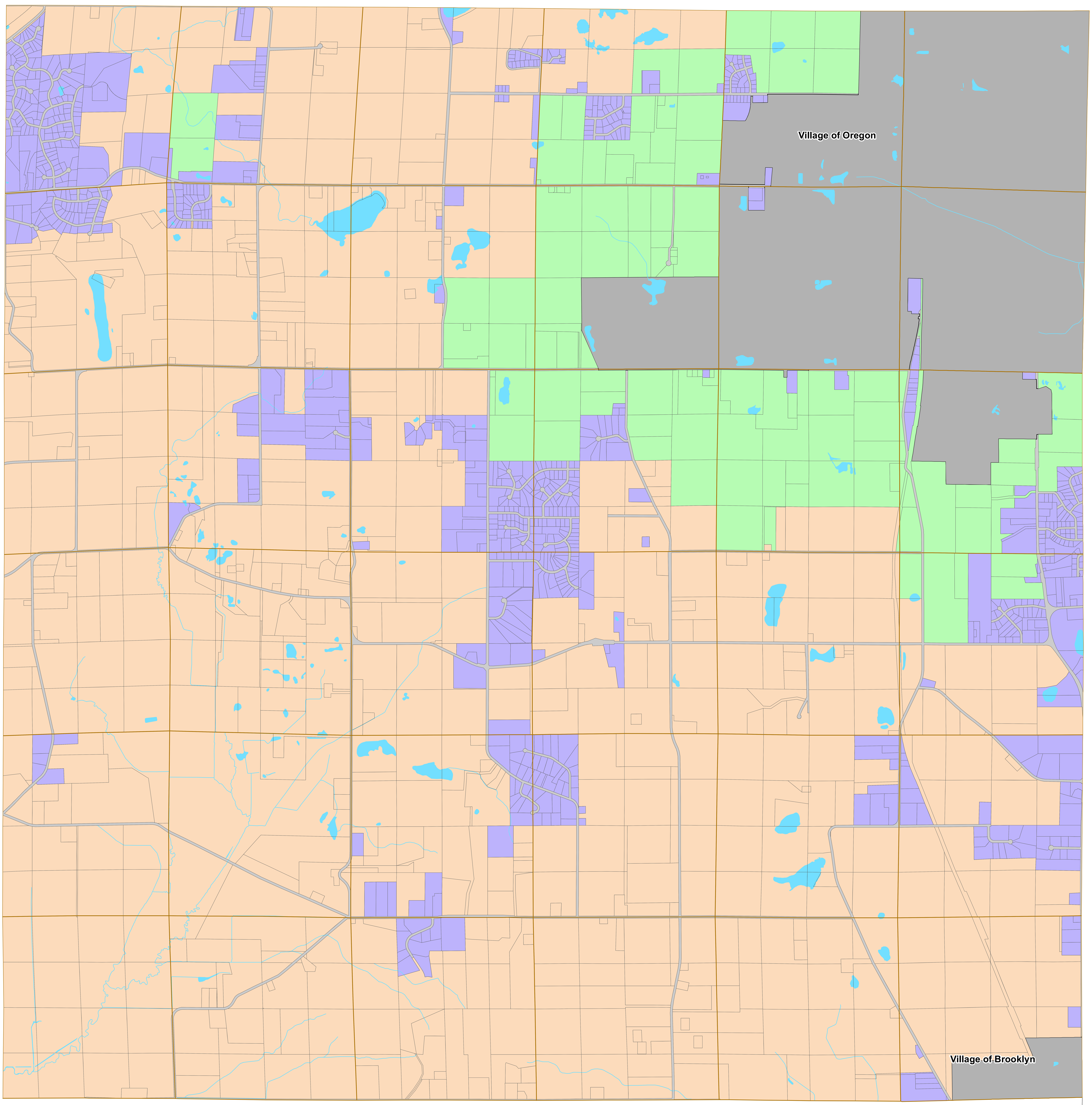
Map created August 2nd 2010 by
Dane County Planning and Development
608-267-4115

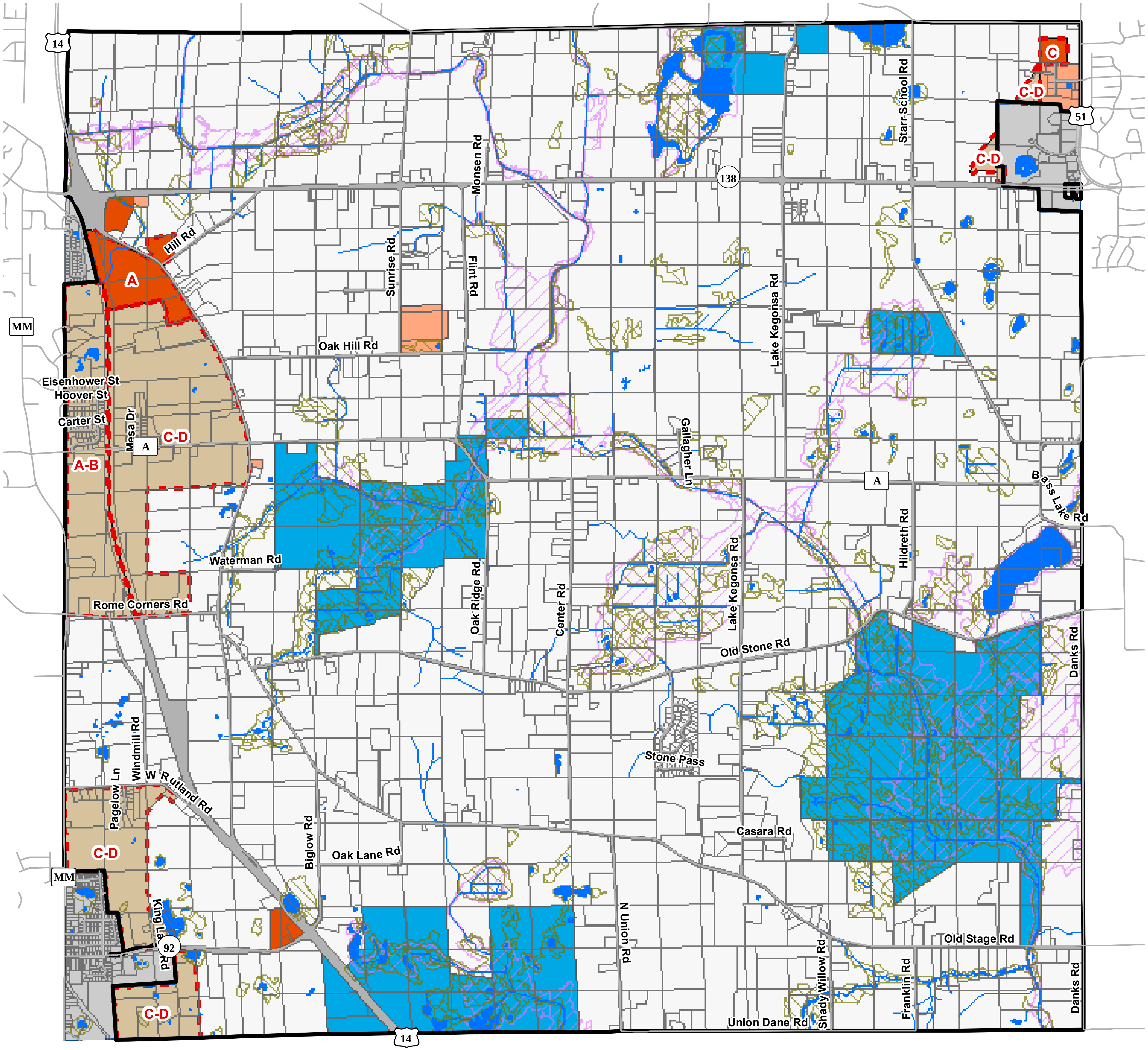
Farmland Preservation Zoning Districts:
A-1Exclusive Agriculture and A-3

Farmland Preservation Categories

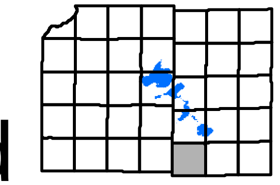
- AGRICULTURAL PRESERVATION
- AGRICULTURAL TRANSITION
- EXISTING NON AGRICULTURAL

- Section Boundary
- Parcel Boundary
- Water
- Village Boundary





Town of Rutland



Future Land Use 2005 to 2024

Comprehensive Plan - Policy Document

Proposed Land Use

- Residential - Medium Density (1 acres lots)
- Commercial
- Commercial - Existing
- Public Resource Land
- Agricultural Preservation

(see exhibit 5-1 for a description of the districts)

Overlay Districts

- Wetland
- 1 Percent Annual Flood Chance Area

Development Phasing

- A 2005 - 2009
- B 2010 - 2014
- C 2015 - 2019
- D 2020 - 2024

Map Legend

- Tax Parcel Boundary
- River or Stream
- Lake or Pond
- Development Phase Boundary
- Municipal Boundary

Sept., 2017

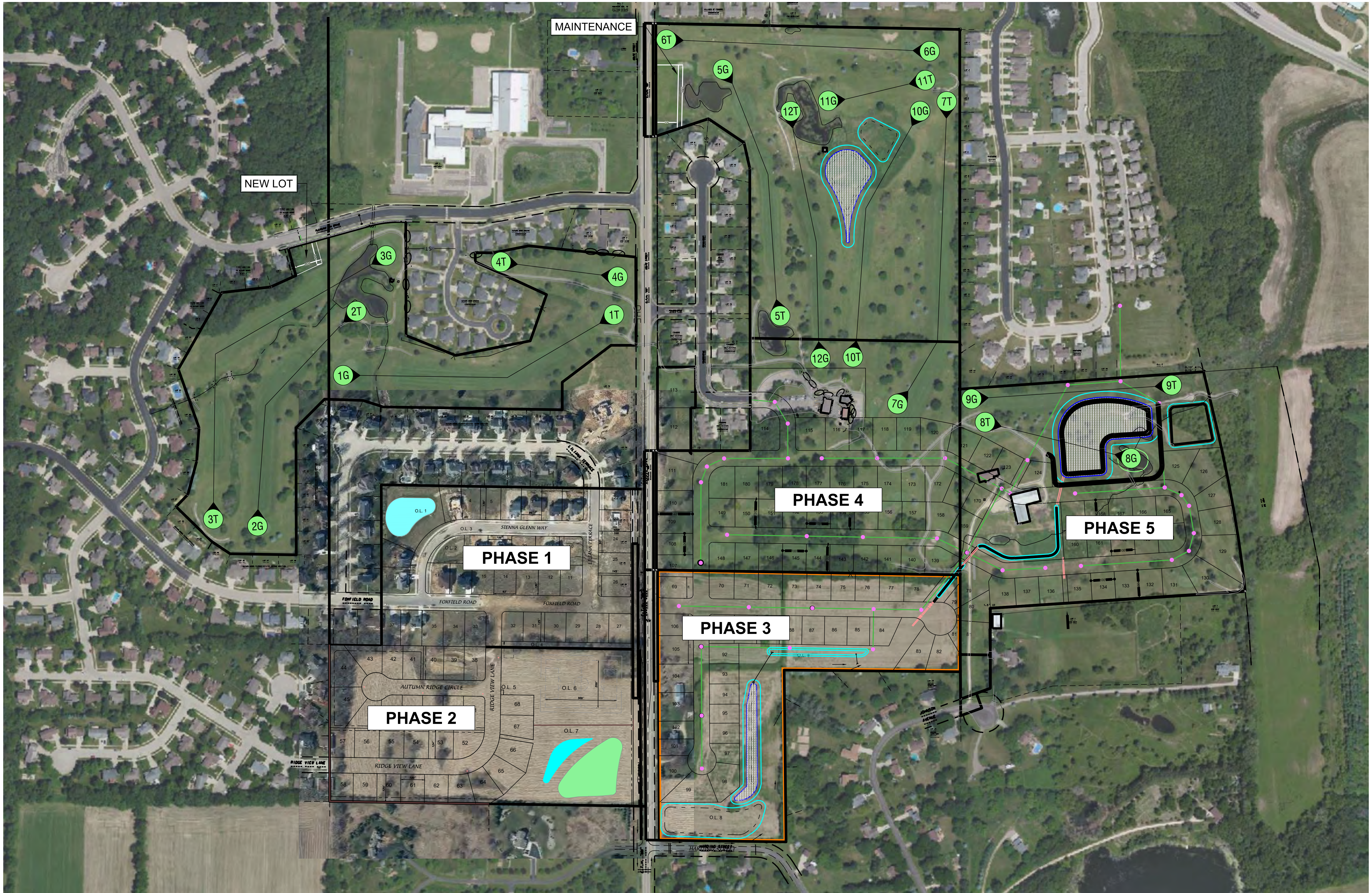
0 0.25 0.5 1 1.5 2 Miles

N

Source Info:
Urban Service Area: 2017, (CARPC)
Municipal Boundary: 2017, (DCPD)
Tax Parcel Boundary: 2017, (DCPD)
Zoning: 2017, (DCPD)

This map was prepared through the Dane County Department of Planning and Development in conjuction with the Dane County Land & Water Resources Department, Dane County Land Information Office and the Capital Area Regional Planning Commission

Attachment D: Foxboro Golf Course Reconfiguration Plan



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

AUTUMN RIDGE - NORTH

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

SCALE: 1"= 400'

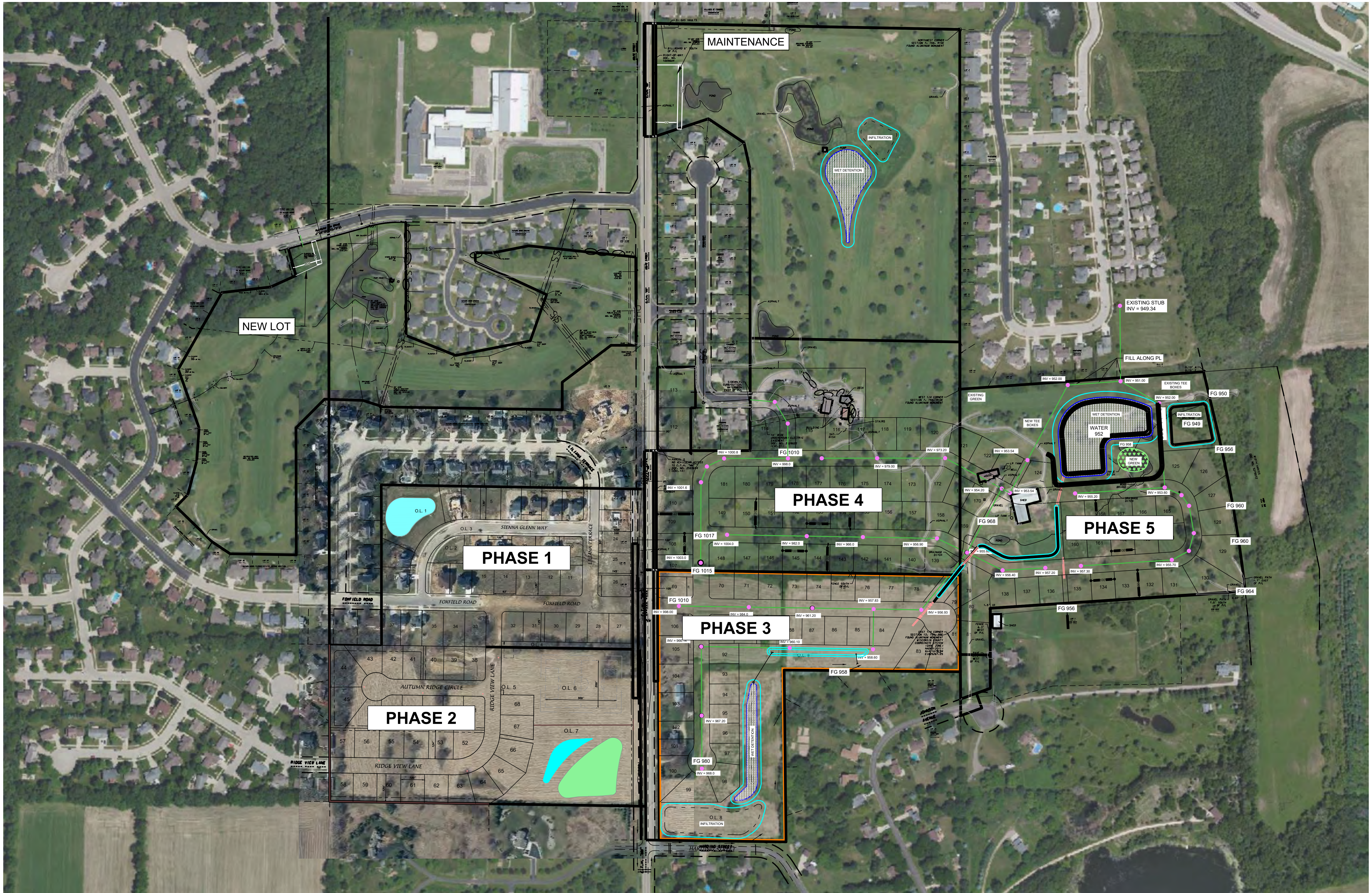
0 200'

DATE: 11-02-22
REVISED:

DRAWN BY: BJH

Sheet Number:

Attachment E: Proposed Neighborhood Plan



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

AUTUMN RIDGE - NORTH

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

SCALE: 1"= 400'

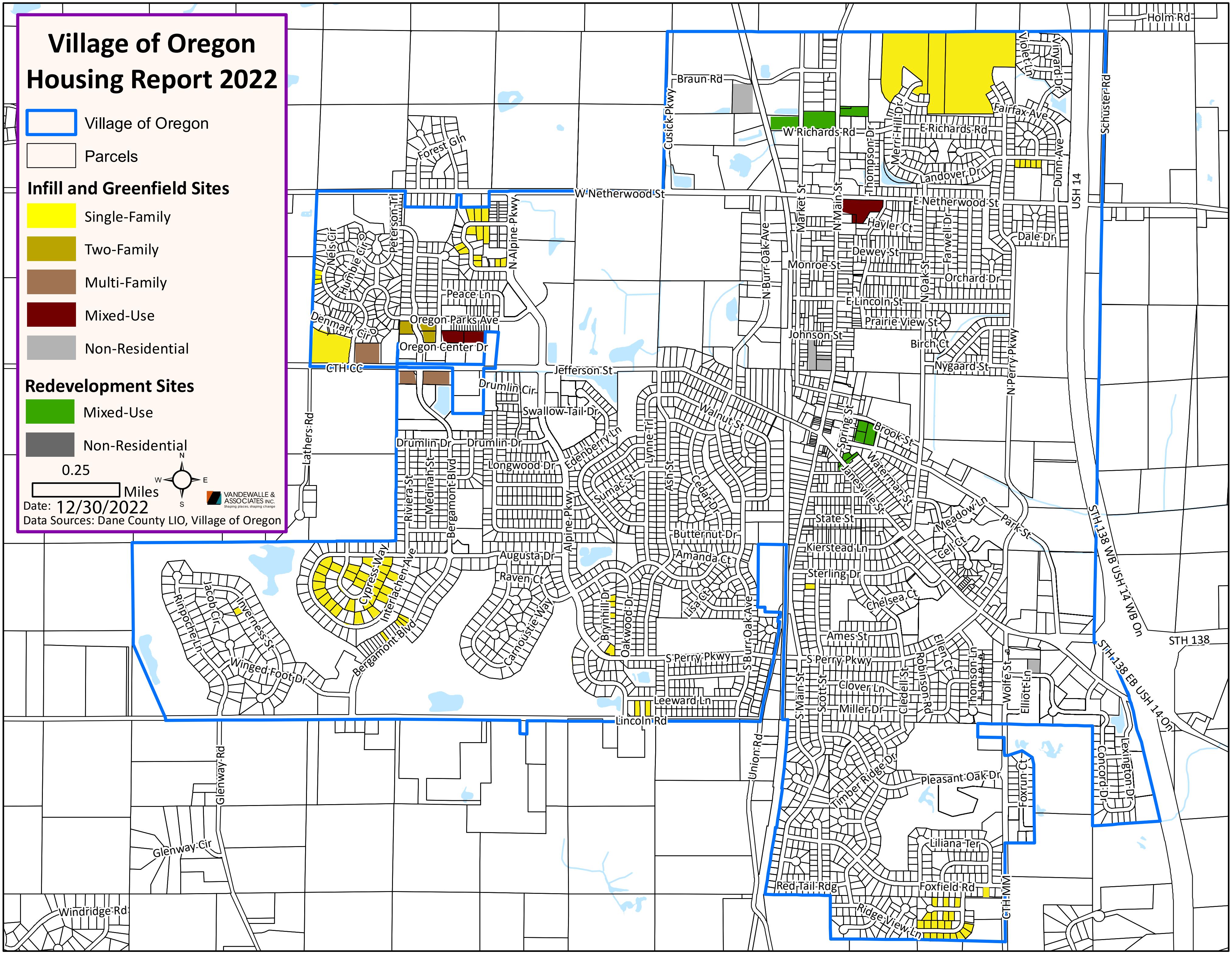
0 200'

DATE: 10-06-22
REVISED:

DRAWN BY: BJH

Sheet Number:

Attachment F: 2022 Village of Oregon Housing Affordability Report Map


Village of Oregon
Housing Report 2022
Village of Oregon
Parcels
Infill and Greenfield Sites
Single-Family
Two-Family
Multi-Family
Mixed-Use
Non-Residential
Redevelopment Sites
Mixed-Use
Non-Residential
0.25
Miles
N
W
E
S
VANDEWALLE & ASSOCIATES INC.
Date: 12/30/2022
Data Sources: Dane County LIO, Village of Oregon
Holm Rd
Braun Rd
Cusick Pkwy
W Richards Rd
E Richards Rd
Thompson Dr
Merri Hill Dr
Fairfax Ave
Violet Ln
Vinyard Dr
Schuster Rd
Dunn Ave
Landover Dr
USH 14
Forest Gln
W Netherwood St
E Netherwood St
Market St
N Main St
Hayler Ct
Dale Dr
Nels Cir
Peterson Trl
N Alpine Pkwy
Humble Gln
N Burr Oak Ave
Dewey St
Farwell Dr
Monroe St
Orchard Dr
Peace Ln
E Lincoln St
N Oak St
Denmark Cir
Oregon Parks Ave
Prairie View St
Johnson St
Birch Ct
Oregon Center Dr
N Perry Pkwy
CTH CC
Jefferson St
Nygaard St
Drumlin Cir
Swallow Tail Dr
Walnut St
Lathers Rd
Spring St
Brook St
Drumlin Dr
Edenberry Ln
Lynne Trl
Waterman St
Longwood Dr
Riviera St
Medinah St
Bergamont Blvd
Sumac St
Ash St
Cedar Dr
Janesville St
Alpine Pkwy
Meadow Ln
Park St
State St
Butternut Dr
Kierstead Ln
Cell Ct
Augusta Dr
Amanda Ct
Cypress Way
Interlachen Ave
Sterling Dr
STH 138 WB USH 14 WB On
Jacob Cir
Raven Ct
Rinpoche Ln
Inverness St
Brynhill Dr
Oakwood Dr
Lisa Ct
S Burr Oak Ave
Chelsea Ct
Carnoustie Way
Ames St
STH 138
Winged Foot Dr
S Perry Pkwy
Ellen Ct
Robinson Rd
Thomson Ln
Wolfe St
Elliott Ln
STH 138 EB USH 14 On
Clover Ln
Scott St
S Main St
Cledell St
Miller Dr
Leeward Ln
Lincoln Rd
Union Rd
Glenway Rd
Timber Ridge Dr
Pleasant Oak Dr
Foxrun Ct
Concord Dr
Lexington Dr
Glenway Cir
Liliana Ter
Red Tail Rdg
Foxfield Rd
CTH MM
Ridge View Ln
Windridge Rd

Attachment G: Wisconsin DNR Bureau of Natural Heritage Conservation for Endangered Resources Review Preliminary Assessment

Endangered Resources Preliminary Assessment

Created on **4/28/2023**. This report is good for one year after the created date.

DNR staff will be reviewing the ER Preliminary Assessments to verify the results provided by the Public Portal. ER Preliminary Assessments are only valid if the project habitat and waterway-related questions are answered accurately based on current site conditions. If an assessment is deemed invalid, a full ER review may be required even if the assessment indicated otherwise.

Results

A search was conducted of the NHI Portal within a 1-mile buffer (for terrestrial and wetland species) and a 2-mile buffer (for aquatic species) of the project area. Based on these search results, below are your next steps.

Actions required to comply with state and/or federal endangered species laws:

The project overlaps the Rusty Patched Bumble Bee High Potential Zone. The USFWS has created a Rusty Patched Bumble Bee High Potential Zone to show where there is a high likelihood for the species to be present. If a project overlaps with this zone then steps should be taken to determine if suitable habitat is present for the bee. Shapefiles and an interactive map of the zone can be found on the USFWS rusty patched bumble bee guidance page: (https://www.fws.gov/species/rusty-patched-bumble-bee-bombus-affinis)

- Suitable active season habitat includes, but is not limited to: prairies, woodlands, marshes/wetlands, agricultural landscapes and residential parks and gardens. The RPBB relies on diverse and abundant flowering plant species in proximity to suitable overwintering sites for hibernating queens.
- Suitable overwintering habitat includes, but is not limited, to: non-compacted soils, sandy soils, or woodlands. Overwintering habitat does not include wetlands.
- Non-suitable habitat includes, but is not limited to: permanently flooded areas/open water, paved areas, areas planted to annual row crops, forest where invasive shrubs are dominant and spring ephemeral flowers are absent, and areas mowed too frequently to allow development of diverse wildflower resources (e.g., road shoulders, medians, lawns).

If your project is 100% within non-suitable habitat then no further actions are necessary. However, if suitable habitat is present within the project site, assume presence and follow one or more the USFWS' recommended conservation measures below:

For prescribed fire, mowing/haying, grazing, pesticide use and tree clearing/thinning, follow the voluntary conservation measures outlined in the Conservation Management Guidelines for the Rusty Patched Bumble Bee (*Bombus affinis*)] document: ((https://www.fws.gov/sites/default/files/documents/ConservationGuidanceRPBBv1_27Feb2018_0.pdf))

For all other projects:

- use native trees, shrubs and flowering plants in landscaping,
- provide plants that bloom from spring through fall ((refer to the Wisconsin Native Plant Species List: (https://p.widencdn.net/tanvm9/NH0936)),
- remove and control invasive plants in any habitat used for foraging, nesting, or overwintering

If **none** of the above conservation measures can be followed or for more information on implementing the above conservation measures, contact the USFWS Bloomington Field Office at (952) 252-0092 or TwinCities@fws.gov for further consultation.

For more information, refer to the **Screening Guidance for the Rusty Patched Bumble Bee (RPBB):** (https://dnr.wi.gov/topic/endangeredresources/documents/NHIbeescreening.pdf).

A copy of this document can be kept on file and submitted with any other necessary DNR permit applications to show that the need for an ER Review has been met. This notice only addresses endangered resources issues. This notice does not constitute DNR authorization of the proposed project and does not exempt the project from securing necessary permits and approvals from the DNR and/or other permitting authorities.

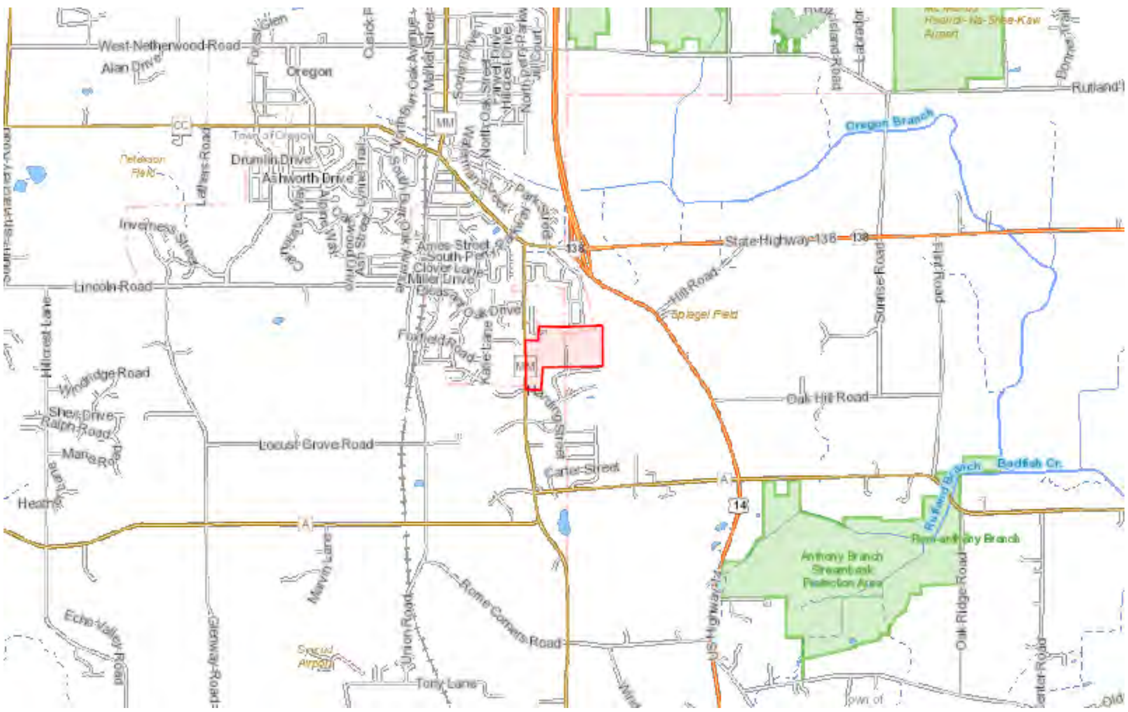
Project Information

Landowner name	**HOFER LIVING TR, GLENN & MICHELLE**
Project address	**958 COUNTY HIGHWAY MM, Oregon, WI** **1020 COUNTY HIGHWAY MM, Oregon, WI** **969 JOHNSON AVE, Oregon, WI**
Project description	**Proposed residential neighborhood development with homes, park, and stormwater**

Project Questions

Does the project involve a public property?	**No**
Is there any federal involvement with the project?	**No**
Is the project a utility, agricultural, forestry or bulk sampling (associated with mining) project?	**No**
Is the project property in Managed Forest Law or Managed Forest Tax Law?	**No**
Project involves tree or shrub removal?	**Yes**
Is project near (within 300 ft) a waterbody or a shoreline?	**No**
Is project within a waterbody or along the shoreline?	**No**

Project Area Maps



The information shown on these maps has been obtained from various sources, and is of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. Users of these maps should confirm the ownership of land through other means in order to avoid trespassing. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal/.

Attachment H: Preliminary Stormwater Management and Erosion Control Report (Phase 3)

SECOND ADDITION TO AUTUMN RIDGE
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

STORM WATER MANAGEMENT AND EROSION CONTROL REPORT

5/16/2023

<u>OWNER</u>

Glenn & Michelle Hofer Living Trust
E13431 Grace Street
Merrimac, WI 53561

May 16, 2023

<u>PREPARED BY</u>

D'Onofrio, Kottke & Associates, Inc.
7530 Westward Way
Madison, Wisconsin 53717

FN: 22-05-143

TABLE OF CONTENTS

<u>EXHIBITS</u>

<u>APPENDICES</u>

INTRODUCTION

The intent of this report is to provide details on how the proposed "Second Addition to Autumn Ridge" residential plat will be developed so that it is constructed in accordance with applicable storm water management standards.

The proposed development is approximately a 17.7-acre plat located in the Village of Oregon. The site is located just to the East of County Hwy MM (Wolfe St.), and South of the Foxboro Golf Club in the SE ¼ of the NE ¼, Section 13, Township 05N, Range 09E. More specifically parcel number 0509-131-9721-0 Village of Oregon, Dane County, Wisconsin. A project location map can be found in Exhibit #1.

The existing layout of the site consists of predominantly agricultural tilled land with surface water generally draining from south/north and west to the east side of the site. In developed conditions the site will create approximately 32 single family lots, 4 duplex lots and 3 Outlots. The plat has two watersheds that will be routed to a wet detention/infiltration basin system for treatment. The soil conditions on site consist of hydrologic soil group type B soils. A site soils map can be found in Exhibit #2.

The proposed improvements for this plat requires land disturbing activity in excess of one acre and the future cumulative addition of 20,000 square feet of impervious surface area. Therefore, according to the Village of Oregon and State of Wisconsin ordinances, the site requires storm water management approvals and permits.

STANDARDS & RESULTS

The proposed development requires the following storm water management performance standards.

Sediment Control
Standard: Reduce, to the maximum extent practicable, total suspended solids load leaving the site by eighty percent (80%) based on the average annual rainfall.

Design Results: Sediment from the site will be reduced by 80% by routing the site runoff to a wet detention basin in the Southeast corner of the plat. WinSLAMM was used for modeling the sediment load reduction. See appendix B for sediment reduction calculations. Water leaving the site to the southeast will be clean runoff mostly from yards and roofs.

Temperature Control
Standard: For development of sites within thermally sensitive areas, provisions and practices to reduce the temperature of the storm water runoff shall be included.

Design Results: The proposed site does not fall within a defined thermally sensitive area.

Runoff Rate Control
Standard: For new developments, storm water management practices shall be designed and implemented to maintain post-development peak runoff discharge rates at predevelopment rates for the 1-year and 2-year, 24-hour design storm event. Reduce the peak runoff rates for the 10-year, 24-hour storm event to the 2-year, 24-hour predevelopment peak flow rate. Reduce the 100-year, 24-hour storm event to the 10-year, 24-hour predevelopment peak flow rate. Maintain post-development peak runoff discharge rates at predevelopment rates for the 200-year, 24-hour design storm event.

Design Results: The basin system will maintain the required peak runoff rates for the 1, 2, 10, 100, and 200-year, 24-hour storm events. The peak flow comparison chart for site can be found in the stormwater management measures section of this report and the HydroCAD output can be found within Appendix D. The disturbed areas will be deep tilled prior to restoration to maintain existing soils classes.

Infiltration
Standard: For new developments, design practices to infiltrate sufficient runoff volume so the post-development infiltration volume shall be at least 90% of the predevelopment infiltration volume.

Design Results: The proposed development was designed to meet the 90% stayon requirement through an infiltration basin. The infiltration basin was sized using WinSLAMM modeling software. A minimum of 60% sediment reduction will occur in the proposed wet detention basin cell prior to entering the designed infiltration basin. The infiltration design calculations can be found in Appendix C.

STORM WATER MANAGEMENT MEASURES

Stormwater from the site will be treated by routing runoff to a wet detention/infiltration basin systems located at the south and east side of the plat. Peak flow, sediment reduction, and stay-on requirements will be met for the entire plat.

HydroCAD Stormwater Modeling software has been used to analyze the stormwater runoff characteristics for the development. HydroCAD uses the TR-55 methodology for determining peak discharge rates. The model output shows the runoff leaving the site in existing and proposed conditions. The site was designed to utilize a combination wet detention basin and infiltration basin system prior to leaving the site in proposed conditions. In this system, the wet detention basin will limit flow into the infiltration basin for the 1-year, 24-hour storm event to remove sediment before entering the infiltration basin. During larger storms, the two basins will fill and act as one basin to limit peak flow from the site (see basin details in Appendix A) .The detention and infiltration basins were modeled dynamically to better represent the elevations of the two basins working together. Draintile is installed in the infiltration basins to assist with the establishment of vegetation during the first 2-3 years. The 4" orifice in the wet pond release structure will be plugged and a separate 4" diameter pipe will act as the low flow outlet that will allow runoff to bypass the infiltration basin temporarily. Once the vegetation is well established in the infiltration basin, the upstream and downstream ends of the 4" pipe will be plugged and the 4" orifice opened up to function as designed. Storm events greater than the 2-year will overflow into the release structure and then into the infiltration basin.

The peak flow results from the stormwater modeling and basin design are shown in the chart on the next page. The chart shows the proposed results from the drainage area along with a comparison of the runoff volume leaving the site through the 200-year storm event. The detention basin system will maintain the peak runoff rates leaving the plat per the Village's requirements.

WinSLAMM was used to perform sediment reduction calculations for the proposed site. Appendix B contains the calculation results. The stormwater management system will provide 80% sediment removal. The peak flow results from stormwater modeling and detention basin design are shown in the chart on the next page. This chart shows a comparison of the drainage area in existing conditions and in post construction conditions. Infiltration modeling for the site was calculated using WinSLAMM software and meets the 90% predevelopment standard per the ordinance. The infiltration calculations can be found in Appendix C.

