February 21, 2023

COLLIER CONSULTING

Box 1137
590 East South Loop
Stephenville, TX 76401
Office: (254) 968-8721
Fax: (254) 968-8725
www.collierconsulting.com

To: Thomas Koepp, P.E., LEED AP

VIA Email: tkoepp@lakepewaukee.org

Re: Groundwater Evaluation Report
Thomas Farms Development
Lake Pewaukee Sanitary District
Pewaukee, WI

Dear Tom:

Collier Consulting, Inc. (Collier) is pleased to provide the Lake Pewaukee Sanitary District (LPSD) with this letter report summarizing the results of the groundwater evaluation activities at the proposed Thomas Farms Development (the Development), which is located between Oakton Road to the north, Golf Road to the south, Glen Cove Road to the west and Elmhurst Road to the east, in the Town of Delafield, WI. This report was completed pursuant to the Groundwater Evaluation Project Cost Estimate prepared by Collier and dated June 8, 2022. The evaluation was based on a review of select lake level and flow data provided to Collier by LPSD, precipitation data obtained from the NOAA website, well logs, various maps and reports. The location of the proposed Thomas Farms Development is shown in **Figure 1**.

LPSD has expressed concerns about the potential for any impacts to the local shallow groundwater flow system, which supplies water to Lake Pewaukee, or the potential for any impacts to the existing spring(s) and wetlands and lake water quality. Our evaluation consisted of a review the documentation provided to Collier by LPSD and included an assessment of the estimated groundwater withdraw from the water supply wells which will be constructed in the proposed Development, and if the wells will have a negative impact on local groundwater and Lake levels.

Background

Lake Pewaukee was created in 1938 by construction of a dam on the Pewaukee River to provide power to a mill. It is classified as a throughflow lake, with a defined inflow to the west and outflow to the east. The lake is fed by surface-water runoff draining from a 24.8 square mile watershed. Four named tributaries (Audley, Coco, Meadowbrook, and Zion Creeks) and two unnamed tributaries contribute water to the Lake. Groundwater is also a significant source of water to the Lake, with springs being particularly common in the northwestern portion of the Lake and in Coco Creek.

Geologic Setting

The surface topography in the vicinity of the Development is gently to moderately rolling. The elevation of the ground surface on the Development rages from 955 feet above mean sea level (ft msl) in the southwest corner of the property to 899 ft msl in the northwest corner of the property. Based on a review of the well logs in the area the depth to bedrock varies from less than 10 feet in the eastern portion of the Development to greater than 75 feet to the northwest. The upper unconsolidated material consists predominantly of clay, silty and sandy clay, and some sand and gravel. Few, if any, of the existing residential wells in the area are completed in the unconsolidated zone. The bedrock in the vicinity of the Development consists of either Silurian-age Dolomite or Ordovician-age Maquoketa shale. The uppermost bedrock in the northwest portion of the site consists of shale, while dolomite is the uppermost bedrock in the northern and eastern portions of the Development. It is reported that bedrock is exposed on the western end of the lake.

Based on the well log for Dayspring Baptist Church, which is located north of I-94, unconsolidated sand and gravel was encountered from surface to 26 ft bg; limestone/dolomite to 60 feet; shale/dolomitic shale (Maquoketa Formation) to 195 feet: limestone/dolomite to 505 feet; and sandstone to 745 ft bg. This well is completed in the sandstone aquifer between the depths of 505 to 745 feet.

This Dayspring Baptist Church well provides an example of the typical geologic section in the Development and in the Lake Pewaukee watershed. The upper unconfined aquifer is present in the unconsolidated material and/or the upper Silurian dolomite. At the base of the Silurian dolomite aquifer lies the Ordovician-Maquoketa shale, which overlies the sandstone aquifer and is present over the entire Lake Pewaukee watershed. The shale forms a regional confining unit that hydraulically isolates the units above the shale from the underlying units. This means that wells that are completed beneath the shale will not affect the shallow unconsolidated aquifer and will not affect the water that is entering the Lake as inflow.

Beneath the Maquoketa shale lies a series of Ordovician and Cambrian units that consist of sandstone, dolomite, and shale. These units are collectively known as the deep sandstone aquifer. Beneath the sandstone aquifer lies the Precambrian basement rock. The Precambrian basement rock consists of granite, quartzite, or metamorphic rock. The Precambrian basement is generally impermeable and represents the bottom of the aquifer system of eastern Wisconsin.

Shallow Groundwater

Lake Pewaukee resides in a basin formed by the retreating glaciers in the last ice age. The terrain is significantly higher to the north, south and west. Shallow groundwater flows from areas of higher elevation where recharge occurs, to areas of lower elevation where discharge occurs. Lake Pewaukee lies in an area where significant discharge occurs, both from springs and seeps in the lower elevation terrain and through the lake bottom. The

shallow groundwater flow contours within the Lake Pewaukee watershed and groundwater shed are presented in **Figure 2**. Note how the water table contours converge on the Lake from the higher elevations in the north, south and west. This figure also presents the recharge potential of the unconsolidated materials within the watersheds. The majority of the soils in the watersheds exhibit moderate to very high recharge potential. The Development resides in an area classified with high to very high recharge potential. Covering recharge areas with buildings or pavement, or diverting storm water flow around the Development, will reduce the naturally occurring recharge rates.

Proposed Development

The Development will be located on three parcels with a total acreage of approximately 152 acres. The parcels are currently zoned either agricultural, undeveloped or agricultural forest. A substantial area located predominantly in the north central portion of the Development consists of wetlands, of which the source of the water is from a spring in the largest pond in the wetland area and likely from small springs/ground seeps in the other saturated areas in the vicinity of the main pond. The acreage which is not forest or wetland is currently cultivated cropland.

The anticipated developer of the site is Neumann Developments, Inc., which has proposed three conceptual plans for the Development: Conceptual Land Plan A (Plan A), Conceptual Land Plan B (Plan B) and Conceptual Land Plan C (Plan C). The conceptual plans are included in **Attachment A**. All three Plans are slated to consist of 8 “Low Density” single family residential units situated on approximately 100 feet wide X 175 feet deep lots, and 35 “Residence’s’ Homes situated on 90 feet wide X 167 feet deep lots. Plan A, B and C will have 85, 84 and 96, respectively, “Villa” Homes situated on 75 feet wide X 135 feet deep lots. Plan A will have a total of 132 condominiums (56 duplex ranch units and 76 duplex townhome units). Plan B will have 152 townhome apartment units. Plan C will have 96 “Villa” Homes. The residential development area is located on approximately 114 acres of the proposed Development.

All three Plans will maintain the “Existing Wetland” area, which is comprised of a spring and /or a series of springs or ground seepage features with fairly thick woodlands surrounding the pond areas and will be retained predominantly “as is.” Mulch trails for residents to walk through the wetland/woodland area are proposed in each Plan. A Primary Environmental Corridor will be implemented along the spring/pond/seepage area and discharge creek, which ultimately empties into Lake Pewaukee.

