A G E N D A
CITY OF WAUPUN BOARD OF PUBLIC WORKS
Waupun City Hall – 201 E. Main Street, Waupun WI
Tuesday, August 12, 2025 at 4:30 PM

VIRTUAL AND TELECONFERENCE ACCESS AVAILABLE

Virtually:
https://us02web.zoom.us/j/81987138114?pwd=jmbyz8Ck1Pdb9Bh58wB99oGOinRW9y.1

Teleconference:
312 626 6799
Meeting ID: 819 8713 8114
Passcode: 359980

CALL TO ORDER

ROLL CALL

PERSONS WISHING TO ADDRESS THE BOARD OF PUBLIC WORKS--*State name, address, and subject of comments. (2 Minutes)*

No Public Participation after this point.

FUTURE MEETINGS AND GATHERING INVOLVING THE BOARD OF PUBLIC WORKS

1. Next Regularly Scheduled Meeting: Tuesday, September 9, 2025, 4:30 p.m. Waupun City Hall, 201 E Main Street, Waupun, WI

CONSIDERATION - ACTION

2. Minutes from June 10, 2025 Board of Public Works Meeting
3. Approve and Recommend to Council to Amend Chapter Six Traffic Code Ordinance
4. Approve and Recommend to Council Sign Policy & Guidelines
5. Edgewood Drive Flood Study

DISCUSSION

6. Department Report for June and July

ADJOURNMENT

Upon reasonable notice, efforts will be made to accommodate disabled individuals through appropriate aids and services. For additional information, contact the City Clerk at 920-324-7915.

M I N U T E S
CITY OF WAUPUN BOARD OF PUBLIC WORKS
Waupun City Hall – 201 E. Main Street, Waupun WI
Tuesday, June 10, 2025 at 4:30 PM

Chairman Seibers called meeting to order at 430pm.

Members present include Alderpersons: Dan Siebers, Michael Matoushek, Bobbi Jo Kunz. Citizens: Dale Heeringa, Andrew Sullivan, Dave Rens. Ex Officio: DPW Director Jeff Daane. Also in attendance is Mayor Rohn Bishop and City Administrator Kathy Schlieve. Absent and excused: Greg Zonnefeld.

Future meetings and gatherings include the next regularly scheduled meeting, scheduled for Tuesday, July 8, 2025, 4:30 p.m. Waupun City Hall, 201 E Main Street, Waupun, WI.

Motion Matoushek, second by Sullivan to approve minutes from May 13, 2025 Board of Public Works meeting. Carried unanimously.

Daane reviews monthly report for May that gives breakdown for total number of work orders, hours for each work order and total costs associated.

Daane presents quote from Aqualis to come in and clean tree roots from the storm sewer line between Bly St and S State St and then televise to make sure the pipe is open and flowing. Motion Matoushek, second by Sullivan to approve Aqualis quote for $4640. Carried unanimously.

Daane presents quote for Shaler Park Avigilon upgrade from Lappen Security. The camera system is very old and has poor quality and date and time does not match up, making it hard to review footage if there was a complaint or any vandalism. Motion Rens, second by Heeringa to approve quote from Lappen for $4972.90. Carried unanimously.

Daane reviews Tru Cleaners LLC contract for services at city buildings. The city brought in other quotes and Tru Cleaners' rates were still better than other services. The city had to make some changes cutting cleaning hours at a few facilities to stay within budget. Rens questioned if the city has thought about hiring someone for cleaning and Daane stated they have and is something they will continue to monitor. Motion Rens, second by Matoushek to approve new cleaning contract with Tru Cleaners for $4800 per month ($57,600 per year). Carried unanimously.

Motion Kunz, second by Heeringa to adjourn this meeting at 4:47pm. Carried unanimously.

AGENDA SUMMARY SHEET

MEETING DATE: 8/12/25

AGENDA SECTION: CONSIDERATION-ACTION

PRESENTER: Jeff Daane, Public Works Director

TITLE: AN ORDINANCE TO AMEND CHAPTER SIX OF THE MUNICIPAL CODE OF THE CITY OF WAUPUN ENTITLED "TRAFFIC CODE."

DEPARTMENT GOAL(S) SUPPORTED *(if applicable)*	**FISCAL IMPACT**	
High Performance Government		

ISSUE SUMMARY:
Complaint came in to look at parking along W. Jefferson St. at the T- intersection of S. Division St. If you look at attached pictures the area is parked full of vehicles making the turn from S. division St. onto the one-way St. of W. Jefferson St. difficult especially pulling at trailer or boat. We are proposing to add a section of no parking along the north curbline of W. Jefferson St. This would be very similar to what has been installed on streets that have been reconstructed in the past few years.

STAFF RECOMMENDATION:
Discuss and approve AN ORDINANCE TO AMEND CHAPTER SIX OF THE MUNICIPAL CODE OF THE CITY OF WAUPUN ENTITLED "TRAFFIC CODE."

ATTACHMENTS:
Ordinance
Pictures
Map of no parking section proposed

RECOMMENDED MOTION:

Recommend to council an ordinance to amend chapter six of the municipal code of the city of waupun entitled "traffic code"

ORDINANCE NUMBER 25-_____

AN ORDINANCE TO AMEND CHAPTER SIX OF THE MUNICIPAL CODE OF THE CITY OF WAUPUN ENTITLED "TRAFFIC CODE."

THE COMMON COUNCIL OF THE CITY OF WAUPUN, DO ORDAIN:

SECTION 1: Section 6.05 (3) (e) of the Waupun Municipal Code entitled "No Parking" is amended to add the following subsection:

152.. On the north side of W Jefferson St commencing 320 feet west of the west curb line of S State St and continuing west for a distance of 90 feet.

SECTION 2: This Ordinance shall be in full force and effect upon its passage and publication as provided by law.

Enacted this _____ day of _____, 2025

_____
Rohn W Bishop,
Mayor

ATTEST:

_____
Angela Hull
City Clerk


Inn Town Motel
3.7 ★ (68)
2-star hotel
W Jefferson St
W Jefferson St
W Jefferson St
S State St
S Division St
S Division St
S State St
Let's Bounce
210
206
200
128
120
118
116
24
20
30
223 1/2
221
114
125
123
121
119
111
100
122
109
115
128
101
33
123

AGENDA SUMMARY SHEET

MEETING DATE: 8/12/25

TITLE: Sign Policy & Guidelines

AGENDA SECTION: CONSIDERATION-ACTION

PRESENTER: Jeff Daane, Public Works Director

DEPARTMENT GOAL(S) SUPPORTED *(if applicable)*	**FISCAL IMPACT**	
High Performance Government		

ISSUE SUMMARY:
This is the updated version of the original stop sign policy that was on the agenda in May. We have made changes removing the wording that was directed at only stop signs. Now the policy is open to consider any potential new sign.

STAFF RECOMMENDATION:
Discuss and approve sign policy. Recommending to council for their review.

ATTACHMENTS:
Sign Policy & Guidelines

RECOMMENDED MOTION:

Recommend the sign policy & Guidelines to council for consideration.

City of Waupun

Sign Policy & Guidelines

Introduction

The City of Waupun wishes to ensure that its streets are as quiet and safe as possible, particularly those in residential areas. As it relates to this, the City often receives requests for the installation of signs to address concerns of interested citizens. In order to provide a predictable and consistent method for responding to these requests, the City has established this Policy and Guidelines document for Sign Installation. This policy also addresses standards which are commonly used by staff for considering such requests and describes the methods adopted by the City for responding to citizen requests and ultimately installing signs on Waupun Streets.

Policy Usage and Guidelines

It is the objective of this Policy to consider requests and the installation of signs where appropriate, based upon engineering analysis and sound judgement.

This document is intended to be used in conjunction with professional engineering judgement and best practices. In addition, due to the fact that most every street in the City of Waupun has its own unique characteristics, these guidelines do not constitute either final or complete design, or evaluation criteria for a complete traffic calming plan. Local site conditions must be evaluated for all traffic calming installations, and terrain, roadway, traffic or land use characteristics, sight distance conditions, and / or any other unusual conditions may require case specific modifications or exceptions.

The City of Waupun reserves the right, at its own discretion, to analyze and implement traffic calming measures including, but not limited to regulatory signs, at specific locations should it deem necessary to increase safety.

Traffic Calming Methodology

The Institute of Traffic Engineers (ITE) defines traffic calming as *"the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non – motorized street users."* In other words, traffic calming is the use of physical changes either on or adjacent to the street in order to improve safety for motorists, pedestrians, and cyclists.