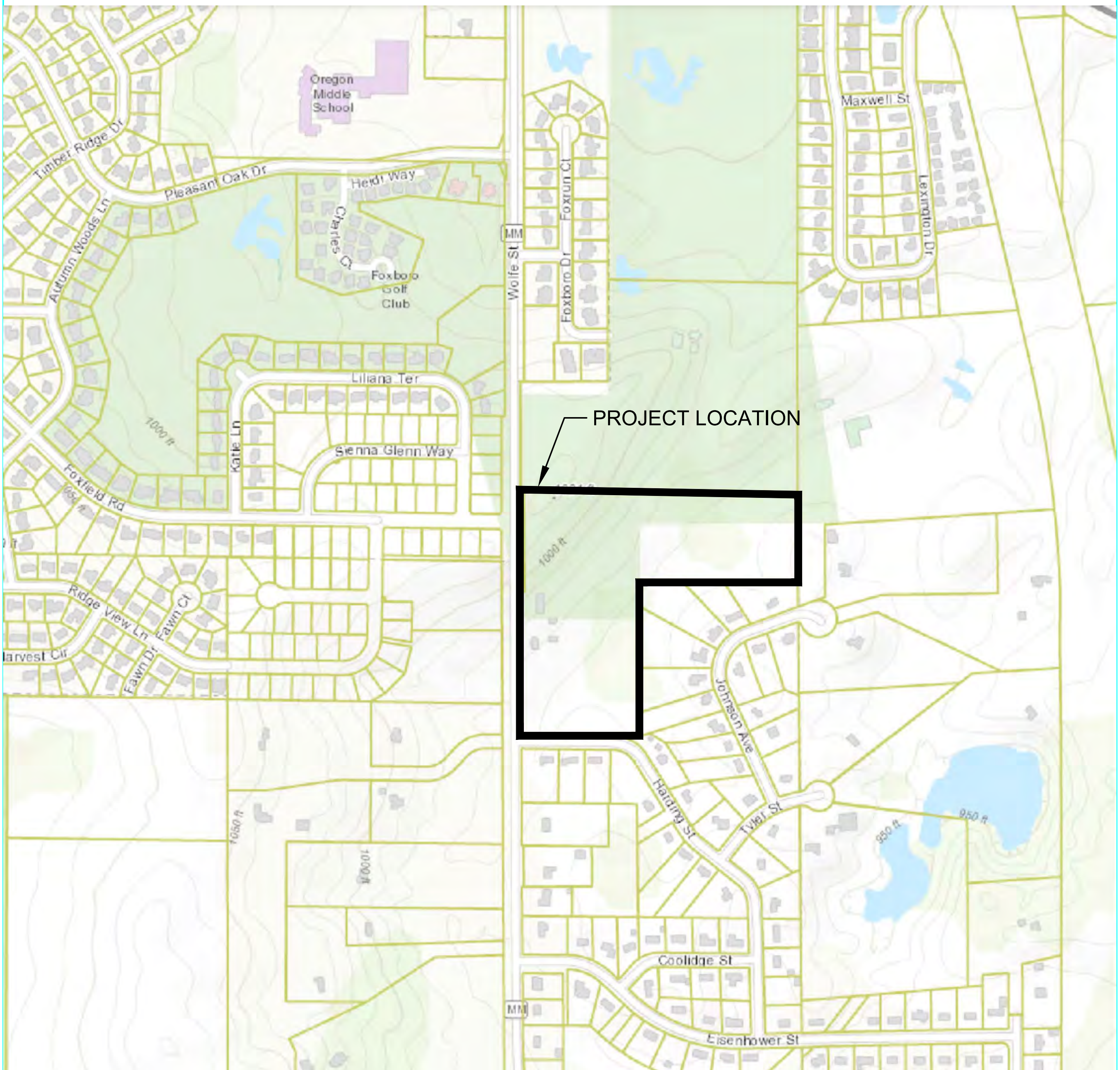
PEAK FLOW COMPARISION CHART
Second Addition to Autumn Ridge

TOTAL	1-year	2-year	10-year	100-year	200-year
PRE-DEVELOPMENT	***5.51***	***8.89***	***23.70***	***61.34***	***74.69***
POST-DEVELOPMENT (NO CONTROLS)	24.83	32.27	60.15	120.74	140.71
POST-DEVELOPMENT (WITH CONTROLS)	**2.25**	**3.38**	**8.20**	**23.07**	**40.98**
CONTROLS					
SOUTH BASIN SYSTEM					
WET DETENTION BASIN: BOTTOM=957.0, OUTLET = 962.0, TOP OF BERM = 966.0					
DISCHARGE RATE	0.48	1.75	10.98	43.42	54.92
PEAK BASIN ELEVATION	963.47	963.62	964.08	965.01	965.14
INFILTRATION BASIN: BOTTOM = 960.0, OUTLET = 961.0, TOP OF BERM = 965.0					
DISCHARGE RATE (TO DITCH)	0.44	0.69	1.47	9.65	20.20
PEAK BASIN ELEVATION	961.35	961.57	963.00	964.17	964.42
NORTHEAST BASIN SYSTEM					
WET DETENTION BASIN: BOTTOM=955.0, OUTLET = 960.0, TOP OF BERM = 964.0					
DISCHARGE RATE	0.40	0.46	1.51	12.73	22.23
PEAK BASIN ELEVATION	961.16	961.51	962.60	963.49	963.75
INFILTRATION BASIN: BOTTOM = 959.0, OUTLET = 960.0, TOP OF BERM = 962.0					
DISCHARGE RATE (TO DITCH)	0.36	0.43	0.80	10.68	18.49
PEAK BASIN ELEVATION	960.35	960.40	960.84	961.72	961.90

CONCLUSIONS

As the results indicate, the storm water management system for the proposed development meets the Village of Oregon and State of Wisconsin Ordinances. The peak flow, sediment control and infiltration requirements have been addressed and met for this site.

EXHIBITS



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.

7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

LOCATION MAP

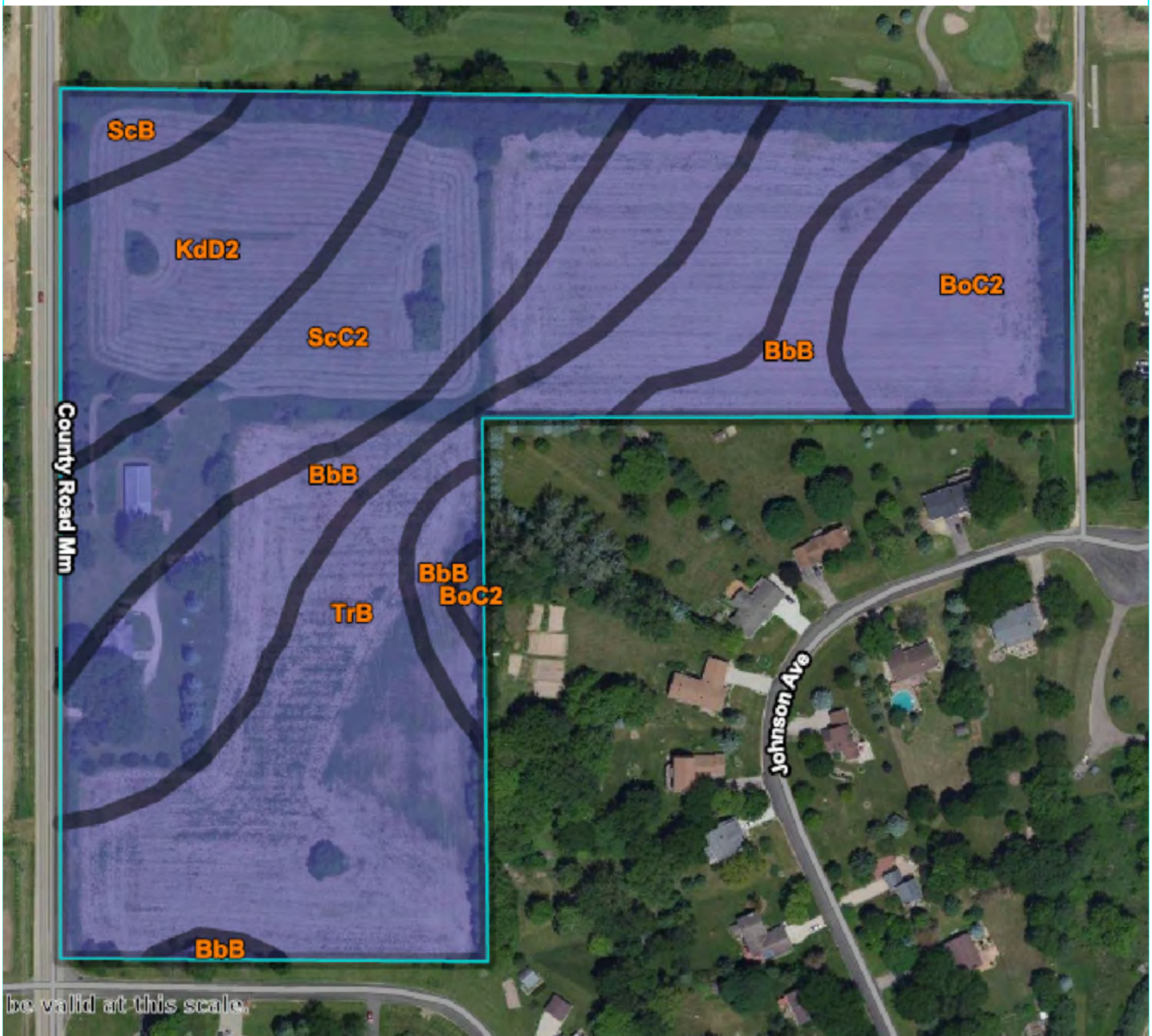
AUTUMN RIDGE - PHASE 3

VILLAGE OF OREGON, WISCONSIN

DRAWN BY: TCF

EXHIBIT 1

U:\USER\2205143\ENGINEERING\SWMP\PHASE 3 SWMP.DWG



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

SITE SOILS MAP

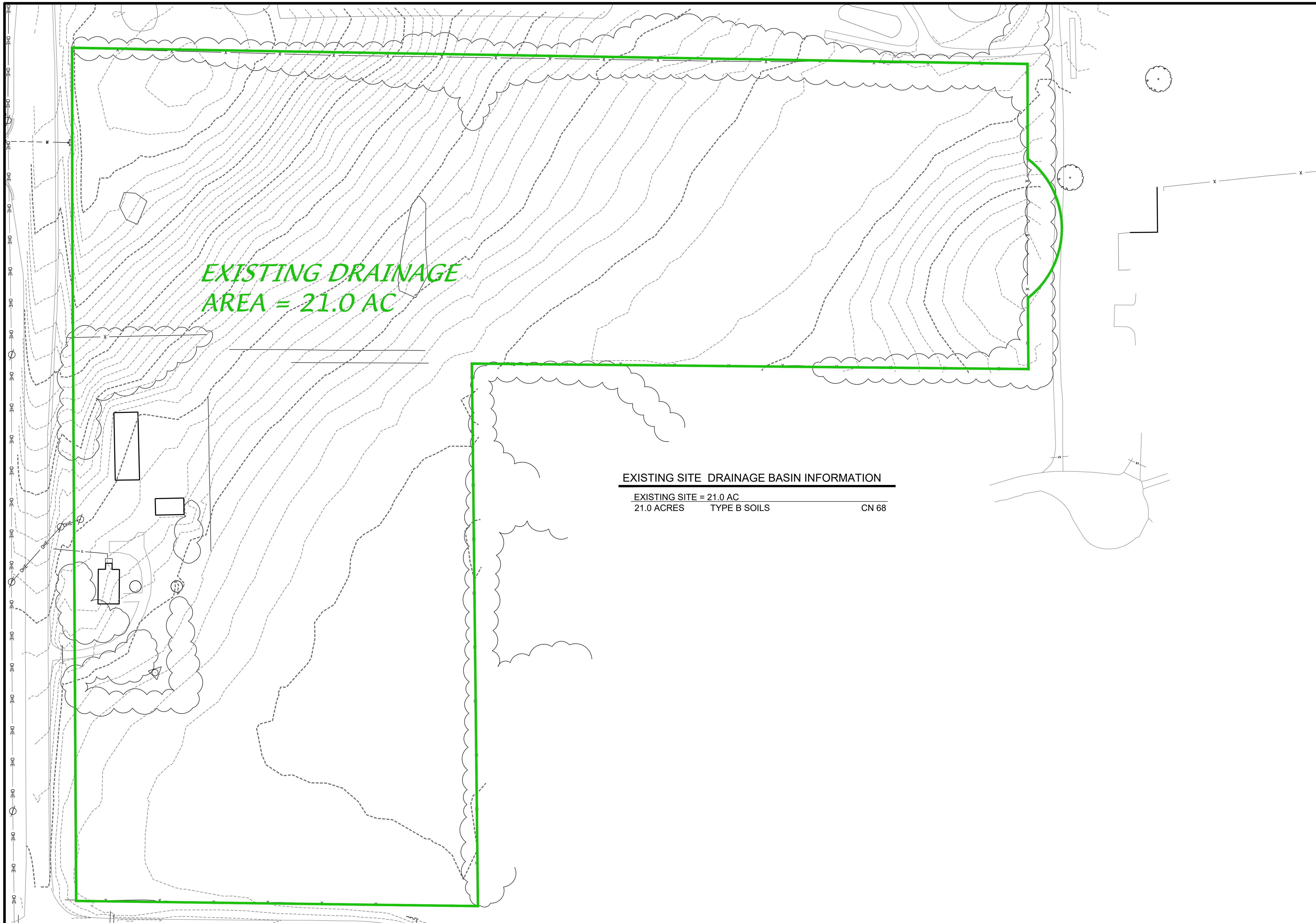
AUTUMN RIDGE - PHASE 3

VILLAGE OF OREGON, WISCONSIN

DRAWN BY: TCF

EXHIBIT 2

U:\USER\2205143\ENGINEERING\SWMP\PHASE 3 SWMP.DWG



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

EXISTING DRAINAGE MAP

AUTUMN RIDGE - PHASE 3

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

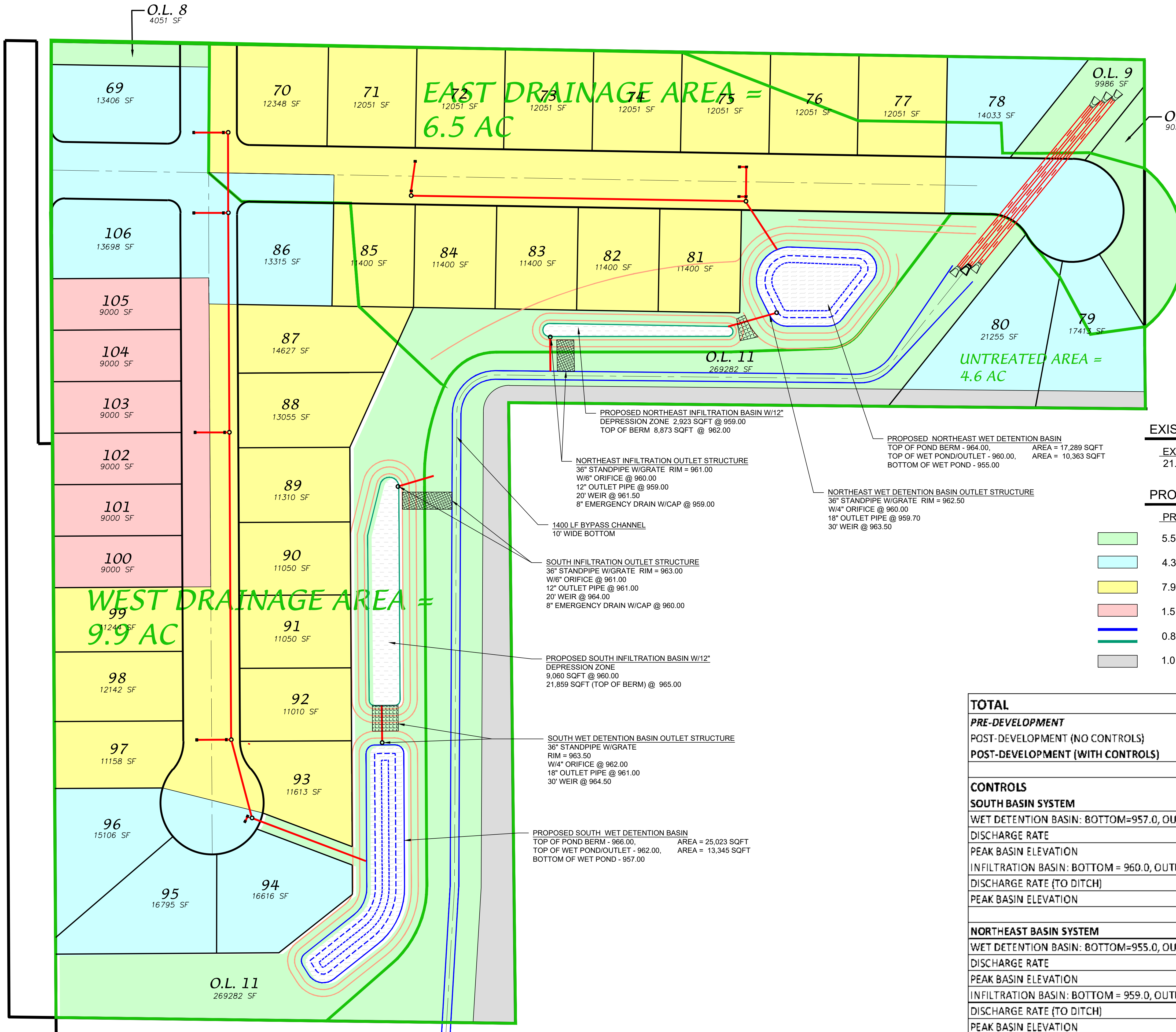
SCALE: 1"= 60'
(22"X34")
0 100

DATE: 05-15-2023
REVISED:

DRAWN BY: WFK

FN: 22-05-143

Sheet Number:
Exhibit 3



EXISTING SITE DRAINAGE BASIN INFORMATION

EXISTING SITE = 21.0 AC

21.0 ACRES	TYPE B SOILS	CN 68

PROPOSED SITE DRAINAGE BASIN INFORMATION

PROPOSED SITE = 21.0 AC

5.5 ACRES	TYPE B OL/PARK	CN 74
4.3 ACRES	30% IMPERVIOUS	CN 81
7.9 ACRES	40% IMPERVIOUS	CN 84
1.5 ACRES	60% IMP DUPLEX LOTS	CN 88
0.8 ACRES	WATER IMPERVIOUS	CN 98
1.0 ACRES	UNDEVELOPED	CN 68

TOTAL	1-year	2-year	10-year	100-year	200-year
PRE-DEVELOPMENT	***5.51***	***8.89***	***23.70***	***61.34***	***74.69***
POST-DEVELOPMENT (NO CONTROLS)	24.83	32.27	60.15	120.74	140.71
POST-DEVELOPMENT (WITH CONTROLS)	**2.25**	**3.38**	**8.20**	**23.07**	**40.98**
CONTROLS					
SOUTH BASIN SYSTEM					
WET DETENTION BASIN: BOTTOM=957.0, OUTLET = 962.0, TOP OF BERM = 966.0					
DISCHARGE RATE	0.48	1.75	10.98	43.42	54.92
PEAK BASIN ELEVATION	963.47	963.62	964.08	965.01	965.14
INFILTRATION BASIN: BOTTOM = 960.0, OUTLET = 961.0, TOP OF BERM = 965.0					
DISCHARGE RATE (TO DITCH)	0.44	0.69	1.47	9.65	20.20
PEAK BASIN ELEVATION	961.35	961.57	963.00	964.17	964.42
NORTHEAST BASIN SYSTEM					
WET DETENTION BASIN: BOTTOM=955.0, OUTLET = 960.0, TOP OF BERM = 964.0					
DISCHARGE RATE	0.40	0.46	1.51	12.73	22.23
PEAK BASIN ELEVATION	961.16	961.51	962.60	963.49	963.75
INFILTRATION BASIN: BOTTOM = 959.0, OUTLET = 960.0, TOP OF BERM = 962.0					
DISCHARGE RATE (TO DITCH)	0.36	0.43	0.80	10.68	18.49
PEAK BASIN ELEVATION	960.35	960.40	960.84	961.72	961.90

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

PROPOSED DRAINAGE MAP

AUTUMN RIDGE - PHASE 3

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

SCALE: 1"= 60'
(22"X34")

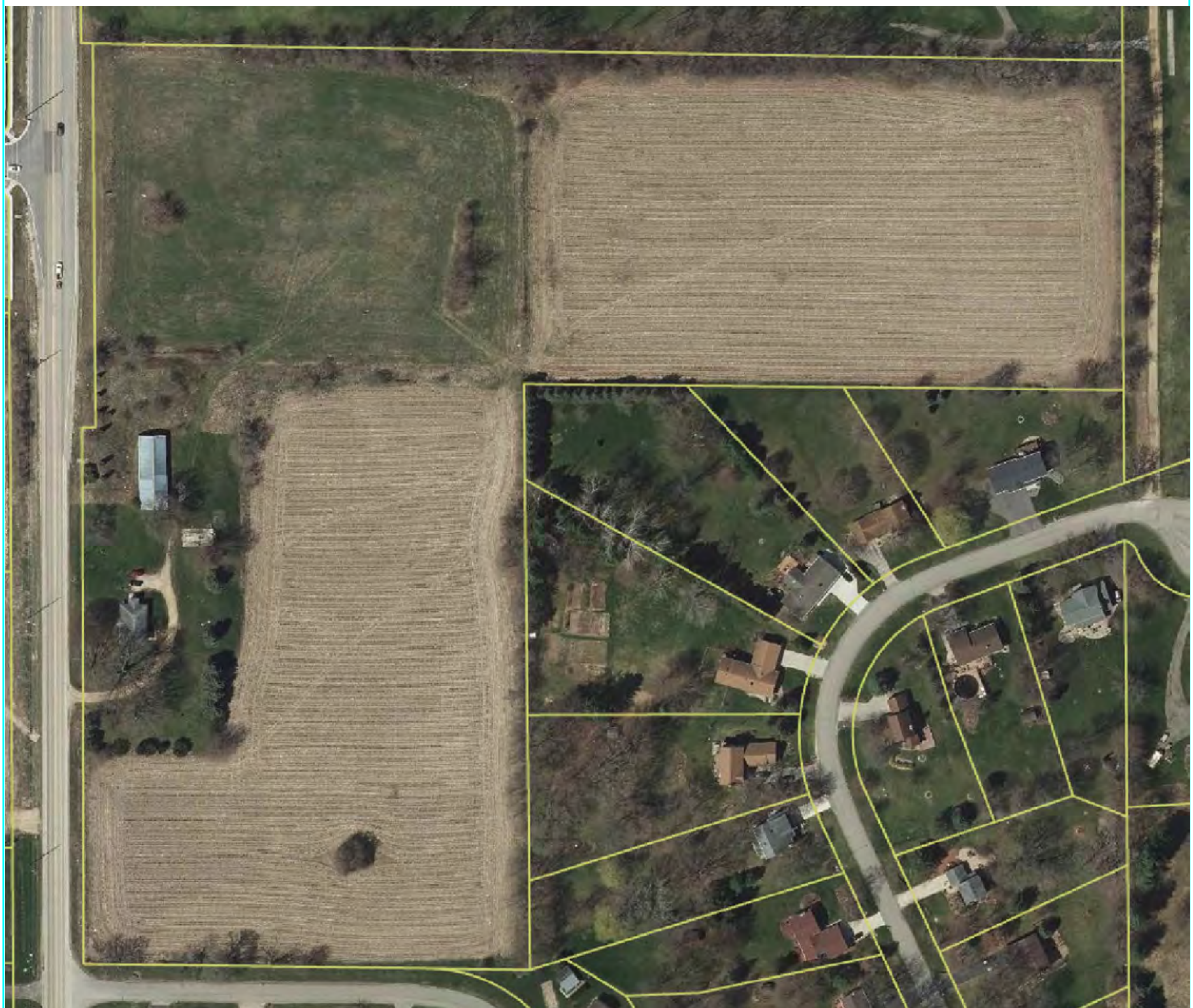
DATE: 05-23-2023
REVISED:

DRAWN BY: WFK

FN: 22-05-143

Sheet Number:
Exhibit 4

File: U:\User\2205143\Engineering\SWMP\2205143 SWMP.dwg Exhibit 4 Plotted: May 23, 2023 - 4:58pm



AERIAL PHOTO

AUTUMN RIDGE - PHASE 3

VILLAGE OF OREGON, WISCONSIN

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

DRAWN BY: TCF

EXHIBIT 6

U:\USER\2205143\ENGINEERING\SWMP\PHASE 3 SWMP.DWG

Surface Water Data Viewer Map

Legend

- Wetland Indicators
- Wetland Class Areas
- Wetland Class Points
  - Dammed pond
  - Excavated pond
  - Filled/drained wetland
  - Wetland too small to delineate
  - Filled excavated pond
- Filled Points
- Wetland Class Areas
- Filled Areas
- Wetland Class Areas
- Wetland Class Points
  - Dammed pond
  - Excavated pond
  - Filled/drained wetland
  - Wetland too small to delineate
  - Filled excavated pond
- Filled Points
- Wetland Class Areas
- Filled Areas
- Wetland Identifications and Confirmations
- NRCS Wetspots
- Municipality
- State Boundaries
- County Boundaries
- Major Roads
  - Interstate Highway
  - State Highway
  - US Highway
- County and Local Roads
  - County HWY
  - Local Road

0.1 0 0.06 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

1: 3,960

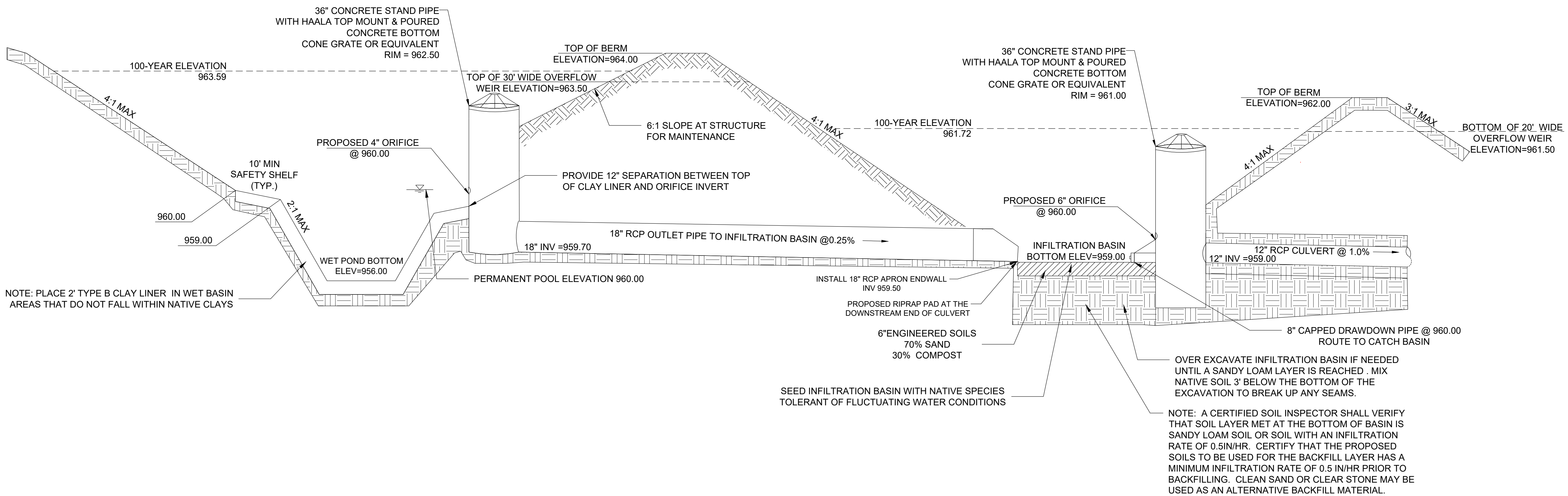
Notes

APPENDIX A

DETENTION POND & INFILTRATION BASIN DETAIL

NOTES:

1. VILLAGE ENGINEER TO MAKE THE FINAL GRADING DETERMINATION AROUND STRUCTURE FOR MAINTENANCE.



PROFILE VIEW

PROPOSED NORTHEAST WET DETENTION BASIN & INFILTRATION BASIN

NOT TO SCALE

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

NORTHEAST POND PROFILE

AUTUMN RIDGE - PHASE 3 FILL

TOWN OF OREGON, DANE COUNTY, WISCONSIN

DATE: 05/15/23
REVISED:

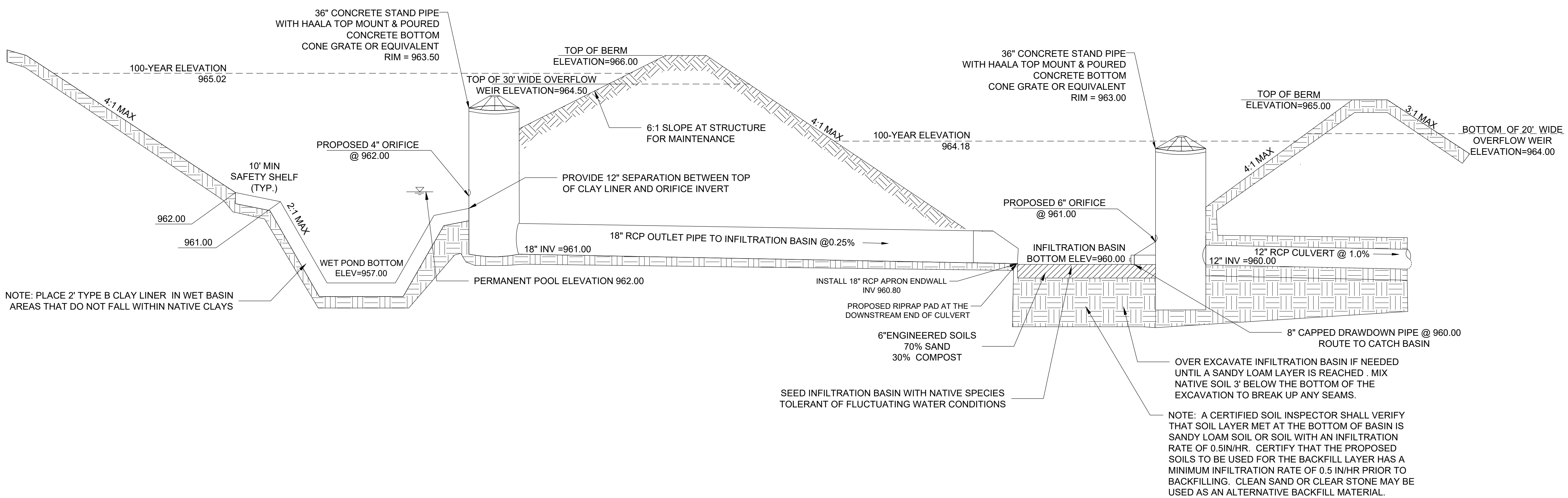
DRAWN BY: TCF

FN: 22-05-143

Sheet Number:

NOTES:

1. VILLAGE ENGINEER TO MAKE THE FINAL GRADING DETERMINATION AROUND STRUCTURE FOR MAINTENANCE.



PROFILE VIEW

PROPOSED SOUTH WET DETENTION BASIN & INFILTRATION BASIN

NOT TO SCALE

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

SOUTH POND PROFILE

AUTUMN RIDGE - PHASE 3 FILL

TOWN OF OREGON, DANE COUNTY, WISCONSIN

DATE: 05/15/23
REVISED:

DRAWN BY: TCF

FN: 22-05-143

Sheet Number:
15 OF 15

APPENDIX B

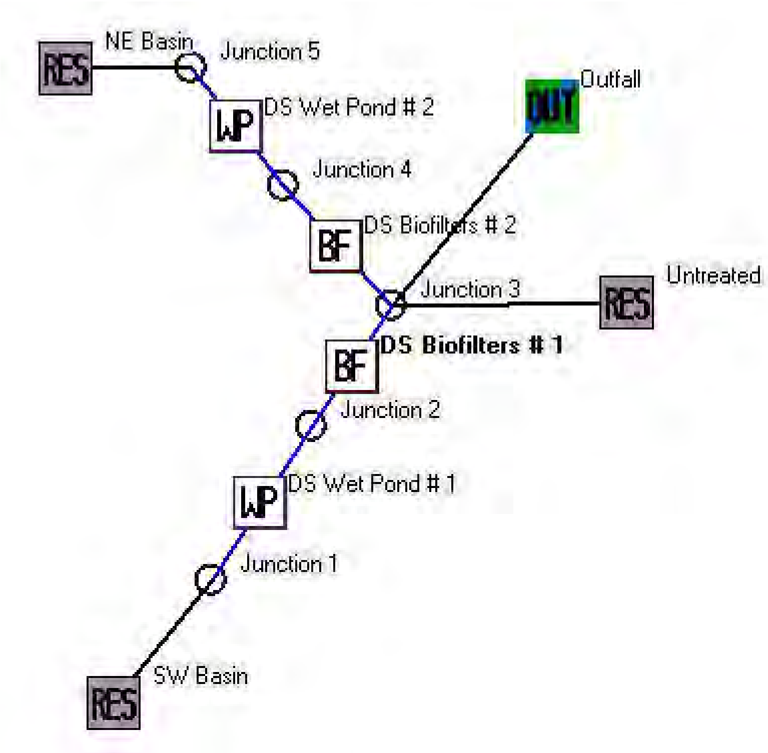
SEDIMENT REDUCTION CALCULATIONS

DETENTION BASIN
SEDIMENTATION REDUCTION CALCULATIONS (SLAMM)

WinSlamm Design

The following Slamm design shows that 80% of sediment is being removed from the proposed site

Model Schematic:



Model Input Information:

Data file name: U:\User\2205143\Engineering\SWMP\WinSLAMM\2205143.mdb
WinSLAMM Version 10.4.0
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 05-15-2023 Time: 20:40:44

Site information:

Pre-Development Area Description	Pre-Development Area (ac)	Pre-Development CN
Imp	.190	98
Per	20.810	68
Total Area (ac)/Composite CN	21.000	68

LU# 1 - Residential: SW Basin   Total area (ac): 9.855
1 - Roofs 1: 0.454 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
2 - Roofs 2: 0.643 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
3 - Roofs 3: 0.404 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 0.454 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
26 - Driveways 2: 0.643 ac.   Disconnected   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
27 - Driveways 3: 0.404 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.605 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
46 - Large Landscaped Areas 2: 1.930 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
47 - Large Landscaped Areas 3: 1.883 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
48 - Large Landscaped Areas 4: 1.921 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.514 ac.   Source Area PSD File:

LU# 2 - Residential: NE Basin   Total area (ac): 6.540
2 - Roofs 2: 0.872 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
3 - Roofs 3: 0.104 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
26 - Driveways 2: 0.872 ac.   Disconnected   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
27 - Driveways 3: 0.104 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
46 - Large Landscaped Areas 2: 2.616 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
47 - Large Landscaped Areas 3: 0.485 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
48 - Large Landscaped Areas 4: 1.182 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.305 ac.   Source Area PSD File:

LU# 3 - Residential: Untreated   Total area (ac): 4.605
2 - Roofs 2: 0.073 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
3 - Roofs 3: 0.133 ac.   Pitched   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
26 - Driveways 2: 0.073 ac.   Disconnected   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
27 - Driveways 3: 0.133 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
46 - Large Landscaped Areas 2: 0.219 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
47 - Large Landscaped Areas 3: 0.623 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
48 - Large Landscaped Areas 4: 2.402 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
57 - Undeveloped Areas 1: 0.949 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Wet Detention Pond CP# 1 (DS) - DS Wet Pond # 1
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft):   5
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
- Outlet type: Orifice 1
  1. Orifice diameter (ft):   0.33
  2. Number of orifices: 1
  3. Invert elevation above datum (ft):   5
- Outlet type: Broad Crested Weir
  1. Weir crest length (ft):   30
  2. Weir crest width (ft):   10
  3. Height from datum to bottom of weir opening: 7.5
- Outlet type: Vertical Stand Pipe
  1. Stand pipe diameter (ft):   3
  2. Stand pipe height above datum (ft):   6.5

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0497	0.00	0.00
2	4.00	0.1576	0.00	0.00
3	5.00	0.3064	0.00	0.00
4	7.00	0.4358	0.00	0.00
5	9.00	0.5744	0.00	0.00

Control Practice 2: Biofilter CP# 1 (DS) - DS Biofilters # 1

1. Top area (square feet) = 21859
2. Bottom aea (square feet) = 9060
3. Depth (ft): 5.5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 0.001
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 0.5
13. Engineered soil porosity = 0.24
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0

Soil Data	Soil Type Fraction in Eng. Soil
User-Defined Soil Type	1.000

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 4.5

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 3.5

Outlet type: Surface Discharge Pipe

1. Surface discharge pipe outlet diameter (ft): 0.5
2. Pipe invert elevation above datum (ft): 1.5
3. Number of surface pipe outlets: 1

Control Practice 3: Wet Detention Pond CP# 2 (DS) - DS Wet Pond # 2

Particle Size Distribution file name: Not needed - calculated by program

Initial stage elevation (ft): 5

Peak to Average Flow Ratio: 3.8

Maximum flow allowed into pond (cfs): No maximum value entered

Outlet Characteristics:

Outlet type: Orifice 1

1. Orifice diameter (ft): 0.33
2. Number of orifices: 1
3. Invert elevation above datum (ft): 5

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 30
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 7.5

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 3

2. Stand pipe height above datum (ft):   6.5

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.1032	0.00	0.00
2	4.00	0.1573	0.00	0.00
3	5.00	0.2379	0.00	0.00
4	7.00	0.3128	0.00	0.00
5	9.00	0.3969	0.00	0.00

Control Practice 4: Biofilter CP# 2 (DS) - DS Biofilters # 2

1. Top area (square feet) = 8874
2. Bottom aea (square feet) = 2923
3. Depth (ft):   3.5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side):   0.001
8. Infiltration rate fraction (bottom):   1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 0.5
13. Engineered soil porosity = 0.24
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft):   0

Soil Data   Soil Type Fraction in Eng. Soil

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft):   20
2. Weir crest width (ft):   10
3. Height of datum to bottom of weir opening: 3

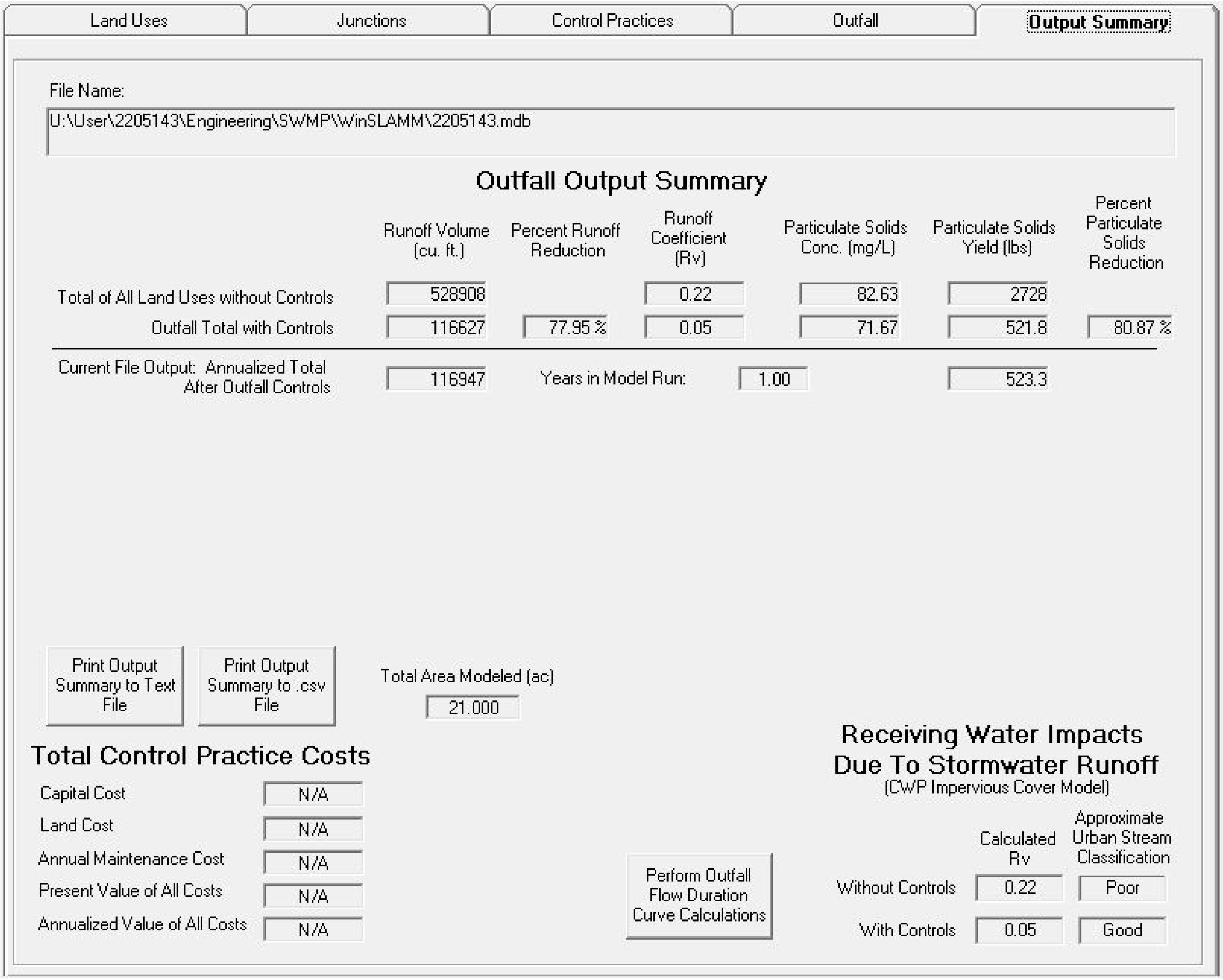
Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft):   3
2. Stand pipe height above datum (ft):   2.5

Outlet type: Surface Discharge Pipe

1. Surface discharge pipe outlet diameter (ft):   0.5
2. Pipe invert elevation above datum (ft):   1.5
3. Number of surface pipe outlets: 1

Output Sediment Reduction:



Total site sediment reduction in developed conditions = 80.87%

Runoff Volume	Part. Solids Yield (lbs)	Part. Solids Conc. (mg/L)	**Summary Table**							
Data File: U:\User\2205143\Engineering\SWMP\WinSLAMM\2205143.mdb										
Rain File: WisReg - Madison WI 1981.RAN										
Date: 05-15-23 Time: 2:38:15 PM										
Site Description:										
Col. #:	2	3	4	5	6	7	8	9	10	
Control Practice No.	Control Practice Type	Control Practice Name or Location	Total Inflow Volume (cf)	Total Outflow Volume (cf)	Percent Volume Reduction	Total Influent Load (lbs)	Total Effluent Load (lbs)	Percent Load Reduction	Flow Weighted Influent Conc (mg/L)	F We Ef Conc
1	Wet Detention Pond	DS Wet Pond # 1	306585	307424	-0.274	1561	249.5	84.02	81.57	
2	Biofilter	DS Biofilters # 1	307424	21549	92.99	249.5	33.36	86.63	13.00	
3	Wet Detention Pond	DS Wet Pond # 2	165704	166155	-0.272	725.6	118.1	83.72	70.14	
4	Biofilter	DS Biofilters # 2	166155	38460	76.85	118.1	46.93	60.26	11.38	

The chart above shows that over 60% sediment reduction will occur prior to the infiltration basins.