It is assumed that the current plans will supply each proposed single-family residence and duplex in the Development with a private well for potable water needs. It is also assumed that each duplex ranch and townhome unit and each townhome apartment unit will have one shared well per unit. The wastewater from each residence will be handled by the existing LPSD sewer system. LPSD has expressed concern about the proposed dense capacity design of the Development and the potential that the Development may tax the original design capacity of the piping system. Currently, all wastewater discharged to LSPD sewers is pumped to the Fox River Water Pollution Control Center (FRWPCC), which is operated by the City of Brookfield. Effluent from the plant discharges to the Fox River (Illinois Fox basin) which empties into the Mississippi River and finally in the Gulf of

Mexico. Exporting the wastewater out of the Lake Pewaukee watershed decreases the potential volume of groundwater that otherwise may have been discharged to Lake Pewaukee. Construction of the Development as planned with individual shallow wells will add to the loss of recharge to the lake. If the wells are completed in the deep aquifer below the Maquoketa shale no loss of recharge to the Lake will occur.

Previous Studies

Two water budgets have previously been completed/compiled by the United States Geological Survey (USGS) and Southeastern Wisconsin Regional Planning Commission (SEWRPC). The initial study covered the period from May 1976 to April 1977 and a long-term water budget covered the period from 1963 to 2001. Additionally, *A Lake Management Plan for Pewaukee Lake,* Community Assistance Planning Report No. 58 (SEWRPC, 2020) provided hydrogeologic information and water budget data estimates. Review of these documents indicate the following average values for water entering the lake (inflow) are estimated at:

- Surface water runoff: 4.28 cubic feet per second (cfs) (26% of the inflow)
- Precipitation directly to the lake surface: 9.33 cfs (58% of the inflow)
- Groundwater: 2.53 cfs (16% of the inflow)
- Total inflow: 16.14 cfs (7,244 gpm)

The outflow from Pewaukee Lake is estimated at:

- Evaporation: 8.45 cfs (52% of the outflow)
- Outflow to Pewaukee River: 7.52 cfs (47% of the outflow)
- Groundwater: 0.16 cfs (1% of the outflow)
- Total outflow: 16.13 cfs (7,240 gpm)
- Approximately 600 acre-feet of water infiltrate into the Lake Bottom (is lost) near the Lake's outlet each year

Note: 1 acre-foot = 325,851 gallons and 1 cfs = 1.983 acre-feet per day = 646,320 gallons of water. 1 cfs is equivalent to 448.8 gallons of water flowing per minute. 1 cfs will produce 724 acre-feet of water per year.

The average residence time for a particle of water is about 1.8 years (from entering the lake to leaving the lake).

SEWRPC Community Assistance Planning Report No. 58 (3rd Edition) addressed groundwater flow into the Lake. High points of the report are as follow:

- Lake Pewaukee is a significant groundwater discharge area
- Monitoring wells installed as part of an earlier study confirmed that groundwater is discharged to all areas of the Lake except near the eastern end of the Lake

- Tributary streams feeding the Lake contribute approximately 6,000 acre-feet per year and roughly half of that (3,000 acre-feet) is likely from groundwater discharge to the tributary streams.
- On an overall basis, groundwater provides approximately 5,000 acre-feet of water to the Lake per year

Based on the updated water balance and the analysis of hydrographs and flow data from a nearby USGS stream gauge on the Bark River as presented in Planning Report No. 58, it is now estimated that approximately 3,000 acre-feet per year of groundwater entering the Lake via tributary streams is likely groundwater. Based on this analysis, groundwater likely provides approximately 5,000 acre-feet (the original 2,000 acre-feet plus 3,000 acre-feet) of water to the Lake in a typical year. This additional groundwater inflow is approximately 4.15 cfs (1,863 gpm), which when combined with the initial 2.53 cfs (1,135 gpm), equals 6.68 cfs (2,998 gpm) of total groundwater inflow to the Lake.

Discussion of Concerns

The primary concern regarding construction of the Development is if pumping groundwater from the residential wells at the development will lower groundwater levels in the area and potentially reduce the amount of groundwater recharge to Lake Pewaukee and diminish or stop the discharge of water at the existing spring and/or groundwater seepage features.

Based on average conditions, which in Wisconsin includes an average household of 3 people (2.97 per www.statista.com/statistics) with an average water consumption rate of 330 gallons per day (gpd), which is approximately the average rate between 365 gpd (USGS) and 300 gpd (EPA), which equals an average pumping rate of 0.23 gallons per minute (gpm) from each proposed residential well. In reference to the three proposed Development conceptual models (Concept A with 260 units, Concept B with 279 units and Concept C with 139 units), each with one family and one private well, will pump an estimated total groundwater volume of 85,800 gpd (60 gpm average), 92,070 gpd (64 gpm average) and 48,870 gpd (32 gpm), respectively.

To compare the volume of pumped groundwater to the volume of wastewater that will be pumped out of the Lake basin under each scenario, we have implemented a conversion based on 1 Resident User Equivalent (RUE) of 210 gallons per day as provided to us by LPSD. Based on a RUE of 210 gpd and an average pumping volume of 330 gpd per family, approximately 64 percent of the water pumped will be lost to wastewater that will be piped out of the basin. Of the remaining 110 gpd difference, most of this water would likely be used for outdoor uses such as watering lawns and plants. Some of this water would be lost to evaporation or runoff, and some may recharge the shallow aquifer. The estimated volume of wastewater lost each day under concepts A, B and C is 54,600 gpd, 58,590 gpd and 31,100 gpd, respectively. Some portion of this water will come at the expense of the shallow groundwater that is recharging the lake. In a worst-case scenario all of the wells would be pumping from the shallow aquifer, and all the wastewater would come at the expense of lake recharge. We believe that this is unlikely as many of the wells are likely to be completed in the deeper aquifer which is not connected to the shallow aquifer and does not contribute to lake recharge. If half the wells were completed in the deep aquifer

(beneath the shale) the volume of wastewater pumped out of the watershed would be cut in half.

The water budget completed by USGS indicated that the total recharge to Lake Pewaukee is 16.14 cfs (7,244 gpm, or 10,431,360 gpd) under the more conservative initial water budgets. The estimated highest groundwater withdrawn from the residential wells is under Concept B and is estimated at 92,070 gpd, or 33,605,550 gallons per year, which is approximately 0.005 percent of the total inflow. The lowest groundwater withdraw from the residential wells is under Concept C and is estimated at 48,870 gpd, or 17,837,550 gallons per year, which is approximately 0.0026 percent of the total inflow. Under the above scenarios, Concept C is shown to pump almost one half of the volume of water as Concept B. This means that the water use for the proposed development represents a small fraction of 1% of the inflows to the lake.