Typical examples of physical changes aimed at traffic calming may include: stop signs, yield signs, warning signs, radar speed feedback signs, crosswalks, special striping, narrow lanes, on –

street parking, median islands, roundabouts, turn prohibition signs, and diagonal diverters, forced turn channelizations, and median barriers. The majority of these measures are implemented within non – residential areas, and as previously mentioned are typically evaluated on a case by case basis through engineering studies and analysis.

Guiding Principles & Sign Criteria

It is important to emphasize that regulatory signs are not appropriate for all intersections. Principles to be aware of prior to making a request include the following:

A. Regulatory signs are intended to control vehicular traffic conflicts at intersections and are not to be used as a device to control speed or solely for the identification of pedestrian crosswalks
B. Individual regulatory signs should not be installed to control traffic, but may be installed as part of an overall neighborhood traffic calming effort.
C. Regulatory signs should not be installed against the major flow of traffic unless special circumstances or design guidelines dictate such installation to address special safety considerations
D. Regulatory signs are not substitutes for other traffic control devices.
E. Warrants recommended by the Manual on Uniform Traffic Control Devices (MUTCD), including the amount of daily traffic, the amount of pedestrian and bicycle activity, high traffic speed, restricted sightlines, accident records, unusual site conditions, and geometrics will be used by staff when evaluating any regulatory sign requests.
F. Accidents shall be used as the primary warrant for the installation of regulatory signs.
G. Regulatory signs shall only be installed at intersections where drivers cannot safely apply the right of way rule as defined by the State of Wisconsin.

Factors that must be considered when determining the need for a regulatory sign at a particular intersection include:

A. Because regulatory signs can cause a substantial inconvenience to motorists, disrupt traffic flow, and can result in increased icing conditions in winter, they should only be used where warranted.
B. Regulatory signs are not typically encouraged to guide right of way because the minimal safety gains are outweighed by the substantial traffic delays and congestion created.
C. Accidents may increase following the installation of regulatory signs if motorists are not aware of the new traffic regulation.
D. If a motorist consistently observes that cross street traffic is light, the motorist is more likely to question and ultimately ignore the regulatory sign thereby decreasing intersection safety. According to the FHWA, excessive use of regulatory signs can diminish their effectiveness

E. The installation of unwarranted regulatory signs may create new speeding problems. Many studies, including FHWA, have shown that motorists tend to accelerate to higher speeds to make up for the time lost at regulatory signs.
F. Excessive uses of regulatory signs may encourage drivers to use alternative routes to avoid the regulatory sign-controlled intersections, thus increasing traffic volumes and relocating the need for traffic calming measures.
G. Any installation of regulatory signs should only occur after a review of its potential impacts on neighboring streets and whether the regulatory sign control is compatible with the overall traffic management concept for the area.

Additionally, regulatory signs need to meet warrants to justify installation. The Federal Highway Administration Manual on Uniform Traffic Control Devices describes the warrants as follows:

> **Section 2B.01 Application of Regulatory Signs**
> **Standard:**
> **Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements.**
>
> **Regulatory signs shall be installed at or near where the regulations apply. The signs shall clearly indicate the requirements imposed by the regulations and shall be designed and installed to provide adequate visibility and legibility in order to obtain compliance.**
>
> **Regulatory signs shall be retroreflective or illuminated to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion of a particular sign or group of signs (see Section 2A.08).**
>
> **The requirements for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.**

Once the decision has been made to install two-way regular control, the decision regarding the appropriate street to have regulated, should be based on engineering judgment. In most cases, the street carrying the lowest volume of traffic should be controlled.

> A regulatory sign should not be installed on the major street unless justified by a traffic engineering study.

Support:
The following are considerations that might influence the decision regarding the appropriate street upon which to install a regulatory sign where two streets with relatively equal volumes and/or characteristics intersect:

A. Controlling the direction that conflicts the most with established pedestrian crossing activity or school walking routes;
B. Controlling the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds;
C. Controlling the direction that has the longest distance of uninterrupted flow approaching the intersection; and
D. Controlling the direction that has the best sight distance to conflicting traffic.

The use of regulatory signs on the minor-street approaches should be considered if engineering judgment indicates that a regulatory sign is always required because of one or more of the following conditions:

A. The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day;
B. A restricted view exists that requires road users to stop or yield in order to adequately observe conflicting traffic on the through street or highway; and/or
C. Crash records indicate that three or more crashes that are susceptible to correction by the installation of a regulatory sign have been reported within a 12-month period, or that five or more such crashes have been reported within a 2-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.

Generally speaking, regulatory signs should only be considered for intersections when supported by adequate traffic counts. Studies have shown that placing stop signs at intersections where they are not justified decreases safety as motorists tend to roll through them without actually stopping, while the cross-street traffic tends to pay less attention as they assume traffic will obey the stop sign and come to a complete stop.

Sign Request Process

Citizens may request a regulatory sign be placed at a particular intersection by completing the attached Regulatory Sign Request Form found on the City of Waupun website.

Upon receipt of the request, staff will gather data and determine whether the intersection meets MUTCD Regulatory sign warrants. Data used in the determination of applicability shall include, but not be limited to:

- Traffic counts for the primary and intersecting streets
- Accident history
- Existing pedestrian accommodations
- Surrounding property uses such as schools, churches, and other gathering spaces, that impact traffic and pedestrian volume
- Analysis of the Overall Traffic Pattern of the larger area

If standards are not met, staff will contact the citizen making the request and explain why a regulatory sign is not recommended. Requests will go to the Board of Public Works for review. If standards are met, a work order for the sign installation will be issued, and the sign will be installed within a reasonable time frame.

In general, a regulatory sign installation may be recommended if the following warrants are met:

A. Accidents
    a. Five (5) or more reported accidents occur within a twelve (12) month period which would likely have been avoided by the installation of an all way regulatory sign.
    b. Three (3) or more reported accidents occur within a twelve (12) month period or five (5) or more reported accidents occur within a twenty four (24) month period that would likely have been avoided by the installation of a two way regulatory sign.
B. Minimum Traffic Volumes and Speed
    a. A regulatory sign is warranted if the number of vehicles entering the intersection from all approaches averages at least three hundred (300) vehicles per hour for any eight (8) hours of an average day, and;
    b. The combined vehicular, bicycle and pedestrian volume from the minor street averages at least two hundred (200) units per hour for the same eight (8) hours.
C. Visibility
    a. A regulatory sign is warranted where visibility is limited at the minor street approach, causing motorists to reduce speed.
    b. The minimum sight distance shall be maintained based on the roadway speed and the criteria described in the latest edition of the AASHTO publication “A Policy on Geometric Design of Highways and Streets.”

City of Waupun Sign Request Form

In accordance with the City of Waupun's adopted Policy and Procedure for Regulatory Sign Installation Requests, citizens interested in requesting the installation of a regulatory sign shall complete and submit this form to the Public Works Department. After receiving the completed form, staff will review the proposed regulatory sign location using the above mentioned policy procedures, which includes discussion with the applicant. Completed forms shall be submitted to:

City of Waupun
Department of Public Works
201 E. Main St
Waupun, WI 53963

They may also be emailed to: jeff@cityofwaupunwi.gov

Please attach additional sheets containing pictures, maps, or additional text if the space provided is insufficient.

1. Requestor's Information:
    a. Name: _____
    b. Address: _____
    c. Phone: _____
    d. Email: _____

2. Location of the Traffic Concern_____
    _____
    _____
    _____
    _____

3. Describe the nature of the traffic problem that is of concern (if possible, please provide pictures and map): _____
    _____
    _____
    _____
    _____

4. Why do you feel a regulatory sign will resolve the traffic concern: _____
   _____
   _____
   _____

5. Is there neighborhood support for your request? Can you demonstrate this support if asked / required? _____
   _____
   _____
   _____

6. Are there any facilities, such as churches, schools, businesses, etc., near this location that generate a high concentration of vehicle and / or pedestrian traffic? _____
   _____
   _____
   _____

AGENDA SUMMARY SHEET

MEETING DATE: 8/12/25 **TITLE:** Edgewood Drive Flood Study

AGENDA SECTION: CONSIDERATION-ACTION

PRESENTER: Jeff Daane, Public Works Director

DEPARTMENT GOAL(S) SUPPORTED *(if applicable)*	**FISCAL IMPACT**	
High Performance Government	$254,300 plus additional geotechnical assessment and land acquisition	

ISSUE SUMMARY:
In late 2024 we reviewed and approved to have MSA Professional Services complete a study that could provide a possible solution to help with flooding. The farm field to the north largely to the south affecting homes and Edgewood Drive. Before approving the study, we looked at past storm data and pictures that showed significant flooding for that area.