APPENDIX C

INFILTRATION DESIGN

Pre-Development Areas a...

	Description	Area (ac)	CN
1	Imp	0.190	98
2	Per	20.810	68
3		0.000	0
4		0.000	0
5		0.000	0
6		0.000	0
	Total Area (ac)	21.000	
	Composite CN		68

Total Model Area (ac): 21.000

Infiltration Design - RESIDENTAIL

Pre-Development Runoff (SLAMM) = 102034 CF

<u>Summary of Stay-On Requirements</u>

Lot Area ac	Rain Total in	Rain Total cf	Outfall Total cf	Total Losses cf	Pre-Dev Runoff cf	Pre-Developed cf	90% STAYON in
21	28.81	2196186	116627	2079559	64738	2131448	25.16

POST-DEVELOPED LOSSES		2079559
PRE-DEVELOPED LOSSES	÷	2131448
		98%

SLAMM Stay-On Calculations

Runoff Volume (cf) | Part. Solids Yield (lbs) | Part. Solids Conc. (mg/L) | Pollutant Yield (lbs) | Pollutan

Data File: U:\User\2205143\Engineering\SWMP\WinSLAMM\2205143.mdb

Rain File: WisReg - Madison WI 1981.RAN

Date: 05-15-23 Time: 8:57:08 PM

Site Description:

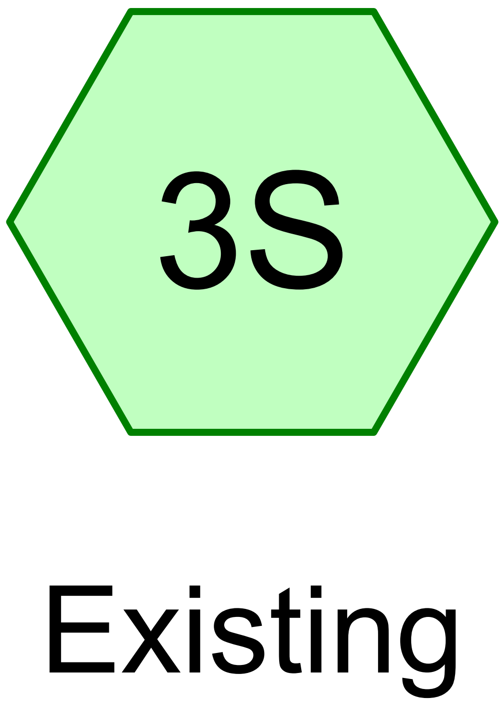
Runoff Volume Total (cf) at the Outfall

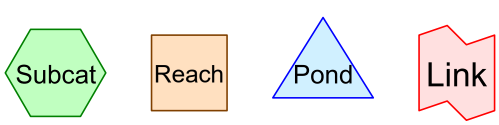
Rain Number	Start Date	Rain Total (in)	Outfall Total (cf)	Rv	Total Losses (in.)	Calculated CN*	Event Peak Flow (cfs)	Pre-Dev Runoff Vol.
100	11/18/81	0.05	22.22	0.006	0.05	97.9	0.010	0
101	11/19/81	0.26	270.9	0.014	0.26	91.0	0.009	0
102	11/23/81	0.18	158.9	0.012	0.18	93.4	0.017	0
103	11/25/81	0.89	1558	0.023	0.87	76.1	0.065	0
104	11/30/81	0.37	473.1	0.017	0.36	87.9	0.018	0
105	12/03/81	-	-	-	-	-	-	-
106	12/14/81	-	-	-	-	-	-	-
107	12/20/81	-	-	-	-	-	-	-
108	12/26/81	-	-	-	-	-	-	-
109	12/31/81	-	-	-	-	-	-	-
Minimum:		0.00	0	0.001	0.01	68.3	0.001	0.0
Maximum:		2.59	40508	0.205	2.06	99.5	1.318	32612.0
Average:		0.26	1070	0.013	0.25	73.8	0.635	719.3
Total:		28.81	116627		27.32			64738.00

* Note: NRCS does not recommend using CN method for rains < 0.5 in.
See 'PreDevelopment Areas and CN' Help for more info.

APPENDIX D

HYDROCAD OUTPUT





Routing Diagram for 2205143
Prepared by HP Inc., Printed 5/15/2023
HydroCAD® 10.10-7a s/n 02063 © 2021 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.190	98	Imp (3S)
20.810	68	Type B Soils (3S)
21.000	**68**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
21.000	Other	3S
21.000		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.190	0.190	Imp	3S
0.000	0.000	0.000	0.000	20.810	20.810	Type B Soils	3S
0.000	**0.000**	**0.000**	**0.000**	**21.000**	**21.000**	**TOTAL AREA**	

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3S: Existing Runoff Area=21.000 ac 0.90% Impervious Runoff Depth>0.37"
Flow Length=950' Tc=22.0 min CN=68 Runoff=5.51 cfs 0.644 af

Total Runoff Area = 21.000 ac Runoff Volume = 0.644 af Average Runoff Depth = 0.37"
99.10% Pervious = 20.810 ac 0.90% Impervious = 0.190 ac

Summary for Subcatchment 3S: Existing

Runoff = 5.51 cfs @ 12.40 hrs, Volume= 0.644 af, Depth> 0.37"
Routed to nonexistent node 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1yr 24hr Rainfall=2.49"

	Area (ac)	CN	Description
*	20.810	68	Type B Soils
*	0.190	98	Imp
	21.000	68	Weighted Average
	20.810		99.10% Pervious Area
	0.190		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	300	0.0433	0.30		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
5.6	650	0.0769	1.94		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
22.0	950	Total			

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3S: Existing Runoff Area=21.000 ac   0.90% Impervious   Runoff Depth>0.53"
Flow Length=950'   Tc=22.0 min   CN=68   Runoff=8.89 cfs 0.928 af

Total Runoff Area = 21.000 ac   Runoff Volume = 0.928 af   Average Runoff Depth = 0.53"
99.10% Pervious = 20.810 ac   0.90% Impervious = 0.190 ac

Summary for Subcatchment 3S: Existing

Runoff = 8.89 cfs @ 12.37 hrs, Volume= 0.928 af, Depth> 0.53"
Routed to nonexistent node 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2yr 24hr Rainfall=2.85"

	Area (ac)	CN	Description
*	20.810	68	Type B Soils
*	0.190	98	Imp
	21.000	68	Weighted Average
	20.810		99.10% Pervious Area
	0.190		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	300	0.0433	0.30		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
5.6	650	0.0769	1.94		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
22.0	950	Total			

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3S: Existing Runoff Area=21.000 ac 0.90% Impervious Runoff Depth>1.23"
Flow Length=950' Tc=22.0 min CN=68 Runoff=23.70 cfs 2.153 af

Total Runoff Area = 21.000 ac Runoff Volume = 2.153 af Average Runoff Depth = 1.23"
99.10% Pervious = 20.810 ac 0.90% Impervious = 0.190 ac

Summary for Subcatchment 3S: Existing

Runoff = 23.70 cfs @ 12.35 hrs, Volume= 2.153 af, Depth> 1.23"
Routed to nonexistent node 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10yr 24hr Rainfall=4.10"

	Area (ac)	CN	Description
*	20.810	68	Type B Soils
*	0.190	98	Imp
	21.000	68	Weighted Average
	20.810		99.10% Pervious Area
	0.190		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	300	0.0433	0.30		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
5.6	650	0.0769	1.94		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
22.0	950	Total			

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3S: Existing Runoff Area=21.000 ac 0.90% Impervious Runoff Depth>3.04"
Flow Length=950' Tc=22.0 min CN=68 Runoff=61.34 cfs 5.314 af

Total Runoff Area = 21.000 ac Runoff Volume = 5.314 af Average Runoff Depth = 3.04"
99.10% Pervious = 20.810 ac 0.90% Impervious = 0.190 ac

Summary for Subcatchment 3S: Existing

Runoff = 61.34 cfs @ 12.33 hrs, Volume= 5.314 af, Depth> 3.04"
Routed to nonexistent node 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 100yr 24hr Rainfall=6.63"

	Area (ac)	CN	Description
*	20.810	68	Type B Soils
*	0.190	98	Imp
	21.000	68	Weighted Average
	20.810		99.10% Pervious Area
	0.190		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	300	0.0433	0.30		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
5.6	650	0.0769	1.94		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
22.0	950	Total			

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 3S: Existing Runoff Area=21.000 ac 0.90% Impervious Runoff Depth>3.69"
Flow Length=950' Tc=22.0 min CN=68 Runoff=74.69 cfs 6.454 af

Total Runoff Area = 21.000 ac Runoff Volume = 6.454 af Average Runoff Depth = 3.69"
99.10% Pervious = 20.810 ac 0.90% Impervious = 0.190 ac

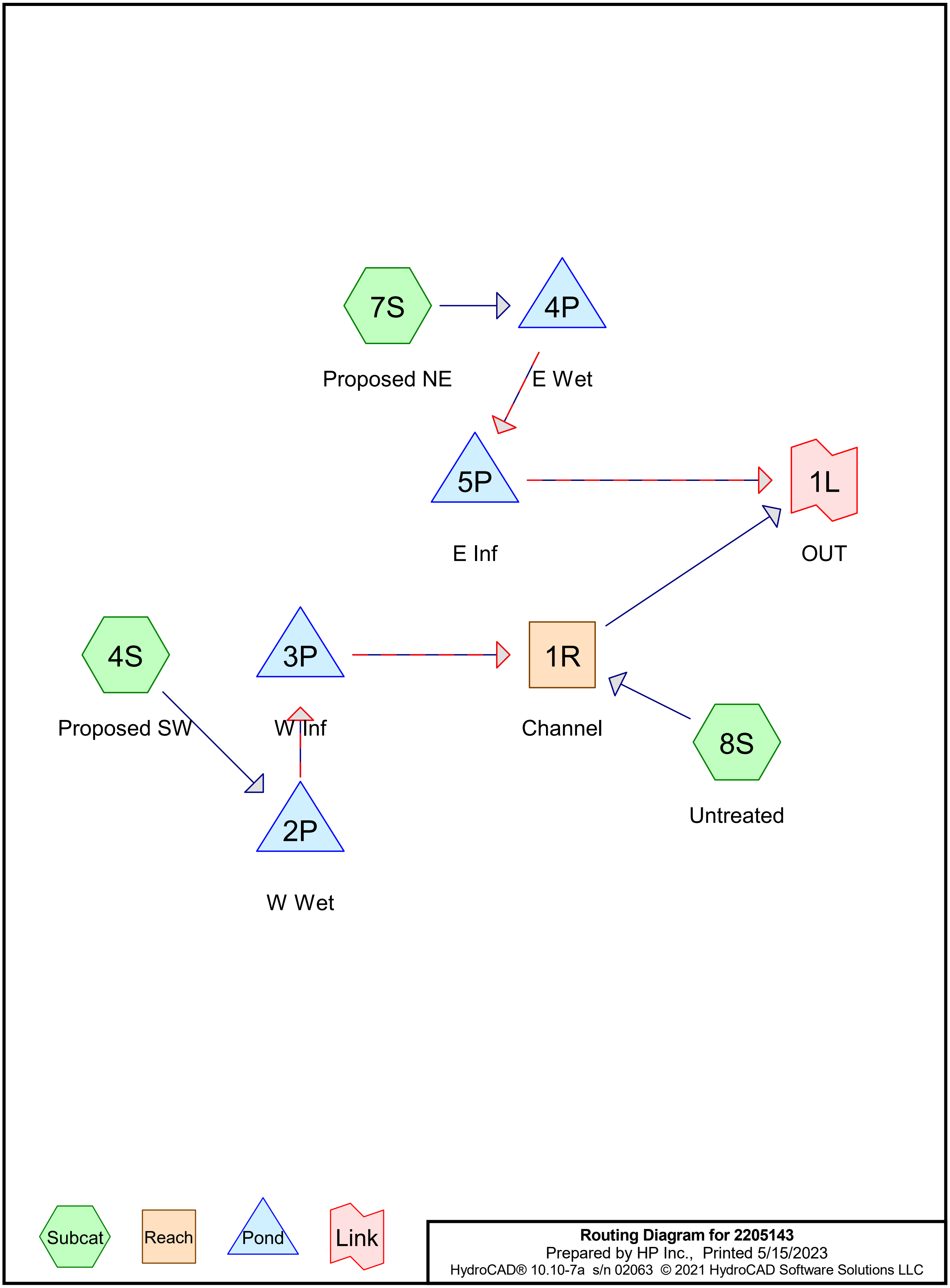
Summary for Subcatchment 3S: Existing

Runoff = 74.69 cfs @ 12.33 hrs, Volume= 6.454 af, Depth> 3.69"
Routed to nonexistent node 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 200yr 24hr Rainfall=7.45"

	Area (ac)	CN	Description
*	20.810	68	Type B Soils
*	0.190	98	Imp
	21.000	68	Weighted Average
	20.810		99.10% Pervious Area
	0.190		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	300	0.0433	0.30		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
5.6	650	0.0769	1.94		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
22.0	950	Total			



Routing Diagram for 2205143
Prepared by HP Inc., Printed 5/15/2023
HydroCAD® 10.10-7a s/n 02063 © 2021 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.274	81	30% Lots (4S, 7S, 8S)
7.941	82	40% Lots (4S, 7S, 8S)
1.512	88	60% Lots (4S)
5.505	74	Open Space (4S, 7S, 8S)
0.819	100	Pond (4S, 7S)
0.949	68	Undeveloped (8S)
21.000	**80**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
21.000	Other	4S, 7S, 8S
21.000		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	4.274	4.274	30% Lots	4S, 7S, 8S
0.000	0.000	0.000	0.000	7.941	7.941	40% Lots	4S, 7S, 8S
0.000	0.000	0.000	0.000	1.512	1.512	60% Lots	4S
0.000	0.000	0.000	0.000	5.505	5.505	Open Space	4S, 7S, 8S
0.000	0.000	0.000	0.000	0.819	0.819	Pond	4S, 7S
0.000	0.000	0.000	0.000	0.949	0.949	Undeveloped	8S
0.000	**0.000**	**0.000**	**0.000**	**21.000**	**21.000**	**TOTAL AREA**	

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: Proposed SW Runoff Area=9.853 ac 5.22% Impervious Runoff Depth>0.97"
Flow Length=800' Tc=10.1 min CN=82 Runoff=12.91 cfs 0.794 af

Subcatchment 7S: Proposed NE Runoff Area=6.541 ac 4.66% Impervious Runoff Depth>0.91"
Flow Length=800' Tc=10.1 min CN=81 Runoff=8.05 cfs 0.497 af

Subcatchment 8S: Untreated Runoff Area=4.606 ac 0.00% Impervious Runoff Depth>0.63"
Flow Length=800' Tc=10.1 min CN=75 Runoff=3.69 cfs 0.240 af

Reach 1R: Channel Avg. Flow Depth=0.25' Max Vel=0.81 fps Inflow=3.69 cfs 0.403 af
n=0.035 L=700.0' S=0.0026 '/' Capacity=96.40 cfs Outflow=2.25 cfs 0.389 af

Pond 2P: W Wet Peak Elev=963.47' Storage=22,706 cf Inflow=12.91 cfs 0.794 af
Primary=0.48 cfs 0.376 af Secondary=0.00 cfs 0.000 af Outflow=0.48 cfs 0.376 af

Pond 3P: W Inf Peak Elev=961.35' Storage=4,139 cf Inflow=0.48 cfs 0.376 af
Discarded=0.15 cfs 0.119 af Primary=0.29 cfs 0.162 af Secondary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.282 af

Pond 4P: E Wet Peak Elev=961.16' Storage=13,075 cf Inflow=8.05 cfs 0.497 af
Primary=0.40 cfs 0.290 af Secondary=0.00 cfs 0.000 af Outflow=0.40 cfs 0.290 af

Pond 5P: E Inf Peak Elev=960.35' Storage=1,821 cf Inflow=0.40 cfs 0.290 af
Discarded=0.06 cfs 0.053 af Primary=0.30 cfs 0.200 af Secondary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.253 af

Link 1L: OUT Inflow=2.25 cfs 0.589 af
Primary=2.25 cfs 0.589 af

Total Runoff Area = 21.000 ac Runoff Volume = 1.531 af Average Runoff Depth = 0.88"
96.10% Pervious = 20.181 ac 3.90% Impervious = 0.819 ac

Summary for Subcatchment 4S: Proposed SW

Runoff = 12.91 cfs @ 12.18 hrs, Volume= 0.794 af, Depth> 0.97"
Routed to Pond 2P : W Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1yr 24hr Rainfall=2.49"

	Area (ac)	CN	Description
*	1.512	88	60% Lots
*	3.216	82	40% Lots
*	2.690	81	30% Lots
*	1.921	74	Open Space
*	0.514	100	Pond
	9.853	82	Weighted Average
	9.339		94.78% Pervious Area
	0.514		5.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 7S: Proposed NE

Runoff = 8.05 cfs @ 12.19 hrs, Volume= 0.497 af, Depth> 0.91"
Routed to Pond 4P : E Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1yr 24hr Rainfall=2.49"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	4.360	82	40% Lots
*	0.694	81	30% Lots
*	1.182	74	Open Space
*	0.305	100	Pond
	6.541	81	Weighted Average
	6.236		95.34% Pervious Area
	0.305		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 8S: Untreated

Runoff = 3.69 cfs @ 12.19 hrs, Volume= 0.240 af, Depth> 0.63"
Routed to Reach 1R : Channel

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1yr 24hr Rainfall=2.49"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	0.365	82	40% Lots
*	0.890	81	30% Lots
*	2.402	74	Open Space
*	0.000	100	Pond
*	0.949	68	Undeveloped
	4.606	75	Weighted Average
	4.606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Reach 1R: Channel

Inflow Area = 14.459 ac, 3.55% Impervious, Inflow Depth > 0.33" for 1yr 24hr event
Inflow = 3.69 cfs @ 12.19 hrs, Volume= 0.403 af
Outflow = 2.25 cfs @ 12.32 hrs, Volume= 0.389 af, Atten= 39%, Lag= 7.9 min
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.81 fps, Min. Travel Time= 14.4 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 27.2 min

Peak Storage= 1,928 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 12.00'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 96.40 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.0 '/' Top Width= 26.00'
Length= 700.0' Slope= 0.0026 '/'
Inlet Invert= 957.85', Outlet Invert= 956.00'

‡

Summary for Pond 2P: W Wet

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 0.97" for 1yr 24hr event
Inflow = 12.91 cfs @ 12.18 hrs, Volume= 0.794 af
Outflow = 0.48 cfs @ 15.16 hrs, Volume= 0.376 af, Atten= 96%, Lag= 178.6 min
Primary = 0.48 cfs @ 15.16 hrs, Volume= 0.376 af
Routed to Pond 3P : W Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 3P : W Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 963.47' @ 15.16 hrs Surf.Area= 17,496 sf Storage= 22,706 cf

Plug-Flow detention time= 294.1 min calculated for 0.375 af (47% of inflow)
Center-of-Mass det. time= 199.5 min (1,022.2 - 822.7)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	76,334 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	13,345	0	0
964.00	18,983	32,328	32,328
966.00	25,023	44,006	76,334

Device	Routing	Invert	Outlet Devices
#1	Primary	961.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.80' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	962.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	963.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	964.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.48 cfs @ 15.16 hrs HW=963.47' TW=961.24' (Dynamic Tailwater)
1=Culvert (Passes 0.48 cfs of 8.92 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.48 cfs @ 5.50 fps)
3=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=962.00' TW=961.00' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: W Inf

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 0.46" for 1yr 24hr event
Inflow = 0.48 cfs @ 15.16 hrs, Volume= 0.376 af
Outflow = 0.44 cfs @ 21.00 hrs, Volume= 0.282 af, Atten= 8%, Lag= 350.2 min
Discarded = 0.15 cfs @ 21.00 hrs, Volume= 0.119 af
Primary = 0.29 cfs @ 21.00 hrs, Volume= 0.162 af
Routed to Reach 1R : Channel
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Reach 1R : Channel

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 961.35' @ 21.00 hrs Surf.Area= 12,296 sf Storage= 4,139 cf

Plug-Flow detention time= 123.4 min calculated for 0.281 af (75% of inflow)
Center-of-Mass det. time= 49.3 min (1,071.5 - 1,022.2)

Volume	Invert	Avail.Storage	Storage Description
#1	961.00'	66,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
961.00	11,420	0	0
963.00	16,438	27,858	27,858
965.00	21,859	38,297	66,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	961.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 949.00'
#2	Primary	961.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	961.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	963.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	964.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.15 cfs @ 21.00 hrs HW=961.35' (Free Discharge)
1=Exfiltration (Controls 0.15 cfs)

Primary OutFlow Max=0.29 cfs @ 21.00 hrs HW=961.35' TW=957.94' (Dynamic Tailwater)
2=Culvert (Passes 0.29 cfs of 0.47 cfs potential flow)
3=Orifice/Grate (Orifice Controls 0.29 cfs @ 2.01 fps)
4=Orifice/Grate (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=961.00' TW=957.85' (Dynamic Tailwater)
5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 4P: E Wet

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 0.91" for 1yr 24hr event
Inflow = 8.05 cfs @ 12.19 hrs, Volume= 0.497 af
Outflow = 0.40 cfs @ 13.13 hrs, Volume= 0.290 af, Atten= 95%, Lag= 56.6 min
Primary = 0.40 cfs @ 13.13 hrs, Volume= 0.290 af
Routed to Pond 5P : E Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 5P : E Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 961.16' @ 15.04 hrs Surf.Area= 12,249 sf Storage= 13,075 cf

Plug-Flow detention time= 277.3 min calculated for 0.290 af (58% of inflow)
Center-of-Mass det. time= 186.2 min (1,011.7 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	54,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	10,363	0	0
962.00	13,625	23,988	23,988
964.00	17,289	30,914	54,902

Device	Routing	Invert	Outlet Devices
#1	Primary	959.70'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.70' / 959.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	960.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	962.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	963.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.40 cfs @ 13.13 hrs HW=961.08' TW=960.19' (Dynamic Tailwater)
└—**1=Culvert** (Passes 0.40 cfs of 4.72 cfs potential flow)
  ├—**2=Orifice/Grate** (Orifice Controls 0.40 cfs @ 4.54 fps)
  └—**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=960.00' (Dynamic Tailwater)
└—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: E Inf

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 0.53" for 1yr 24hr event
Inflow = 0.40 cfs @ 13.13 hrs, Volume= 0.290 af
Outflow = 0.36 cfs @ 16.62 hrs, Volume= 0.253 af, Atten= 9%, Lag= 209.3 min
Discarded = 0.06 cfs @ 16.62 hrs, Volume= 0.053 af
Primary = 0.30 cfs @ 16.62 hrs, Volume= 0.200 af
Routed to Link 1L : OUT
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 960.35' @ 16.62 hrs Surf.Area= 5,523 sf Storage= 1,821 cf

Plug-Flow detention time= 78.1 min calculated for 0.252 af (87% of inflow)
Center-of-Mass det. time= 39.0 min (1,050.7 - 1,011.7)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	13,680 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	4,806	0	0
962.00	8,874	13,680	13,680

Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -25.00'
#2	Primary	959.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.00' / 958.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	960.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	961.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	961.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.06 cfs @ 16.62 hrs HW=960.35' (Free Discharge)
└─**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.30 cfs @ 16.62 hrs HW=960.35' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.30 cfs of 3.32 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.30 cfs @ 2.02 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: OUT

Inflow Area = 21.000 ac, 3.90% Impervious, Inflow Depth > 0.34" for 1yr 24hr event
Inflow = 2.25 cfs @ 12.32 hrs, Volume= 0.589 af
Primary = 2.25 cfs @ 12.32 hrs, Volume= 0.589 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: Proposed SW Runoff Area=9.853 ac 5.22% Impervious Runoff Depth>1.23"
Flow Length=800' Tc=10.1 min CN=82 Runoff=16.55 cfs 1.013 af

Subcatchment 7S: Proposed NE Runoff Area=6.541 ac 4.66% Impervious Runoff Depth>1.17"
Flow Length=800' Tc=10.1 min CN=81 Runoff=10.41 cfs 0.638 af

Subcatchment 8S: Untreated Runoff Area=4.606 ac 0.00% Impervious Runoff Depth>0.84"
Flow Length=800' Tc=10.1 min CN=75 Runoff=5.10 cfs 0.323 af

Reach 1R: Channel Avg. Flow Depth=0.32' Max Vel=0.94 fps Inflow=5.10 cfs 0.644 af
n=0.035 L=700.0' S=0.0026 '/' Capacity=96.40 cfs Outflow=3.38 cfs 0.628 af

Pond 2P: W Wet Peak Elev=963.62' Storage=25,280 cf Inflow=16.55 cfs 1.013 af
Primary=1.75 cfs 0.554 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.554 af

Pond 3P: W Inf Peak Elev=961.57' Storage=6,858 cf Inflow=1.75 cfs 0.554 af
Discarded=0.16 cfs 0.127 af Primary=0.53 cfs 0.321 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.448 af

Pond 4P: E Wet Peak Elev=961.51' Storage=17,493 cf Inflow=10.41 cfs 0.638 af
Primary=0.46 cfs 0.346 af Secondary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.346 af

Pond 5P: E Inf Peak Elev=960.40' Storage=2,088 cf Inflow=0.46 cfs 0.346 af
Discarded=0.07 cfs 0.054 af Primary=0.36 cfs 0.248 af Secondary=0.00 cfs 0.000 af Outflow=0.43 cfs 0.302 af

Link 1L: OUT Inflow=3.38 cfs 0.876 af
Primary=3.38 cfs 0.876 af

Total Runoff Area = 21.000 ac Runoff Volume = 1.974 af Average Runoff Depth = 1.13"
96.10% Pervious = 20.181 ac 3.90% Impervious = 0.819 ac

Summary for Subcatchment 4S: Proposed SW

Runoff = 16.55 cfs @ 12.18 hrs, Volume= 1.013 af, Depth> 1.23"
Routed to Pond 2P : W Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2yr 24hr Rainfall=2.85"

	Area (ac)	CN	Description
*	1.512	88	60% Lots
*	3.216	82	40% Lots
*	2.690	81	30% Lots
*	1.921	74	Open Space
*	0.514	100	Pond
	9.853	82	Weighted Average
	9.339		94.78% Pervious Area
	0.514		5.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 7S: Proposed NE

Runoff = 10.41 cfs @ 12.18 hrs, Volume= 0.638 af, Depth> 1.17"
Routed to Pond 4P : E Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2yr 24hr Rainfall=2.85"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	4.360	82	40% Lots
*	0.694	81	30% Lots
*	1.182	74	Open Space
*	0.305	100	Pond
	6.541	81	Weighted Average
	6.236		95.34% Pervious Area
	0.305		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 8S: Untreated

Runoff = 5.10 cfs @ 12.19 hrs, Volume= 0.323 af, Depth> 0.84"
Routed to Reach 1R : Channel

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2yr 24hr Rainfall=2.85"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	0.365	82	40% Lots
*	0.890	81	30% Lots
*	2.402	74	Open Space
*	0.000	100	Pond
*	0.949	68	Undeveloped
	4.606	75	Weighted Average
	4.606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Reach 1R: Channel

Inflow Area = 14.459 ac, 3.55% Impervious, Inflow Depth > 0.53" for 2yr 24hr event
Inflow = 5.10 cfs @ 12.19 hrs, Volume= 0.644 af
Outflow = 3.38 cfs @ 12.30 hrs, Volume= 0.628 af, Atten= 34%, Lag= 6.8 min
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 12.4 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 23.0 min

Peak Storage= 2,507 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.32' , Surface Width= 12.54'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 96.40 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.0 '/' Top Width= 26.00'
Length= 700.0' Slope= 0.0026 '/'
Inlet Invert= 957.85', Outlet Invert= 956.00'

Summary for Pond 2P: W Wet

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 1.23" for 2yr 24hr event
Inflow = 16.55 cfs @ 12.18 hrs, Volume= 1.013 af
Outflow = 1.75 cfs @ 13.22 hrs, Volume= 0.554 af, Atten= 89%, Lag= 62.0 min
Primary = 1.75 cfs @ 13.22 hrs, Volume= 0.554 af
Routed to Pond 3P : W Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 3P : W Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 963.62' @ 13.22 hrs Surf.Area= 17,906 sf Storage= 25,280 cf

Plug-Flow detention time= 235.7 min calculated for 0.554 af (55% of inflow)
Center-of-Mass det. time= 146.4 min (963.7 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	76,334 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	13,345	0	0
964.00	18,983	32,328	32,328
966.00	25,023	44,006	76,334

Device	Routing	Invert	Outlet Devices
#1	Primary	961.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.80' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	962.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	963.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	964.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.75 cfs @ 13.22 hrs HW=963.62' TW=961.26' (Dynamic Tailwater)
1=Culvert (Passes 1.75 cfs of 9.46 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.51 cfs @ 5.80 fps)
3=Orifice/Grate (Weir Controls 1.25 cfs @ 1.12 fps)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=962.00' TW=961.00' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: W Inf

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 0.67" for 2yr 24hr event
Inflow = 1.75 cfs @ 13.22 hrs, Volume= 0.554 af
Outflow = 0.69 cfs @ 15.36 hrs, Volume= 0.448 af, Atten= 61%, Lag= 128.9 min
Discarded = 0.16 cfs @ 15.36 hrs, Volume= 0.127 af
Primary = 0.53 cfs @ 15.36 hrs, Volume= 0.321 af
Routed to Reach 1R : Channel
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Reach 1R : Channel

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 961.57' @ 15.36 hrs Surf.Area= 12,839 sf Storage= 6,858 cf

Plug-Flow detention time= 136.1 min calculated for 0.448 af (81% of inflow)
Center-of-Mass det. time= 71.2 min (1,034.9 - 963.7)

Volume	Invert	Avail.Storage	Storage Description
#1	961.00'	66,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
961.00	11,420	0	0
963.00	16,438	27,858	27,858
965.00	21,859	38,297	66,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	961.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 949.00'
#2	Primary	961.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	961.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	963.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	964.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.16 cfs @ 15.36 hrs HW=961.57' (Free Discharge)
└─**1=Exfiltration** (Controls 0.16 cfs)

Primary OutFlow Max=0.53 cfs @ 15.36 hrs HW=961.57' TW=957.98' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.53 cfs of 1.12 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.53 cfs @ 2.70 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=961.00' TW=957.85' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4P: E Wet

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 1.17" for 2yr 24hr event
Inflow = 10.41 cfs @ 12.18 hrs, Volume= 0.638 af
Outflow = 0.46 cfs @ 13.41 hrs, Volume= 0.346 af, Atten= 96%, Lag= 73.6 min
Primary = 0.46 cfs @ 13.41 hrs, Volume= 0.346 af
Routed to Pond 5P : E Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 5P : E Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 961.51' @ 15.08 hrs Surf.Area= 12,824 sf Storage= 17,493 cf

Plug-Flow detention time= 283.9 min calculated for 0.346 af (54% of inflow)
Center-of-Mass det. time= 193.2 min (1,013.0 - 819.9)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	54,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	10,363	0	0
962.00	13,625	23,988	23,988
964.00	17,289	30,914	54,902

Device	Routing	Invert	Outlet Devices
#1	Primary	959.70'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.70' / 959.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	960.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	962.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	963.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.46 cfs @ 13.41 hrs HW=961.46' TW=960.27' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.46 cfs of 6.49 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.46 cfs @ 5.24 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=960.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: E Inf

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 0.63" for 2yr 24hr event
Inflow = 0.46 cfs @ 13.41 hrs, Volume= 0.346 af
Outflow = 0.43 cfs @ 16.81 hrs, Volume= 0.302 af, Atten= 7%, Lag= 204.1 min
Discarded = 0.07 cfs @ 16.81 hrs, Volume= 0.054 af
Primary = 0.36 cfs @ 16.81 hrs, Volume= 0.248 af
Routed to Link 1L : OUT
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 960.40' @ 16.81 hrs Surf.Area= 5,621 sf Storage= 2,088 cf

Plug-Flow detention time= 75.9 min calculated for 0.302 af (87% of inflow)
Center-of-Mass det. time= 37.6 min (1,050.6 - 1,013.0)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	13,680 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	4,806	0	0
962.00	8,874	13,680	13,680

Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -25.00'
#2	Primary	959.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.00' / 958.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	960.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	961.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	961.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 16.81 hrs HW=960.40' (Free Discharge)
└─**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.36 cfs @ 16.81 hrs HW=960.40' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.36 cfs of 3.41 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.36 cfs @ 2.15 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: OUT

Inflow Area = 21.000 ac, 3.90% Impervious, Inflow Depth > 0.50" for 2yr 24hr event
Inflow = 3.38 cfs @ 12.30 hrs, Volume= 0.876 af
Primary = 3.38 cfs @ 12.30 hrs, Volume= 0.876 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: Proposed SW Runoff Area=9.853 ac 5.22% Impervious Runoff Depth>2.24"
Flow Length=800' Tc=10.1 min CN=82 Runoff=30.00 cfs 1.842 af

Subcatchment 7S: Proposed NE Runoff Area=6.541 ac 4.66% Impervious Runoff Depth>2.16"
Flow Length=800' Tc=10.1 min CN=81 Runoff=19.22 cfs 1.178 af

Subcatchment 8S: Untreated Runoff Area=4.606 ac 0.00% Impervious Runoff Depth>1.70"
Flow Length=800' Tc=10.1 min CN=75 Runoff=10.66 cfs 0.653 af

Reach 1R: Channel Avg. Flow Depth=0.53' Max Vel=1.27 fps Inflow=10.66 cfs 1.517 af
n=0.035 L=700.0' S=0.0026 '/' Capacity=96.40 cfs Outflow=8.16 cfs 1.491 af

Pond 2P: W Wet Peak Elev=964.08' Storage=33,763 cf Inflow=30.00 cfs 1.842 af
Primary=10.98 cfs 1.324 af Secondary=0.00 cfs 0.000 af Outflow=10.98 cfs 1.324 af

Pond 3P: W Inf Peak Elev=963.00' Storage=27,864 cf Inflow=10.98 cfs 1.324 af
Discarded=0.22 cfs 0.174 af Primary=1.25 cfs 0.864 af Secondary=0.00 cfs 0.000 af Outflow=1.47 cfs 1.037 af

Pond 4P: E Wet Peak Elev=962.60' Storage=32,428 cf Inflow=19.22 cfs 1.178 af
Primary=1.51 cfs 0.575 af Secondary=0.00 cfs 0.000 af Outflow=1.51 cfs 0.575 af

Pond 5P: E Inf Peak Elev=960.84' Storage=4,730 cf Inflow=1.51 cfs 0.575 af
Discarded=0.08 cfs 0.063 af Primary=0.72 cfs 0.448 af Secondary=0.00 cfs 0.000 af Outflow=0.80 cfs 0.511 af

Link 1L: OUT Inflow=8.20 cfs 1.939 af
Primary=8.20 cfs 1.939 af

Total Runoff Area = 21.000 ac Runoff Volume = 3.672 af Average Runoff Depth = 2.10"
96.10% Pervious = 20.181 ac 3.90% Impervious = 0.819 ac

Summary for Subcatchment 4S: Proposed SW

Runoff = 30.00 cfs @ 12.18 hrs, Volume= 1.842 af, Depth> 2.24"
Routed to Pond 2P : W Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10yr 24hr Rainfall=4.10"

	Area (ac)	CN	Description
*	1.512	88	60% Lots
*	3.216	82	40% Lots
*	2.690	81	30% Lots
*	1.921	74	Open Space
*	0.514	100	Pond
	9.853	82	Weighted Average
	9.339		94.78% Pervious Area
	0.514		5.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 7S: Proposed NE

Runoff = 19.22 cfs @ 12.18 hrs, Volume= 1.178 af, Depth> 2.16"
Routed to Pond 4P : E Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10yr 24hr Rainfall=4.10"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	4.360	82	40% Lots
*	0.694	81	30% Lots
*	1.182	74	Open Space
*	0.305	100	Pond
	6.541	81	Weighted Average
	6.236		95.34% Pervious Area
	0.305		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 8S: Untreated

Runoff = 10.66 cfs @ 12.18 hrs, Volume= 0.653 af, Depth> 1.70"
Routed to Reach 1R : Channel