To help assess the potential of the lake levels being reduced due to lowered groundwater levels from pumping the residential wells in the Development, an evaluation of the relationship between lake level elevation, precipitation and sluice gate openings was performed. Based on the data obtained from LSPD, the following years were reviewed: 2019, 2020 and 2021. Review of the precipitation data indicates that generally the baseline lake elevation for the winter months (November to March) fluctuates in the vicinity of 852.2 feet above mean sea level (ft msl). In the late spring, winter and early fall period, the lake level rises about 0.5 to 0.9 ft msl. Based on the precipitation data collected by LSPD, the driest to wettest years were 2021 (24.47 in.); 2020 (28.33 in.) and 2019 (37.08 in.). In each of these years it is evident that the sluice gate controls the water level of the lake, even in dry years. The data is shown graphically in **Figures 3** through **5**. This demonstrates that recharge to the Lake via precipitation, runoff and groundwater inflow is prolific enough to supply the Lake with an excess of fresh water even in the driest year. A slight diminishment in groundwater discharge to the lake would result in a decrease in flow over the outlet structure that is too small to measure and would not cause a meaningful change in lake level.

Based on the review of available well logs in close proximity to the Development most all the wells are completed in the bedrock which consists of limestone and dolomite, and shale. The uppermost bedrock unit at the site can be either dolomite or shale. The Development is close to the western edge of the Maquoketa shale and the thickness and depth of the shale are variable. Based on the well logs reviewed as part of this evaluation, the depth to the bedrock across the site ranges from approximately 7 ft bg to the east, 29 ft bg to the north, 33 to 77 feet to the northwest, 19 to 37 ft bg to the southwest and approximately 40 feet in the central portion of the site. This indicates that most all the wells will likely be completed in the bedrock.

Per Wisconsin Administrative Code (WAC) NR811.13(2), the minimum well casing pipe depth for all drilled wells in unconsolidated formations, not including any screen, is 25 feet or 10 feet below the static water level when the static water level is greater than 15 feet below ground surface. Given that the unconsolidated units are thin in much of this site, few wells are likely to be constructed in this unit. Some wells may be completed in the upper dolomite or shale units, but this thickness of the upper dolomite is limited in much of the area and the yield for both the upper dolomite and shale units is uncertain and may

not be sufficient to support a residential well. As a result, some of the wells in the Development may need to be completed in the sandstone aquifer below the shale unit. Wells open to, or below the shale units are less likely to pull in shallow groundwater as the shale acts as a low permeability barrier to flow between the shallow and deeper aquifers.

Drilling deeper wells will result in significantly higher costs for the wells and could produce water with elevated levels of radium. While there is no regulatory standard for radium in private water supply wells, radium is a known carcinogen and there are significant health risks associated with drinking water with elevated radium levels. This may cause many residents to add treatment systems to their drinking water taps. Given the increased cost of drilling wells into the deeper units beneath the shale, and the potential concerns of elevated radium levels, it may be more economic and protective of public health to develop a community water system for this development. If the well, or wells (DNR may require a backup well) for the system were drilled into the sandstone aquifer, there would be no impact to the lake or to the local shallow water table due to pumping from the deep aquifer.

The SEWRPC lake management plan (SEWRPC, 2020) recommends enhanced recharge methods to offset impacts to the groundwater system supporting the lake. Any actions that increase infiltration at the Development can be expected to increase recharge to the shallow ground water system and will help to compensate for any net loss from the shallow aquifer due to pumping from the residential wells. Development Concepts A, B and C each have nine storm water basins to collect excess runoff. It is not clear if any of these basins will have permeable bottoms to allow the collected water to infiltrate to the shallow water table. Routing stormwater to an infiltration basin will induce recharge which will result in an increase in groundwater recharge on the site. Any actions that increase infiltration, such as infiltration basins can help to offset any loss of inflow to the lake due to pumpage from the residential wells at the Development. It is important that the application of road salt to local streets, highways, parking areas and sidewalks should be minimized as much as possible to lower the risk of road salt contamination to the shallow aquifer and Lake Pewaukee.

The construction activities for the development could pose a risk to the springs on the site. Foundations or excavations into the hillside above the springs could disrupt the flow paths or divert water from the springs. This could disrupt the wetlands or cause undesirable surface flooding in other areas, or in basements of the new homes. For these reasons, the developer should conduct a study of the springs and the flow system supporting them, to evaluate construction methods to mitigate potential impacts to the springs. The location of the springs with respect to the proposed residential units in Concepts A, B and C is shown in **Attachment A**.

While this study has identified the potential pathways for the development to adversely impact the lake or the springs, the magnitude of the potential impacts due to pumping from the Development residential wells cannot be quantified within the scope of our review or without additional site data. To determine the extent of the potential impact to the shallow groundwater flow system at the Development, a comprehensive groundwater and surface water model such as MODFLOW, or similar methods, will need to be constructed and run with numerous scenarios of various input parameters for factors such as precipitation,

hydraulic conductivity, runoff, infiltration, soil/sediment and rock conductivity, green areas and impermeable areas, etc. This method is the only way to reliably achieve an estimate of the projected impact to the local groundwater flow system in the vicinity of the Development and Lake Pewaukee. The means to acquire the necessary data would come through the installation of numerous soil borings and the construction of pairs of nested monitoring wells, groundwater pumping tests and measuring infiltration rates. Without completing a detailed assessment via completion of test borings and monitoring well nests, the hydrogeological flow regime in the vicinity of the Development cannot be reliably quantified.

Summary and Recommendations

Based on our review of the provided reference materials related to the proposed Development, it appears that the water level in Lake Pewaukee is controlled by the sluice gate, even in abnormally dry years. The potential impact of the development on lake levels is small to the point of being unmeasurable, especially if most of the Development wells are drilled into the deeper aquifer or if a community water system is developed in the sandstone aquifer. There are economic and public health concerns that may make developing individual private wells in the deeper aquifer undesirable for this development. Based on the average water use values for an average family, Concept A and B would pump almost double the amount of groundwater as Concept C. Additionally, Concept C will provide much more greenspace, which will promote more infiltration to the shallow groundwater aquifer. Based on the analysis presented above, Collier believes that Concept C will be the best solution for construction of a new development while providing higher infiltration rates than Concept A or B and withdrawing approximately 50 percent less than Concept B.

The excavation and construction activities in the development could impact the springs on site that support the wetlands. Construction activities above the elevation of the springs could reduce spring flow, divert flow to areas that are currently dry, or cause water problems in basements. For these reasons the Town of Delafield, Waukesha County, and LSPD should mandate that a hydrogeologic analysis of the springs and the flow system that supports them, should be completed prior to finalizing the Development plans. The analysis should include the installation of a monitoring well network sufficient to assess the shallow aquifer flow regime to ensure that construction activities will not impact the springs. The Town of Delafield, Waukesha County, and LSPD should also mandate that all wells constructed as part of the Development are to be completed below the Maquoketa shale, so that no loss of recharge to the Lake will occur.