Three potential alternative solutions to these problems were evaluated, including:
- **Alternative 1**: Extension of the existing storm sewer further north into the farm field, removal of the inlet structure, and grading the local area to flow directly into the open pipe end.
- **Alternative 2**: Includes Alternative 1 but adds construction of approximately 400 lineal feet of berm extending east to direct flow into the open pipe end.
- **Alternative 3**: Includes Alternatives 1 and 2 and incorporates construction of an approximately 2-acre stormwater detention basin at the open pipe end.

Alternative 1 offers a slight reduction in the extent of 100-yr flooding throughout the entire study area, but is not able to significantly improve flooding conditions for affected homes. The addition of the berm in Alternative 2 is able to eliminate flooding within Edgewood Drive for the 1% AEP event; however, flooding in the farm field is greatly increased. Alternative 3 both eliminates flooding of the residential properties north of Edgewood Drive, as well as slightly reducing flooding in the farm field. This alternative appears to address the driving concern of flooding of the residential properties along Edgewood Drive. While this alternative does not cause flood conditions to be made worse in the farm field to the north, it will require the City to negotiate with the owner of the farm field to acquire rights to construct the stormwater pond and berm on this property. Note; however, that the construction of this pond could easily be completed in a way to accommodate the stormwater management requirements of future land development in this area.

STAFF RECOMMENDATION:
Discuss the results of the flood study and determine a direction the board would like to pass along council for consideration.

ATTACHMENTS:
Edgewood Drive Flood Study

RECOMMENDED MOTION:

MSA Memo

To:	Jeff Daane, Department of Public Works
	City of Waupun
From:	Abby Schaefer, PE and Eric Thompson, PE
Subject:	Edgewood Drive Flood Study
Date:	July 1, 2025

Introduction

This memorandum documents the findings of a study of drainage and flooding problems reported by residential property owners along Edgewood Drive on the north side of the City. Residents report that runoff from the agricultural fields to the north of the city flows south into the city and between the existing homes causing damage to yards and water accumulation in basements.

The study is based on a 2-dimensional XP-SWMM computer model of the 65.2-acre watershed depicted in Figure 1. Modeling was used to evaluate existing conditions to determine the scope and magnitude of flood conditions as well as to evaluate alternatives to improve drainage and reduce flood conditions affecting existing homes.

Existing Drainage System

Figure 1 depicts the drainage system serving the watershed. Information describing existing drainage infrastructure was obtained from record drawings for the Fairway Estates and Woodland Hills development plans. These plans describe a primary drainage system consisting of a 24" RCP storm sewer system originating on the northwest corner of the undeveloped lot at 728 Edgewood Drive which flows south across Edgewood Drive. This pipe is believed to have been extended to its current location for the purpose of collecting drainage from undeveloped lands outside the City; however, it is observed that the only way runoff can enter the pipe is via a flat grate, which is hydraulically very restrictive. Additionally, existing grades surrounding the grate do not effectively route runoff toward the pipe. Both considerations contribute to the reported flooding.

The 24" RCP storm sewer flows south to Edgewood Drive where it receives additional drainage from Edgewood Drive and surrounding lands before discharging to an open channel system on the south side of Edgewood Drive. Drainage from the west is delivered via a system of roadside ditches while runoff from the east is conveyed by storm

sewers. The channel south of Edgewood Drive discharges into a stormwater pond behind the homes at 600 and 604 Beske Street which in turn discharges to the South Branch of the Rock River.

Design flow rates and flood elevations were calculated using the XP-SWMM 2D computer model version 2024.1. XP SWMM is an integrated fully dynamic hydrologic and hydraulic model capable of generating runoff hydrographs for specified rainfall conditions and routing the hydrographs through a complex drainage system consisting of closed conduits (pipes/culvert) and topographical surface features.

Hydrologic Calculations

The hydrologic modeling portion of the XP-SWMM model was set up to use the TR-55, 'Urban Hydrology for Small Watersheds' (USDA, 1986) methodology of calculating runoff volumes and routing operations. In addition to a rainfall data record to be used to simulate rainfall conditions, the TR-55 method requires three primary input parameters to determine peak discharge rates and runoff volumes. These parameters describe the runoff characteristics of a watershed and include drainage area, runoff curve number, and time of concentration. The model uses these input parameters to translate a rainfall hyetograph (distribution of rainfall depth over time) to a runoff hydrograph that the hydraulic portion of the model then routes through the system to determine peak runoff rates and flood elevations.

Rainfall Events. Because this study was intended to evaluate the function of the existing system of storm sewers and inlets under normal 'design' conditions, as well as to determine how the overall drainage system performed under 'flood' conditions, stormwater calculations were performed for the 1-, 5-, 10-, 25-, and 100-yr 24-hr rainfall events.

The MSE 24-hour rainfall intensity distribution with NOAA Atlas 14 rainfall depths for Fond du Lac County were used for event-based modeling. Table 1 lists the design depths used in the analysis.

Table 1. **NOAA Atlas 14 Design Storm Rainfall Depths**

Rainfall Duration	99.9% AEP (inches) 1-Year	20% AEP (inches) 5-Year	10% AEP (inches) 10-Year	4% AEP (inches) 25-Year	1% AEP (inches) 100-Year
24-hours	2.23	3.69	4.57	5.33	6.16

Drainage Areas. Drainage areas were manually delineated using 1-foot contours, storm sewer mapping, and aerial photographs obtained from Fond du Lac County LiDAR data. The primary watershed boundary was defined as those areas draining

towards the existing stormwater pond. Subwatersheds were delineated according to the presence of inlets serving streets and cross-culverts serving roadway crossings.

In total, 65.2 acres of land is included in the study area limits (see Figure 1). This area was subdivided into 6 subwatersheds:

- Area draining to the existing area drain to the north of Edgewood Drive (WH-M2).
- Area draining to each 15" RCP culvert located on either side of Edgewood Drive (WH-E2 and WH-E4).
- Area draining overland to the existing detention basin (FEP7).
- Area draining to the curb and gutter inlets within the intersection of Beske Street and Beekman Street (WH-I1).
- Area draining to the curb and gutter inlets within Edgewood Drive (WH-I11).

Runoff Curve Numbers. For this study, each subwatershed was divided into two (2) separate catchments, one representing directly connected imperious areas and one representing the aggregation of disconnected impervious area and pervious areas. Impervious area within the study area was manually digitized using recent aerial photos, and impervious area connectivity was estimated according to its type (sidewalk, street, roof, etc.) and the surrounding land use category (residential, commercial, institutional, etc.) according to published average values (see Figure 2). In total there is approximately 3.8 acres of total impervious area with the study area (approximately 5.8% of total study area), of which approximately 2.6 are estimated to be directly connected.

All impervious areas, regardless of connectivity, were assigned a runoff curve number of 98. Pervious area curve numbers were assigned values according to the TR-55 manual for pervious areas appropriate to their vegetated cover and underlying hydrologic soil classification. Review of aerial photographs indicated there were three general types of vegetative cover in the study area: turf, woods, and row crops (agricultural). The underlying soils within the study area are Hydrologic Soil Group (HSG) B Soils (see Figure 3). Soils with dual classifications such as B/D were treated as though they were in the drained condition.

Times of Concentration. Each subwatershed in the study area was assigned a unique time of concentration based on estimated runoff conditions within each subwatershed. Unique time of concentration values were calculated for the portion of each subwatershed describing directly connected impervious areas vs. those representing aggregated unconnected impervious and pervious areas within each subwatershed.

Times of concentration were calculated assuming only sheet flow and shallow concentrated flow regimes occurred.

Sheet flow was limited to a maximum of 100-feet and was assigned a Manning's roughness coefficient based off the land use along the flow path:

- Impervious surfaces (street surfaces), n = 0.016
- Turf grass, n = 0.150
- Woodland, n = 0.40

Shallow concentrated flow was assumed to be occurring between the end of the sheet flow conditions and the outlet of the watershed, typically located at a storm sewer inlet location. Shallow concentrated flow velocity factors were assigned as follows:

- Impervious areas (paved), velocity factor = 20.3 ft/sec.
- Grassed waterways (turf grass), velocity factor = 15.0 ft/sec.
- Cropland (cultivated straight rows), velocity factor = 9.0 ft/sec.
- Woodland, velocity factor = 5.0 ft/sec.