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10yr 24hr Rainfall=4.10"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	0.365	82	40% Lots
*	0.890	81	30% Lots
*	2.402	74	Open Space
*	0.000	100	Pond
*	0.949	68	Undeveloped
	4.606	75	Weighted Average
	4.606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Reach 1R: Channel

Inflow Area = 14.459 ac, 3.55% Impervious, Inflow Depth > 1.26" for 10yr 24hr event
Inflow = 10.66 cfs @ 12.18 hrs, Volume= 1.517 af
Outflow = 8.16 cfs @ 12.27 hrs, Volume= 1.491 af, Atten= 23%, Lag= 5.0 min
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.27 fps, Min. Travel Time= 9.2 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 17.8 min

Peak Storage= 4,484 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.53' , Surface Width= 14.23'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 96.40 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.0 '/' Top Width= 26.00'
Length= 700.0' Slope= 0.0026 '/'
Inlet Invert= 957.85', Outlet Invert= 956.00'

Summary for Pond 2P: W Wet

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 2.24" for 10yr 24hr event
Inflow = 30.00 cfs @ 12.18 hrs, Volume= 1.842 af
Outflow = 10.98 cfs @ 12.41 hrs, Volume= 1.324 af, Atten= 63%, Lag= 13.9 min
Primary = 10.98 cfs @ 12.41 hrs, Volume= 1.324 af
Routed to Pond 3P : W Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 3P : W Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 964.08' @ 12.41 hrs Surf.Area= 19,210 sf Storage= 33,763 cf

Plug-Flow detention time= 132.4 min calculated for 1.320 af (72% of inflow)
Center-of-Mass det. time= 61.0 min (865.3 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	76,334 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	13,345	0	0
964.00	18,983	32,328	32,328
966.00	25,023	44,006	76,334

Device	Routing	Invert	Outlet Devices
#1	Primary	961.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.80' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	962.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	963.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	964.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=10.97 cfs @ 12.41 hrs HW=964.07' TW=961.62' (Dynamic Tailwater)
1=Culvert (Barrel Controls 10.97 cfs @ 6.21 fps)
2=Orifice/Grate (Passes < 0.58 cfs potential flow)
3=Orifice/Grate (Passes < 13.38 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=962.00' TW=961.00' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: W Inf

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 1.61" for 10yr 24hr event
Inflow = 10.98 cfs @ 12.41 hrs, Volume= 1.324 af
Outflow = 1.47 cfs @ 14.31 hrs, Volume= 1.037 af, Atten= 87%, Lag= 114.1 min
Discarded = 0.22 cfs @ 14.31 hrs, Volume= 0.174 af
Primary = 1.25 cfs @ 14.31 hrs, Volume= 0.864 af
Routed to Reach 1R : Channel
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Reach 1R : Channel

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 963.00' @ 14.31 hrs Surf.Area= 16,439 sf Storage= 27,864 cf

Plug-Flow detention time= 219.8 min calculated for 1.035 af (78% of inflow)
Center-of-Mass det. time= 147.5 min (1,012.8 - 865.3)

Volume	Invert	Avail.Storage	Storage Description
#1	961.00'	66,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
961.00	11,420	0	0
963.00	16,438	27,858	27,858
965.00	21,859	38,297	66,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	961.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 949.00'
#2	Primary	961.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	961.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	963.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	964.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.22 cfs @ 14.31 hrs HW=963.00' (Free Discharge)
1=Exfiltration (Controls 0.22 cfs)

Primary OutFlow Max=1.25 cfs @ 14.31 hrs HW=963.00' TW=958.07' (Dynamic Tailwater)
2=Culvert (Passes 1.25 cfs of 4.41 cfs potential flow)
3=Orifice/Grate (Orifice Controls 1.25 cfs @ 6.37 fps)
4=Orifice/Grate (Weir Controls 0.00 cfs @ 0.06 fps)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=961.00' TW=957.85' (Dynamic Tailwater)
5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 4P: E Wet

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 2.16" for 10yr 24hr event
Inflow = 19.22 cfs @ 12.18 hrs, Volume= 1.178 af
Outflow = 1.51 cfs @ 13.46 hrs, Volume= 0.575 af, Atten= 92%, Lag= 76.7 min
Primary = 1.51 cfs @ 13.46 hrs, Volume= 0.575 af
Routed to Pond 5P : E Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 5P : E Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 962.60' @ 13.47 hrs Surf.Area= 14,716 sf Storage= 32,428 cf

Plug-Flow detention time= 263.5 min calculated for 0.575 af (49% of inflow)
Center-of-Mass det. time= 175.7 min (982.2 - 806.5)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	54,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	10,363	0	0
962.00	13,625	23,988	23,988
964.00	17,289	30,914	54,902

Device	Routing	Invert	Outlet Devices
#1	Primary	959.70'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.70' / 959.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	960.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	962.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	963.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.51 cfs @ 13.46 hrs HW=962.60' TW=960.56' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.51 cfs of 10.41 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.60 cfs @ 6.88 fps)
  └─**3=Orifice/Grate** (Weir Controls 0.91 cfs @ 1.01 fps)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=960.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: E Inf

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 1.05" for 10yr 24hr event
Inflow = 1.51 cfs @ 13.46 hrs, Volume= 0.575 af
Outflow = 0.80 cfs @ 15.15 hrs, Volume= 0.511 af, Atten= 47%, Lag= 101.7 min
Discarded = 0.08 cfs @ 15.15 hrs, Volume= 0.063 af
Primary = 0.72 cfs @ 15.15 hrs, Volume= 0.448 af
Routed to Link 1L : OUT
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 960.84' @ 15.15 hrs Surf.Area= 6,507 sf Storage= 4,730 cf

Plug-Flow detention time= 83.5 min calculated for 0.511 af (89% of inflow)
Center-of-Mass det. time= 46.3 min (1,028.4 - 982.2)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	13,680 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	4,806	0	0
962.00	8,874	13,680	13,680

Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -25.00'
#2	Primary	959.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.00' / 958.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	960.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	961.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	961.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.08 cfs @ 15.15 hrs HW=960.84' (Free Discharge)
└─**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.72 cfs @ 15.15 hrs HW=960.84' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.72 cfs of 4.16 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.72 cfs @ 3.69 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: OUT

Inflow Area = 21.000 ac, 3.90% Impervious, Inflow Depth > 1.11" for 10yr 24hr event
Inflow = 8.20 cfs @ 12.27 hrs, Volume= 1.939 af
Primary = 8.20 cfs @ 12.27 hrs, Volume= 1.939 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: Proposed SW Runoff Area=9.853 ac 5.22% Impervious Runoff Depth>4.49"
Flow Length=800' Tc=10.1 min CN=82 Runoff=58.76 cfs 3.687 af

Subcatchment 7S: Proposed NE Runoff Area=6.541 ac 4.66% Impervious Runoff Depth>4.38"
Flow Length=800' Tc=10.1 min CN=81 Runoff=38.23 cfs 2.389 af

Subcatchment 8S: Untreated Runoff Area=4.606 ac 0.00% Impervious Runoff Depth>3.75"
Flow Length=800' Tc=10.1 min CN=75 Runoff=23.40 cfs 1.439 af

Reach 1R: Channel Avg. Flow Depth=0.88' Max Vel=1.70 fps Inflow=24.14 cfs 3.917 af
n=0.035 L=700.0' S=0.0026 '/' Capacity=96.40 cfs Outflow=20.13 cfs 3.886 af

Pond 2P: W Wet Peak Elev=965.02' Storage=53,321 cf Inflow=58.76 cfs 3.687 af
Primary=13.59 cfs 2.343 af Secondary=29.92 cfs 0.798 af Outflow=43.42 cfs 3.142 af

Pond 3P: W Inf Peak Elev=964.17' Storage=48,950 cf Inflow=43.42 cfs 3.142 af
Discarded=0.27 cfs 0.216 af Primary=5.88 cfs 2.328 af Secondary=3.50 cfs 0.149 af Outflow=9.65 cfs 2.694 af

Pond 4P: E Wet Peak Elev=963.49' Storage=46,381 cf Inflow=38.23 cfs 2.389 af
Primary=12.73 cfs 1.697 af Secondary=0.00 cfs 0.000 af Outflow=12.73 cfs 1.697 af

Pond 5P: E Inf Peak Elev=961.72' Storage=11,290 cf Inflow=12.73 cfs 1.697 af
Discarded=0.10 cfs 0.079 af Primary=5.36 cfs 1.272 af Secondary=5.22 cfs 0.270 af Outflow=10.68 cfs 1.621 af

Link 1L: OUT Inflow=23.07 cfs 5.428 af
Primary=23.07 cfs 5.428 af

Total Runoff Area = 21.000 ac Runoff Volume = 7.515 af Average Runoff Depth = 4.29"
96.10% Pervious = 20.181 ac 3.90% Impervious = 0.819 ac

Summary for Subcatchment 4S: Proposed SW

Runoff = 58.76 cfs @ 12.17 hrs, Volume= 3.687 af, Depth> 4.49"
Routed to Pond 2P : W Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 100yr 24hr Rainfall=6.63"

	Area (ac)	CN	Description
*	1.512	88	60% Lots
*	3.216	82	40% Lots
*	2.690	81	30% Lots
*	1.921	74	Open Space
*	0.514	100	Pond
	9.853	82	Weighted Average
	9.339		94.78% Pervious Area
	0.514		5.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 7S: Proposed NE

Runoff = 38.23 cfs @ 12.17 hrs, Volume= 2.389 af, Depth> 4.38"
Routed to Pond 4P : E Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 100yr 24hr Rainfall=6.63"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	4.360	82	40% Lots
*	0.694	81	30% Lots
*	1.182	74	Open Space
*	0.305	100	Pond
	6.541	81	Weighted Average
	6.236		95.34% Pervious Area
	0.305		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 8S: Untreated

Runoff = 23.40 cfs @ 12.18 hrs, Volume= 1.439 af, Depth> 3.75"
Routed to Reach 1R : Channel

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 100yr 24hr Rainfall=6.63"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	0.365	82	40% Lots
*	0.890	81	30% Lots
*	2.402	74	Open Space
*	0.000	100	Pond
*	0.949	68	Undeveloped
	4.606	75	Weighted Average
	4.606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Reach 1R: Channel

Inflow Area = 14.459 ac, 3.55% Impervious, Inflow Depth > 3.25" for 100yr 24hr event
Inflow = 24.14 cfs @ 12.18 hrs, Volume= 3.917 af
Outflow = 20.13 cfs @ 12.25 hrs, Volume= 3.886 af, Atten= 17%, Lag= 4.1 min
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.70 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 14.8 min

Peak Storage= 8,290 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.88' , Surface Width= 17.01'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 96.40 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.0 '/' Top Width= 26.00'
Length= 700.0' Slope= 0.0026 '/'
Inlet Invert= 957.85', Outlet Invert= 956.00'

Summary for Pond 2P: W Wet

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 4.49" for 100yr 24hr event
Inflow = 58.76 cfs @ 12.17 hrs, Volume= 3.687 af
Outflow = 43.42 cfs @ 12.26 hrs, Volume= 3.142 af, Atten= 26%, Lag= 5.4 min
Primary = 13.59 cfs @ 12.24 hrs, Volume= 2.343 af
Routed to Pond 3P : W Inf
Secondary = 29.92 cfs @ 12.27 hrs, Volume= 0.798 af
Routed to Pond 3P : W Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 965.02' @ 12.27 hrs Surf.Area= 22,071 sf Storage= 53,321 cf

Plug-Flow detention time= 99.6 min calculated for 3.142 af (85% of inflow)
Center-of-Mass det. time= 48.7 min (837.7 - 789.0)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	76,334 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	13,345	0	0
964.00	18,983	32,328	32,328
966.00	25,023	44,006	76,334

Device	Routing	Invert	Outlet Devices
#1	Primary	961.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.80' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	962.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	963.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	964.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=13.26 cfs @ 12.24 hrs HW=965.00' TW=962.41' (Dynamic Tailwater)
1=Culvert (Outlet Controls 13.26 cfs @ 7.50 fps)
2=Orifice/Grate (Passes < 0.68 cfs potential flow)
3=Orifice/Grate (Passes < 41.67 cfs potential flow)

Secondary OutFlow Max=28.70 cfs @ 12.27 hrs HW=965.01' TW=962.63' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Weir Controls 28.70 cfs @ 1.88 fps)

Summary for Pond 3P: W Inf

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 3.83" for 100yr 24hr event
Inflow = 43.42 cfs @ 12.26 hrs, Volume= 3.142 af
Outflow = 9.65 cfs @ 12.75 hrs, Volume= 2.694 af, Atten= 78%, Lag= 29.3 min
Discarded = 0.27 cfs @ 12.75 hrs, Volume= 0.216 af
Primary = 5.88 cfs @ 12.75 hrs, Volume= 2.328 af
Routed to Reach 1R : Channel
Secondary = 3.50 cfs @ 12.75 hrs, Volume= 0.149 af
Routed to Reach 1R : Channel

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 964.17' @ 12.75 hrs Surf.Area= 19,610 sf Storage= 48,950 cf

Plug-Flow detention time= 127.2 min calculated for 2.694 af (86% of inflow)
Center-of-Mass det. time= 78.9 min (916.6 - 837.7)

Volume	Invert	Avail.Storage	Storage Description
#1	961.00'	66,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
961.00	11,420	0	0
963.00	16,438	27,858	27,858
965.00	21,859	38,297	66,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	961.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 949.00'
#2	Primary	961.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	961.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	963.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	964.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.27 cfs @ 12.75 hrs HW=964.17' (Free Discharge)
└─**1=Exfiltration** (Controls 0.27 cfs)

Primary OutFlow Max=5.88 cfs @ 12.75 hrs HW=964.17' TW=958.52' (Dynamic Tailwater)
└─**2=Culvert** (Barrel Controls 5.88 cfs @ 7.48 fps)
  ├─**3=Orifice/Grate** (Passes < 1.62 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 36.81 cfs potential flow)

Secondary OutFlow Max=3.49 cfs @ 12.75 hrs HW=964.17' TW=958.52' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 3.49 cfs @ 1.03 fps)

Summary for Pond 4P: E Wet

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 4.38" for 100yr 24hr event
Inflow = 38.23 cfs @ 12.17 hrs, Volume= 2.389 af
Outflow = 12.73 cfs @ 12.32 hrs, Volume= 1.697 af, Atten= 67%, Lag= 8.6 min
Primary = 12.73 cfs @ 12.32 hrs, Volume= 1.697 af
Routed to Pond 5P : E Inf
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af
Routed to Pond 5P : E Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 963.49' @ 12.45 hrs Surf.Area= 16,361 sf Storage= 46,381 cf

Plug-Flow detention time= 132.1 min calculated for 1.697 af (71% of inflow)
Center-of-Mass det. time= 61.8 min (852.8 - 791.0)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	54,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	10,363	0	0
962.00	13,625	23,988	23,988
964.00	17,289	30,914	54,902

Device	Routing	Invert	Outlet Devices
#1	Primary	959.70'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.70' / 959.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	960.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	962.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	963.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=12.29 cfs @ 12.32 hrs HW=963.40' TW=961.18' (Dynamic Tailwater)
1=Culvert (Outlet Controls 12.29 cfs @ 6.95 fps)
2=Orifice/Grate (Passes < 0.63 cfs potential flow)
3=Orifice/Grate (Passes < 26.53 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=960.00' TW=960.00' (Dynamic Tailwater)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 5P: E Inf

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 3.11" for 100yr 24hr event
Inflow = 12.73 cfs @ 12.32 hrs, Volume= 1.697 af
Outflow = 10.68 cfs @ 12.63 hrs, Volume= 1.621 af, Atten= 16%, Lag= 18.8 min
Discarded = 0.10 cfs @ 12.63 hrs, Volume= 0.079 af
Primary = 5.36 cfs @ 12.63 hrs, Volume= 1.272 af
Routed to Link 1L : OUT
Secondary = 5.22 cfs @ 12.63 hrs, Volume= 0.270 af
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 961.72' @ 12.63 hrs Surf.Area= 8,308 sf Storage= 11,290 cf

Plug-Flow detention time= 47.6 min calculated for 1.621 af (96% of inflow)
Center-of-Mass det. time= 27.8 min (880.6 - 852.8)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	13,680 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	4,806	0	0
962.00	8,874	13,680	13,680

Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -25.00'
#2	Primary	959.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.00' / 958.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	960.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	961.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	961.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.10 cfs @ 12.63 hrs HW=961.72' (Free Discharge)
└─**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=5.36 cfs @ 12.63 hrs HW=961.72' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Barrel Controls 5.36 cfs @ 6.83 fps)
  ├─**3=Orifice/Grate** (Passes < 1.15 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 18.89 cfs potential flow)

Secondary OutFlow Max=5.21 cfs @ 12.63 hrs HW=961.72' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 5.21 cfs @ 1.18 fps)

Summary for Link 1L: OUT

Inflow Area = 21.000 ac, 3.90% Impervious, Inflow Depth > 3.10" for 100yr 24hr event
Inflow = 23.07 cfs @ 12.52 hrs, Volume= 5.428 af
Primary = 23.07 cfs @ 12.52 hrs, Volume= 5.428 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

Time span=2.00-22.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 4S: Proposed SW Runoff Area=9.853 ac 5.22% Impervious Runoff Depth>5.25"
Flow Length=800' Tc=10.1 min CN=82 Runoff=68.16 cfs 4.309 af

Subcatchment 7S: Proposed NE Runoff Area=6.541 ac 4.66% Impervious Runoff Depth>5.13"
Flow Length=800' Tc=10.1 min CN=81 Runoff=44.47 cfs 2.799 af

Subcatchment 8S: Untreated Runoff Area=4.606 ac 0.00% Impervious Runoff Depth>4.46"
Flow Length=800' Tc=10.1 min CN=75 Runoff=27.70 cfs 1.713 af

Reach 1R: Channel Avg. Flow Depth=1.00' Max Vel=1.83 fps Inflow=28.46 cfs 4.759 af
n=0.035 L=700.0' S=0.0026 '/' Capacity=96.40 cfs Outflow=25.54 cfs 4.726 af

Pond 2P: W Wet Peak Elev=965.14' Storage=55,999 cf Inflow=68.16 cfs 4.309 af
Primary=13.77 cfs 2.503 af Secondary=41.73 cfs 1.257 af Outflow=54.92 cfs 3.760 af

Pond 3P: W Inf Peak Elev=964.42' Storage=53,844 cf Inflow=54.92 cfs 3.760 af
Discarded=0.29 cfs 0.226 af Primary=6.14 cfs 2.485 af Secondary=13.77 cfs 0.561 af Outflow=20.20 cfs 3.272 af

Pond 4P: E Wet Peak Elev=963.75' Storage=50,559 cf Inflow=44.47 cfs 2.799 af
Primary=13.38 cfs 1.924 af Secondary=9.13 cfs 0.172 af Outflow=22.23 cfs 2.095 af

Pond 5P: E Inf Peak Elev=961.90' Storage=12,788 cf Inflow=22.23 cfs 2.095 af
Discarded=0.10 cfs 0.082 af Primary=5.57 cfs 1.405 af Secondary=12.82 cfs 0.525 af Outflow=18.49 cfs 2.012 af

Link 1L: OUT Inflow=40.98 cfs 6.655 af
Primary=40.98 cfs 6.655 af

Total Runoff Area = 21.000 ac Runoff Volume = 8.820 af Average Runoff Depth = 5.04"
96.10% Pervious = 20.181 ac 3.90% Impervious = 0.819 ac

Summary for Subcatchment 4S: Proposed SW

Runoff = 68.16 cfs @ 12.17 hrs, Volume= 4.309 af, Depth> 5.25"
Routed to Pond 2P : W Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 200yr 24hr Rainfall=7.45"

	Area (ac)	CN	Description
*	1.512	88	60% Lots
*	3.216	82	40% Lots
*	2.690	81	30% Lots
*	1.921	74	Open Space
*	0.514	100	Pond
	9.853	82	Weighted Average
	9.339		94.78% Pervious Area
	0.514		5.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 7S: Proposed NE

Runoff = 44.47 cfs @ 12.17 hrs, Volume= 2.799 af, Depth> 5.13"
Routed to Pond 4P : E Wet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 200yr 24hr Rainfall=7.45"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	4.360	82	40% Lots
*	0.694	81	30% Lots
*	1.182	74	Open Space
*	0.305	100	Pond
	6.541	81	Weighted Average
	6.236		95.34% Pervious Area
	0.305		4.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

Summary for Subcatchment 8S: Untreated

Runoff = 27.70 cfs @ 12.18 hrs, Volume= 1.713 af, Depth> 4.46"
Routed to Reach 1R : Channel

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 200yr 24hr Rainfall=7.45"

	Area (ac)	CN	Description
*	0.000	88	60% Lots
*	0.365	82	40% Lots
*	0.890	81	30% Lots
*	2.402	74	Open Space
*	0.000	100	Pond
*	0.949	68	Undeveloped
	4.606	75	Weighted Average
	4.606		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
0.5	600	0.0800	20.37	63.99	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.1	800	Total			

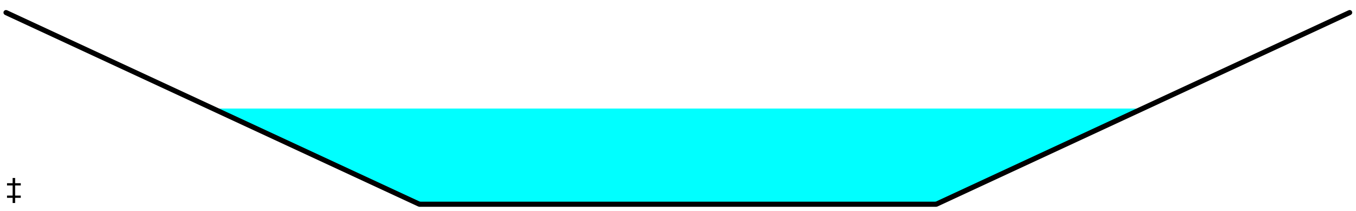
Summary for Reach 1R: Channel

Inflow Area = 14.459 ac, 3.55% Impervious, Inflow Depth > 3.95" for 200yr 24hr event
Inflow = 28.46 cfs @ 12.18 hrs, Volume= 4.759 af
Outflow = 25.54 cfs @ 12.56 hrs, Volume= 4.726 af, Atten= 10%, Lag= 23.0 min
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.83 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 14.4 min

Peak Storage= 9,781 cf @ 12.56 hrs
Average Depth at Peak Storage= 1.00' , Surface Width= 17.99'
Bank-Full Depth= 2.00' Flow Area= 36.0 sf, Capacity= 96.40 cfs

10.00' x 2.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 4.0 '/' Top Width= 26.00'
Length= 700.0' Slope= 0.0026 '/'
Inlet Invert= 957.85', Outlet Invert= 956.00'



Summary for Pond 2P: W Wet

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 5.25" for 200yr 24hr event
Inflow = 68.16 cfs @ 12.17 hrs, Volume= 4.309 af
Outflow = 54.92 cfs @ 12.24 hrs, Volume= 3.760 af, Atten= 19%, Lag= 4.3 min
Primary = 13.77 cfs @ 12.20 hrs, Volume= 2.503 af
Routed to Pond 3P : W Inf
Secondary = 41.73 cfs @ 12.25 hrs, Volume= 1.257 af
Routed to Pond 3P : W Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 965.14' @ 12.25 hrs Surf.Area= 22,435 sf Storage= 55,999 cf

Plug-Flow detention time= 90.7 min calculated for 3.750 af (87% of inflow)
Center-of-Mass det. time= 45.1 min (830.7 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1	962.00'	76,334 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
962.00	13,345	0	0
964.00	18,983	32,328	32,328
966.00	25,023	44,006	76,334

Device	Routing	Invert	Outlet Devices
#1	Primary	961.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.80' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	962.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	963.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	964.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=13.03 cfs @ 12.20 hrs HW=965.08' TW=962.58' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 13.03 cfs @ 7.37 fps)
  ├─**2=Orifice/Grate** (Passes < 0.66 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 42.79 cfs potential flow)

Secondary OutFlow Max=41.72 cfs @ 12.25 hrs HW=965.14' TW=963.17' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 41.72 cfs @ 2.16 fps)

Summary for Pond 3P: W Inf

Inflow Area = 9.853 ac, 5.22% Impervious, Inflow Depth > 4.58" for 200yr 24hr event
Inflow = 54.92 cfs @ 12.24 hrs, Volume= 3.760 af
Outflow = 20.20 cfs @ 12.53 hrs, Volume= 3.272 af, Atten= 63%, Lag= 16.8 min
Discarded = 0.29 cfs @ 12.53 hrs, Volume= 0.226 af
Primary = 6.14 cfs @ 12.53 hrs, Volume= 2.485 af
Routed to Reach 1R : Channel
Secondary = 13.77 cfs @ 12.53 hrs, Volume= 0.561 af
Routed to Reach 1R : Channel

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 964.42' @ 12.53 hrs Surf.Area= 20,275 sf Storage= 53,844 cf

Plug-Flow detention time= 109.8 min calculated for 3.263 af (87% of inflow)
Center-of-Mass det. time= 65.2 min (895.9 - 830.7)

Volume	Invert	Avail.Storage	Storage Description
#1	961.00'	66,155 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
961.00	11,420	0	0
963.00	16,438	27,858	27,858
965.00	21,859	38,297	66,155

Device	Routing	Invert	Outlet Devices
#1	Discarded	961.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 949.00'
#2	Primary	961.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 961.00' / 960.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	961.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	963.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	964.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.29 cfs @ 12.53 hrs HW=964.41' (Free Discharge)
└─**1=Exfiltration** (Controls 0.29 cfs)

Primary OutFlow Max=6.14 cfs @ 12.53 hrs HW=964.41' TW=958.84' (Dynamic Tailwater)
└─**2=Culvert** (Barrel Controls 6.14 cfs @ 7.82 fps)
  ├─**3=Orifice/Grate** (Passes < 1.68 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 40.46 cfs potential flow)

Secondary OutFlow Max=13.65 cfs @ 12.53 hrs HW=964.41' TW=958.84' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 13.65 cfs @ 1.65 fps)

Summary for Pond 4P: E Wet

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 5.13" for 200yr 24hr event
Inflow = 44.47 cfs @ 12.17 hrs, Volume= 2.799 af
Outflow = 22.23 cfs @ 12.32 hrs, Volume= 2.095 af, Atten= 50%, Lag= 8.9 min
Primary = 13.38 cfs @ 12.27 hrs, Volume= 1.924 af
Routed to Pond 5P : E Inf
Secondary = 9.13 cfs @ 12.34 hrs, Volume= 0.172 af
Routed to Pond 5P : E Inf

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 963.75' @ 12.34 hrs Surf.Area= 16,822 sf Storage= 50,559 cf

Plug-Flow detention time= 119.4 min calculated for 2.095 af (75% of inflow)
Center-of-Mass det. time= 53.3 min (840.8 - 787.5)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	54,902 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	10,363	0	0
962.00	13,625	23,988	23,988
964.00	17,289	30,914	54,902

Device	Routing	Invert	Outlet Devices
#1	Primary	959.70'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.70' / 959.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	960.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	962.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	963.50'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=12.68 cfs @ 12.27 hrs HW=963.66' TW=961.29' (Dynamic Tailwater)
└—**1=Culvert** (Outlet Controls 12.68 cfs @ 7.18 fps)
  ├—**2=Orifice/Grate** (Passes < 0.65 cfs potential flow)
  └—**3=Orifice/Grate** (Passes < 36.59 cfs potential flow)

Secondary OutFlow Max=8.96 cfs @ 12.34 hrs HW=963.74' TW=961.73' (Dynamic Tailwater)
└—**4=Broad-Crested Rectangular Weir** (Weir Controls 8.96 cfs @ 1.23 fps)

Summary for Pond 5P: E Inf

Inflow Area = 6.541 ac, 4.66% Impervious, Inflow Depth > 3.84" for 200yr 24hr event
Inflow = 22.23 cfs @ 12.32 hrs, Volume= 2.095 af
Outflow = 18.49 cfs @ 12.42 hrs, Volume= 2.012 af, Atten= 17%, Lag= 6.2 min
Discarded = 0.10 cfs @ 12.42 hrs, Volume= 0.082 af
Primary = 5.57 cfs @ 12.42 hrs, Volume= 1.405 af
Routed to Link 1L : OUT
Secondary = 12.82 cfs @ 12.42 hrs, Volume= 0.525 af
Routed to Link 1L : OUT

Routing by Dyn-Stor-Ind method, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs
Peak Elev= 961.90' @ 12.42 hrs Surf.Area= 8,667 sf Storage= 12,788 cf

Plug-Flow detention time= 41.2 min calculated for 2.007 af (96% of inflow)
Center-of-Mass det. time= 23.7 min (864.5 - 840.8)

Volume	Invert	Avail.Storage	Storage Description
#1	960.00'	13,680 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
960.00	4,806	0	0
962.00	8,874	13,680	13,680

Device	Routing	Invert	Outlet Devices
#1	Discarded	960.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -25.00'
#2	Primary	959.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 959.00' / 958.50' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	960.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	961.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	961.50'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.10 cfs @ 12.42 hrs HW=961.89' (Free Discharge)
1=Exfiltration (Controls 0.10 cfs)

Primary OutFlow Max=5.56 cfs @ 12.42 hrs HW=961.89' TW=0.00' (Dynamic Tailwater)
2=Culvert (Barrel Controls 5.56 cfs @ 7.08 fps)
3=Orifice/Grate (Passes < 1.21 cfs potential flow)
4=Orifice/Grate (Passes < 25.73 cfs potential flow)

Secondary OutFlow Max=12.28 cfs @ 12.42 hrs HW=961.89' TW=0.00' (Dynamic Tailwater)
5=Broad-Crested Rectangular Weir (Weir Controls 12.28 cfs @ 1.59 fps)

Summary for Link 1L: OUT

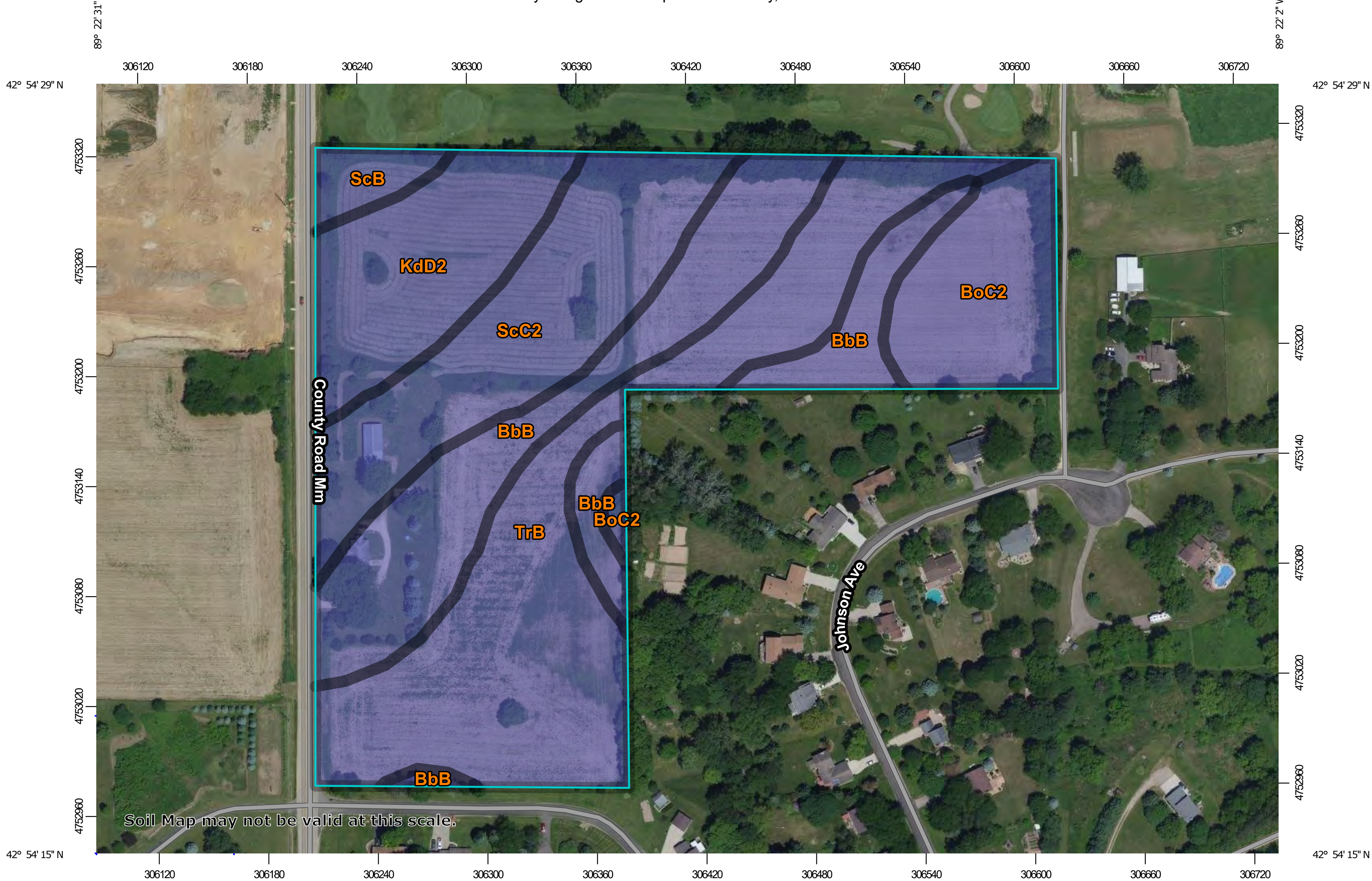
Inflow Area = 21.000 ac, 3.90% Impervious, Inflow Depth > 3.80" for 200yr 24hr event
Inflow = 40.98 cfs @ 12.49 hrs, Volume= 6.655 af
Primary = 40.98 cfs @ 12.49 hrs, Volume= 6.655 af, Atten= 0%, Lag= 0.0 min
Routed to nonexistent node 3L

Primary outflow = Inflow, Time Span= 2.00-22.00 hrs, dt= 0.05 hrs

APPENDIX E

SOILS INFORMATION

Hydrologic Soil Group—Dane County, Wisconsin



89° 22' 31" W

89° 22' 2" W

Map Scale: 1:2,960 if printed on A landscape (11" x 8.5") sheet.

N

0 40 80 160 240 Meters

0 100 200 400 600 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dane County, Wisconsin
Survey Area Data: Version 21, Sep 6, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 13, 2020—Jul 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BbB	Batavia silt loam, gravelly substratum, 2 to 6 percent slopes	B	5.4	24.4%
BoC2	Boyer sandy loam, 6 to 12 percent slopes, eroded	B	2.4	10.8%
KdD2	Kidder loam, 12 to 20 percent slopes, eroded	B	2.9	13.0%
ScB	St. Charles silt loam, 2 to 6 percent slopes	B	0.5	2.3%
ScC2	St. Charles silt loam, 6 to 12 percent slopes, eroded	B	4.1	18.7%
TrB	Troxel silt loam, 0 to 3 percent slopes	B	6.8	30.8%
Totals for Area of Interest			**22.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX F

STORMWATER OPINON OF PROBABLE COST

STORM WATER OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	Unclassified Excavation (Detention)	10,000	CY	$2.00	$20,000.00
5.	Infiltration Basin	12,000	SQFT	$10.00	$120,000.00
1.	Outlet Structure	2	EA	$2000.00	$4,000.00
			TOTAL		**$144,000.00**

In providing Opinions of Probable Costs, it is understood that the Consultant has no control over the cost or availability of labor, equipment or materials, or over conditions or the Contractor's method of pricing, and that the Consultant's Opinions of Probable Construction Costs are made on the basis of the Consultant's professional judgment and experience. The Consultant makes no warranty, expressed or implied, that bids, quantities, or negotiated costs of the Work will not vary from the Consultant's Opinion of Probable Construction

APPENDIX G

DRAFT MAINTENANCE AGREEMENT

Village will assume maintenance upon completion of all stormwater management devices. The Village will follow suggestions as outlined in the following maintenance provisions sheet.

STORM WATER MANAGEMENT SYSTEM MAINTENANCE AGREEMENT

THIS AGREEMENT ("Agreement"), entered into this _____ day of _____________, 2023 by and between Village of Oregon (the"Owner") and Village of Oregon, a Wisconsin Municipal Corporation (the "Village"), collectively, the "Parties."

RECITALS

A. The Owner is developing certain real property located in the Village of Oregon legally described in paragraph 2 herein (the "Property").

B. The Parties desire to set forth their obligations for the maintenance of certain storm water management improvements on the Property.

NOW THEREFORE, in consideration of the mutual covenants herein set forth and other good and valuable consideration the receipt and sufficiency of which is hereby acknowledged, the Parties hereby agree as follows.

Recording area (Dane Co. Register of Deeds)

Send To: Village Clerk
Village of Oregon
117 Spring Street
Oregon, WI 53575

TBD

Parcel Identification Number

1. Sole Agreement. This agreement is the sole applicable agreement pertaining to storm water management for the described Property.

2. Site Legal Description. The Property subject to this agreement is legally described as follows: Second Addition to Autumn Ridge plat, Village of Oregon, Dane County, Wisconsin.

3. Responsible Party.

   a. CONSTRUCTION PHASE MAINTENANCE. The Owner is responsible for satisfying the provisions of this agreement throughout the Property for the duration of the construction and warranty period.

   b. POST-CONSTRUCTION PERPETUAL MAINTENANCE. Upon completion of all construction phases and expiration of the warranty period, the Owner shall assume responsibility for maintaining the storm water management system in perpetuity.

4. Temporary Components of the Infiltration Basin.

   a. The goal is to keep the infiltration basin offline to the extent possible. Draintile is installed to assist with the establishment of vegetation during the first 2-3 years. The 4" orifice in the wet pond release structure will be plugged and a separate 4" diameter pipe will act as the low flow outlet that will allow runoff to bypass the infiltration basin temporarily. Once the vegetation is well established in the infiltration basin, the upstream and downstream ends of the 4" pipe will be plugged and the 4" orifice opened up to function as designed.

5. Permanent Components of The Storm Water Management System.

   a. The storm water management system for the property consists of the following management practices or components:
      i. Wet Pond
      ii. Infiltration Basin
      iii. Storm Sewer System

b. Storm water management practices components on this site include the proposed lots, streets, and outlots. See the Second Addition to Autumn Ridge Storm Water Management & Erosion Control Report, initially dated December 8, 2022 written by D'Onofrio Kottke and Associates, Inc. for drainage area map (Exhibit 4 in Report).