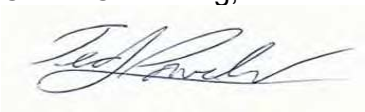
In addition, to reduce the amount of road salt that will be applied to the paved areas of the Development, the Town of Delafield should apply a 50/50 salt and sand mixture to the roads and parking areas of the Development during winter instead of 100 percent salt as is the current practice. As an additional bonus to the salt reduction, the sand doesn't help to melt the snow or ice but increases traction, thereby reducing the amount of road salt required.

It is also noted that Collier assumed the information provided by LPSD was complete and correct, and that no substantive information that would change our analysis was omitted.

Our analysis indicates that additional site information is required to obtain quantitative predictions of future water levels which was beyond the scope of this report.

We trust that this information meets your needs. Please do not hesitate to call if you have any questions or would like to discuss our findings further.

Sincerely,
Collier Consulting, Inc.



Ted L. Powell, P.G.
Senior Hydrogeologist
ted@collierconsulting.com

John Jansen, P.G.
Senior Hydrogeologist
john@collierconsulting.com

Attachments

FIGURES

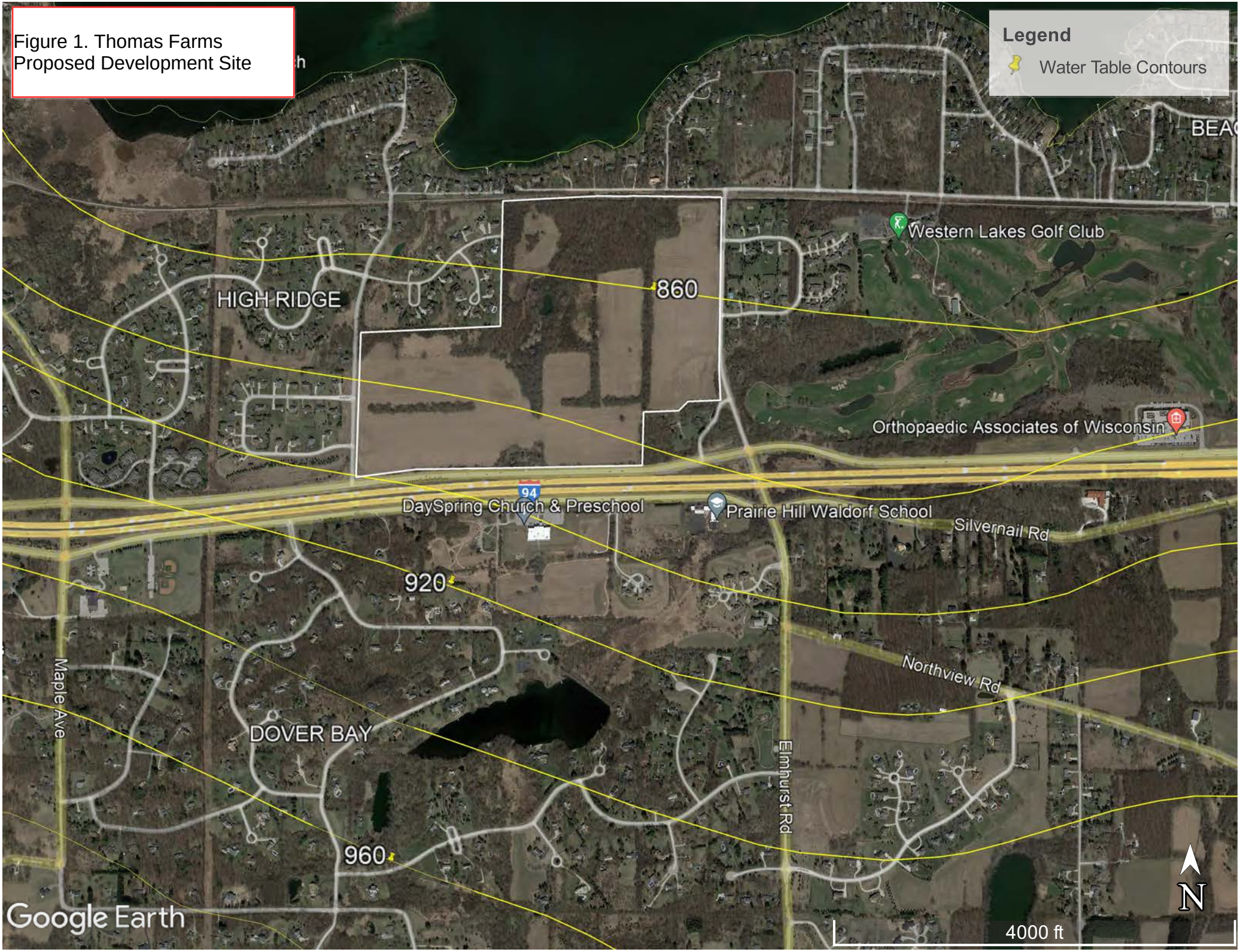
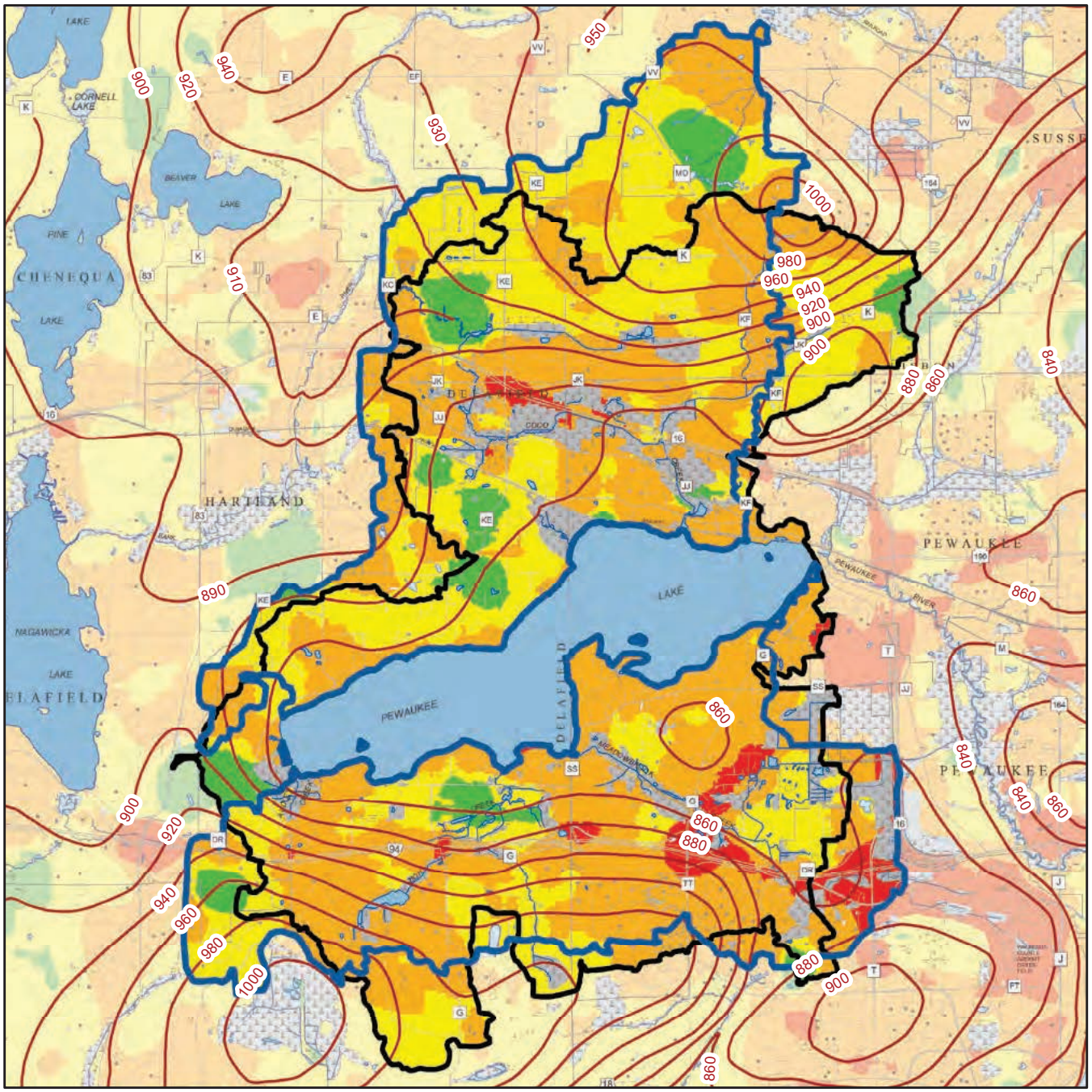