Due to the small size and corresponding short overland flow path within many of the subwatersheds, calculated time of concentration values were often less than 6 minutes. In such cases, a minimum value of 6 minutes was applied.

Hydraulic Calculations

Hydraulic modeling was completed using a 1D layer which included the system of culverts, storm sewers, and storm sewer inlets comprising the majority of the constructed drainage system and a 2D layer representing the ground surface which is utilized by the model when overland flows are determined to occur.

1D Hydraulic Drainage System. The 1D model network was developed primarily from data collected from record drawings for the Fairway Estates and Woodland Hills developments. The following information from the record drawings was used in the 1D model:

- **Pipes**
  - Length
  - Diameter (all pipes in the study area are circular)
  - Upstream and downstream inverts
  - Material (all pipes are concrete)
- **Structures:** (generally manholes or inlets)
  - Structure invert
  - Incoming/outgoing pipe invert
  - Rim elevation
- **Stormwater Pond**
  - Primary spillway dimensions and elevation

In addition to data described above, there were three other significant elements describing system function which needed to be added to the model. These include inlet capacity, pipe roughness factors, and system minor losses.

Storm Sewer Inlet Capacity. With one exception, storm sewer inlet capacity was not considered for this study. The one location where inlet capacity was incorporated was for the flat grate serving the storm sewer extending north from Edgewood Drive that was intended to receive flow from the farm field. The inlet capacity of this grate was limited according to the following equation; Q = 5.22 x Depth^0.5. This equation is a buit-in feature of XP-SWMM and approximates the weir flow behavior at shallow depths (generally less than 6") and orifice behavior at greater depths.

Manning Roughness. Only concrete pipes were identified in the record drawings. Correspondingly, a Manning's 'n' value of 0.013 was assigned for all pipes.

Minor Losses. Minor losses were assigned to the 1D model any time there was a transition from a closed conduit to an open channel condition or vice versa. Additionally, minor losses were assigned at structures within storm sewer systems. The following values were used:

- **Entry Loss Coefficients**
  - Culverts:
    - End Section conforming to fill = 0.5
    - Projecting = 0.9
  - Storm Sewer:
    - Straight Through = 0.05
    - 45 degree bend = 0.25
    - 90 degree bend = 0.5
- **Exit Loss Coefficient**
  - Culverts:
    - Exit closed conduit to open channel = 0.5
    - Exit closed conduit to lake or pond = 1.0
  - Storm Sewer:
    - Straight Through = 0.05
    - 45 degree bend = 0.25
    - 90 degree bend = 0.5

Stormwater Pond. A stage-storage curve for the existing stormwater pond was developed from 1-ft contours derived from Fond du Lac County LiDAR data. The detention pond was modeled with an initial water depth of 2' which appeared to be the typical water level in the pond based on recent and historic aerial imagery. The primary spillway of the existing detention pond was modeled with Type 2, fixed backwater outlet control. The tailwater condition was set at elevation 882.4' reflecting the approximate 10-yr flood elevation in the South Branch of the Rock River.

2D Surface Hydraulic Drainage System

The entire study area was included as a 2D surface within the XP-SWMM model. Buildings and the stormwater pond surface area were set to be inactive; this forced surface flows around buildings and prevented double counting of pond storage which was more precisely included in the 1D model.

The 2D surface was used by the model to route runoff through the study area any time there was inadequate pipe capacity or where the predominant drainage system was an open channel system. This latter condition principally existed downstream from the storm sewer system, with open channels conveying discharge from the storm sewer system to the existing stormwater pond.

2D Surface Modeling Parameters. A 6-foot grid cell (with 1 second base time step) was assigned to the study area. Within each assigned grid cell values defining overland flow characteristics are aggregated to a single value applicable to the entire area defined by a single cell. While this results in a simplification of overland flow conditions, the selection of smaller cell sizes results in increasingly long model solutions times.

2D Land Use and Roughness Values. With regard to the 2D surface and overland flow characteristics, there were four principal roughness categories; Turf Grass, Woods, Agricultural, and Pavement. The values itemized below were applied as Manning roughness values for the listed ground conditions:

- Pavement = 0.016
- Turf = 0.03
- Agricultural = 0.05
- Woodlands = 0.05

1D-2D Interface Lines. A 1D-2D interface line was added to the model to connect the 1D and 2D layers of the model at the boundary of the inactive area representing the stormwater pond.

2D Boundary Conditions. Surface flow was predicted to leave the study area under the scenarios evaluated in this study in the area to the southwest of Edgewood Drive, including discharge from the existing detention pond. In these locations, a 2D boundary line was added to the model with an elevation set slightly below the ground elevation as defined by the 2D surface to allow surface flow to freely leave the model. This allowed a free outfall from the model system and prevented the appearance of flooding that would otherwise have been the result of an implied vertical wall that otherwise would exist around the perimeter of the 2D model area.

Existing Flood Conditions

Figures 4 through 8 depict estimated flood conditions within the study area under 1-, 5-, 10-, 25-, and 100-yr 24-hr rainfall conditions. Under even 1-yr conditions there is a substantial amount of runoff flowing overland from the farm field through the side yards of the residential lots between 720 and 732 Edgewood Drive. As rain events become more severe, stormwater accumulates behind these lots until, under 25-yr runoff conditions, an additional overflow occurs between 704 and 712 Edgewood Drive.

There is a substantial accumulation of flow passing through the currently undeveloped lot at 728 Edgewood Drive. When this lot is developed, the building pad should be elevated well above the existing grade to protect the future home. It should be noted; however, that this will likely displace runoff onto other properties potentially increase flood impacts to those properties.

Otherwise, it does not appear that overland flows coming from the farm field to the north of Edgewood Drive will directly impact existing homes. Frequent and extended overflows through side yards would be expected to saturate soil surrounding the homes which could cause groundwater intrusions into basements; however.

One stormwater collects in the Edgewood Drive, flows appear to be contained within the right of way or designated drainage easements, even under 100-yr conditions.

With specific regard to the findings of this study, it is important to recognize the limitations of the 2D component of this model. The main limitation is the newest available LiDAR data able to be used to develop the 2D model surface is older than some development shown on newer aerial photos (and even the most recent aerial photos don't reflect all of current development). In these instances, the model surface likely does not reflect current topography and overland flow patterns may not be accurate. Since elevation data is aggregated within grid cells in the model some fine details critical to surface flow patterns may be lost.

Alternatives Analysis

As presented in the introduction of this memorandum and documenting in the previous section on existing flood conditions, this study was completed to investigating resident reports that runoff from the agricultural fields to the north of the city flows south into the city and between the existing homes causing damage to yards and water accumulation in basements. Three potential alternative solutions to these problems were evaluated, including:

- Alternative 1: Extension of the existing storm sewer further north into the farm field, removal of the inlet structure, and grading the local area to flow directly into the open pipe end.
- Alternative 2: Includes Alternative 1 but adds construction of approximately 400 lineal feet of berm extending east to direct flow into the open pipe end.
- Alternative 3: Includes Alternatives 1 and 2 and incorporates construction of an approximately 2-acre stormwater detention basin at the open pipe end.

Alternative 1 offers a slight reduction in the extent of 100-yr flooding throughout the entire study area, but is not able to significantly improve flooding conditions for affected homes.

The addition of the berm in Alternative 2 is able to eliminate flooding within Edgewood Drive for the 1% AEP event; however, flooding in the farm field is greatly increased.

Alternative 3 both eliminates flooding of the residential properties north of Edgewood Drive, as well as slightly reducing flooding in the farm field. This alternative appears to address the driving concern of flooding of the residential properties along Edgewood Drive. While this alternative does not cause flood conditions to be made worse in the farm field to the north, it will require the City to negotiate with the owner of the farm field to acquire rights to construct the stormwater pond and berm on this property. Note; however, that the construction of this pond could easily be completed in a way to accommodate the stormwater management requirements of future land development in this area.

MSA prepared a preliminary construction cost estimate for this alternative by creating a tabulated list of estimated quantities, which does not include any costs associated with the acquisition of the farmlands. Construction costs, not including property acquisition, are estimated to be approximately $250,000.

Note, the cost estimate includes estimated engineering costs, but does not include a geotechnical assessment, it also assumes the bedrock will not be encountered, nor will there be a need to control groundwater. It is further assumed that there will be no need for a clay liner in the pond.