6. Inspection and Maintenance Schedule.

   a. All components of the storm water management system shall be inspected by the Responsible Party:

      i. At least semiannually in early Spring and early Autumn; and
      ii. Within 72 hours following any major storm or flood event of sufficient intensity or duration to pose significant risk of damage to the system.

   b. In particular, the following components shall be inspected by the Responsible Party:

      i. The Owner shall visually inspect basins and outlet structures by checking for potential problems such as: subsidence, erosion, tree growth in and around the embankment and outfall structure, sediment accumulation, clogging of outfall structure, and damage to the emergency spillway.

      ii. The surface water retained in the infiltration basin areas shall have a maximum drawdown time of 24 hours following cessation of rainfall. The standard test for failure of the infiltration system is the presence of surface water retained beyond said 24-hour period. In the event a failure condition is observed (excluding times of winter diversion), the infiltration system shall be inspected and correction action taken to meet said maximum 24-hour drawdown time.

   c. The Responsible Party shall make the appropriate repairs whenever the performance of a storm water management practice or component is compromised due to sediment or debris.

7. Regulations.

   a. Mowing in buffer areas, pond banks and drainage ways shall be minimized to the greatest extent possible in order to maximize filtration of runoff. If occasional mowing is necessary, the mowing height shall be no shorter than six inches.

   b. Applications of fertilizers, herbicides, pesticide or other chemical applications are prohibited in buffer areas, on pond banks and along drainage ways, unless specifically authorized by the Village Engineer on an individual event basis, and provided that the application is performed by professional personnel certified for that purpose.

8. Maintenance of Inspection Records and Reporting.

   a. The Owner shall maintain records of the results of all site inspections and any enforcement actions, correction actions or other documented contacts and any follow-up actions taken by or at the direction of Owner or Responsible Party for seven years after such action.

   b. The Owner shall submit to the Village Engineer periodic reports certifying that the storm water controls are functioning as designed. The reports shall conform to the following requirements. The reports shall be:

      i. Submitted each of the first two years following completion of the construction of the storm water management system covered by this Agreement, and every even numbered year thereafter.
      ii. Submitted in PDF format using the Village's report template, or in other format approved by the Village Engineer, as may be amended from time to time.
      iii. Submitted by June 30 of each reporting year.
      iv. Certified and sealed by a Professional Engineer or Professional Hydrologist.

   c. If failures are noted in any report, Owner shall include with the report a plan and schedule for repair of the failed components of the storm water management system to its design condition, for review and approval by the Village.

   d. The Village Engineer shall maintain public records of the results of all Village inspections of the site, shall inform the Owner of the inspection results, and shall indicate any specific corrective actions required to bring the storm water management practice or component into accordance with this Agreement.

9. Default by Responsible Party. In the event that the Village determines that Responsible Party has failed to comply with any of the responsibilities as set forth in this Agreement, the Village shall give written notice to Owner identifying any said default and requiring compliance within five working days of receipt of the notice or such longer period of time as specified by the Village in the notice. In the event Owner fails to complete any actions required to remedy the default within said five day period, unless extended by the Village in writing, Owner consents that Village may enter the property on which private storm water management systems and practices are located, correct the default and charge the cost of such corrective action to Owner. If Owner fails to pay for said costs of corrective action, then Village shall be entitled to place the cost of the corrective action on the tax roll for the Owner's property as a special charge pursuant to Wis. Stats. § 66.0627.

10. Severability. All provisions of this Agreement are severable, and if any one or more provision is deemed unenforceable for any reason, the remaining provisions shall remain in full force and effect.

11. Binding Agreement. All provisions of this Agreement, including the benefits and burdens hereunder, run with the property and are binding upon and inure to the benefit of the parties hereto and their successors and assigns.

12. Amendment; Termination. This Agreement may be amended or terminated by a document signed by the Owner and the Village.

13. Requirement to Record. This Agreement and any subsequent amendments thereto shall be recorded at the Dane County Register of Deeds.

14. Governing Law. This Agreement at all times shall be enforced in accordance with the laws of the State of Wisconsin.

15. Assignment. A Responsible Party's obligations may not be assigned to another party without the prior written consent of Village except that such consent is not required when a Responsible Party as property owner transfers fee simple title to a buyer who will assume the maintenance responsibilities of the owner / responsible party. In either case, the Owner, or alternatively the Responsible Party acting on behalf of the Owner, shall notify the Village in writing of the name and contact information of any new Responsible Party.

16. Notices. All notices to be given under the terms of this Agreement shall be in writing and signed by the person serving the notice and shall be sent registered or certified mail, return receipt requested, postage prepaid, or hand delivered to the addresses of the parties listed below:

FOR THE VILLAGE:

Office of the Public Works Department
Village of Oregon
ATTN: Director of Public Works
117 Spring Street
Oregon, WI 53575
608-835-6290

FOR THE OWNER:

Office of the Public Works Department
Village of Oregon
ATTN: Director of Public Works
117 Spring Street
Oregon, WI 53575
608-835-6290

DRAFTED BY:
Thomas C. Fahl
D'Onofrio Kottke & Assoc., Inc.

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first written above.

FOR THE OWNER:

By:____

Name:______________________________________

Title:_______________________________________

Date:_______________________________________

STATE OF WISCONSIN)
) ss.
COUNTY OF_________________________)

Personally came before me this ________ day of ____________________________, 20__, the above-named ____________________________, to me known to be the person who executed the foregoing and acknowledged the same.

____
Notary Public, State of Wisconsin
Print Name ________________________________
My Commission: ______________________________

VILLAGE OF OREGON

By: ____

Name: Randy Glysch

Title: Village President

Date: ____

By: ____

Name: Candi Jones

Title: Village Clerk

Date: ____

STATE OF WISCONSIN)
) ss.
COUNTY OF_________________________)

Personally came before me this ____ day of ______________, 20__, the above-named Martin Shanks and Candi Jones, to me known to be the persons who executed the foregoing and acknowledged the same.

____
Notary Public, State of Wisconsin
Print Name ________________________________
My Commission: ______________________________

Attachment I: Sewer Capacity Study, 2023

SCOPE OF SERVICES
MEMORANDUM

Date:	July 6, 2023
To:	Jeff Rau, Director of Public Works – Village of Oregon
From:	Brian Berquist, P.E., President – Town and Country Engineering
Subject:	Sewer System Analysis Results for Park Street Interceptor

The Village of Oregon has planned a residential development on the southeast side of the Village; Autumn's Ridge Phase 3, 4, and 5. In order to ensure the existing sanitary sewer had adequate capacity, Town and Country Engineering conducted a sanitary sewer analysis at the request of the Village. This area was originally studied in 2021, but the current effort reflects the most recent concept plans and sewer routing.

Sewer Area

Collector and interceptor sewers for the Park Street interceptor were modeled to confirm adequate capacity exists for the planned development. The Park Street interceptor will be experiencing additional flow from the Autumn Ridge Phase 3, 4, and 5 developments, which includes residential sewer flows. Sewer flows from these areas travel the Park Street interceptor prior to being discharged into the pumping station at the WWTP. A map of the Sewer Area being analyzed is included as Attachment A.

Sewersheds

A key step in modeling and analyzing the existing sewer system is quantifying the flowrate being conveyed to each manhole. This was accomplished by creating a "sewershed" for each manhole. A sewershed is an area of land where all the sewers flow to a single endpoint, or in this case, a manhole. Once the sewershed was determined, the number of homes, businesses, etc. was totaled so that a total flow for this area could be calculated.

Sewer Drainage Information

In order to properly analyze the sanitary sewer that will be affected by the planned developments, the manhole elevations and pipe inverts had to be determined. The Village of Oregon currently has manhole rim and invert elevations for the majority of the sewer system location in their GIS mapping system, obtained by using a handheld GPS device. As the vertical accuracy of the GPS unit can vary by up to 3 feet, it was necessary that the accurate manhole rims and pipe inverts were collected. 26 of the 30 manhole rims within the sewershed were surveyed by Town and Country with precise survey equipment, with an accuracy of 0.02 ft. The 4 remaining rim elevations were found using contours from the Village of Oregon GIS mapping system and estimated to the nearest 0.25 ft. The pipe inverts were calculated using the surveyed/contour rim elevations and the depth provided in the Village of Oregon GIS mapping system.

Existing Flow

To quantify the existing sanitary flows in the sewer, sewer sales records were obtained from the Village and broken down by billing category (Residential, Commercial, Industrial, and Public Authority.) The residential flows were summarized for an annual daily usage, per meter. For 2018-2020, the annual daily flow rate per residential meter was 130 gallons per day. For the multi-family developments multiple methods were applied for estimating flow. Where applicable individual sewer bills were requested and summarized. If sewer bills were not requested an average daily usage of 80 gallons per day was applied to each unit except for the Oregon Apartments. For the Oregon Apartments a flow per square feet of rooftop conversion factor was found using the 2018-2020 average sewer bills of 218 Wolfe St. and 101 Elliot St. and an aerial measurement in the

Oregon GIS mapping system of the rooftops. This conversion factor was 0.161 gallon per day per square foot of rooftop. The multi-family usage is on average less than the residential to reflect the variety of unit sizes (i.e. studio, 3-bedroom.) For commercial lots, 2018-2020 sewer bills were requested and then averaged. An average of 241 gallons per day per commercial meter resulted and was applied. In addition, individual sewer bills from the Oregon Hotel were obtained, as they also are a contributor to the sanitary system being analyzed. To calculate peak flows, a peaking factor of 4 was applied to the average daily flows, in accordance with NR 110. Based on existing information, the peak flow rate at the furthest downstream manhole (Manhole 698) is estimated to be approximately 482 gpm.

Future Flows

Future flows for the planned development were determined by taking the number of residential housing units, and applying the average daily flow rate of 130 gpm per unit. When the future flows were added to the existing flows, Manhole 698 had a peak flow rate of approximately 540 gpm. A table of existing and future flows is included as Attachment B.

Modeling

Once the flows and sewer information was obtained and verified, a model of the existing system was creating using AutoCAD Storm and Sanitary Analysis. GIS data, as well as CAD survey information was imported into the program to model the existing system. Flows were added at each manhole to represent the sewersheds contributing to each manhole.

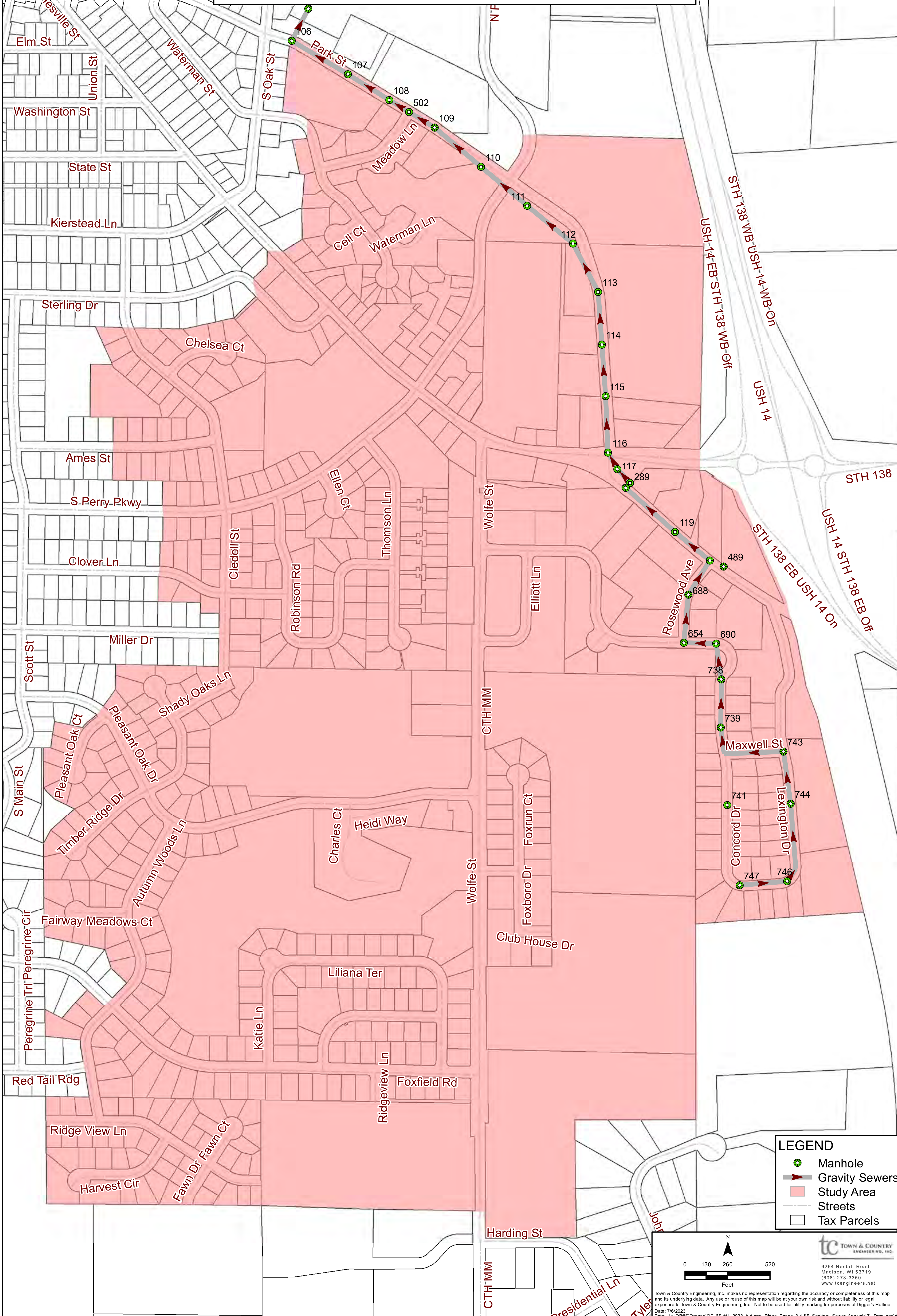
Results

Modeling of the sanitary system indicated that the sanitary sewer interceptors do have adequate capacity for the planned developments and associated flows. The sewer capacity was compared to a “full pipe” condition, the level of water equal to, but not exceeding, the diameter of the pipe. A full pipe is considered to be at 100% capacity. Actual capacity varies from segment to segment based upon pipe diameter and slope.

The anticipated capacity utilized ratios varied in the system from 8% to 70%, and can be viewed in the sanitary sewer analysis results, located in Attachment C. A map of the Park Street sewershed was created to graphically display the various flows through the system, and is included as Attachment D. Profile sections of the sanitary model are included as Attachment E.

In addition to the pipe capacity, the manholes were also analyzed to determine if they would experience surcharging during peak flows. Surcharging occurs in a manhole when the rate of water entering is greater that the capacity of the outlet pipe. A manhole is determined to be surcharged when the water level in the manhole rises about the top of the outlet pipe. Based on the model, none of the manholes within this analysis will surcharge.

Autumn Ridge Future Phases Sewer Analysis
Village of Oregon
Attachment A



Village of Oregon
Sanitary Sewer System Analysis
OG 65

Attachment B

Existing Sewershed										Future Sewershed						
MH ID	Residential homes (#)	Residential Daily Flow (gal/day)	Multi-family Daily Flow (gal/day)	Industrial Daily Flow (gal/day)	Commercial Daily Flow (gal/day)	Public Authority Daily Flow (gal/day)	Total Daily Flow (gal/day)	Total Cumulative Flow (gpm)	Peak Flow (gpm)	Residential homes (#)	Residential Daily Flow (gal/day)	Commercial Daily Flow (gpd)	Total Daily Flow (gpd)	Future Peak Flow (gpm)	Future Cumulative Flow (gpm)	Future Peak Cumulative Flow (gpm)
698		0					0	121	482		0		0	0	135	540
106		0					0	121	482		0		0	0	135	540
107		0				642	642	121	482		0		0	0	135	540
108		0					0	120	481		0		0	0	135	538
502	74	9,694					9,768	120	481		0		0	0	135	538
109	1	131					132	113	453		0		0	0	128	511
110	572	74,932	17,244	2,542	2,050		97,339	113	453		0		0	0	128	511
111		0					0	46	183		0		0	0	60	240
112		0					0	46	183		0		0	0	60	240
113	12	1,572	3,765				5,349	46	183		0		0	0	60	240
114	12	1,572	1,970				3,554	42	168		0		0	0	56	225
115	9	1,179					1,188	39	158		0		0	0	54	216
116	124	16,244	1975		2650		20,993	39	155		0		0	0	53	212
117		0					0	24	96		0		0	0	38	154
289		0					0	24	96		0		0	0	38	154
1172	88	11,528	5,202		964		17,782	24	96	12	1,572		1,572	4	38	154
119		0					0	12	47		0		0	0	25	100
681	7	917	3497	3,065	964		8,450	12	47		0		0	0	25	100
688		0					0	6	23		0		0	0	19	77
654	49	6,419					6,468	6	23		0		0	0	19	77
690		0					0	1	6		0		0	0	15	59
738		0					0	1	6		0		0	0	15	59
739		0					0	1	6		0		0	0	15	59
740	15	1,965					1,980	1	6		0		0	0	15	59
741		0					0	0	0		0		0	0	0	0
742		0					0	0	0		0		0	0	0	0
743	36	4,716					4,752	4	16		0		0	13	13	53
744		0					0	1	3		0		0	0	10	40
745	7	917					924	1	3	103	13,493		13,493	40	10	40
Stub		0					0	0	0		0		0	0	0	0

Oregon Sanitary Sewer Analysis
Village of Oregon
7/6/2023

Attachment C

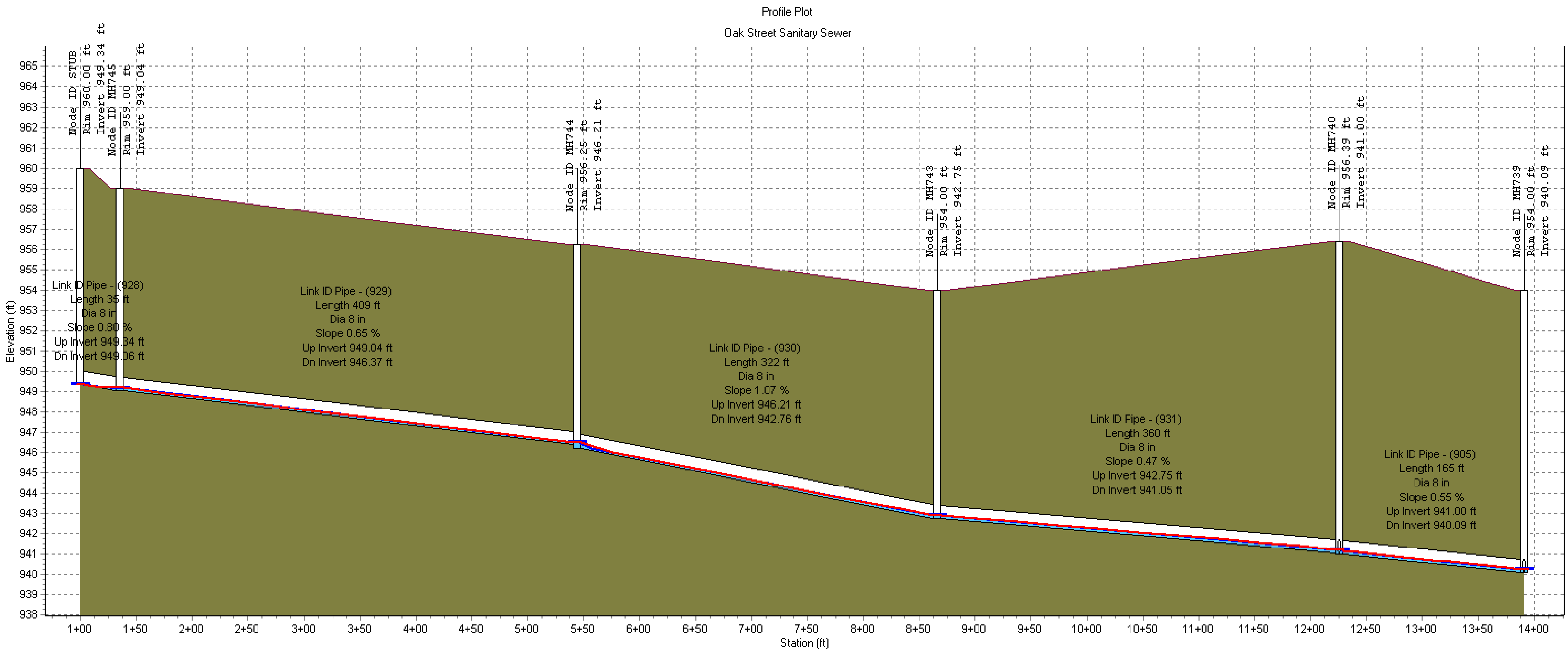
Future Flow Conditions

Element ID	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Total Drop (ft)	Average Slope (%)	Pipe Diameter or Height (inches)	Peak Flow (gpm)	Max Flow Velocity (ft/sec)	Design Flow Capacity (gpm)	Max Flow / Design Flow Ratio	Max Flow Depth / Total Depth Ratio	Max Flow Depth (ft)
Pipe - (928)	STUB	SANMH 745	35	949.34	949.06	0.28	0.80	8.0	0	0.00	525	0.00	0.00	0.00
Pipe - (929)	SANMH 745	SANMH 744	409	949.04	946.37	2.67	0.65	8.0	40	1.84	475	0.08	0.20	0.13
Pipe - (930)	SANMH 744	SANMH 743	322	946.21	942.76	3.45	1.07	8.0	40	2.18	608	0.07	0.17	0.12
Pipe - (931)	SANMH 743	SANMH 740	360	942.75	941.05	1.70	0.47	8.0	53	1.78	404	0.13	0.24	0.16
Pipe - (903)	SANMH 742	SANMH 741	401	955.78	950.57	5.21	1.30	8.0	0	0.00	670	0.00	0.00	0.00
Pipe - (904)	SANMH 741	SANMH 740	313	950.57	941.01	9.56	3.05	8.0	0	0.00	1027	0.00	0.00	0.00
Pipe - (905)	SANMH 740	SANMH 739	165	941.00	940.09	0.91	0.55	8.0	59	1.94	436	0.14	0.25	0.17
Pipe - (906)	SANMH 739	SANMH 738	292	940.09	938.86	1.23	0.42	8.0	59	1.77	381	0.15	0.27	0.18
Pipe - (907)	SANMH 738	SANMH 690	220	938.85	936.62	2.23	1.01	8.0	59	2.41	591	0.10	0.21	0.14
Pipe - (908)	SANMH 690	SANMH 654	197	936.28	935.12	1.16	0.59	8.0	59	1.99	451	0.13	0.24	0.16
Pipe - (909)	SANMH 654	SANMH 688	296	935.10	933.65	1.45	0.49	8.0	76	2.00	411	0.18	0.29	0.19
Pipe - (910)	SANMH 688	SANMH 681	246	933.65	932.22	1.43	0.58	8.0	76	2.13	448	0.17	0.28	0.19
Pipe - (911)	SANMH 681	SANMH 119	276	931.62	927.86	3.76	1.36	8.0	100	3.12	686	0.15	0.26	0.17
Pipe - (912)	SANMH 119	SANMH 1172	403	927.80	926.13	1.67	0.41	8.0	100	2.04	378	0.26	0.35	0.23
Pipe - (913)	SANMH 1172	SANMH 289	41	926.03	925.93	0.10	0.24	8.0	154	1.88	291	0.53	0.52	0.35
Pipe - (914)	SANMH 289	SANMH 117	112	925.90	925.09	0.81	0.73	10.0	154	2.76	908	0.17	0.28	0.23
Pipe - (915)	SANMH 117	SANMH 116	116	925.09	924.78	0.31	0.27	10.0	154	1.93	551	0.28	0.36	0.30
Pipe - (916)	SANMH 116	SANMH 115	345	924.76	923.70	1.06	0.31	10.0	213	2.22	591	0.36	0.42	0.35
Pipe - (917)	SANMH 115	SANMH 114	317	923.70	923.32	0.38	0.12	10.0	216	1.90	476	0.45	0.47	0.39
Pipe - (918)	SANMH 114	SANMH 113	323	923.31	922.23	1.08	0.33	10.0	226	2.32	616	0.37	0.42	0.35
Pipe - (919)	SANMH 113	SANMH 112	333	922.21	921.71	0.50	0.15	10.0	241	1.95	476	0.51	0.50	0.42
Pipe - (920)	SANMH 112	SANMH 111	362	921.65	920.75	0.90	0.25	10.0	241	2.12	531	0.45	0.47	0.39
Pipe - (921)	SANMH 111	SANMH 110	371	920.71	919.93	0.78	0.21	12.0	241	1.97	794	0.30	0.38	0.38
Pipe - (922)	SANMH 110	SANMH 109	371	919.83	919.09	0.74	0.20	12.0	511	2.35	775	0.66	0.59	0.59
Pipe - (923)	SANMH 109	SANMH 502	181	919.09	918.68	0.41	0.23	12.0	511	2.46	825	0.62	0.57	0.57
Pipe - (924)	SANMH 502	SANMH 108	142	918.68	918.42	0.26	0.18	12.0	539	2.37	775	0.70	0.61	0.61
Pipe - (925)	SANMH 108	SANMH 107	300	918.40	917.65	0.75	0.25	12.0	539	2.59	867	0.62	0.57	0.57
Pipe - (926)	SANMH 107	SANMH 106	399	917.65	916.61	1.04	0.26	12.0	539	2.63	885	0.61	0.56	0.56
Pipe - (927)	SANMH 106	Out-1Pipe - (927)	222	916.50	916.10	0.40	0.18	12.0	539	2.37	775	0.70	0.61	0.61

Highlighted pipes are above 50% of full capacity during peak flow

Autumn Ridge Future Phases Sewer Analysis
Village of Oregon
Attachment D

Attachment E

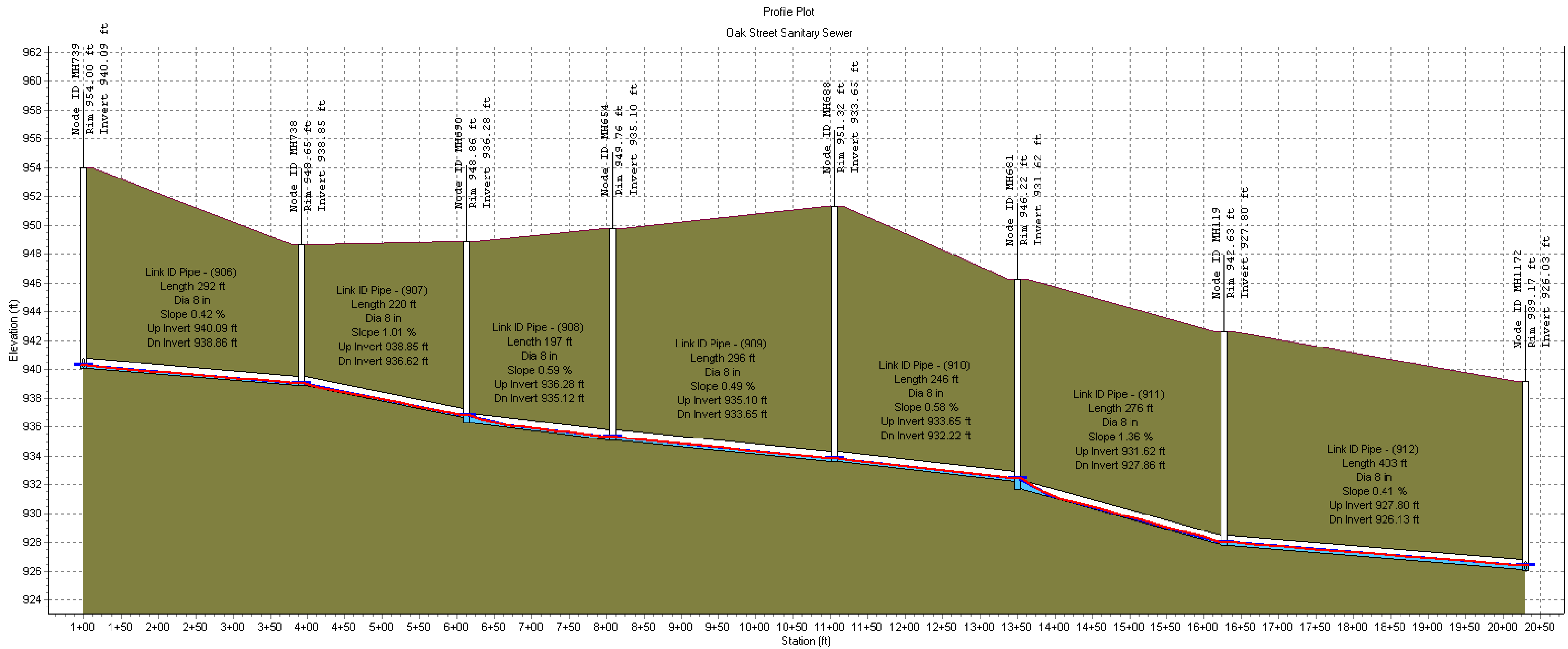


Node ID:	STUB	MH745	MH744	MH743	MH740	MH739
Rim (ft):	960.00	959.00	956.25	954.00	956.39	954.00
Invert (ft):	949.34	949.04	946.21	942.75	941.00	940.09
Min Pipe Cover (ft):	9.99	9.27	9.21	10.57	14.67	13.24
Max HGL (ft):	949.34	949.17	946.50	942.91	941.21	940.27

Link ID:	Pipe - (928)	Pipe - (929)	Pipe - (930)	Pipe - (931)	Pipe - (905)
Length (ft):	35	409	322	360	165
Dia (in):	8	8	8	8	8
Slope (%):	0.80	0.65	1.07	0.47	0.55
Up Invert (ft):	949.34	949.04	946.21	942.75	941.00
Dn Invert (ft):	949.06	946.37	942.76	941.05	940.09
Max Q (gpm):	0.00	40.00	40.00	53.00	59.00
Max Vel (ft/s):	0.00	1.84	2.17	1.78	1.94
Max Depth (ft):	0.00	0.13	0.12	0.16	0.17

Autodesk Storm and Sanitary Analysis

Attachment E

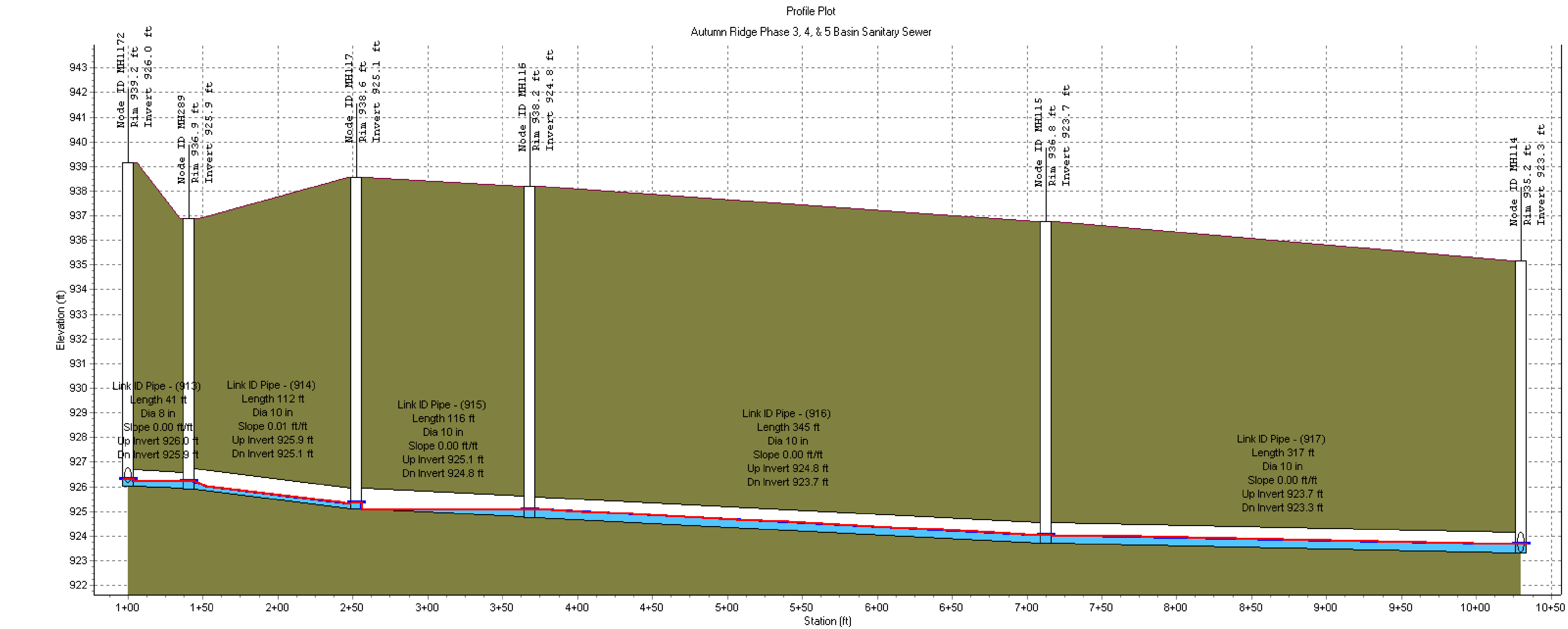


Node ID:	MH739	MH738	MH690	MH654	MH688	MH681	MH119	MH1172
Rim (ft):	954.00	948.65	948.86	949.76	951.32	946.22	942.63	939.17
Invert (ft):	940.09	938.85	936.28	935.10	933.65	931.62	927.80	926.03
Min Pipe Cover (ft):	13.24	9.12	11.57	13.97	17.00	13.33	14.10	12.37
Max HGL (ft):	940.27	939.04	936.76	935.29	933.84	932.41	928.03	926.38

Link ID:	Pipe - (906)	Pipe - (907)	Pipe - (908)	Pipe - (909)	Pipe - (910)	Pipe - (911)	Pipe - (912)
Length (ft):	292	220	197	296	246	276	403
Dia (in):	8	8	8	8	8	8	8
Slope (%):	0.42	1.01	0.59	0.49	0.58	1.36	0.41
Up Invert (ft):	940.09	938.85	936.28	935.10	933.65	931.62	927.80
Dn Invert (ft):	938.86	936.62	935.12	933.65	932.22	927.86	926.13
Max Q (gpm):	59.00	59.00	59.00	76.00	76.00	100.00	100.00
Max Vel (ft/s):	1.77	2.41	1.99	2.00	2.13	3.12	2.04
Max Depth (ft):	0.18	0.14	0.16	0.19	0.19	0.17	0.23

Autodesk Storm and Sanitary Analysis

Attachment E

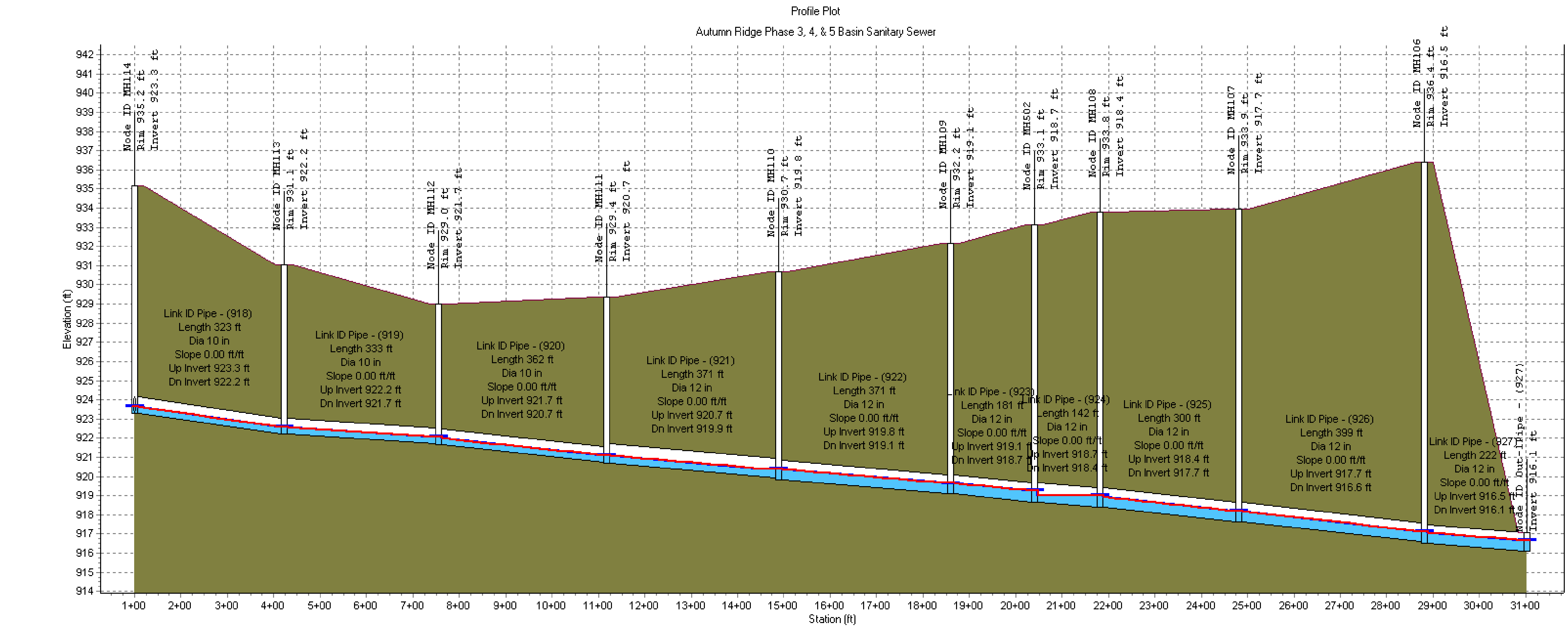


Node ID:	MH1172	MH289	MH117	MH116	MH115	MH114
Rim (ft):	939.2	936.9	938.6	938.2	936.8	935.2
Invert (ft):	926.0	925.9	925.1	924.8	923.7	923.3
Min Pipe Cover (ft):	12.37	10.14	12.63	12.57	12.25	11.01
Max HGL (ft):	926.3	926.2	925.3	925.1	924.1	923.7

Link ID:	Pipe - (913)	Pipe - (914)	Pipe - (915)	Pipe - (916)	Pipe - (917)
Length (ft):	41	112	116	345	317
Dia (in):	8	10	10	10	10
Slope (ft/ft):	0.00	0.01	0.00	0.00	0.00
Up Invert (ft):	926.0	925.9	925.1	924.8	923.7
Dn Invert (ft):	925.9	925.1	924.8	923.7	923.3
Max Q (gpm):	112.00	112.00	112.00	171.00	174.00
Max Vel (ft/s):	1.73	2.52	1.77	2.09	1.79
Max Depth (ft):	0.29	0.20	0.25	0.31	0.35

Autodesk Storm and Sanitary Analysis

Attachment E



Node ID:	MH114	MH113	MH112	MH111	MH110	MH109	MH502	MH108	MH107	MH106	
Rim (ft):	935.2	931.1	929.0	929.4	930.7	932.2	933.1	933.8	933.9	936.4	
Invert (ft):	923.3	922.2	921.7	920.7	919.8	919.1	918.7	918.4	917.7	916.5	916.1
Min Pipe Cover (ft):	11.01	8.00	6.47	7.66	9.75	12.09	13.45	14.38	15.29	18.81	
Max HGL (ft):	923.7	922.6	922.1	921.1	920.4	919.7	919.3	919.0	918.2	917.2	916.7

Link ID:	Pipe - (918)	Pipe - (919)	Pipe - (920)	Pipe - (921)	Pipe - (922)	Pipe - (923)	Pipe - (924)	Pipe - (925)	Pipe - (926)	Pipe - (927)
Length (ft):	323	333	362	371	371	181	142	300	399	222
Dia (in):	10	10	10	12	12	12	12	12	12	12
Slope (ft/ft):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Up Invert (ft):	923.3	922.2	921.7	920.7	919.8	919.1	918.7	918.4	917.7	916.5
Dn Invert (ft):	922.2	921.7	920.7	919.9	919.1	918.7	918.4	917.7	916.6	916.1
Max Q (gpm):	184.00	199.00	199.00	199.00	469.00	469.00	497.00	497.00	497.00	497.00
Max Vel (ft/s):	2.20	1.86	2.01	1.87	2.30	2.41	2.33	2.54	2.58	2.33
Max Depth (ft):	0.31	0.38	0.35	0.34	0.56	0.54	0.58	0.54	0.54	0.58

Autodesk Storm and Sanitary Analysis

Attachment J: CTH MM Traffic Study, 2023

STRAND ASSOCIATES®
Excellence in Engineering
Since 1946

Strand Associates, Inc.®
910 West Wingra Drive
Madison, WI 53715
(P) 608.251.4843
www.strand.com

June 7, 2023

Mr. Jeffrey Rau
Village of Oregon
101 Alpine Parkway
Oregon, WI 53575

Re: Intersection Control Evaluation–Wolfe Street and Foxfield Road
Village of Oregon, Wisconsin

Dear Mr. Rau:

Enclosed is one copy of the final Intersection Control Evaluation for the intersection of Wolfe Street and Foxfield Road.