Figure 1. Thomas Farms
Proposed Development Site
Legend
Water Table Contours
Western Lakes Golf Club
HIGH RIDGE
860
Orthopaedic Associates of Wisconsin
94
DaySpring Church & Preschool
Prairie Hill Waldorf School
Silvernail Rd
920
Northview Rd
Maple Ave
DOVER BAY
Elmhurst Rd
960
Google Earth
4000 ft
N

Figure 2
Groundwater Elevation Contours and Recharge Potential Within the Pewaukee Lake Groundwatershed



VERY HIGH
HIGH
MODERATE
LOW
UNDEFINED

WATER TABLE ELEVATION CONTOUR
SURFACE WATER
WETLAND
STREAM
SURFACE WATER WATERSHED BOUNDARY
MODEL-DEFINED GROUNDWATERSHED BOUNDARY

Note: Colors outside the watershed boundary are reduced in intensity to show the adjacent extent and distribution of each legend category.

N

0 1,500 3,000 6,000 Feet

Source: Wisconsin Geological and Natural History Survey and SEWRPC

Figure 3
2019
Lake Pewaukee
Elevation, Precipitation and Sluice Gate Opening

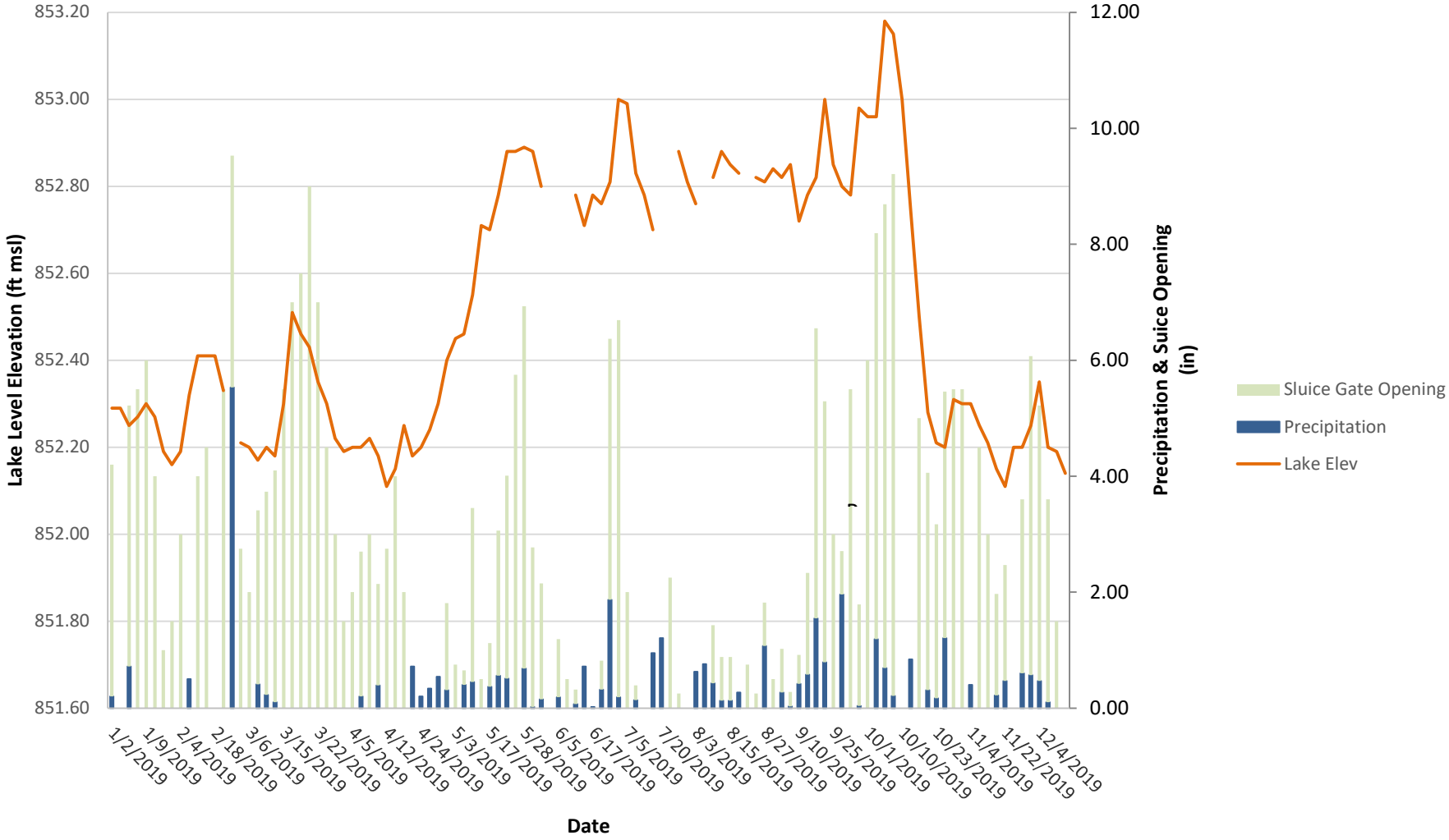


Figure 4
2020
Lake Pewaukee
Elevation, Precipitation and Sluice Gate Opening

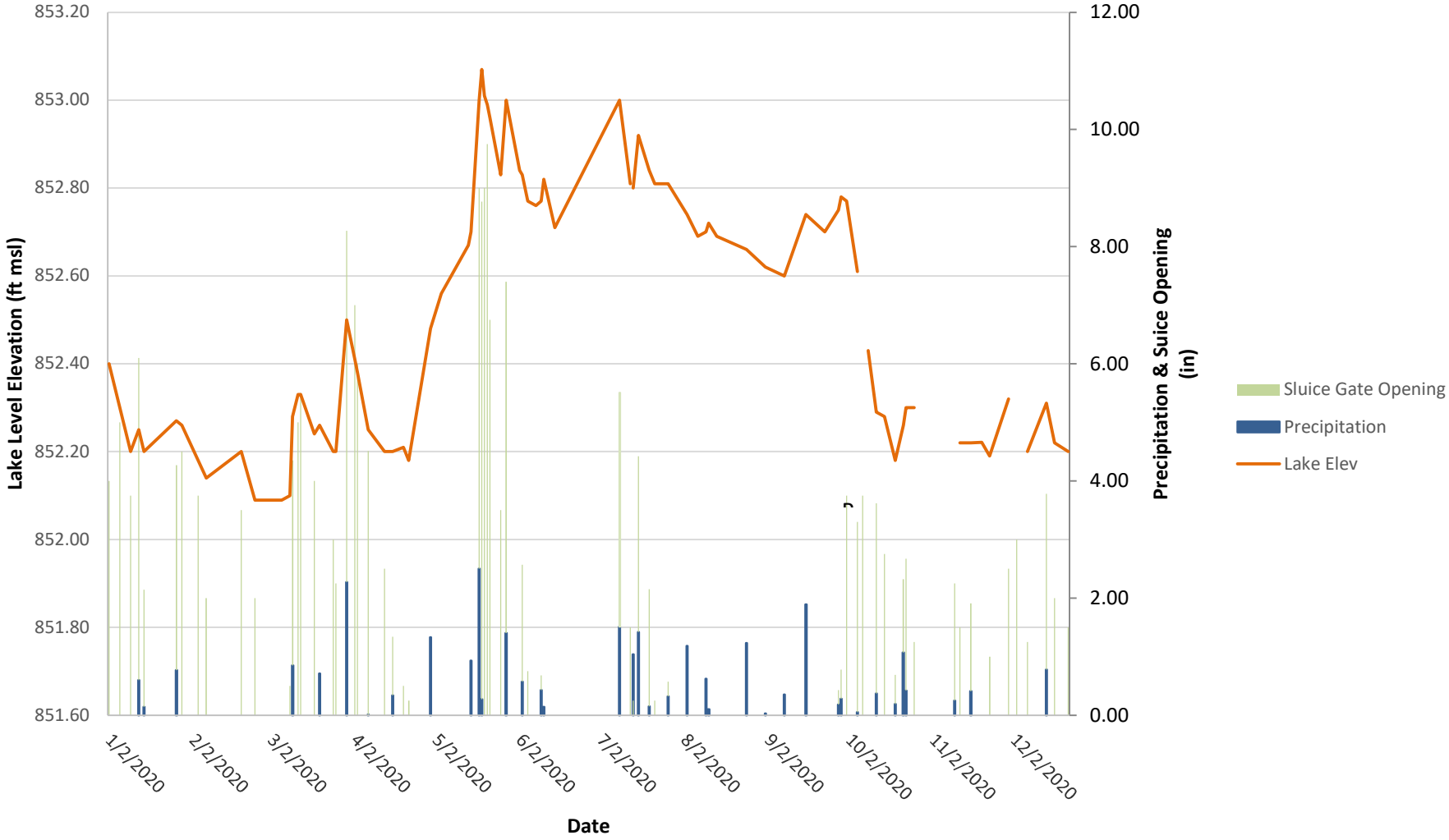


Figure 5
2021
Lake Pewaukee
Elevation, Precipitation and Sluice Gate Opening

ATTACHMENTS

Development Data Table ***GENERAL SITE PLAN A***

"Thomas Farm"

Proposed Zoning = NEW - PLANNED DEVELOPMENT DISTRICT #1

ZONE	Total Area (acres)	Lowland PEC (acres)	Upland PEC (acres)	Development Area (non-EC) (acres)	PROPOSED USE	Product	Proposed Units	Proposed Density (un/ac)	Max Allowable Density (un/ac)	Required Open Space (% of site*)	Max Building Footprint (% of lot*)	Max Impervious Surface (% of lot area*)	Actual Open Space (% of site*)	Surplus Open Space (ac)
1	24.0	8.0	7.9	8.1	Low Density Single Family Residential (1 un/ac)	Low Density Homes	8	0.33	1.0	30.0%	17.5%	30.0%	51.9%	