This scope of this study did not include efforts associated with the optimization of this design. For instance, the pond may be able to be reduced in size, if a larger outlet pipe

were installed. This would require removal of approximately 200 feet of existing 24" pipe and replacement with larger pipe but could potentially be off-set by a reduction in pond construction costs (less excavation and land acquisition). Until such time as land acquisition costs are better known, it is not possible to confidently determine if costs will be significantly reduced through this process. Additionally, as the land to the north is anticipated to be developed at some time in the future and stormwater management will be required to serve that development, optimization of the pond through downstream improvements may not be warranted at this time.

Watershed and Model Network

FIGURE 1
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N

Land Use and Impervious Area

FIGURE 2
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

TOWN OF WAUPUN

CITY OF WAUPUN

- Watershed Study Area
- City of Waupun

Surface Roughness (Manning's n)

- Streets, Sidewalk, Driveway, Parking = 0.016
- Buildings, Inactive
- Pond, Inactive
- Turf Grass = 0.03
- Wooded = 0.05
- Agricultural = 0.05

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Impervious Areas: MSA
Land Uses: MSA

MSA

0 125 250 Feet

N

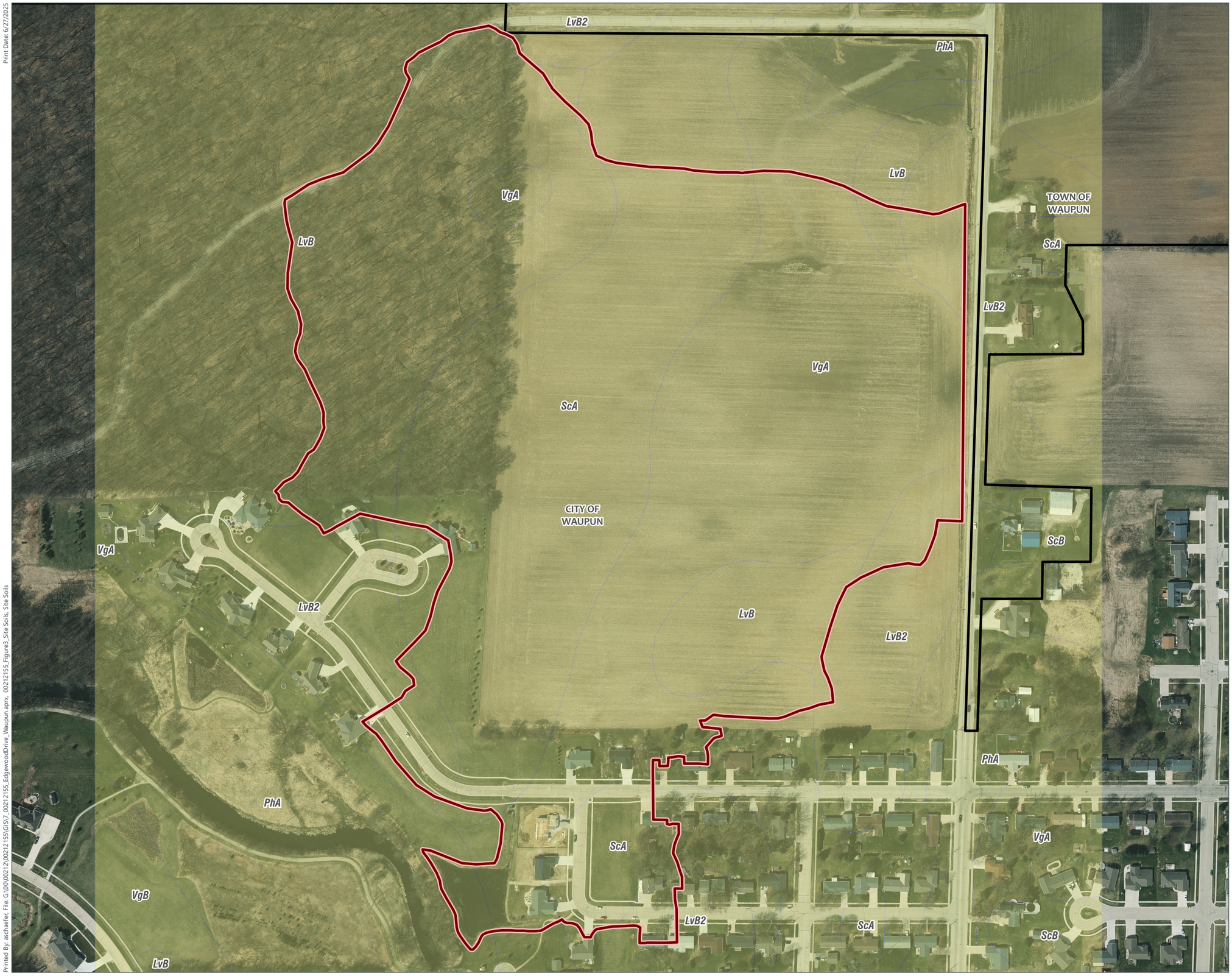
Print Date: 6/27/2025

Printed By: aschaefer, File: G:\00\00212\00212155\GIS\7_00212155_EdgewoodDrive_Waupun.aprx 00212155_Figure2_ImperviousSurfaceRoughness_Surface Roughness - Impervious Areas

Site Soils

FIGURE 3
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI



- Watershed Study Area
- City of Waupun

Hydrologic Soil Group

- B
- C

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Soils: NRCS (2025)

MSA

0 125 250 Feet

N

Existing Conditions
99.9% AEP
(1 Year Storm)

FIGURE 4
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

TOWN OF WAUPUN

CITY OF WAUPUN

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Maximum Water Depth (ft)

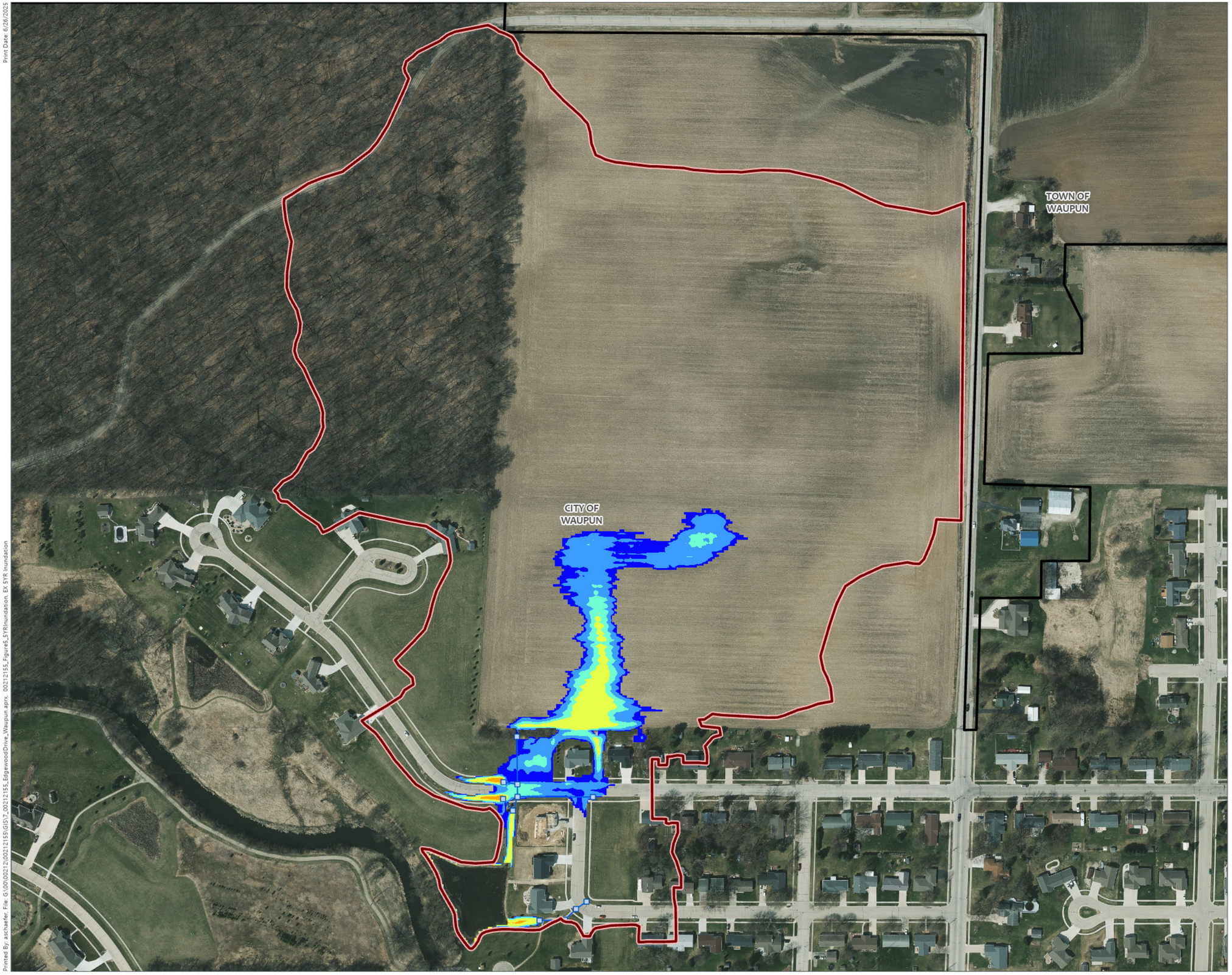
- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N