The evaluation concluded that Phases 3, 4, and 5 of the Autumn Ridge Development will not negatively impact traffic operations on the County Highway MM corridor. The intersection is anticipated to operate acceptably through the horizon year 2033.

Please call 608-251-4843 with questions.

Sincerely,

STRAND ASSOCIATES, INC.®

Kyle R. Henderson, P.E.

Enclosure: Report

KRH:lln\R:\MAD\Documents\Reports\Archive\2023\Oregon, Village of (WI)\ICE-Wolfe St and Foxfield Rd.4334.011.KRH.June\Report\Report.docx\060723

Report for

Village of Oregon, Wisconsin

Intersection Control Evaluation–Wolfe Street and Foxfield Road

WISCONSIN
KYLE R.
HENDERSON
E-42361
MADISON
WI
PROFESSIONAL ENGINEER

6/7/23

Prepared by:

STRAND ASSOCIATES, INC.®
910 West Wingra Drive
Madison, WI 53715
www.strand.com

June 2023

STRAND
ASSOCIATES®
Excellence in Engineering
Since 1946

TABLE OF CONTENTS

Page No.
or Following

INTRODUCTION

Strand Associates, Inc.® (Strand) was hired by the Village of Oregon (Village) to prepare an Intersection Control Evaluation for the intersection of County Highway (CTH) MM (Wolfe Street) and Foxfield Road due to the construction of Phases 3, 4, and 5 of the Autumn Ridge Development (Development). Phases 3, 4, and 5 are located east of Wolfe Street require the construction of an east leg to the intersection. The Village is investigating the required intersection geometry to accommodate the construction of the east leg.

This analysis includes the following:

1. Evaluates the impact of new trips generated by the Development in the existing 2023 and horizon year 2033 traffic conditions for weekday AM and PM peak hours.

2. Evaluates traffic signal warrants.

3. Evaluates traffic operations at the intersection in both 2023 and 2033.

The project site location is shown in Figure 1.

Figure 1 Project Location

TRAFFIC DATA

Strand performed an 8-hour traffic count on Thursday, May 18, 2023, between the hours of 6 and 10 A.M. and 2 and 6 P.M. Figure 2 shows the 2023 existing peak hour traffic volumes at the intersection.

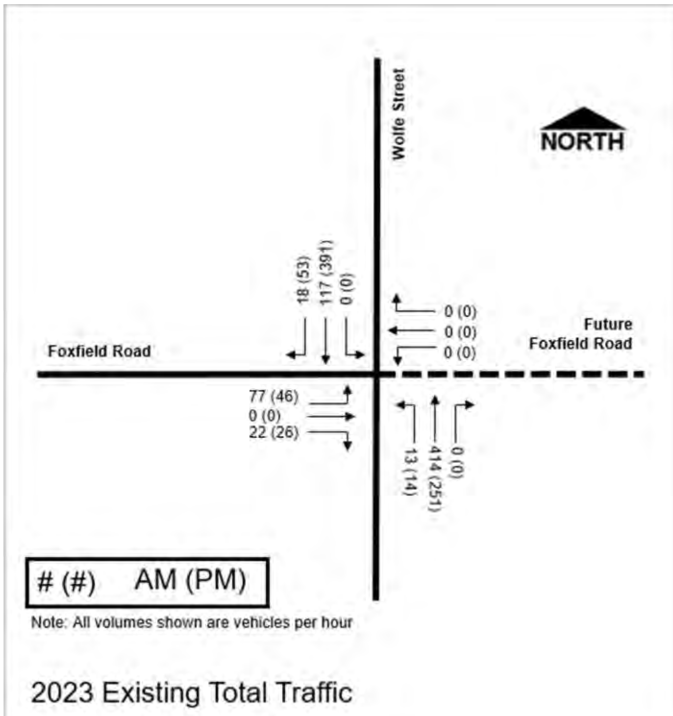


Figure 2 2023 Existing Traffic Summary

TRIP GENERATION AND ASSIGNMENT

A. Trip Generation

The trip generation for the Development Phases 3, 4, and 5 used rates from the Institute of Transportation Engineers' (ITE's) *Trip Generation Manual,* 11th Edition. The proposed Development includes single-family detached housing; therefore, the weekday AM and PM peak hours were selected for analysis. Table 1 shows the weekday AM and PM peak hour trip generation. Full trip generation calculations are shown in Appendix A.

New Automobile Trips Breakdown					
Land Use		AM		PM	
		Total Entering	Total Leaving	Total Entering	Total Leaving
2023 and 2033	Single-Family Detached Housing	20	61	69	40

Table 1 Trip Generation

B. Trip Distribution and Assignment

Vehicle trips were assigned assuming 75 percent of all traffic approaches and departs the Development from the north. The assumed trip assignment is shown in Figure 3. The 2023 total traffic summary is shown in Figure 4. The background growth and total traffic summary for 2033 are shown in Figures 5 and 6, respectively.

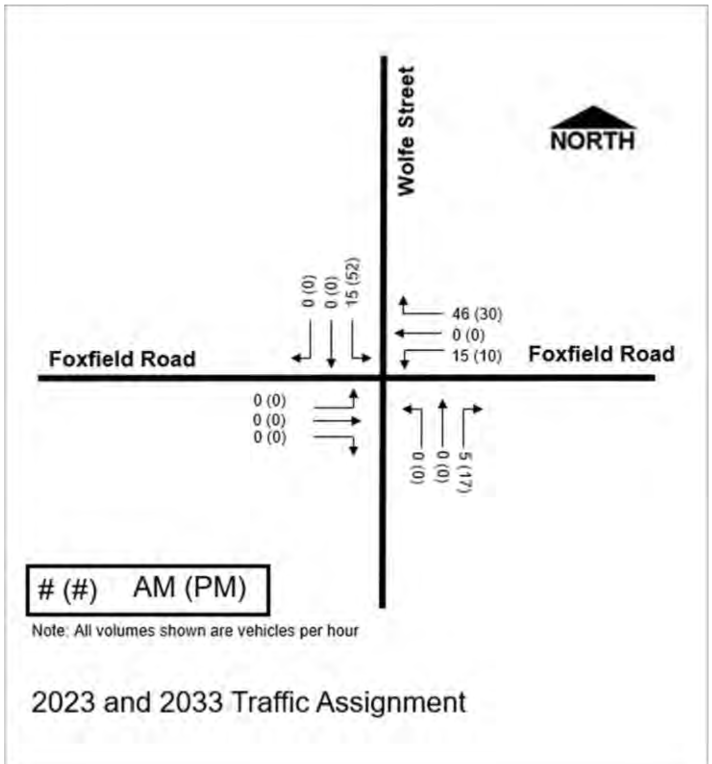


Figure 3 Trip Assignment

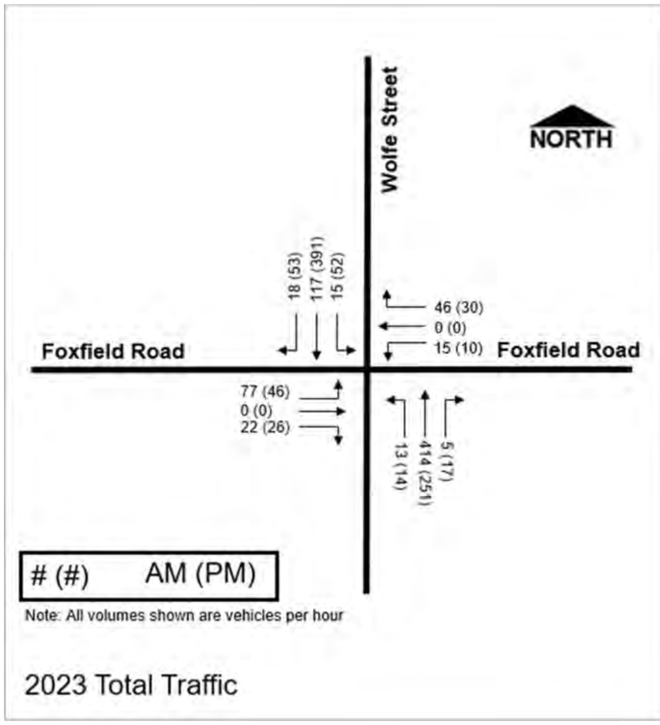


Figure 4 2023 Total Traffic Summary

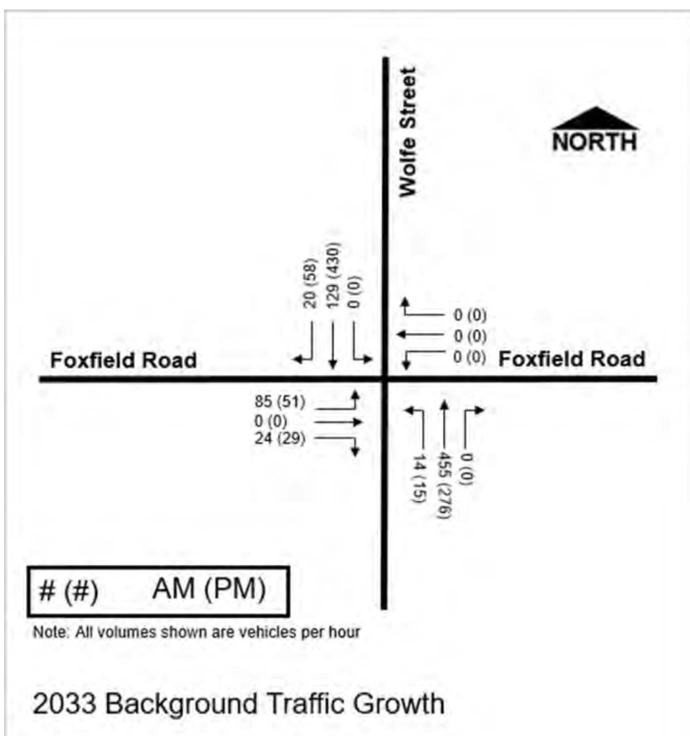


Figure 5 2033 Background Traffic Growth

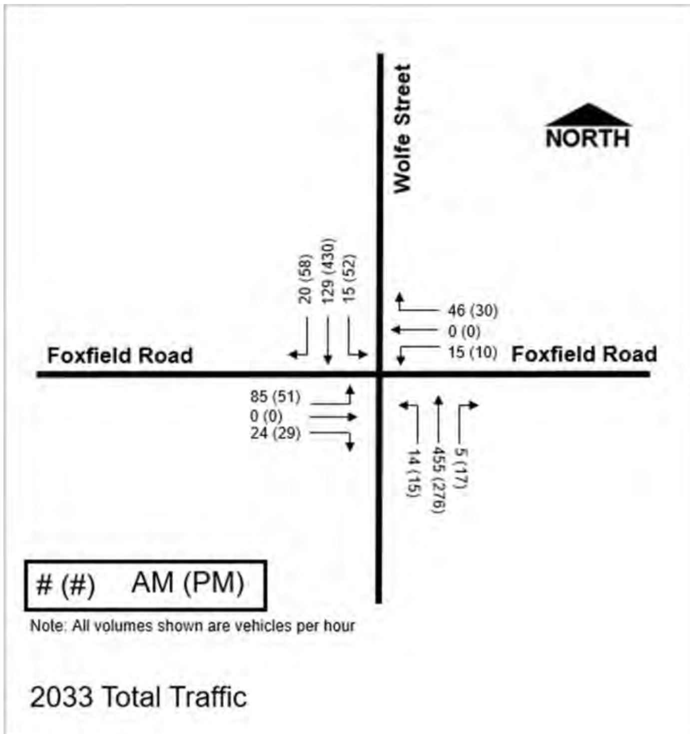


Figure 6 2033 Total Traffic Summary

SIGNAL WARRANT ANALYSIS

Traffic signal warrants for the intersection were analyzed following the guidelines from the Manual on Uniform Traffic Control Devices (MUTCD). Warrants 1, 2, and 3 were evaluated for Eight-Hour, Four-Hour, and Peak-Hour Vehicular Volume, respectively. Traffic Signal Warrants 1, 2, and 3 were not satisfied. Plots of the evaluated Traffic Signal Warrants are located in Appendix B.

SYNCHRO ANALYSIS

The evaluation used Synchro/SimTraffic 11 software to analyze current and future traffic conditions in the study area. Results following the Highway Capacity Manual 6th Edition procedures are reported for this analysis and available in full in Appendix C. Motor vehicle traffic operations are evaluated based on a Level of Service (LOS) scale. Intersections and turning movements that operate with very low delay and backups are considered to operate at LOS A. When an intersection or individual turning movement has volumes that exceed its capacity, the operations are LOS F. LOS values of B, C, D, and E represent the conditions in between the two ends of the scale.

A. Existing 2023

The Existing 2023 Model evaluates 2023 existing traffic volumes with no improvements to roadway geometry before construction of the east leg of Foxfield Road. All movements at the intersection operate at LOS B or better in the Existing 2023 Model in both the AM and PM peaks.

B. Future No-Build 2033

The Future No-Build 2033 Model evaluates 2033 background traffic growth volumes with no improvements to roadway geometry before construction of the east leg of Foxfield Road. All movements at the intersection operate at LOS C or better in the Future No-Build 2033 model in both the AM and PM peaks.

C. Improved 2023

The Improved 2023 Model evaluates 2023 total traffic volumes after construction of the east leg of Foxfield Road. All movements at the intersection operate at LOS C or better in the Improved 2023 Model in both the AM and PM peaks.

D. Future Improved 2033

The Future Improved 2033 model evaluates 2033 total traffic volumes after construction of the east leg of Foxfield Road. All movements at the intersection operate at LOS C or better in the Future Improved 2033 Model in both the AM and PM peaks.

CONCLUSIONS

The analysis of the warehouse development yielded the following conclusions:

1. The Development will not negatively impact traffic operations on the CTH MM corridor.

2. The intersection is anticipated to operate acceptably through 2033. The intersection should have stop control on the eastbound and westbound approaches and the following geometry:

    a. Northbound–One Left/Through lane, one 200-foot, right-turn lane

    b. Southbound–One Left/Through lane, one 200-foot, right-turn lane

    c. Eastbound–One Left/Through/Right lane

    d. Westbound–One Left/Through/Right lane

APPENDIX A
TRAFFIC DISTRIBUTION CALCULATIONS

Land Use		Land Use No.	Units		AM		PM	
					Formula	Trips	Formula	Trips
2023 and 2033	Single-Family Detached Housing	210	111	Number of Dwelling Units	Ln(T) = (0.91 * Ln(X)) + 0.12	82	Ln(T) = (0.94 * Ln(X)) + 0.27	110

Table A-1 New Automobile Trips

Land Use		Land Use No.	AM				PM			
			% Entering	% Leaving	Total Entering	Total Leaving	% Entering	% Leaving	Total Entering	Total Leaving
2023 and 2033	Single Family Detached Housing	210	25%	75%	20	61	63%	37%	69	40

Table A-2 New Automobile Trips Breakdown

APPENDIX B
TRAFFIC SIGNAL WARRANTS

Wisconsin Department of Transportation Traffic Signal Warrant Summary Worksheet

70%

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Wolfe Street and Foxfield Road
County: Dane
Village: Oregon

Major Street: Wolfe Street (CTH MM)
Critical Approach Speed: 45 mph
Lanes: 2 or more lanes

Minor Street: Foxfield Road
Critical Approach Speed: 25 mph
Lanes: 1 lane

% Right Turns Included
From North (SB) 0%
From East (WB) 0%
From South (NB) 0%
From West (EB) 0%

In built-up area of isolated community of < 10,000 population? Yes
Total number of approaches at intersection? 4 or more
If it is a "T" intersection, inflate minor threshold to 150%? No
Manually set volume level? 70%

Analysis based on EXISTING volume data.

Date	Day of the Week	Time (HH:MM)			
		From	AM / PM	To	AM / PM
5/18/2023	Thursday	6:00	AM	10:00	AM
5/18/2023	Thursday	2:00	PM	6:00	PM

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	No
Condition A: Minimum Vehicular Volume	No
Condition B: Interruption of Continuous Traffic	No
Condition C: Combination: 80% of A and B	No
Warrant 2: Four-Hour Volume	No
Warrant 3: Peak Hour Volume	No
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour	
Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:
Name: Kurt Walker
Agency: Strand Associates, Inc.
Date: 5/30/2023

Warrant 1: Eight - Hour Vehicular Volume 70%

Warrant Evaluated? Yes   Warrant Satisfied? No   Manually Set To:

Condition A : Min. Veh. Volume		
Volume Level	70%	56%
Major Rd. Req	420	336
Minor Rd. Req	105	84
Number of Hours	0	0

Satisfied? No

Condition B: Interruption of Continuous Traffic		
Volume Level	70%	56%
Major Rd. Req	630	504
Minor Rd. Req	53	42
Number of Hours	0	3

Satisfied? No

Condition C: Combination of A & B at 56%

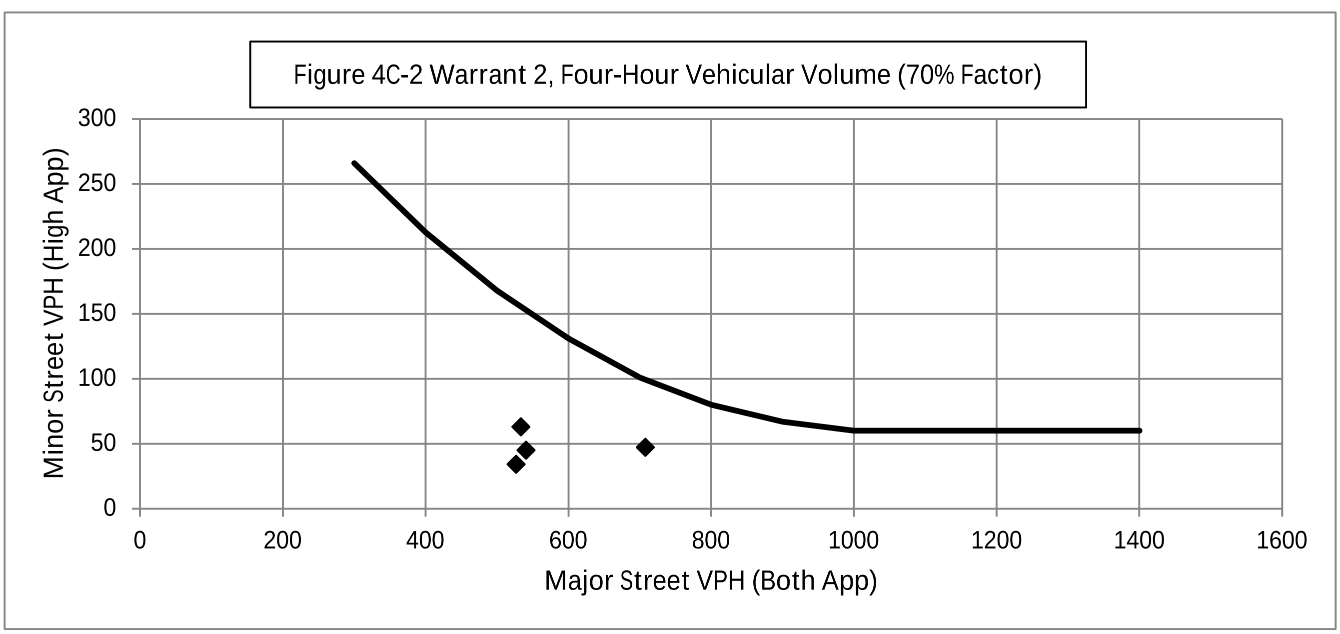
Satisfied? No

6:00 AM	Enter Start Time (Military Time) (HH:MM)				
Time Period	From	To	Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	Total
1	6:00	7:00	414	28	442
2	7:00	8:00	534	63	597
3	8:00	9:00	413	48	461
4	9:00	10:00	297	24	321
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	398	16	414
10	15:00	16:00	541	45	586
11	16:00	17:00	708	47	755
12	17:00	18:00	527	34	561
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 70%

Warrant Evaluated? Yes
Warrant Satisfied? No
Manually Set To:

Hour Start	16:00	7:00	15:00	17:00
Major Road Vol.	708	534	541	527
Minor Road Vol.	47	63	45	34



Warrant 3: Peak Hour Volume 70%

Warrant Evaluated? Yes

Warrant Satisfied? No

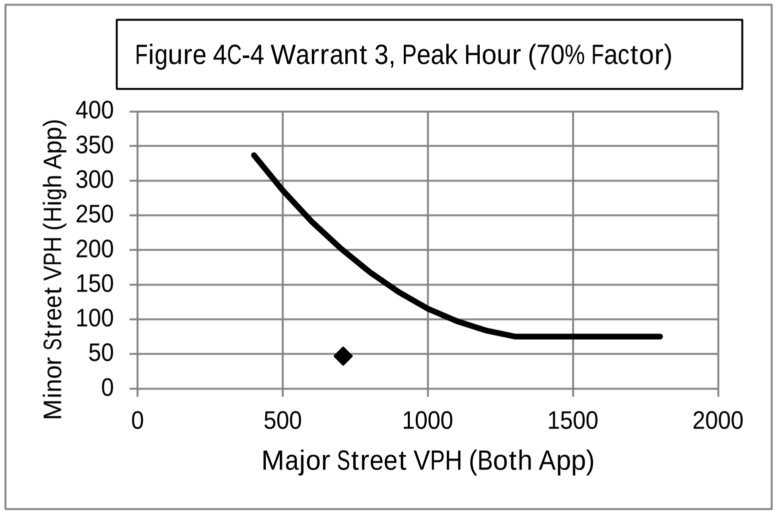
Manually Set To:

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	
Volume on Minor Approach	100	No
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
16:00	708	47



Warrant 4: Pedestrian Volume 70%

Warrant Evaluated?

Warrant Satisfied? N/A

Manually Set To:

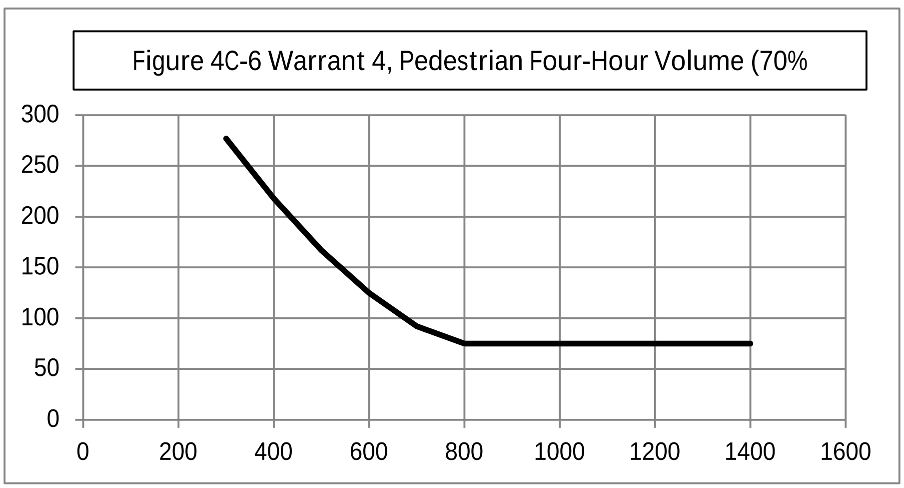
Criterion A: Four Hour

Hour (Start)	Pedestrian Volume	Major Road Vol.
		0
		0
		0
		0

Manually Set Major Rd Vol?

Avg. walk speed less than 3.5 ft/s?

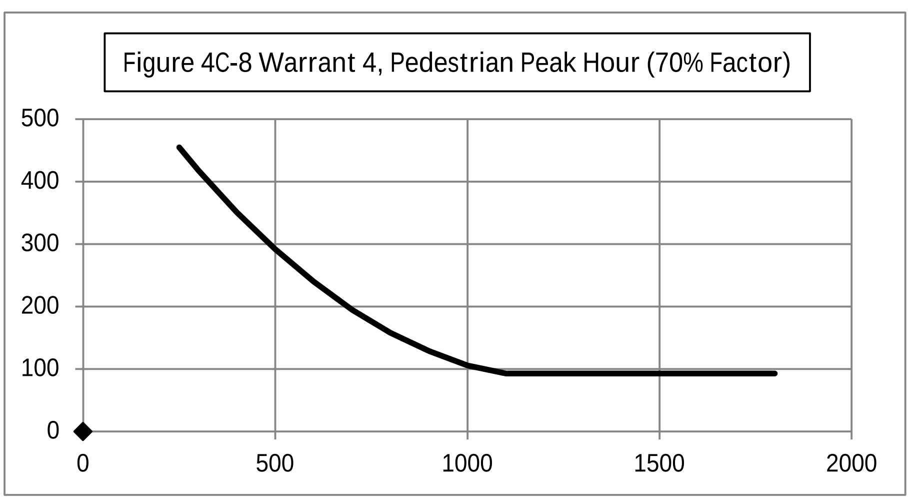
Criterion A Satisfied?



Criterion B: Peak Hour

Peak Hour	Pedestrian Vol.	Major Road Vol.
0:00	0	0

Criterion B Satisfied?



APPENDIX C
SYNCHRO RESULTS

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	77	22	13	414	117	18
Future Vol, veh/h	77	22	13	414	117	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	130	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	7	7	6	6	18	18
Mvmt Flow	82	23	14	440	124	19

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	124	143	0	-	0
Stage 1	124	-	-	-	-	-
Stage 2	468	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	461	913	1415	-	-	-
Stage 1	889	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	456	913	1415	-	-	-
Mov Cap-2 Maneuver	456	-	-	-	-	-
Stage 1	880	-	-	-	-	-
Stage 2	620	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.8	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1415	-	513	-	-
HCM Lane V/C Ratio	0.01	-	0.205	-	-
HCM Control Delay (s)	7.6	-	13.8	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.8	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	46	26	14	251	391	53
Future Vol, veh/h	46	26	14	251	391	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	130	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	10	10	7	7	6	6
Mvmt Flow	48	27	15	261	407	55

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	698	407	462	0	-	0
Stage 1	407	-	-	-	-	-
Stage 2	291	-	-	-	-	-
Critical Hdwy	6.5	6.3	4.17	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	2.263	-	-	-
Pot Cap-1 Maneuver	395	627	1073	-	-	-
Stage 1	655	-	-	-	-	-
Stage 2	741	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	389	627	1073	-	-	-
Mov Cap-2 Maneuver	389	-	-	-	-	-
Stage 1	646	-	-	-	-	-
Stage 2	741	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1073	-	451	-	-
HCM Lane V/C Ratio	0.014	-	0.166	-	-
HCM Control Delay (s)	8.4	-	14.6	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.6	-	-

Intersection						
Int Delay, s/veh	2.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	85	24	14	455	129	20
Future Vol, veh/h	85	24	14	455	129	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	130	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	7	7	6	6	18	18
Mvmt Flow	90	26	15	484	137	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	651	137	158	0	-	0
Stage 1	137	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Critical Hdwy	6.47	6.27	4.16	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-
Follow-up Hdwy	3.563	3.363	2.254	-	-	-
Pot Cap-1 Maneuver	425	898	1398	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	420	898	1398	-	-	-
Mov Cap-2 Maneuver	420	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	590	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15	0.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1398	-	476	-	-
HCM Lane V/C Ratio	0.011	-	0.244	-	-
HCM Control Delay (s)	7.6	-	15	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.9	-	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	51	29	15	276	430	58
Future Vol, veh/h	51	29	15	276	430	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	130	-	-	120
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	10	10	7	7	6	6
Mvmt Flow	53	30	16	288	448	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	768	448	508	0	-	0
Stage 1	448	-	-	-	-	-
Stage 2	320	-	-	-	-	-
Critical Hdwy	6.5	6.3	4.17	-	-	-
Critical Hdwy Stg 1	5.5	-	-	-	-	-
Critical Hdwy Stg 2	5.5	-	-	-	-	-
Follow-up Hdwy	3.59	3.39	2.263	-	-	-
Pot Cap-1 Maneuver	359	594	1032	-	-	-
Stage 1	627	-	-	-	-	-
Stage 2	718	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	353	594	1032	-	-	-
Mov Cap-2 Maneuver	353	-	-	-	-	-
Stage 1	617	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.9	0.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1032	-	414	-	-
HCM Lane V/C Ratio	0.015	-	0.201	-	-
HCM Control Delay (s)	8.5	-	15.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	77	0	22	15	0	46	13	414	5	15	117	18
Future Vol, veh/h	77	0	22	15	0	46	13	414	5	15	117	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	120	-	-	120
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	92	94	92	92	92	94	94	92	92	94	94
Heavy Vehicles, %	7	2	7	2	2	2	6	6	2	2	18	18
Mvmt Flow	82	0	23	16	0	50	14	440	5	16	124	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	652	629	124	645	643	440	143	0	0	445	0	0
Stage 1	156	156	-	468	468	-	-	-	-	-	-	-
Stage 2	496	473	-	177	175	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.52	6.27	7.12	6.52	6.22	4.16	-	-	4.12	-	-
Critical Hdwy Stg 1	6.17	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4.018	3.363	3.518	4.018	3.318	2.254	-	-	2.218	-	-
Pot Cap-1 Maneuver	374	399	913	385	392	617	1415	-	-	1115	-	-
Stage 1	835	769	-	575	561	-	-	-	-	-	-	-
Stage 2	546	558	-	825	754	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	336	387	913	367	381	617	1415	-	-	1115	-	-
Mov Cap-2 Maneuver	336	387	-	367	381	-	-	-	-	-	-	-
Stage 1	824	757	-	568	554	-	-	-	-	-	-	-
Stage 2	495	551	-	791	742	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.6	12.8	0.2	0.8
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1415	-	-	391	528	1115	-	-
HCM Lane V/C Ratio	0.01	-	-	0.269	0.126	0.015	-	-
HCM Control Delay (s)	7.6	0	-	17.6	12.8	8.3	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.4	0	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	0	26	10	0	30	14	251	17	52	391	53
Future Vol, veh/h	46	0	26	10	0	30	14	251	17	52	391	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	120	-	-	120
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	10	2	10	2	2	2	7	7	2	2	6	6
Mvmt Flow	48	0	27	11	0	33	15	261	18	57	407	55

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	838	830	407	853	867	261	462	0	0	279	0	0
Stage 1	521	521	-	291	291	-	-	-	-	-	-	-
Stage 2	317	309	-	562	576	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.52	6.3	7.12	6.52	6.22	4.17	-	-	4.12	-	-
Critical Hdwy Stg 1	6.2	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.018	3.39	3.518	4.018	3.318	2.263	-	-	2.218	-	-
Pot Cap-1 Maneuver	277	306	627	279	291	778	1073	-	-	1284	-	-
Stage 1	524	532	-	717	672	-	-	-	-	-	-	-
Stage 2	678	660	-	512	502	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	250	283	627	251	269	778	1073	-	-	1284	-	-
Mov Cap-2 Maneuver	250	283	-	251	269	-	-	-	-	-	-	-
Stage 1	515	500	-	705	661	-	-	-	-	-	-	-
Stage 2	639	649	-	460	472	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.7	12.7	0.4	0.9
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1073	-	-	319	510	1284	-	-
HCM Lane V/C Ratio	0.014	-	-	0.235	0.085	0.044	-	-
HCM Control Delay (s)	8.4	0	-	19.7	12.7	7.9	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	85	0	24	15	0	46	14	455	5	15	129	20
Future Vol, veh/h	85	0	24	15	0	46	14	455	5	15	129	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	120	-	-	120
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	92	94	92	92	92	94	94	92	92	94	94
Heavy Vehicles, %	7	2	7	2	2	2	6	6	2	2	18	18
Mvmt Flow	90	0	26	16	0	50	15	484	5	16	137	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	711	688	137	707	704	484	158	0	0	489	0	0
Stage 1	169	169	-	514	514	-	-	-	-	-	-	-
Stage 2	542	519	-	193	190	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.52	6.27	7.12	6.52	6.22	4.16	-	-	4.12	-	-
Critical Hdwy Stg 1	6.17	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4.018	3.363	3.518	4.018	3.318	2.254	-	-	2.218	-	-
Pot Cap-1 Maneuver	341	369	898	350	361	583	1398	-	-	1074	-	-
Stage 1	821	759	-	543	535	-	-	-	-	-	-	-
Stage 2	516	533	-	809	743	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	305	358	898	332	350	583	1398	-	-	1074	-	-
Mov Cap-2 Maneuver	305	358	-	332	350	-	-	-	-	-	-	-
Stage 1	809	747	-	535	527	-	-	-	-	-	-	-
Stage 2	465	525	-	773	731	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.9	13.5	0.2	0.8
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1398	-	-	357	492	1074	-	-
HCM Lane V/C Ratio	0.011	-	-	0.325	0.135	0.015	-	-
HCM Control Delay (s)	7.6	0	-	19.9	13.5	8.4	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.5	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	0	29	10	0	30	15	276	17	52	430	58
Future Vol, veh/h	51	0	29	10	0	30	15	276	17	52	430	58
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	120	-	-	120
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	92	96	92	92	92	96	96	92	92	96	96
Heavy Vehicles, %	10	2	10	2	2	2	7	7	2	2	6	6
Mvmt Flow	53	0	30	11	0	33	16	288	18	57	448	60

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	908	900	448	927	942	288	508	0	0	306	0	0
Stage 1	562	562	-	320	320	-	-	-	-	-	-	-
Stage 2	346	338	-	607	622	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.52	6.3	7.12	6.52	6.22	4.17	-	-	4.12	-	-
Critical Hdwy Stg 1	6.2	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.018	3.39	3.518	4.018	3.318	2.263	-	-	2.218	-	-
Pot Cap-1 Maneuver	248	278	594	249	263	751	1032	-	-	1255	-	-
Stage 1	498	510	-	692	652	-	-	-	-	-	-	-
Stage 2	653	641	-	483	479	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	222	255	594	222	241	751	1032	-	-	1255	-	-
Mov Cap-2 Maneuver	222	255	-	222	241	-	-	-	-	-	-	-
Stage 1	489	477	-	679	640	-	-	-	-	-	-	-
Stage 2	613	629	-	429	448	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.6	13.4	0.4	0.8
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1032	-	-	287	471	1255	-	-
HCM Lane V/C Ratio	0.015	-	-	0.29	0.092	0.045	-	-
HCM Control Delay (s)	8.5	0	-	22.6	13.4	8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.2	0.3	0.1	-	-

Attachment K: 2020 Village Facilities Plan

Village of Oregon 2020 Facilities Plan

https://www.vil.oregon.wi.us/vertical/sites/%7B3631401E-89E6-4B18-B72B-25DC241CC205%7D/uploads/Village_of_Oregon_WWTP_Facility_Plan(1).pdf

Attachment L: Autumn Ridge 1st Addition Stormwater Report

FIRST ADDITION TO AUTUMN RIDGE
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

STORM WATER MANAGEMENT REPORT

OWNER

Glenn & Michelle Hofer Living Trust
610 Ondossagon Way
Madison, WI 53719

June 10, 2021

PREPARED BY
D'Onofrio, Kottke & Associates, Inc.
7530 Westward Way
Madison, Wisconsin 53717
608.833.7530

FN: 20-05-162

TABLE OF CONTENTS

EXHIBITS

APPENDICES

INTRODUCTION

The intent of this report is to provide details on how the proposed "First Addition to Autumn Ridge" residential plat will be developed so that it is constructed in accordance with applicable storm water management standards.

The proposed development is approximately a 19-acre plat located in the Village of Oregon. The site is located just to the West of County Hwy MM (Wolfe St.), and South of Foxfield Road in the NW ¼ of the SE ¼, Section 13, Township 05N, Range 09E. More specifically parcel number 0509-134-8500-0 Village of Oregon, Dane County, Wisconsin. A project location map can be found in Exhibit #1.

The existing layout of the site consists of predominantly agricultural tilled land with surface water generally draining from north and west to the southeast corner of the site. The surface water eventually drains out of the southeast corner of the plat. In developed conditions the site will create approximately 31 single family lots and 2 Outlots. The residential plat area will predominantly be routed to a proposed wet detention/infiltration basin system for treatment. The soil conditions on site consist of hydrologic soil group type B soils. A site soils map can be found in Exhibit #2.

The proposed improvements for this plat requires land disturbing activity in excess of one acre and the future cumulative addition of 20,000 square feet of impervious surface area. Therefore, according to the Village of Oregon and State of Wisconsin ordinances, the site requires storm water management approvals and permits.

STANDARDS & RESULTS

The proposed development requires the following storm water management performance standards.

Sediment Control

Standard: Reduce, to the maximum extent practicable, total suspended solids load leaving the site by eighty percent (80%) based on the average annual rainfall.

Design Results: Sediment from the site will be reduced by 80% by routing the site runoff to a wet detention basin in the Southeast corner of the plat. WinSLAMM was used for modeling the sediment load reduction. See appendix B for sediment reduction calculations. Water leaving the site to the southeast will be clean runoff mostly from yards and roofs.