2	32.0	-	9.4	22.6	Medium Density- Single Family (2 un/ac)	"Residences" Single Family Homes	35	1.09	2.0	30.0%	25.0%	40.0%	48.3%	5.8
3	45.0	8.1	2.6	34.3	Condominimum (4 un/ac)	Duplex Ranch & Duplex Townhome	132	2.93	4.0	40.0%	25.0%	60.0%	60.3%	9.1
4	51.0	1.8	-	49.2	Medium Density- Single Family (2 un/ac)	"Villas" Single Family	85	1.66	2.0	30.0%	25.0%	40.0%	32.2%	1.1
SUBTOTAL	152.0	17.9	19.9	114.2	Total # Units =		260	1.71						

* Development Calculation Notes:
- Open space preservation credits may be transferred from Zones 2 & 4 to Zone 3.
- Lowland (wetland, floodplain and PEC) acreage is included in required open space at a multiplication rate of 0.2
- Zones 2-4: Open space for Single Family = 30%; for Condominiums = 40%
- Zones 2-4: Max Impervious for Single Family = 40%; for Condominiums = 60%

General Development Plan Notes:
- The development will be an attractive plan, complimentary to the surroundings and preserving the natural environment.
- The development shall be served by public sewer from the Lake Pewaukee Sanitary District, with the overall density less than 3.3 un/ac.
- Project is expected to be served by individual private wells. Public water main, if practicable, shall be from an offsite public water main extension from the west.
- A bike and pedestrian plan that includes connection at Brookstone Circle & northeast to the Lake Country Trail.
- An active recreation area (eg neighborhood pocket park) a minimum 0.5 acres in size.
- Landscape buffers along Glen Cove Rd, Elmhurst Rd and Golf Rd to ensure harmony with surrounding neighborhoods.
- The road access plan meeting zoning code requirements and providing direct access to Golf Rd for higher intensity uses.
- Lowland areas to be field verified by wetland delineator; potential for less lowlands based on field determination.