Existing Conditions
20% AEP
(5 Year Storm)

FIGURE 5
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Maximum Water Depth (ft)

- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N

Existing Conditions
10% AEP
(10 Year Storm)

FIGURE 6
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

TOWN OF WAUPUN

CITY OF WAUPUN

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Maximum Water Depth (ft)

- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N

Existing Conditions
4% AEP
(25 Year Storm)

FIGURE 7
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

TOWN OF WAUPUN

CITY OF WAUPUN

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Maximum Water Depth (ft)

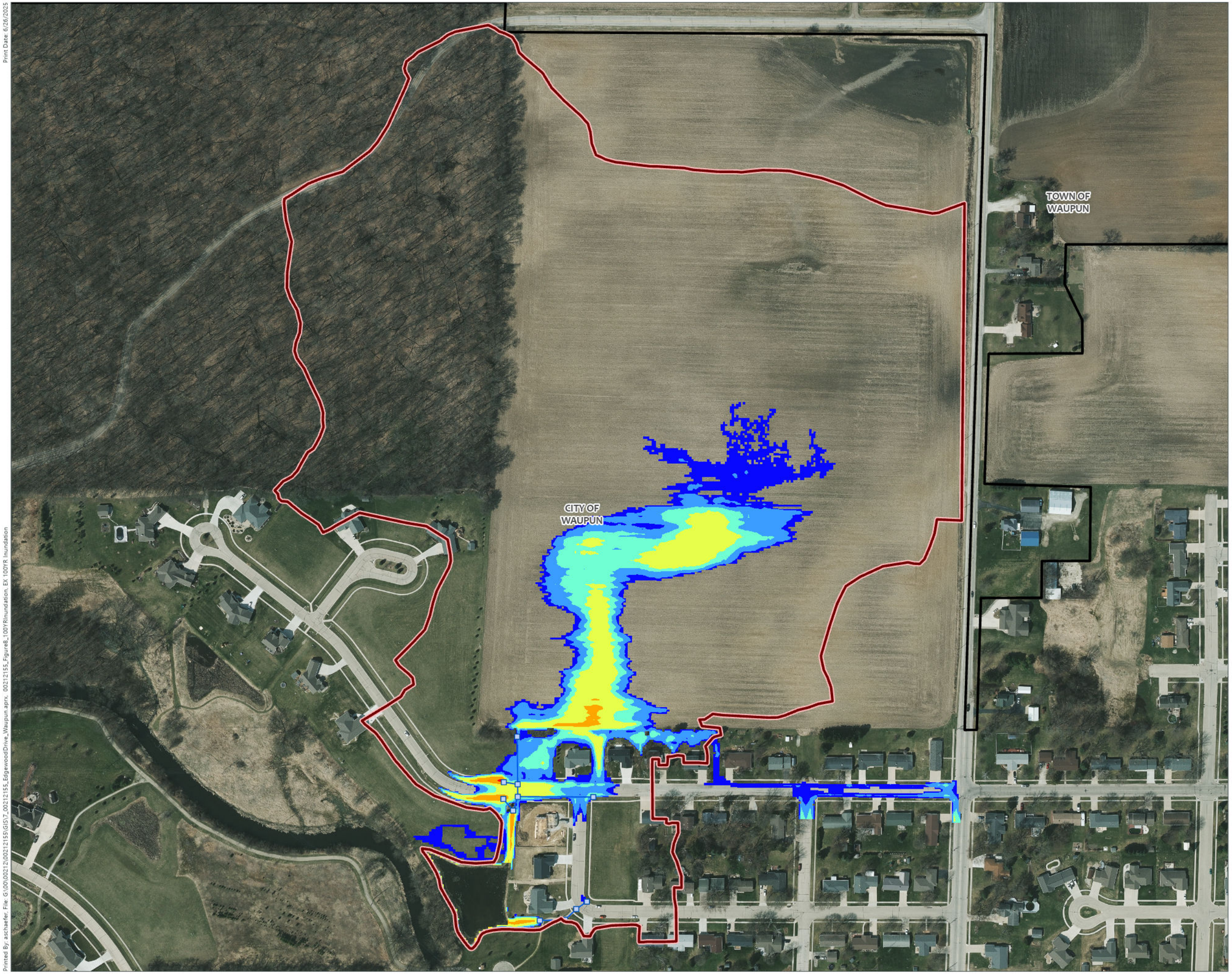
- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N



Existing Conditions
1% AEP
(100 Year Storm)

FIGURE 8
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Maximum Water Depth (ft)

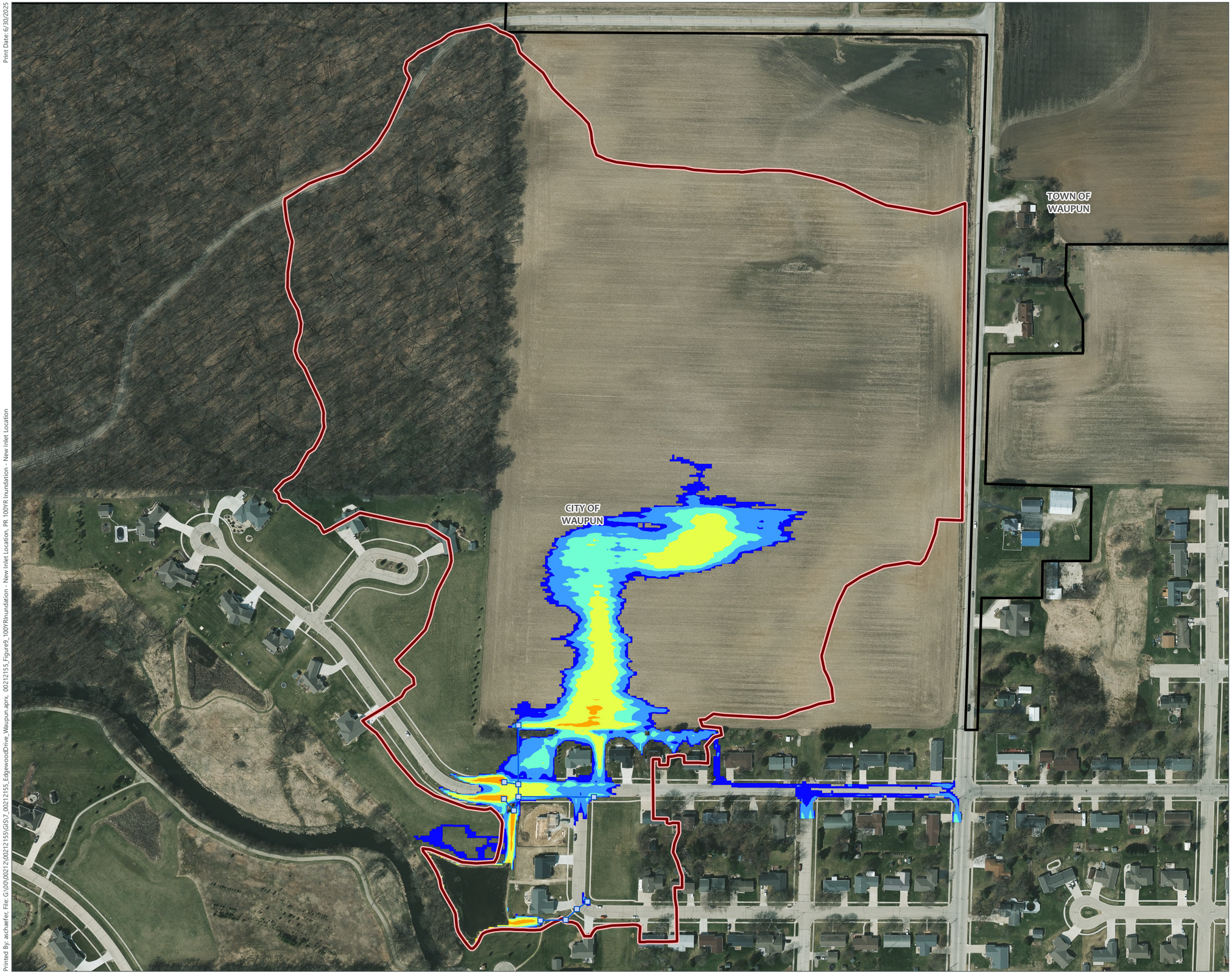
- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N