Temperature Control

Standard: For development of sites within thermally sensitive areas, provisions and practices to reduce the temperature of the storm water runoff shall be included.

Design Results: The proposed site does not fall within a defined thermally sensitive area.

Runoff Rate Control

Standard: For new developments, storm water management practices shall be designed and implemented to maintain post-development peak runoff discharge rates at predevelopment rates for the 1yr and 2yr-24 hour design storm event. Reduce the peak runoff rates for the 10yr-24hr storm event to the 2yr-24 hour predevelopment peak flow rate. Reduce the 100yr-24hr storm event to the 10yr-24hr predevelopment peak flow rate.

Design Results: The basin system will maintain the required peak runoff rates for the 1, 2, 10, and 100 year- 24 hour storm events. The peak flow comparison chart for site can be found in the stormwater management measures section of this report and the HydroCAD output can be found within Appendix D. The disturbed areas will be deep tilled prior to restoration to maintain existing soils classes.

Infiltration

Standard: For new developments, design practices to infiltrate sufficient runoff volume so the post-development infiltration volume shall be at least 90% of the predevelopment infiltration volume.

Design Results: The proposed development was designed to meet the 90% stayon requirement through an infiltration basin. The infiltration basin was sized using WinSLAMM modeling software. A minimum of 60% sediment reduction will occur in the proposed wet detention basin cell prior to entering the designed infiltration basin. Along with meeting the 90% stayon requirement, the basin was also designed to match the existing volume runoff for the 50 year storm event. The infiltration design calculations can be found in Appendix C.

STORM WATER MANAGEMENT MEASURES

The site generally drains to the southeast corner of the plat in existing and proposed conditions. The stormwater from the site will be treated by routing runoff to a wet detention/infiltration basin systems located at the southeast side of the plat. Peak flow, sediment reduction, and stayon requirements will be met for the entire plat within this system.

HydroCAD Stormwater Modeling software has been used to analyze the stormwater runoff characteristics for the development. HydroCAD uses the TR-55 methodology for determining peak discharge rates. The model output shows the runoff leaving the site in existing and proposed conditions. The site was designed to utilize a combination wet detention basin and infiltration basin system prior to leaving the site in proposed conditions. In this system, the wet detention chamber in will limit flow into the infiltration basin chamber for the 1yr-24hr storm event to remove sediment before entering the infiltration basin. During larger storms, the two chambers in the basin systems will act as one basin to limit peak flow from the site (see basin details in Appendix A).The detention and infiltration basins were modeled dynamically to better represent the elevations of the two chambers working together. The peak flow results from the stormwater modeling and basin design are shown in the chart on the next page. The chart shows the proposed results from the drainage area along with a comparison of the runoff volume leaving the site through the 50yr storm event. The detention basin system will maintain the peak runoff rates leaving the plat per the Village's requirements.

WinSLAMM was used to perform the sediment reduction calculations for the proposed site. Appendix B contains the calculation results. The stormwater management system will provide 80% sediment removal. The peak flow results from stormwater modeling and detention basin design are shown in the chart on the next page. This chart shows a comparison of the drainage area in existing conditions and in post construction conditions. Infiltration modeling for the site was calculated using WinSLAMM software and meets the 90% predevelopment standard per the ordinance. The infiltration basins will be implemented when at a minimum 75% of the plat area draining to the basin is complete. The infiltration calculations can be found in Appendix C.

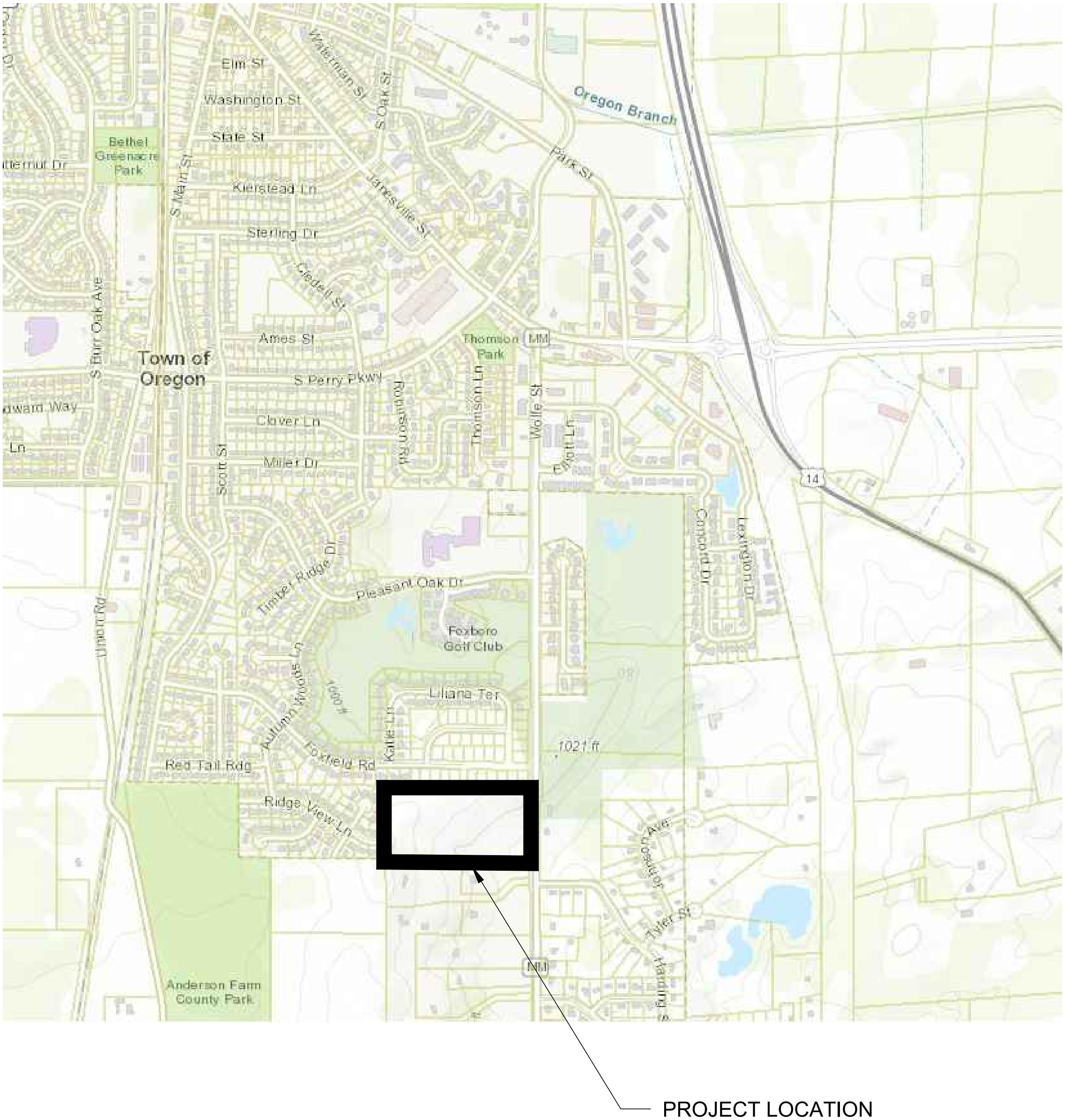
PEAK FLOW COMPARISION CHART
First Addition to Autumn Ridge

First Add to Autumn Ridge - 24-HR STORM EVENT (PEAK FLOW IN CFS)-PEAK FLOW COMPARISION					
	1YR	**2YR**	**10YR**	**50YR**	**100YR**
PHASE 2 DRAINAGE AREA					
Existing Flow	0.7	1.7	9.0	24.9	34.4
Proposed Total Treated Flow	0.0	0.0	0.5	1.4	5.5
Proposed Total Untreated Flow	10.3	15.2	35.8	68.5	56.1
PHASE 2 RUNOFF VOLUME (ACFT)					
Existing Runoff Volume (ACFT)	0.2	0.4	1.1	2.6	3.5
Proposed Runoff Volume Treated (ACFT)	0.0	0.0	0.7	2.6	3.6
Proposed Runoff Volume Untreated (ACFT)	0.8	1.1	2.3	4.4	5.5
PHASE 2 BASIN DESIGN					
Routed Detention Basin to Infiltration Basin	0.5	0.6	7.6	47.2	71.5
Elevation (Top = 991, Outlet = 986)	987.41	987.98	988.87	989.53	989.77
Routed Infiltration Basin to Offsite	0.0	0.0	0.5	1.4	5.5
Elevation (Top = 982, Bottom=977)	977.34	977.62	978.50	980.37	980.82

CONCLUSIONS

As the results indicate, the storm water management system for the proposed development meets the Village of Oregon and State of Wisconsin Ordinances. The peak flow, sediment control and infiltration requirements have been addressed and met for this site.

EXHIBITS



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.

7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089

YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

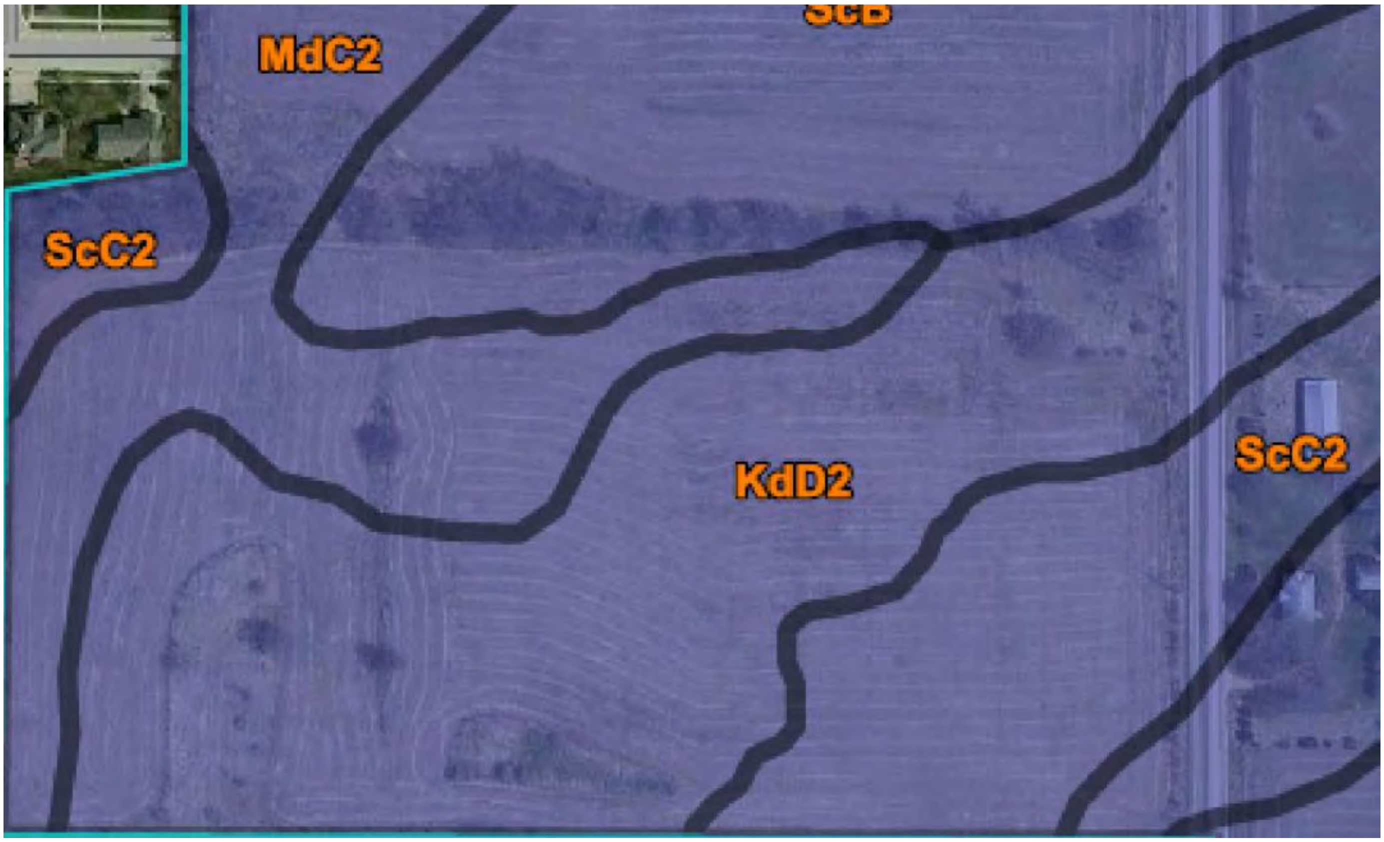
LOCATION MAP

AUTUMN RIDGE - PHASE II

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

DRAWN BY:GVP

EXHIBIT 1



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.

7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089

YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

SOILS MAP

AUTUMN RIDGE - PHASE II

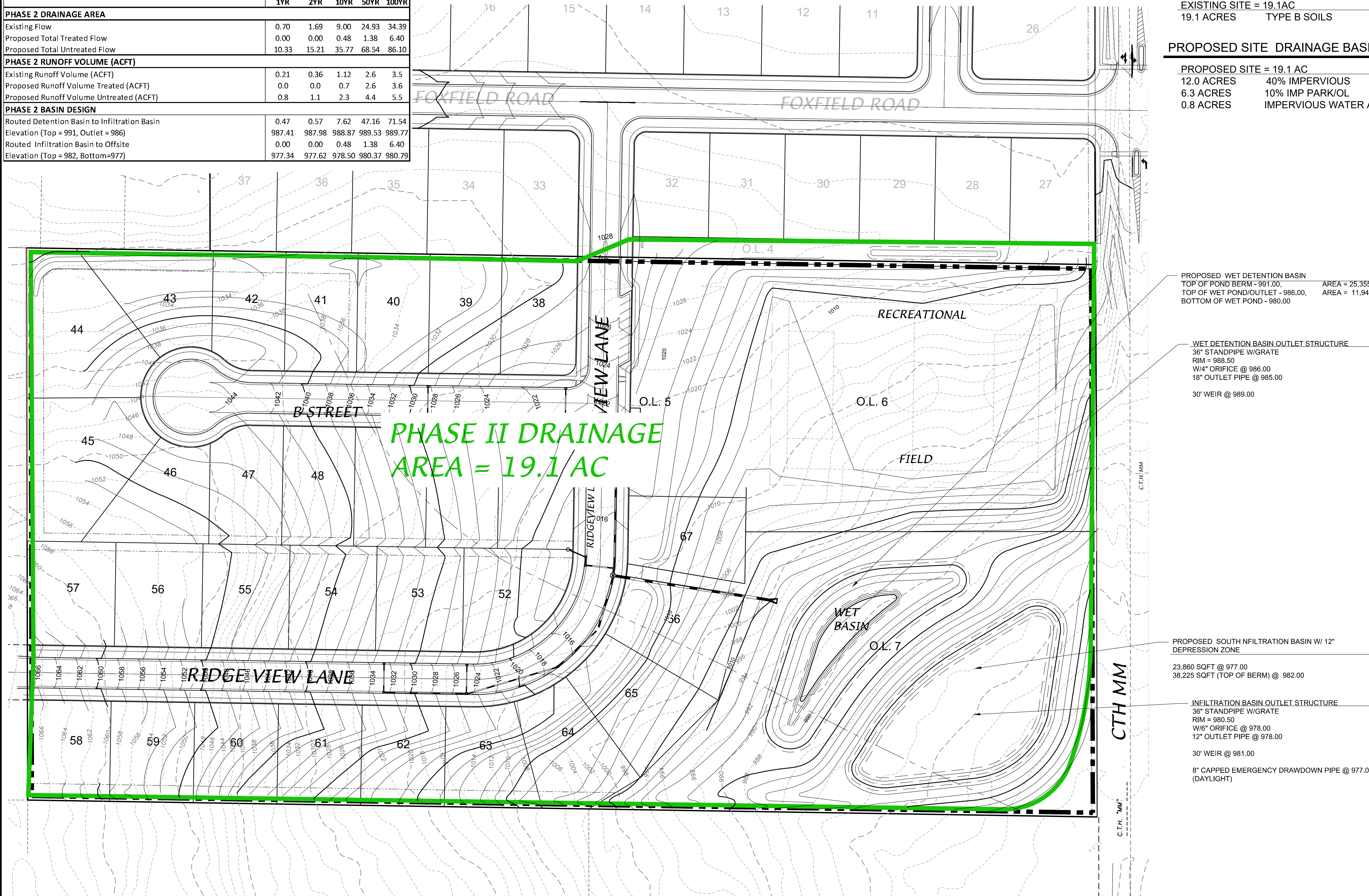
VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

DRAWN BY:GVP

EXHIBIT 2

File: U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\2005162 PH. 2 SWMP.dwg soils Plotted: Apr 12, 2021 - 3:52pm

AUTUMN RIDGE PH 2 - 24-HR STORM EVENT (PEAK FLOW IN CFS)-PEAK FLOW COMPARISION	1YR	2YR	10YR	50YR	100YR
PHASE 2 DRAINAGE AREA					
Existing Flow	0.70	1.69	9.00	24.93	34.39
Proposed Total Treated Flow	0.00	0.00	0.48	1.38	6.40
Proposed Total Untreated Flow	10.33	15.21	35.77	68.54	86.10
PHASE 2 RUNOFF VOLUME (ACFT)					
Existing Runoff Volume (ACFT)	0.21	0.36	1.12	2.6	3.5
Proposed Runoff Volume Treated (ACFT)	0.0	0.0	0.7	2.6	3.6
Proposed Runoff Volume Untreated (ACFT)	0.8	1.1	2.3	4.4	5.5
PHASE 2 BASIN DESIGN					
Routed Detention Basin to Infiltration Basin	0.47	0.57	7.62	47.16	71.54
Elevation (Top = 991, Outlet = 986)	987.41	987.98	988.87	989.53	989.77
Routed Infiltration Basin to Offsite	0.00	0.00	0.48	1.38	6.40
Elevation (Top = 982, Bottom=977)	977.34	977.62	978.50	980.37	980.79



EXISTING SITE DRAINAGE BASIN INFORMATION

EXISTING SITE = 19.1AC

19.1 ACRES	TYPE B SOILS	CN 58

PROPOSED SITE DRAINAGE BASIN INFORMATION

PROPOSED SITE = 19.1 AC

12.0 ACRES	40% IMPERVIOUS	CN 74
6.3 ACRES	10% IMP PARK/OL	CN 62
0.8 ACRES	IMPERVIOUS WATER AREA	CN 98

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

PROPOSED PHASE 2 STORMWATER DRAINAGE PLAN

AUUTMN RIDGE - PHASE 2

VILLAGE OF OREGON, WISCONSIN

NOT FOR CONSTRUCTION

DATE: 06/10/21

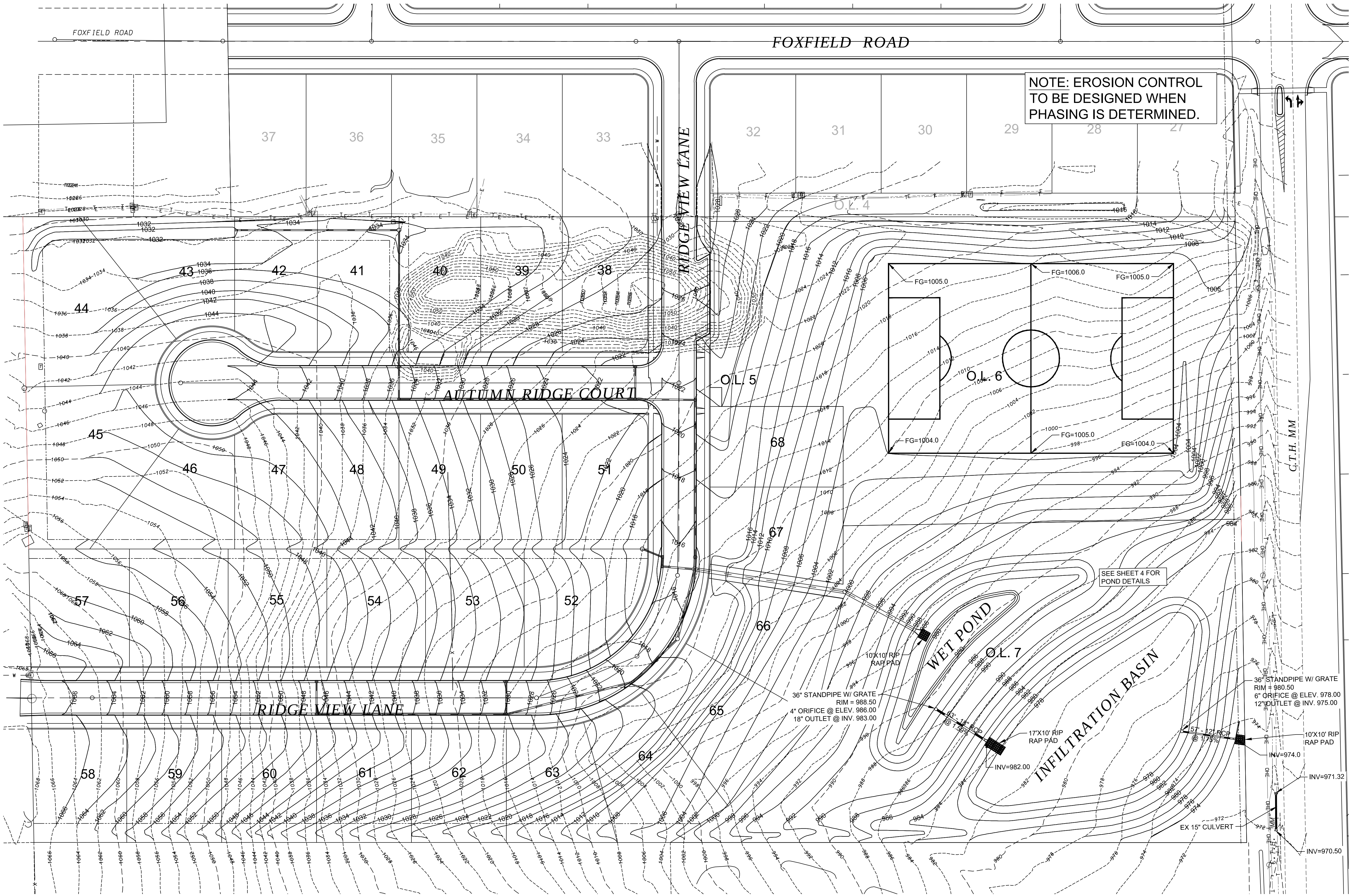
REVISED:

DRAWN BY: GVP

FN: 20-05-162

Sheet Number:

EXHIBIT 3



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

GRADING & EROSION CONTROL

1ST ADDITION TO AUTUMN RIDGE

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

SCALE: 1"= 100'
(PAGE SIZE: 11x17)

DATE: 06/10/2021
REVISED:

DRAWN BY: TCF

FN: 20-05-162

Sheet Number:
2 OF 14

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.

7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089

YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

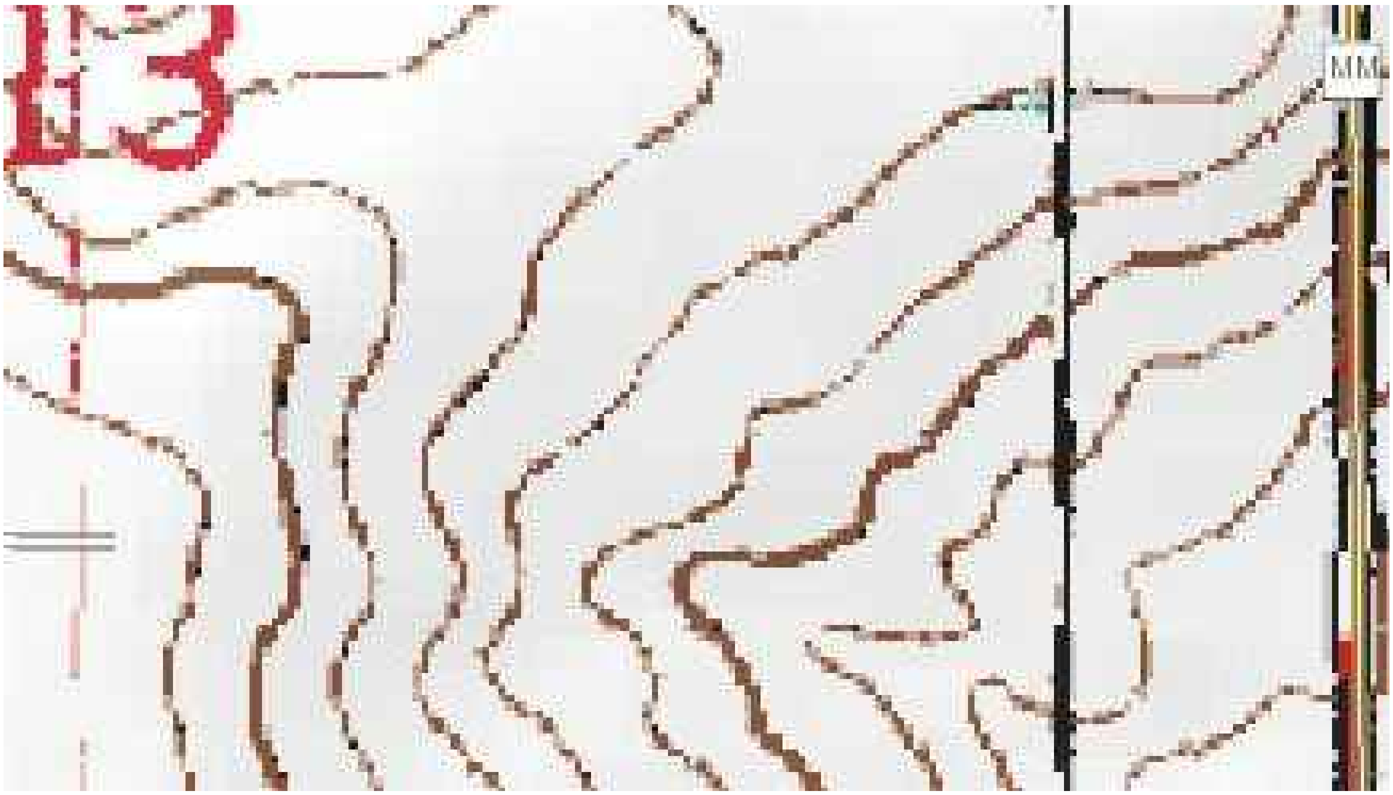
AERIAL MAP

AUTUMN RIDGE - PHASE II

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

DRAWN BY:GVP

EXHIBIT 5



D'ONOFRIO KOTTKE AND ASSOCIATES, INC.

7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089

YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

USGS PHOTO

AUTUMN RIDGE - PHASE II

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

DRAWN BY:GVP

EXHIBIT 6

NOTE: NO WETLAND INDICATORS LOCATED ON SITE

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

WETLAND INDICATOR MAP

AUTUMN RIDGE - PHASE II

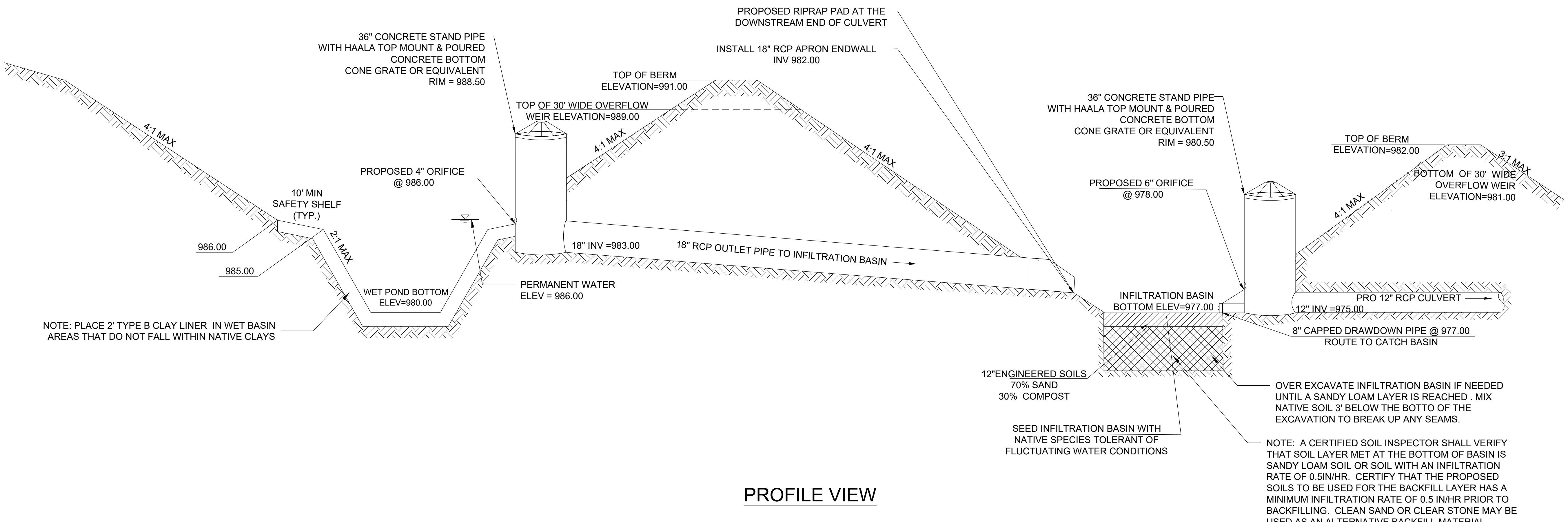
VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

DRAWN BY:GVP

EXHIBIT 7

APPENDIX A

DETENTION POND & INFLITRATION BASIN DETAIL



PROFILE VIEW

PROPOSED WET DETENTION BASIN & INFILTRATION BASIN

NOT TO SCALE

D'ONOFRIO KOTTKE AND ASSOCIATES, INC.
7530 Westward Way, Madison, WI 53717
Phone: 608.833.7530 • Fax: 608.833.1089
YOUR NATURAL RESOURCE FOR LAND DEVELOPMENT

STORMWATER MANAGEMENT DETAILS

1ST ADDITION TO AUTUMN RIDGE

VILLAGE OF OREGON, DANE COUNTY, WISCONSIN

DATE: 06/10/2021
REVISED:

DRAWN BY: TCF

FN: 20-05-162

Sheet Number:
4 OF 14

APPENDIX B

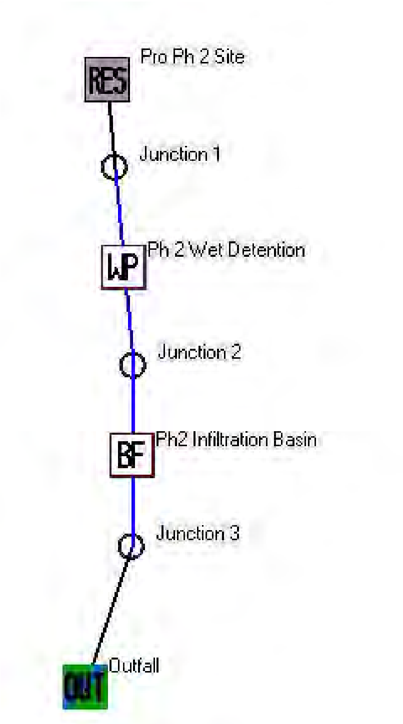
SEDIMENT REDUCTION CALCULATIONS

DETENTION BASIN
SEDIMENTATION REDUCTION CALCULATIONS (SLAMM)

WinSlamm Design

The following Slamm design shows that 80% of sediment is being removed from the proposed site

Model Schematic:



Model Input Information:

Data file name: U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\pro ph2 slamm.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 04-12-2021 Time: 15:13:07
Site information:

LU# 1 - Residential: Pro Ph 2 Site Total area (ac): 19.100

1 - Roofs 1: 1.790 ac. Pitched Disconnected Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
2 - Roofs 2: 0.920 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 1.190 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
37 - Streets 1: 1.520 ac. Intermediate Street Length = 1.045 curb-mi Street Width (assuming two curb-mi per street mile) = 24 ft
Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 12.880 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.800 ac. Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - Ph 2 Wet Detention
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 6
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. Orifice diameter (ft): 0.33
2. Number of orifices: 1
3. Invert elevation above datum (ft): 6

Outlet type: Broad Crested Weir
1. Weir crest length (ft): 30
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 9

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 8.5

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.10	0.0500	0.00	0.00
2	1.00	0.0700	0.00	0.00
3	2.00	0.0800	0.00	0.00
4	3.00	0.1000	0.00	0.00
5	4.00	0.1200	0.00	0.00
6	5.00	0.1400	0.00	0.00
7	6.00	0.3300	0.00	0.00
8	7.00	0.3900	0.00	0.00
9	8.00	0.4500	0.00	0.00
10	9.00	0.5200	0.00	0.00
11	10.00	0.5800	0.00	0.00

Control Practice 2: Biofilter CP# 1 (DS) - Ph2 Infiltration Basin
1. Top area (square feet) = 38225
2. Bottom aea (square feet) = 23860
3. Depth (ft): 5
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.5
6. Random infiltration rate generation? No
7. Infiltration rate fraction (side): 0.01
8. Infiltration rate fraction (bottom): 1
9. Depth of biofilter that is rock filled (ft) 0
10. Porosity of rock filled volume = 0
11. Engineered soil infiltration rate: 0
12. Engineered soil depth (ft) = 0
13. Engineered soil porosity = 0
14. Percent solids reduction due to flow through engineered soil = 0
15. Biofilter peak to average flow ratio = 3.8
16. Number of biofiltration control devices = 1
17. Particle size distribution file: Not needed - calculated by program
18. Initial water surface elevation (ft): 0

Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics:
Outlet type: Broad Crested Weir
1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 4

Outlet type: Vertical Stand Pipe
1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 3.5

Outlet type: Surface Discharge Pipe
1. Surface discharge pipe outlet diameter (ft): 0.5
2. Pipe invert elevation above datum (ft): 1
3. Number of surface pipe outlets: 1

Output Sediment Reduction:

File Name:

U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\pro ph2 slamm.mdb

Outfall Output Summary

	Runoff Volume (cu. ft.)	Percent Runoff Reduction	Runoff Coefficient (Rv)	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	486470		0.22	137.2	4167	
Outfall Total with Controls	3071	99.37 %	0.00	33.89	6.498	99.84 %
Current File Output: Annualized Total After Outfall Controls	3079	Years in Model Run: 1.00			6.516	

Print Output Summary to .csv File

Print Output Summary to Text File

Print Output Summary to Printer

Total Area Modeled (ac) 19.100

Total Control Practice Costs

Capital Cost	N/A
Land Cost	N/A
Annual Maintenance Cost	N/A
Present Value of All Costs	N/A
Annualized Value of All Costs	N/A

Perform Outfall Flow Duration Curve Calculations

Receiving Water Impacts Due To Stormwater Runoff

(CWP Impervious Cover Model)

	Calculated Rv	Approximate Urban Stream Classification
Without Controls	0.22	Poor
With Controls	0.00	Good

Total site sediment reduction in developed conditions = <u>99.84%</u>

Data File: U:\User\2005162\Engpro ph2 slamm.mdb							
Rain File: WisReg - Madison WI							
Date: 04-12-21 Time: 3:14:45 PM							
Site Description:							
Col. #:	2	4	5	6	7	8	9
Control Practice No.	Control Practice Type	Total Inflow Volume (cf)	Total Outflow Volume (cf)	Percent Volume Reduction	Total Influent Load (lbs)	Total Effluent Load (lbs)	Percent Load Reduction
1	Wet Detention Pond	486470	487742	-0.261	4167	709.5	82.97
2	Biofilter	487742	3071	99.37	709.5	6.498	99.08

The chart above shows that over 60% sediment reduction will occur prior to the infiltration basins.

APPENDIX C

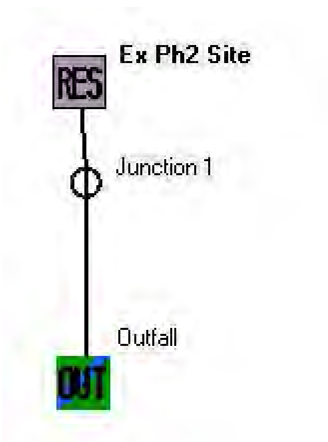
INFILTRATION DESIGN

INFILTRATION SIZING FOR THE PROPOSED PLAT

Methodology: To meet infiltration requirements, the following will show that the infiltration design will meet stayon requirements for the site. To establish the infiltration requirements, the site was modeled using WinSLAMM in existing conditions to establish an existing stayon value first. A target stayon value was established as 90% of the existing value per the ordinance. As shown in the following calculations; The site will meet the required infiltration performance standard in developed conditions

WinSLAMM Model to Establish Stayon Requirements

Model Schematic:



Model Input Information:

Data file name: U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\Ph2 ex slamm.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81   Study period ending date: 12/31/81
Start of Winter Season: 12/02   End of Winter Season: 03/12
Date: 04-12-2021   Time: 15:17:55
Site information:

LU# 1 - Residential: Ex Ph2 Site   Total area (ac): 19.100
45 - Large Landscaped Areas 1: 19.100 ac.   Normal Silty   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Output Existing Stayon From Plat:

Data File: U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\Ph2 ex slar

Rain File: WisReg - Madison WI 1981.RAN

Date: 04-12-21 Time: 3:18:47 PM

Site Description:

Runoff Volume Total (cf) at the Outfall

Rain Number	Start Date	Rain Total (in)	Outfall Total (cf)	Rv	Total Losses (in.)
73	08/28/81	0.04	0	0.000	0.04
74	08/31/81	0.03	0	0.000	0.03
75	08/31/81	1.52	5662	0.054	1.44
76	09/07/81	0.89	2656	0.043	0.85
77	09/11/81	0.08	0	0.000	0.08
78	09/16/81	0.03	0	0.000	0.03
79	09/21/81	0.45	735.5	0.024	0.44
80	09/24/81	0.90	2692	0.043	0.86
81	09/26/81	0.12	0	0.000	0.12
82	09/28/81	0.10	0	0.000	0.10
83	09/29/81	0.16	0	0.000	0.16
84	09/30/81	0.36	434.4	0.017	0.35
85	10/01/81	0.01	0	0.000	0.01
86	10/04/81	0.15	0	0.000	0.15
87	10/05/81	0.04	0	0.000	0.04
88	10/05/81	0.02	0	0.000	0.02
89	10/09/81	0.14	0	0.000	0.14
90	10/13/81	1.20	4334	0.052	1.14
91	10/15/81	0.02	0	0.000	0.02
92	10/17/81	0.95	2875	0.044	0.91
93	10/18/81	0.06	0	0.000	0.06
94	10/21/81	0.06	0	0.000	0.06
95	10/21/81	0.01	0	0.000	0.01
96	10/24/81	0.01	0	0.000	0.01
97	10/31/81	0.01	0	0.000	0.01
98	11/05/81	0.04	0	0.000	0.04
99	11/15/81	0.07	0	0.000	0.07
100	11/18/81	0.05	0	0.000	0.05
101	11/19/81	0.26	121.4	0.007	0.26
102	11/23/81	0.18	0	0.000	0.18
103	11/25/81	0.89	2656	0.043	0.85
104	11/30/81	0.37	473.9	0.018	0.36
105	12/03/81	-	-	-	-
106	12/14/81	-	-	-	-
107	12/20/81	-	-	-	-
108	12/26/81	-	-	-	-
109	12/31/81	-	-	-	-
Minimum:		0.00	0	0.000	0.01
Maximum:		2.59	35914	0.200	2.07
Average:		0.26	1100	0.012	0.25
Total:		28.81	119892		27.09

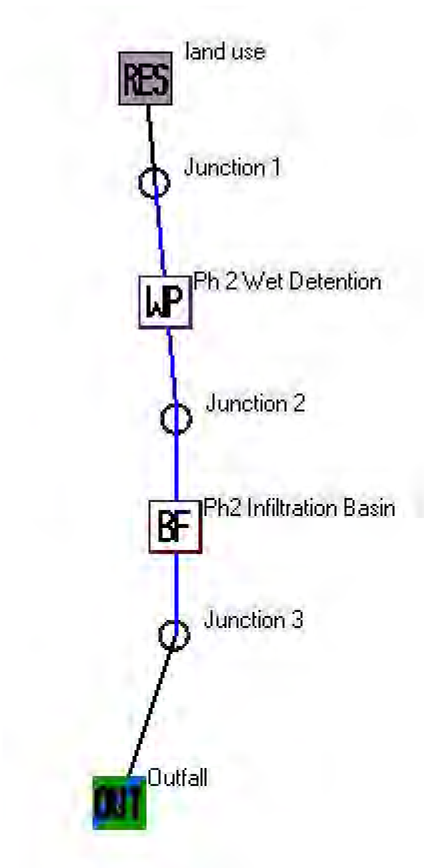
The plat has **27.09** inches of stayon in existing conditions. 90% of 27.09 inches = **24.4 inches of stayon required** to meet stayon requirements for the plat.