PEWAUKEE LAKE

8 LOW DENSITY SINGLE FAMILY RESIDENTIAL LOTS
- 20,000 SF LOTS
- 100'W X 175'D
- 15' SIDE / 30' FRONT

SEE DEVELOPMENT DATA TABLE TO DENSITY AND OPENSPACE DETAILS FOR ZONE 1

1OO' WIDE LANDSCAPED BUFFER ALONG OAKTON ROAD

PAVED NEIGHBORHOOD PATH CONNECTION TO LAKE COUNTRY RECREATION TRAIL

STORMWATER AREA

35 'RESIDENCE'S' HOMES
- 90'W X 167'D
- 12.5' SIDE / 25' FRONT

SEE DEVELOPMENT DATA TABLE TO DENSITY AND OPENSPACE DETAILS FOR ZONE 2

50' WIDE LANDSCAPED BUFFER ALONG ELMHURST ROAD

1OO' WIDE LANDSCAPED BUFFER

WOODLAND MULCH TRAIL

CONNECTION TO ELMHURST ROAD

85 VILLA HOMES
- 75' W X 135' D
- 10' SIDE / 25' FRONT

SEE DEVELOPMENT DATA TABLE TO DENSITY AND OPENSPACE DETAILS FOR ZONE 4

SUBJECT AREA
+/- 152 ACRES

PAVED NEIGHBORHOOD PATH CONNECTION TO LAKE COUNTRY RECREATION TRAIL

EXISTING WOODLAND CORRIDOR TO BE PRESERVED

PAVED NEIGHBORHOOD TRAILS, CONNECTING TO LAKE COUNTRY TRAIL

CONNECTION TO GLEN COVE ROAD

56 DUPLEX RANCH UNITS
28 BUILDINGS
20' B-B / 25' FRONT
&
76 DUPLEX TOWNHOME UNIT
- 38 BUILDINGS
- 20' B-B / 25' FRONT

SEE DEVELOPMENT DATA TABLE TO DENSITY AND OPENSPACE DETAILS FOR ZONE 3

1OO' WIDE LANDSCAPED BUFFER ALONG GLENCOVE ROAD

CLUBHOUSE
- POOL
- PICKLE COURTS (SOUTH OF ROAD, EXISTING TREES TO SCREEN LIGHTS)
- BOCCE
- PARKING

1OO' WIDE LANDSCAPED BUFFER ALONG GOLF ROAD

CONNECTION TO GOLF ROAD

NEIGHBORHOOD POCKET PARK

CONNECTION TO GOLF ROAD

Zone 1 24 ac
Zone 2 32 ac
Zone 3 51 ac
Zone 4 45 ac

PRIMARY ENVIRONMENTAL CORRIDOR
EXISTING WETLAND
ENVIRONMENTAL CORRIDOR
SHORELAND ZONING
EXISTING WETLAND
EXISTING PEC
EXISTING WETLAND
Landscape Berm

OAKTON ROAD
ELMHURST ROAD
GLEN COVE ROAD
GOLF ROAD
INTERSTATE 94

100'
50'

CONCEPTUAL LAND PLAN- CONCEPT A

THOMAS FARM

DELAFIELD, WISCONSIN

0 200 400 800

JULY 5TH, 2022

NEUMANN DEVELOPMENTS, INC.

TRIO LAND SURVEYING CIVIL ENGINEERING
4100 N. CALHOUN ROAD,
BROOKFIELD, WI 53005
t: (262) 790-1480
e: info@trioeng.com

teska associates
627 Grove Street
Evanston, Illinois

Development Data Table ***GENERAL SITE PLAN B***

"Thomas Farm"

Proposed Zoning = NEW - PLANNED DEVELOPMENT DISTRICT #1

ZONE	Total Area (acres)	Lowland PEC (acres)	Upland PEC (acres)	Development Area (non-EC) (acres)	PROPOSED USE	Product	Proposed Units	Proposed Density (un/ac)	Max Allowable Density (un/ac)	Required Open Space (% of site*)	Max Building Footprint (% of lot*)	Max Impervious Surface (% of lot area*)	Actual Open Space (% of site*)	Surplus Open Space (ac)
1	24.0	8.0	7.9	8.1	Low Density Single Family Residential (1 un/ac)	Low Density Homes	8	0.33	1.0	30.0%	17.5%	30.0%	51.9%	
2	32.0	-	9.4	22.6	Medium Density- Single Family (2 un/ac)	"Residences" Single Family Homes	35	1.09	2.0	30.0%	25.0%	40.0%	48.1%	5.8
3	45.0	8.1	2.6	34.3	High-Quality Townhome Multi-family (4.5 un/ac)	(19) 8-unit Townhomes	152	3.37	4.5	60.0%	25.0%	30.0%	75.4%	15.9
4	51.0	1.8	-	49.2	Medium Density- Single Family (2 un/ac)	"Villas" Single Family	84	1.64	2.0	30.0%	25.0%	40.0%	33.4%	1.7
SUBTOTAL	152.0	17.9	19.9	114.2	Total # Units =		279	1.83						

* Development Calculation Notes:
- Open space preservation credits may be transferred from Zones 2 & 4 to Zone 3.
- Lowland (wetland, floodplain and PEC) acreage is included in required open space at a multiplication rate of 0.2
- Zones 2-4: Open space for Single Family = 30%; for 8-unit Townhome = 60%
- Zones 2-4: Max Impervious for Single Family = 40%; for 8-unit Townhomes = 30%

General Development Plan Notes:
- The development will be an attractive plan, complimentary to the surroundings and preserving the natural environment.
- The development shall be served by public sewer from the Lake Pewaukee Sanitary District, with the overall density less than 3.3 un/ac.
- Project is expected to be served by individual private wells. Public water main, if practicable, shall be from an offsite public water main extension from the west.
- A bike and pedestrian plan that includes connection at Brookstone Circle & northeast to the Lake Country Trail.
- An active recreation area (eg neighborhood pocket park) a minimum 0.5 acres in size.
- Landscape buffers along Glen Cove Rd, Elmhurst Rd and Golf Rd to ensure harmony with surrounding neighborhoods.
- The road access plan meeting zoning code requirements and providing direct access to Golf Rd for higher intensity uses.
- Lowland areas to be field verified by wetland delineator; potential for less lowlands based on field determination.