Proposed Conditions
1% AEP
New Inlet Location

FIGURE 9
Edgewood Drive
Study Report

City of Waupun
Dodge County, WI

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links

Maximum Water Depth (ft)

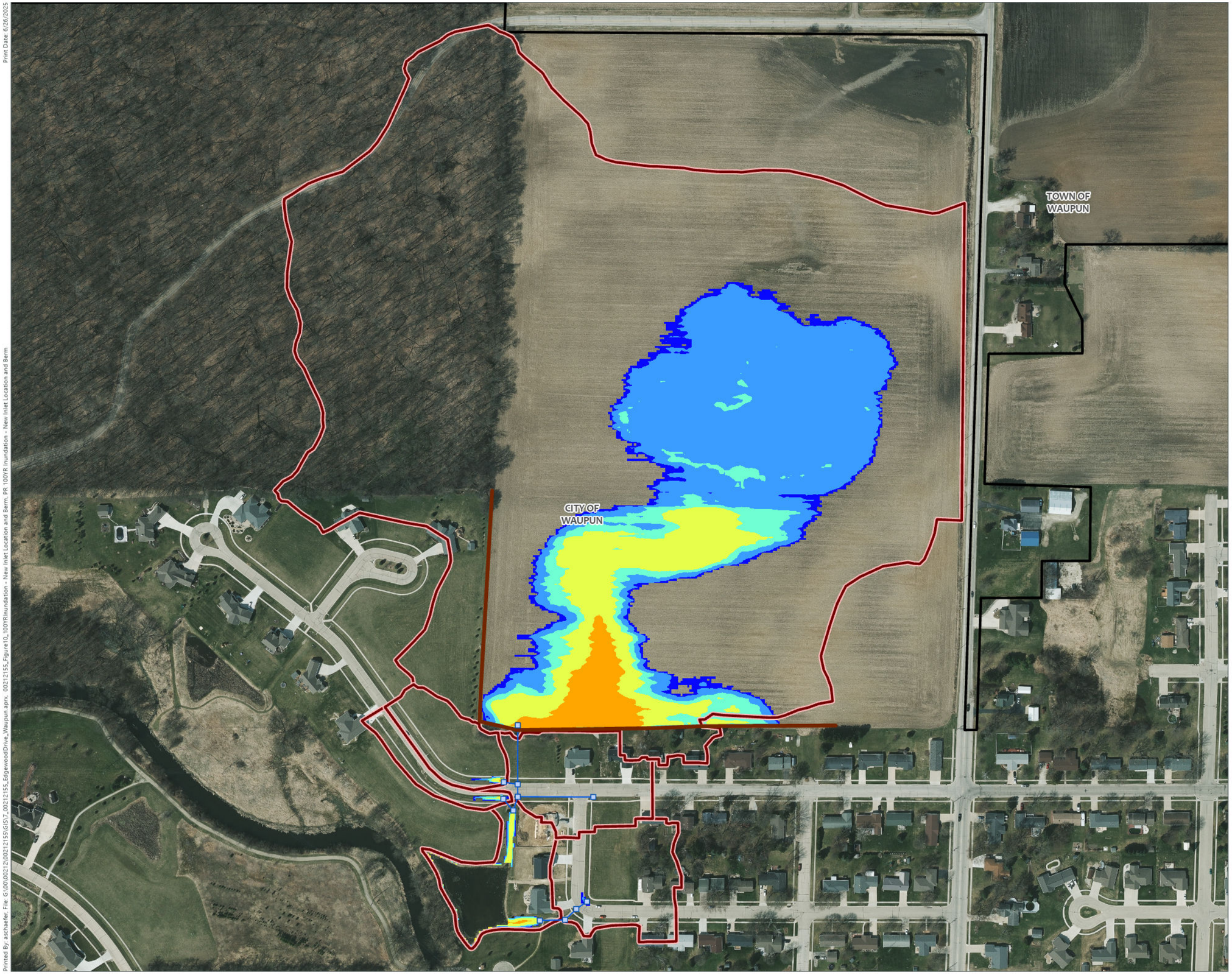
- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Storm Drainage System: MSA and City of Waupun

MSA

0 125 250 Feet

N



Proposed Conditions 1% AEP New Inlet Location and Berm

FIGURE 10
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links
- Proposed Berm

Maximum Water Depth (ft)

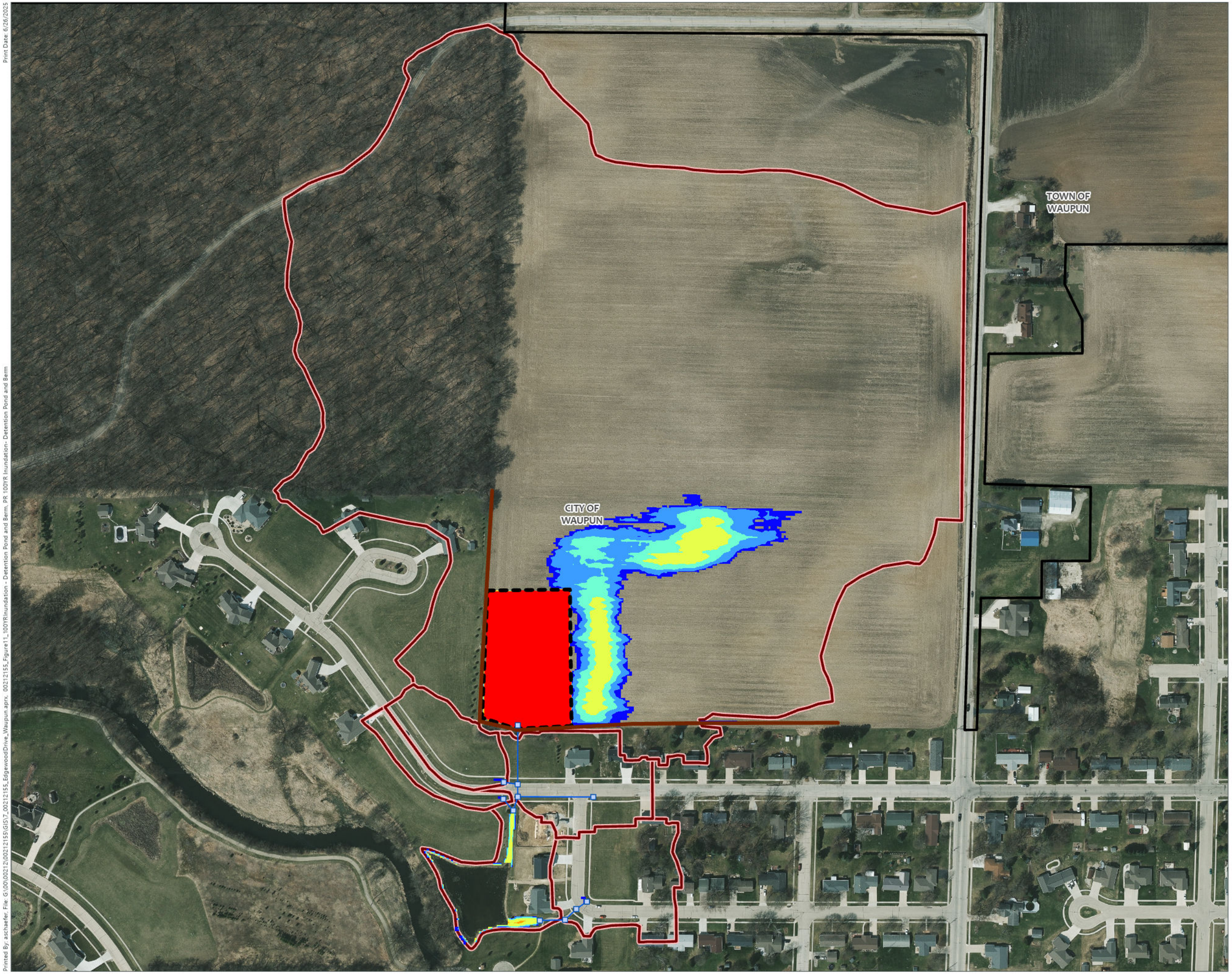
- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2018)
Watershed Boundaries: MSA
Stormwater System: City of Waupun