Proposed Infiltration Design:

Proposed Site Infiltration Design:
Stayon Required = 24.4 inches
Note: Assume 0.5 in/hr infiltration can be attained

WinSlamm Design

Model Schematic:



Model Input Information:

Data file name: U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\pro ph2 slamm.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Madison WI 1981.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations
Seed for random number generator: -42
Study period starting date: 01/01/81 Study period ending date: 12/31/81
Start of Winter Season: 12/02 End of Winter Season: 03/12
Date: 04-12-2021 Time: 15:13:07
Site information:

LU# 1 - Residential: Pro Ph 2 Site Total area (ac): 19.100
1 - Roofs 1: 1.790 ac. Pitched Disconnected Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
2 - Roofs 2: 0.920 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 1.190 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
37 - Streets 1: 1.520 ac. Intermediate Street Length = 1.045 curb-mi Street Width (assuming two curb-mi per street mile) = 24 ft
Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 12.880 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.800 ac. Source Area PSD File:

Control Practice 1: Wet Detention Pond CP# 1 (DS) - Ph 2 Wet Detention
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 6
Peak to Average Flow Ratio: 3.8
Maximum flow allowed into pond (cfs): No maximum value entered
Outlet Characteristics:
Outlet type: Orifice 1
1. **Orifice diameter (ft): 0.33**
2. **Number of orifices: 1**
3. **Invert elevation above datum (ft): 6**

Outlet type: Broad Crested Weir
1. **Weir crest length (ft): 30**
2. **Weir crest width (ft): 10**
3. **Height from datum to bottom of weir opening: 9**

Outlet type: Vertical Stand Pipe
1. **Stand pipe diameter (ft): 3**
2. **Stand pipe height above datum (ft): 8.5**

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.10	0.0500	0.00	0.00
2	1.00	0.0700	0.00	0.00
3	2.00	0.0800	0.00	0.00
4	3.00	0.1000	0.00	0.00
5	4.00	0.1200	0.00	0.00
6	5.00	0.1400	0.00	0.00
7	6.00	0.3300	0.00	0.00
8	7.00	0.3900	0.00	0.00
9	8.00	0.4500	0.00	0.00
10	9.00	0.5200	0.00	0.00
11	10.00	0.5800	0.00	0.00

Control Practice 2: Biofilter CP# 1 (DS) - Ph2 Infiltration Basin
1. **Top area (square feet) = 38225**
2. **Bottom aea (square feet) = 23860**
3. **Depth (ft): 5**
4. **Biofilter width (ft) - for Cost Purposes Only: 10**
5. **Infiltration rate (in/hr) = 0.5**
6. **Random infiltration rate generation? No**
7. **Infiltration rate fraction (side): 0.01**
8. **Infiltration rate fraction (bottom): 1**
9. **Depth of biofilter that is rock filled (ft) 0**
10. **Porosity of rock filled volume = 0**
11. **Engineered soil infiltration rate: 0**
12. **Engineered soil depth (ft) = 0**
13. **Engineered soil porosity = 0**
14. **Percent solids reduction due to flow through engineered soil = 0**
15. **Biofilter peak to average flow ratio = 3.8**
16. **Number of biofiltration control devices = 1**
17. **Particle size distribution file: Not needed - calculated by program**
18. **Initial water surface elevation (ft): 0**

Soil Data Soil Type Fraction in Eng. Soil
Biofilter Outlet/Discharge Characteristics:
Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 10
3. Height of datum to bottom of weir opening: 4

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 3
2. Stand pipe height above datum (ft): 3.5

Outlet type: Surface Discharge Pipe

1. Surface discharge pipe outlet diameter (ft): 0.5
2. Pipe invert elevation above datum (ft): 1
3. Number of surface pipe outlets: 1

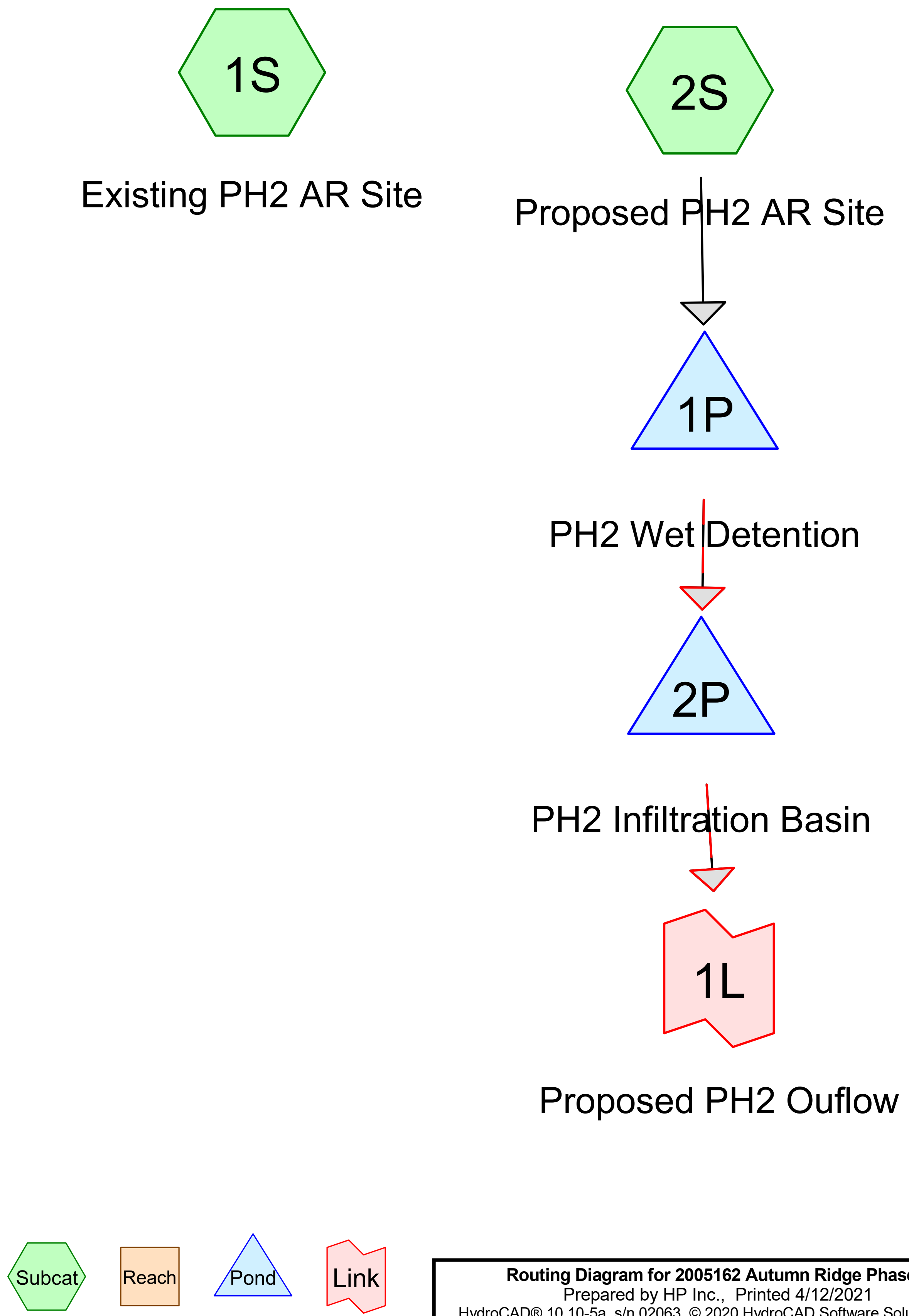
Proposed Infiltration Design:

Data File: U:\User\2005162\Engineering\SWMP\Phase 2 SW Design\pro ph2 sla					
Rain File: WisReg - Madison WI 1981.RAN					
Date: 04-12-21 Time: 3:21:38 PM					
Site Description:					
Runoff Volume Total (cf) at the Outfall					
Rain Number	Start Date	Rain Total (in)	Outfall Total (cf)	Rv	Total Losses (in.)
73	08/28/81	0.04	0	0.000	0.04
74	08/31/81	0.03	0	0.000	0.03
75	08/31/81	1.52	0	0.000	1.52
76	09/07/81	0.89	0	0.000	0.89
77	09/11/81	0.08	0	0.000	0.08
78	09/16/81	0.03	0	0.000	0.03
79	09/21/81	0.45	0	0.000	0.45
80	09/24/81	0.90	0	0.000	0.90
81	09/26/81	0.12	0	0.000	0.12
82	09/28/81	0.10	0	0.000	0.10
83	09/29/81	0.16	0	0.000	0.16
84	09/30/81	0.36	0	0.000	0.36
85	10/01/81	0.01	0	0.000	0.01
86	10/04/81	0.15	0	0.000	0.15
87	10/05/81	0.04	0	0.000	0.04
88	10/05/81	0.02	0	0.000	0.02
89	10/09/81	0.14	0	0.000	0.14
90	10/13/81	1.20	0	0.000	1.20
91	10/15/81	0.02	0	0.000	0.02
92	10/17/81	0.95	0	0.000	0.95
93	10/18/81	0.06	0	0.000	0.06
94	10/21/81	0.06	0	0.000	0.06
95	10/21/81	0.01	0	0.000	0.01
96	10/24/81	0.01	0	0.000	0.01
97	10/31/81	0.01	0	0.000	0.01
98	11/05/81	0.04	0	0.000	0.04
99	11/15/81	0.07	0	0.000	0.07
100	11/18/81	0.05	0	0.000	0.05
101	11/19/81	0.26	0	0.000	0.26
102	11/23/81	0.18	0	0.000	0.18
103	11/25/81	0.89	0	0.000	0.89
104	11/30/81	0.37	0	0.000	0.37
105	12/03/81	-	-	-	-
106	12/14/81	-	-	-	-
107	12/20/81	-	-	-	-
108	12/26/81	-	-	-	-
109	12/31/81	-	-	-	-
Minimum:		0.00	0	0.000	0.01
Maximum:		2.59	3071	0.017	2.55
Average:		0.26	28.17	0.000	0.26
Total:		28.81	3071		28.77

28.77 inches of stayon attained on the site in proposed conditions. This exceeds 24.4 inches required in developed conditions

APPENDIX D

HYDROCAD OUTPUT



Routing Diagram for 2005162 Autumn Ridge Phase 2
Prepared by HP Inc., Printed 4/12/2021
HydroCAD® 10.10-5a s/n 02063 © 2020 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Existing PH2 AR Site

Runoff = 0.70 cfs @ 12.71 hrs, Volume= 0.209 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1yr 24hr Rainfall=2.49"

	Area (ac)	CN	Description
*	19.100	58	Type B Soils
	19.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	300	0.0330	0.27		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
7.6	800	0.0625	1.75		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
25.9	1,100	Total			

Summary for Subcatchment 2S: Proposed PH2 AR Site

Runoff = 10.33 cfs @ 12.21 hrs, Volume= 0.774 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 1yr 24hr Rainfall=2.49"

	Area (ac)	CN	Description
*	12.000	74	40% Imp
*	0.800	98	Water
*	6.300	62	10% Imp Park
	19.100	71	Weighted Average
	18.300		95.81% Pervious Area
	0.800		4.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
1.1	900	0.0367	13.80	43.34	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.7	1,100	Total			

Summary for Pond 1P: PH2 Wet Detention

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth = 0.49" for 1yr 24hr event
Inflow = 10.33 cfs @ 12.21 hrs, Volume= 0.774 af
Outflow = 0.47 cfs @ 15.68 hrs, Volume= 0.750 af, Atten= 95%, Lag= 208.1 min
Primary = 0.47 cfs @ 15.68 hrs, Volume= 0.750 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 987.41' @ 15.68 hrs Surf.Area= 15,493 sf Storage= 19,375 cf

Plug-Flow detention time= 545.1 min calculated for 0.750 af (97% of inflow)
Center-of-Mass det. time= 530.3 min (1,404.3 - 874.0)

Volume	Invert	Avail.Storage	Storage Description
#1	986.00'	92,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
986.00	11,944	0	0
987.00	14,425	13,185	13,185
988.00	17,006	15,716	28,900
989.00	19,689	18,348	47,248
990.00	22,471	21,080	68,328
991.00	25,355	23,913	92,241

Device	Routing	Invert	Outlet Devices
#1	Primary	985.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.00' / 978.00' S= 0.0875 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	986.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	988.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	989.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.47 cfs @ 15.68 hrs HW=987.41' TW=977.08' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.47 cfs of 10.98 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.47 cfs @ 5.38 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=986.00' TW=977.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: PH2 Infiltration Basin

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth > 0.47" for 1yr 24hr event
Inflow = 0.47 cfs @ 15.68 hrs, Volume= 0.750 af
Outflow = 0.29 cfs @ 29.40 hrs, Volume= 0.751 af, Atten= 39%, Lag= 823.5 min
Discarded = 0.29 cfs @ 29.40 hrs, Volume= 0.751 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 977.34' @ 29.40 hrs Surf.Area= 24,756 sf Storage= 8,160 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 293.2 min (1,697.4 - 1,404.3)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	154,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	23,860	0	0
978.00	26,530	25,195	25,195
979.00	29,304	27,917	53,112
980.00	32,177	30,741	83,853
981.00	35,151	33,664	117,517
982.00	38,225	36,688	154,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	977.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -7.00'
#2	Primary	977.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 974.00' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	978.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	980.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	981.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.29 cfs @ 29.40 hrs HW=977.34' (Free Discharge)
└─**1=Exfiltration** (Controls 0.29 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Proposed PH2 Ouflow

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth = 0.00" for 1yr 24hr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing PH2 AR Site

Runoff = 1.69 cfs @ 12.58 hrs, Volume= 0.357 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2yr 24hr Rainfall=2.84"

	Area (ac)	CN	Description
*	19.100	58	Type B Soils
	19.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	300	0.0330	0.27		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
7.6	800	0.0625	1.75		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
25.9	1,100	Total			

Summary for Subcatchment 2S: Proposed PH2 AR Site

Runoff = 15.21 cfs @ 12.20 hrs, Volume= 1.067 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 2yr 24hr Rainfall=2.84"

	Area (ac)	CN	Description
*	12.000	74	40% Imp
*	0.800	98	Water
*	6.300	62	10% Imp Park
	19.100	71	Weighted Average
	18.300		95.81% Pervious Area
	0.800		4.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
1.1	900	0.0367	13.80	43.34	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.7	1,100	Total			

Summary for Pond 1P: PH2 Wet Detention

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth = 0.67" for 2yr 24hr event
Inflow = 15.21 cfs @ 12.20 hrs, Volume= 1.067 af
Outflow = 0.57 cfs @ 16.51 hrs, Volume= 1.033 af, Atten= 96%, Lag= 258.4 min
Primary = 0.57 cfs @ 16.51 hrs, Volume= 1.033 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 987.98' @ 16.51 hrs Surf.Area= 16,944 sf Storage= 28,489 cf

Plug-Flow detention time= 640.6 min calculated for 1.033 af (97% of inflow)
Center-of-Mass det. time= 623.9 min (1,487.8 - 863.9)

Volume	Invert	Avail.Storage	Storage Description
#1	986.00'	92,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
986.00	11,944	0	0
987.00	14,425	13,185	13,185
988.00	17,006	15,716	28,900
989.00	19,689	18,348	47,248
990.00	22,471	21,080	68,328
991.00	25,355	23,913	92,241

Device	Routing	Invert	Outlet Devices
#1	Primary	985.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.00' / 978.00' S= 0.0875 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	986.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	988.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	989.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.57 cfs @ 16.51 hrs HW=987.98' TW=977.16' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.57 cfs of 12.69 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.57 cfs @ 6.48 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=986.00' TW=977.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: PH2 Infiltration Basin

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth > 0.65" for 2yr 24hr event
Inflow = 0.57 cfs @ 16.51 hrs, Volume= 1.033 af
Outflow = 0.30 cfs @ 34.15 hrs, Volume= 0.859 af, Atten= 48%, Lag= 1,058.7 min
Discarded = 0.30 cfs @ 34.15 hrs, Volume= 0.859 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 977.62' @ 34.15 hrs Surf.Area= 25,502 sf Storage= 15,181 cf

Plug-Flow detention time= 488.6 min calculated for 0.859 af (83% of inflow)
Center-of-Mass det. time= 323.9 min (1,811.7 - 1,487.8)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	154,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	23,860	0	0
978.00	26,530	25,195	25,195
979.00	29,304	27,917	53,112
980.00	32,177	30,741	83,853
981.00	35,151	33,664	117,517
982.00	38,225	36,688	154,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	977.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -7.00'
#2	Primary	977.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 974.00' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	978.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	980.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	981.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.30 cfs @ 34.15 hrs HW=977.62' (Free Discharge)
└─**1=Exfiltration** (Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Proposed PH2 Ouflow

Inflow Area =	19.100 ac,	4.19% Impervious,	Inflow Depth = 0.00"	for 2yr 24hr event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing PH2 AR Site

Runoff = 9.00 cfs @ 12.45 hrs, Volume= 1.124 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10yr 24hr Rainfall=4.09"

	Area (ac)	CN	Description
*	19.100	58	Type B Soils
	19.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	300	0.0330	0.27		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
7.6	800	0.0625	1.75		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
25.9	1,100	Total			

Summary for Subcatchment 2S: Proposed PH2 AR Site

Runoff = 35.77 cfs @ 12.19 hrs, Volume= 2.318 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 10yr 24hr Rainfall=4.09"

	Area (ac)	CN	Description
*	12.000	74	40% Imp
*	0.800	98	Water
*	6.300	62	10% Imp Park
	19.100	71	Weighted Average
	18.300		95.81% Pervious Area
	0.800		4.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
1.1	900	0.0367	13.80	43.34	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.7	1,100	Total			

Summary for Pond 1P: PH2 Wet Detention

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth = 1.46" for 10yr 24hr event
Inflow = 35.77 cfs @ 12.19 hrs, Volume= 2.318 af
Outflow = 7.62 cfs @ 12.64 hrs, Volume= 2.255 af, Atten= 79%, Lag= 26.6 min
Primary = 7.62 cfs @ 12.64 hrs, Volume= 2.255 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 988.87' @ 12.64 hrs Surf.Area= 19,339 sf Storage= 44,703 cf

Plug-Flow detention time= 464.5 min calculated for 2.255 af (97% of inflow)
Center-of-Mass det. time= 449.8 min (1,292.3 - 842.5)

Volume	Invert	Avail.Storage	Storage Description
#1	986.00'	92,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
986.00	11,944	0	0
987.00	14,425	13,185	13,185
988.00	17,006	15,716	28,900
989.00	19,689	18,348	47,248
990.00	22,471	21,080	68,328
991.00	25,355	23,913	92,241

Device	Routing	Invert	Outlet Devices
#1	Primary	985.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.00' / 978.00' S= 0.0875 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	986.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	988.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	989.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=7.59 cfs @ 12.64 hrs HW=988.87' TW=977.22' (Dynamic Tailwater)
└─**1=Culvert** (Passes 7.59 cfs of 15.03 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.69 cfs @ 7.91 fps)
  └─**3=Orifice/Grate** (Weir Controls 6.90 cfs @ 1.99 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=986.00' TW=977.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: PH2 Infiltration Basin

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth > 1.42" for 10yr 24hr event
Inflow = 7.62 cfs @ 12.64 hrs, Volume= 2.255 af
Outflow = 0.80 cfs @ 19.49 hrs, Volume= 1.660 af, Atten= 90%, Lag= 411.3 min
Discarded = 0.32 cfs @ 19.49 hrs, Volume= 0.945 af
Primary = 0.48 cfs @ 19.49 hrs, Volume= 0.715 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 978.50' @ 19.49 hrs Surf.Area= 27,925 sf Storage= 38,889 cf

Plug-Flow detention time= 693.5 min calculated for 1.658 af (74% of inflow)
Center-of-Mass det. time= 399.2 min (1,691.5 - 1,292.3)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	154,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	23,860	0	0
978.00	26,530	25,195	25,195
979.00	29,304	27,917	53,112
980.00	32,177	30,741	83,853
981.00	35,151	33,664	117,517
982.00	38,225	36,688	154,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	977.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -7.00'
#2	Primary	977.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 974.00' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	978.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	980.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	981.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.32 cfs @ 19.49 hrs HW=978.50' (Free Discharge)
└─**1=Exfiltration** (Controls 0.32 cfs)

Primary OutFlow Max=0.48 cfs @ 19.49 hrs HW=978.50' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.48 cfs of 3.79 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 0.48 cfs @ 2.42 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Proposed PH2 Ouflow

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth > 0.45" for 10yr 24hr event
Inflow = 0.48 cfs @ 19.49 hrs, Volume= 0.715 af
Primary = 0.48 cfs @ 19.49 hrs, Volume= 0.715 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing PH2 AR Site

Runoff = 24.93 cfs @ 12.41 hrs, Volume= 2.600 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 50yr 24hr Rainfall=5.80"

	Area (ac)	CN	Description
*	19.100	58	Type B Soils
	19.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	300	0.0330	0.27		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
7.6	800	0.0625	1.75		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
25.9	1,100	Total			

Summary for Subcatchment 2S: Proposed PH2 AR Site

Runoff = 68.54 cfs @ 12.19 hrs, Volume= 4.359 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 50yr 24hr Rainfall=5.80"

	Area (ac)	CN	Description
*	12.000	74	40% Imp
*	0.800	98	Water
*	6.300	62	10% Imp Park
	19.100	71	Weighted Average
	18.300		95.81% Pervious Area
	0.800		4.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
1.1	900	0.0367	13.80	43.34	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.7	1,100	Total			

Summary for Pond 1P: PH2 Wet Detention

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth = 2.74" for 50yr 24hr event
Inflow = 68.54 cfs @ 12.19 hrs, Volume= 4.359 af
Outflow = 47.16 cfs @ 12.30 hrs, Volume= 4.288 af, Atten= 31%, Lag= 6.6 min
Primary = 16.54 cfs @ 12.30 hrs, Volume= 3.649 af
Secondary = 30.62 cfs @ 12.30 hrs, Volume= 0.639 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 989.53' @ 12.30 hrs Surf.Area= 21,162 sf Storage= 58,059 cf

Plug-Flow detention time= 261.6 min calculated for 4.288 af (98% of inflow)
Center-of-Mass det. time= 252.3 min (1,079.1 - 826.8)

Volume	Invert	Avail.Storage	Storage Description
#1	986.00'	92,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
986.00	11,944	0	0
987.00	14,425	13,185	13,185
988.00	17,006	15,716	28,900
989.00	19,689	18,348	47,248
990.00	22,471	21,080	68,328
991.00	25,355	23,913	92,241

Device	Routing	Invert	Outlet Devices
#1	Primary	985.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.00' / 978.00' S= 0.0875 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	986.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	988.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	989.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=16.54 cfs @ 12.30 hrs HW=989.53' TW=977.69' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 16.54 cfs @ 9.36 fps)
  ├─**2=Orifice/Grate** (Passes < 0.77 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 32.17 cfs potential flow)

Secondary OutFlow Max=30.59 cfs @ 12.30 hrs HW=989.53' TW=977.69' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 30.59 cfs @ 1.93 fps)

Summary for Pond 2P: PH2 Infiltration Basin

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth > 2.69" for 50yr 24hr event
Inflow = 47.16 cfs @ 12.30 hrs, Volume= 4.288 af
Outflow = 1.76 cfs @ 16.73 hrs, Volume= 3.617 af, Atten= 96%, Lag= 265.9 min
Discarded = 0.39 cfs @ 16.73 hrs, Volume= 1.057 af
Primary = 1.38 cfs @ 16.73 hrs, Volume= 2.560 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 980.37' @ 16.73 hrs Surf.Area= 33,282 sf Storage= 96,009 cf

Plug-Flow detention time= 702.0 min calculated for 3.614 af (84% of inflow)
Center-of-Mass det. time= 514.7 min (1,593.8 - 1,079.1)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	154,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	23,860	0	0
978.00	26,530	25,195	25,195
979.00	29,304	27,917	53,112
980.00	32,177	30,741	83,853
981.00	35,151	33,664	117,517
982.00	38,225	36,688	154,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	977.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -7.00'
#2	Primary	977.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 974.00' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	978.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	980.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	981.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.39 cfs @ 16.73 hrs HW=980.37' (Free Discharge)
└─**1=Exfiltration** (Controls 0.39 cfs)

Primary OutFlow Max=1.38 cfs @ 16.73 hrs HW=980.37' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 1.38 cfs of 6.41 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 1.38 cfs @ 7.01 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Proposed PH2 Ouflow

Inflow Area =	19.100 ac,	4.19% Impervious,	Inflow Depth > 1.61"	for 50yr 24hr event	
Inflow =	1.38 cfs @	16.73 hrs,	Volume=	2.560 af	
Primary =	1.38 cfs @	16.73 hrs,	Volume=	2.560 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1S: Existing PH2 AR Site

Runoff = 34.39 cfs @ 12.40 hrs, Volume= 3.472 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 100yr 24hr Rainfall=6.66"

	Area (ac)	CN	Description
*	19.100	58	Type B Soils
	19.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	300	0.0330	0.27		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
7.6	800	0.0625	1.75		**Shallow Concentrated Flow, Shallow** Short Grass Pasture Kv= 7.0 fps
25.9	1,100	Total			

Summary for Subcatchment 2S: Proposed PH2 AR Site

Runoff = 86.10 cfs @ 12.19 hrs, Volume= 5.474 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
MSE 24-hr 4 100yr 24hr Rainfall=6.66"

	Area (ac)	CN	Description
*	12.000	74	40% Imp
*	0.800	98	Water
*	6.300	62	10% Imp Park
	19.100	71	Weighted Average
	18.300		95.81% Pervious Area
	0.800		4.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.0200	0.18		**Sheet Flow, Sheet** Range n= 0.130 P2= 2.84"
0.3	100	0.0800	5.74		**Shallow Concentrated Flow, Shallow** Paved Kv= 20.3 fps
1.1	900	0.0367	13.80	43.34	**Pipe Channel, Channel** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013
10.7	1,100	Total			

Summary for Pond 1P: PH2 Wet Detention

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth = 3.44" for 100yr 24hr event
Inflow = 86.10 cfs @ 12.19 hrs, Volume= 5.474 af
Outflow = 71.54 cfs @ 12.26 hrs, Volume= 5.401 af, Atten= 17%, Lag= 4.3 min
Primary = 17.06 cfs @ 12.26 hrs, Volume= 4.155 af
Secondary = 54.49 cfs @ 12.26 hrs, Volume= 1.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 989.77' @ 12.26 hrs Surf.Area= 21,830 sf Storage= 63,222 cf

Plug-Flow detention time= 212.6 min calculated for 5.401 af (99% of inflow)
Center-of-Mass det. time= 204.8 min (1,026.2 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1	986.00'	92,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
986.00	11,944	0	0
987.00	14,425	13,185	13,185
988.00	17,006	15,716	28,900
989.00	19,689	18,348	47,248
990.00	22,471	21,080	68,328
991.00	25,355	23,913	92,241

Device	Routing	Invert	Outlet Devices
#1	Primary	985.00'	**18.0" Round Culvert** L= 80.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 985.00' / 978.00' S= 0.0875 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	986.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	988.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	989.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=17.03 cfs @ 12.26 hrs HW=989.76' TW=978.06' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 17.03 cfs @ 9.64 fps)
  ├─**2=Orifice/Grate** (Passes < 0.80 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 38.18 cfs potential flow)

Secondary OutFlow Max=53.33 cfs @ 12.26 hrs HW=989.76' TW=978.06' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 53.33 cfs @ 2.34 fps)

Summary for Pond 2P: PH2 Infiltration Basin

Inflow Area = 19.100 ac, 4.19% Impervious, Inflow Depth > 3.39" for 100yr 24hr event
Inflow = 71.54 cfs @ 12.26 hrs, Volume= 5.401 af
Outflow = 6.80 cfs @ 13.67 hrs, Volume= 4.710 af, Atten= 91%, Lag= 84.8 min
Discarded = 0.40 cfs @ 13.67 hrs, Volume= 1.086 af
Primary = 6.40 cfs @ 13.67 hrs, Volume= 3.624 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 980.79' @ 13.67 hrs Surf.Area= 34,535 sf Storage= 110,303 cf

Plug-Flow detention time= 602.1 min calculated for 4.705 af (87% of inflow)
Center-of-Mass det. time= 447.5 min (1,473.7 - 1,026.2)

Volume	Invert	Avail.Storage	Storage Description
#1	977.00'	154,205 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
977.00	23,860	0	0
978.00	26,530	25,195	25,195
979.00	29,304	27,917	53,112
980.00	32,177	30,741	83,853
981.00	35,151	33,664	117,517
982.00	38,225	36,688	154,205

Device	Routing	Invert	Outlet Devices
#1	Discarded	977.00'	**0.500 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = -7.00'
#2	Primary	977.00'	**12.0" Round Culvert** L= 50.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 977.00' / 974.00' S= 0.0600 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	978.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	980.50'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	981.00'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.40 cfs @ 13.67 hrs HW=980.79' (Free Discharge)
└─**1=Exfiltration** (Controls 0.40 cfs)

Primary OutFlow Max=6.39 cfs @ 13.67 hrs HW=980.79' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 6.39 cfs of 6.86 cfs potential flow)
  ├─**3=Orifice/Grate** (Orifice Controls 1.51 cfs @ 7.68 fps)
  └─**4=Orifice/Grate** (Weir Controls 4.88 cfs @ 1.77 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=977.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Proposed PH2 Ouflow

Inflow Area =	19.100 ac,	4.19% Impervious,	Inflow Depth > 2.28"	for 100yr 24hr event	
Inflow =	6.40 cfs @	13.67 hrs,	Volume=	3.624 af	
Primary =	6.40 cfs @	13.67 hrs,	Volume=	3.624 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

APPENDIX E

SOILS INFORMATION

1002-CPS-23
Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

Attachment 2:

SOIL AND SITE EVALUATION - STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road

County *Dane*

Parcel I.D. *042/0509-134-8500-0*

Please print all information

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]

Reviewed by:
Date:

Property Owner *Hofer Living Trust, Glenn & Michelle*

Property Location
Govt. Lot *NW* ¼ *SE* ¼ S *13* T *5* N R *9* E

Property Owner's Mail Address *610 Ondossagon Way*

Lot # Block# Subd. Name or CSM #

City *Madison* State *WI* Zip Code *53719* Phone Number

☐ City ☐ Village ☒ Town *Oregon*

Nearest Road *CTH MM*

Drainage area ______ ☐ sq ft ☐ acres

Hydraulic Application Test Method
☒ Morphological Evaluation
☐ Double Ring Infiltrometer
☐ Other: (specify) ______

Soil Moisture
Date of soil borings: ______
USDA-NRCS WETS Value:
☐ Dry = 1;
☐ Normal = 2;
☐ Wet = 3.

Test site suitable for (check all that apply): ☐ Site not suitable;
☐ Bioretention; ☐ Subsurface Disperal System;
☐ Reuse; ☐ Irrigation; ☐ Other ______

SP1 #OBS. ☒ Pit ☐ Boring Ground surface elevation 982.4 ft. Elevation of limiting factor < 968.4 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-7	10YR 4/2	None	SIL	1msbk	mvfi	gw	< 5		0.13
2	7-48	10YR 5/4	None	SICL	1msbk	mvfi	gw	< 5		0.04
3	48-58	10YR 4/6	None	SCL	1fsbk	mfi	gw	< 5		0.11
4	58-72	10YR 5/4	None	FS	0sg	ml	gw	< 5		0.5
5	72-108	10YR 6/4; 6/6	None	GRSL/FS/SIL	0sg	ml	gw	10-20		0.13-0.5(1)
6	108-168	10YR 7/8	None	FS	0sg	ml		10-20	5.9	0.5

Comments: Groundwater was not encountered during or upon completion of excavation. Extensive sloughing/caving of sidewalls experienced, limiting the depth of test pit. (1)Presence of silt loam seams will limit infiltration potential within horizon, unless removed or properly deep-tilled to break-up the lower permeability seams.

SP2 #OBS. ☒ Pit ☐ Boring Ground surface elevation 980.8 ft. Elevation of limiting factor < 965.8 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-9	10YR 4/2	None	SIL	1fsbk	mvfi	gw	< 5		0.13
2	9-42	10YR 5/4	None	SICL	1mabk	mvfi	gw	< 5		0.04
3	42-62	10YR 5/6	None	SL	0sg	ml	gw	< 5		0.5
4	62-100	10YR 6/4	None	LFS/SIL	0sg	ml	gw	5-15	39.6(2)	0.13-0.5(1)
5	100-180	10YR 6/6	None	FS/SIL	0sg	ml		5-15		0.13-0.5(1)

Comments: Stratigraphy of test pit was extremely variable in all directions. Above profile obtained from south sidewall of excavation. Groundwater was not encountered during or upon completion of excavation. (1)Presence of silt loam seams will limit infiltration potential within horizon, unless removed or properly deep-tilled to break-up the lower permeability seams. Thicker deposits of silt loam (> 2 in.) will require removal. (2)Results from mixed representative sample of horizon.

Name (Please Print) Ryan J. Portman
Signature Ryan J. Portman
Credential Number **1201636**

Address 201 N. Mallard Dr., Sun Prairie, WI 53590
Date Evaluation Conducted **4/8/2021**
Telephone Number 608-288-4100

SP3 #OBS. [X] Pit [ ] Boring Ground surface elevation 976.3 ft. Elevation of limiting factor < 961.3 ft. Page 2 of 2

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-30	10YR 4/2	None	SIL	1fsbk	mvfi	gw	< 5		0.13
2	30-82	10YR 5/4	None	SICL	1mabk	mvfi	gw	< 5		0.04
3	82-96	10YR 5/4	None	L	0sg	ml	gw	< 5		0.24
4	96-132	10YR 5/6; 5/8	None	LFS/SIL	0sg	ml		5-15	17.3[2]	0.13-0.5[1]

Comments: Groundwater was not encountered during or upon completion of excavation. Extensive sloughing/caving of sidewalls experienced, limiting the depth of test pit. [1]Presence of silt loam seams will limit infiltration potential within horizon, unless removed or properly deep-tilled to break-up the lower permeability seams. [2]Results from mixed representative sample of horizon.

#OBS. [ ] Pit [ ] Boring Ground surface elevation ____ ft. Elevation of limiting factor ____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr

Comments:

#OBS. [ ] Pit [ ] Boring Ground surface elevation ____ ft. Elevation of limiting factor ____ ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr

Comments:

Overall Site Comments: See text in related report.

APPENDIX F

STORMWATER OPINON OF PROBABLE COST

STORM WATER OPINION OF PROBABLE COST

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
1.	Unclassified Excavation (Detention)	8,525	CY	$2.00	$17,050.00
5.	Infiltration Basin	23,860	SQFT	$10.00	$230,860.00
1.	Outlet Structure	2	EA	$2000.00	$4,000.00
			TOTAL		**$251,910.00**

In providing Opinions of Probable Costs, it is understood that the Consultant has no control over the cost or availability of labor, equipment or materials, or over conditions or the Contractor's method of pricing, and that the Consultant's Opinions of Probable Construction Costs are made on the basis of the Consultant's professional judgment and experience. The Consultant makes no warranty, expressed or implied, that bids, quantities, or negotiated costs of the Work will not vary from the Consultant's Opinion of Probable Construction

APPENDIX G

DRAFT MAINTENANCE AGREEMENT

Maintenance provisions:

Detention Basin

Visual inspection of the detention basin and outlet structure shall be performed, at a minimum annually. The inspections shall include checking for potential problems such as: subsidence, erosion, tree growth in and around the embankment and outfall structure, sediment accumulation, clogging of outfall structure, and damage to the emergency spillway. Problems identified by the inspections shall be repaired as soon as practicable.

Sediment accumulations shall be removed by dredging when two (2) foot of siltation has occurred or as directed by the Village of Waunakee. The dredged material shall be removed and disposed of in accordance with NR 347.

The detention basin shall be mowed a minimum of twice per year. Mowing shall maintain a minimum grass height of 6 to 8 inches. Areas of sparse vegetation shall be reseeded. Additional fertilizer shall be applied as needed, per the results of a soil test.

Separate and distinct records shall be maintained by the owner to record the specific activities and costs thereof for the maintenance plan implementation. The records shall include the dates of maintenance visits and the specific work performed. Records shall be kept as required by local, state or federal law.

Infiltration Basin

Visual Inspection of the Infiltration Basin shall be performed, at a minimum, annually.

Maintenance shall be required when system shows standing water beyond 24 hours of rain event. Cleaning shall consist of removal of sediment, two (2) foot undercut, undercut replacement with material consisting of 15-30% compost and 70-85% sand and restoration in-kind.

Restoration of plant material shall be with native plugs or seed mixture tolerant of fluctuating water conditions. If a seed mixture is used steps shall be taken to assure vegetation establishes