CONCEPTUAL LAND PLAN- CONCEPT B

THOMAS FARM

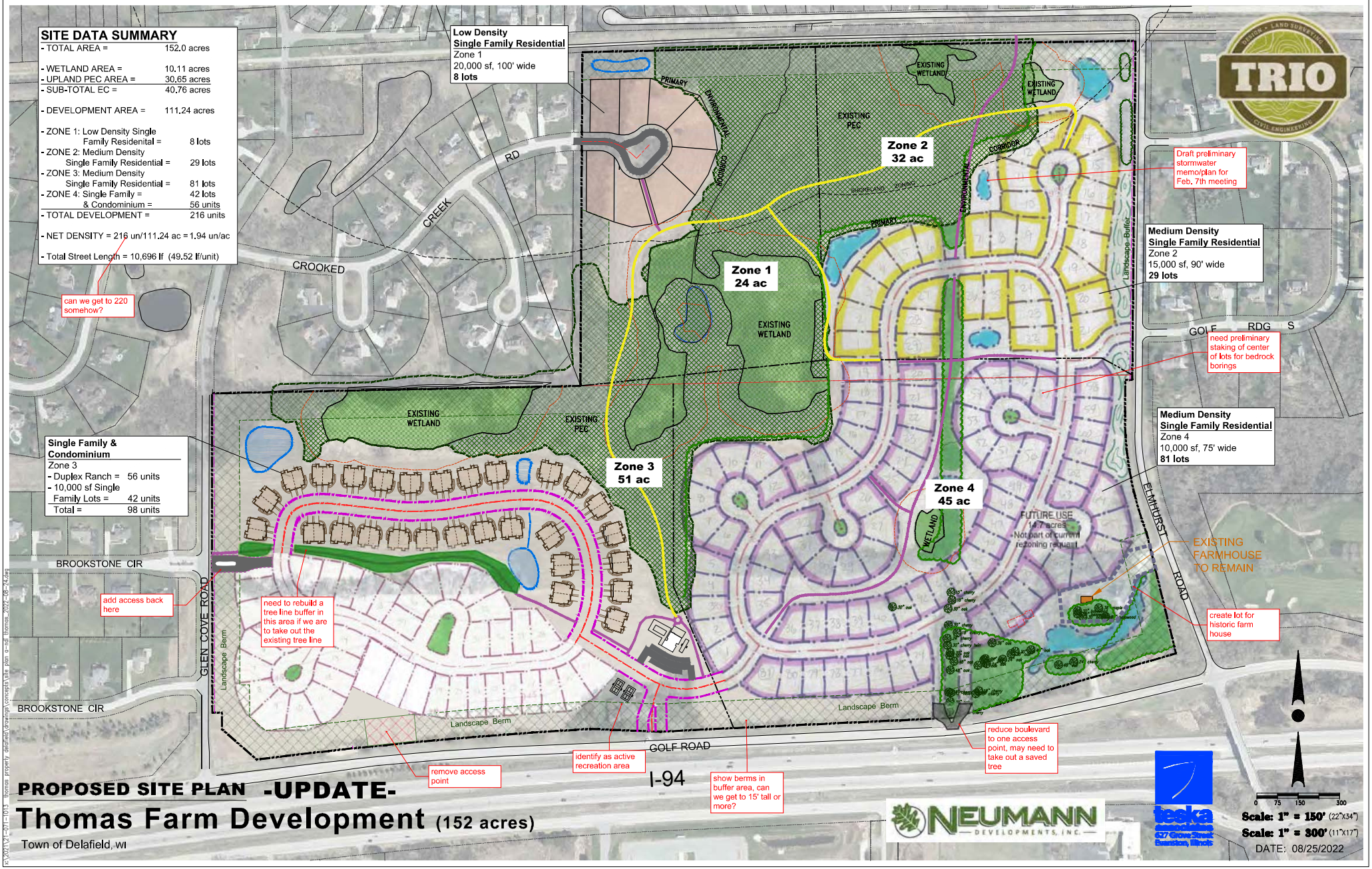
DELAFIELD, WISCONSIN

0 200 400 800

JULY 5TH, 2022

4100 N. CALHOUN ROAD,
BROOKFIELD, WI 53005
t: (262) 790-1480
e: info@trioeng.com

teska associates
627 Grove Street
Evanston, Illinois


SITE DATA SUMMARY
- TOTAL AREA = 152.0 acres
- WETLAND AREA = 10.11 acres
- UPLAND PEC AREA = 30.65 acres
- SUB-TOTAL EC = 40.76 acres
- DEVELOPMENT AREA = 111.24 acres
- ZONE 1: Low Density Single Family Residenital = 8 lots
- ZONE 2: Medium Density Single Family Residential = 29 lots
- ZONE 3: Medium Density Single Family Residential = 81 lots
- ZONE 4: Single Family = & Condominium = 56 units
- TOTAL DEVELOPMENT = 216 units
- NET DENSITY = 216 un/111.24 ac = 1.94 un/ac
- Total Street Length = 10,696 lf (49.52 lf/unit)
can we get to 220 somehow?
Low Density
Single Family Residential
Zone 1
20,000 sf, 100' wide
8 lots
Zone 1
24 ac
Zone 2
32 ac
Zone 3
51 ac
Zone 4
45 ac
Single Family & Condominium
Zone 3
- Duplex Ranch = 56 units
- 10,000 sf Single Family Lots = 42 units
Total = 98 units
Medium Density
Single Family Residential
Zone 2
15,000 sf, 90' wide
29 lots
Medium Density
Single Family Residential
Zone 4
10,000 sf, 75' wide
81 lots
Draft preliminary stormwater memo/plan for Feb. 7th meeting
need preliminary staking of center of lots for bedrock borings
add access back here
need to rebuild a tree line buffer in this area if we are to take out the existing tree line
remove access point
identify as active recreation area
show berms in buffer area, can we get to 15' tall or more?
reduce boulevard to one access point, may need to take out a saved tree
create lot for historic farm house
EXISTING FARMHOUSE TO REMAIN
FUTURE USE
14.7 acres
-Not part of current rezoning request
EXISTING WETLAND
EXISTING PEC
PRIMARY ENVIRONMENTAL CORRIDOR
SHORELAND BUFFER
Landscape Buffer
Landscape Berm
CROOKED CREEK RD
BROOKSTONE CIR
GLEN COVE ROAD
GOLF ROAD
GOLF RDG S
ELMHURST ROAD
I-94
PROPOSED SITE PLAN -UPDATE-
Thomas Farm Development (152 acres)
Town of Delafield, WI
NEUMANN DEVELOPMENTS, INC.
TRIO ENGINEERING
teska
Scale: 1" = 150' (22"X34")
Scale: 1" = 300' (11"X17")
DATE: 08/25/2022