MSA

0 125 250 Feet

N



Proposed Conditions 1% AEP Detention Pond and Berm

FIGURE 11
Edgewood Drive
Study Report

City of Waupun
Fond du Lac County, WI

- Watershed Study Area
- City of Waupun
- Modeled Nodes
- Modeled Links
- Proposed Berm
- Proposed Detention Pond

Maximum Water Depth (ft)

- 0 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5

Data Sources:
Aerial: WI DNR (2024)
Watershed Boundaries: MSA
Stormwater System: City of Waupun

MSA

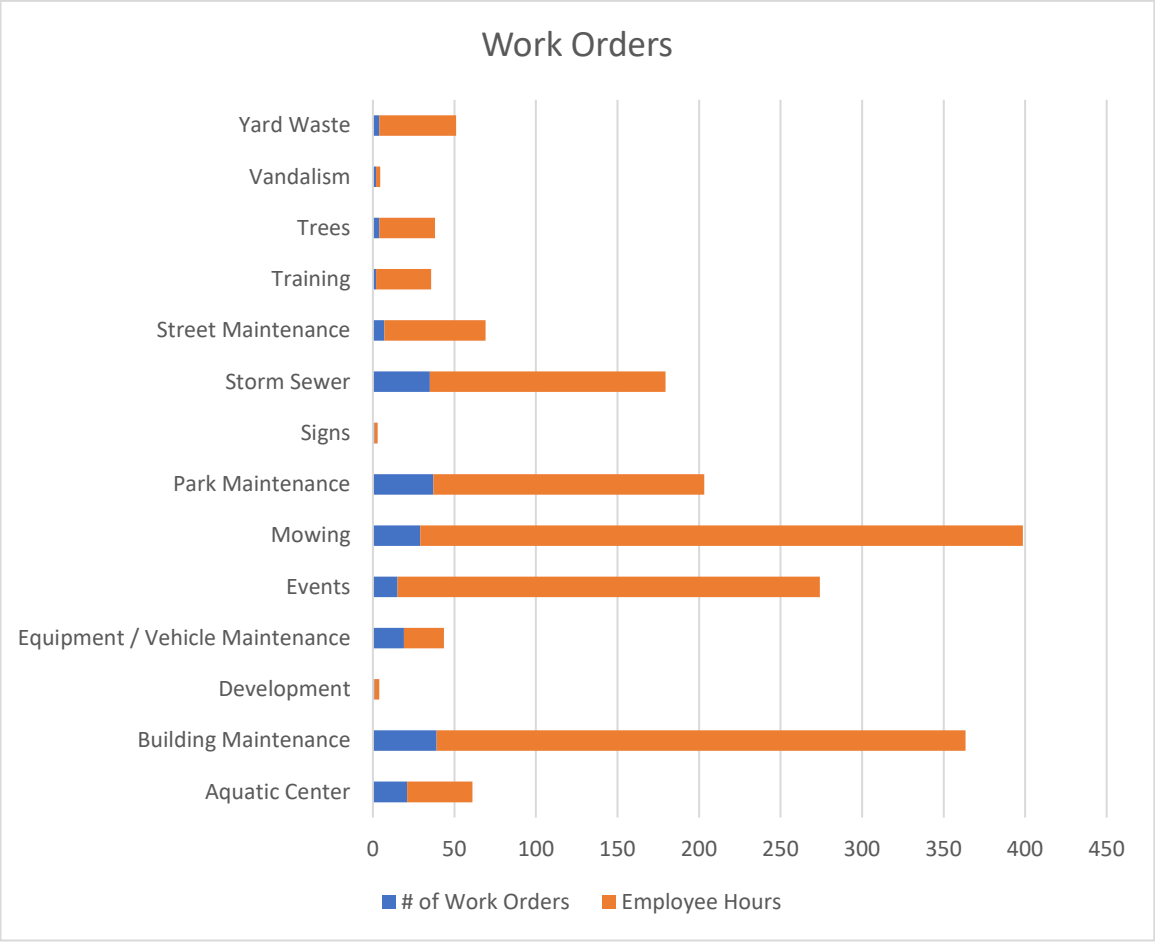
0 125 250 Feet

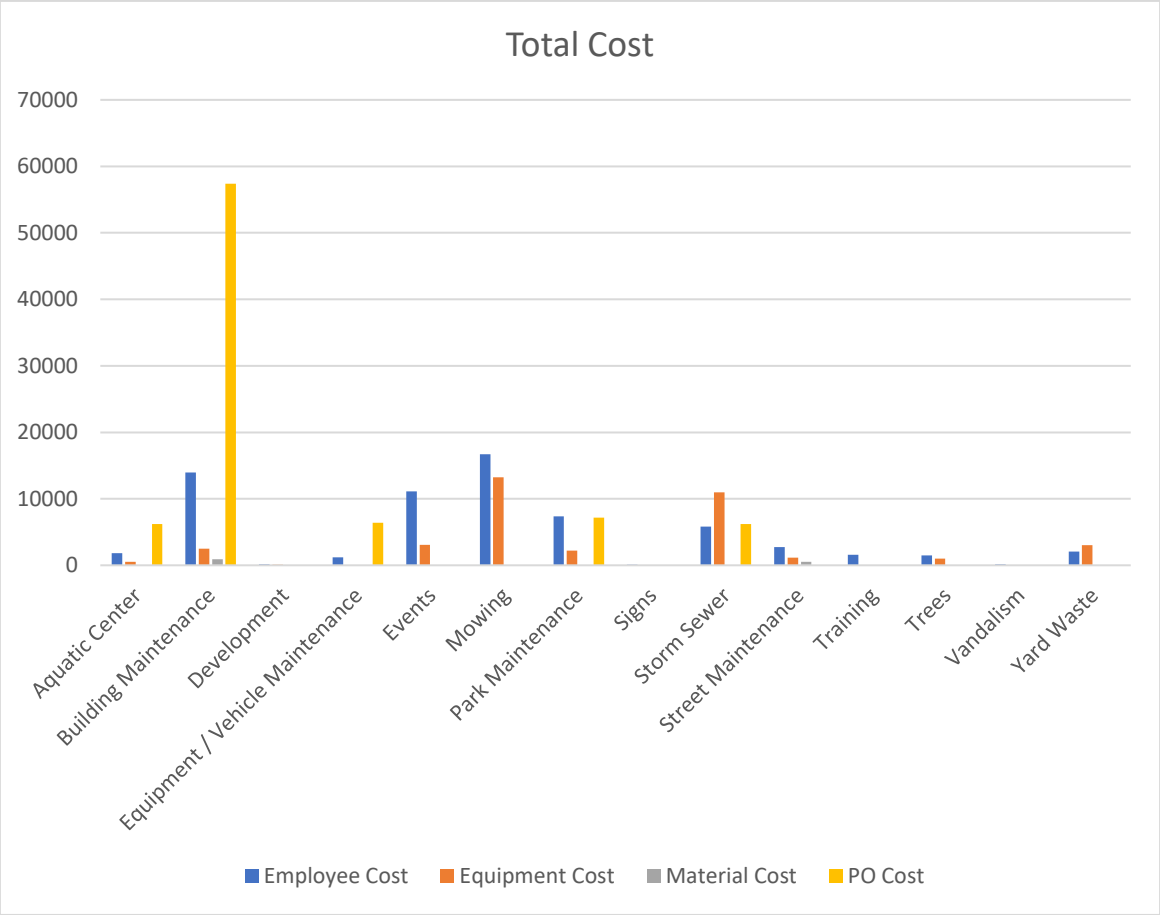
Proposed Pond North of Edgewood Drive
Project Cost Estimate Prepared by MSA Professional Services, Inc.
July 1, 2025

Item	Quantity	Units	Unit Cost	Estimated Cost
Mobilization, Bonds, Insurance	1	EA	$ 8,200.00	$ 8,200.00
Erosion Control	1	EA	$ 5,000.00	$ 5,000.00
Embankment Fill	700	CY	$ 6.00	$ 4,200.00
Common Excavation	17900	CY	$ 6.00	$ 107,400.00
RCP Piping (24")	50	LF	$ 150.00	$ 7,500.00
Control Structure	1	EA	$ 10,000.00	$ 10,000.00
Restoration	14500	SY	$ 2.00	$ 29,000.00
25% Construction Contingency				$ 43,000.00
Engineering				$ 40,000.00
TOTAL				**$ 254,300.00**

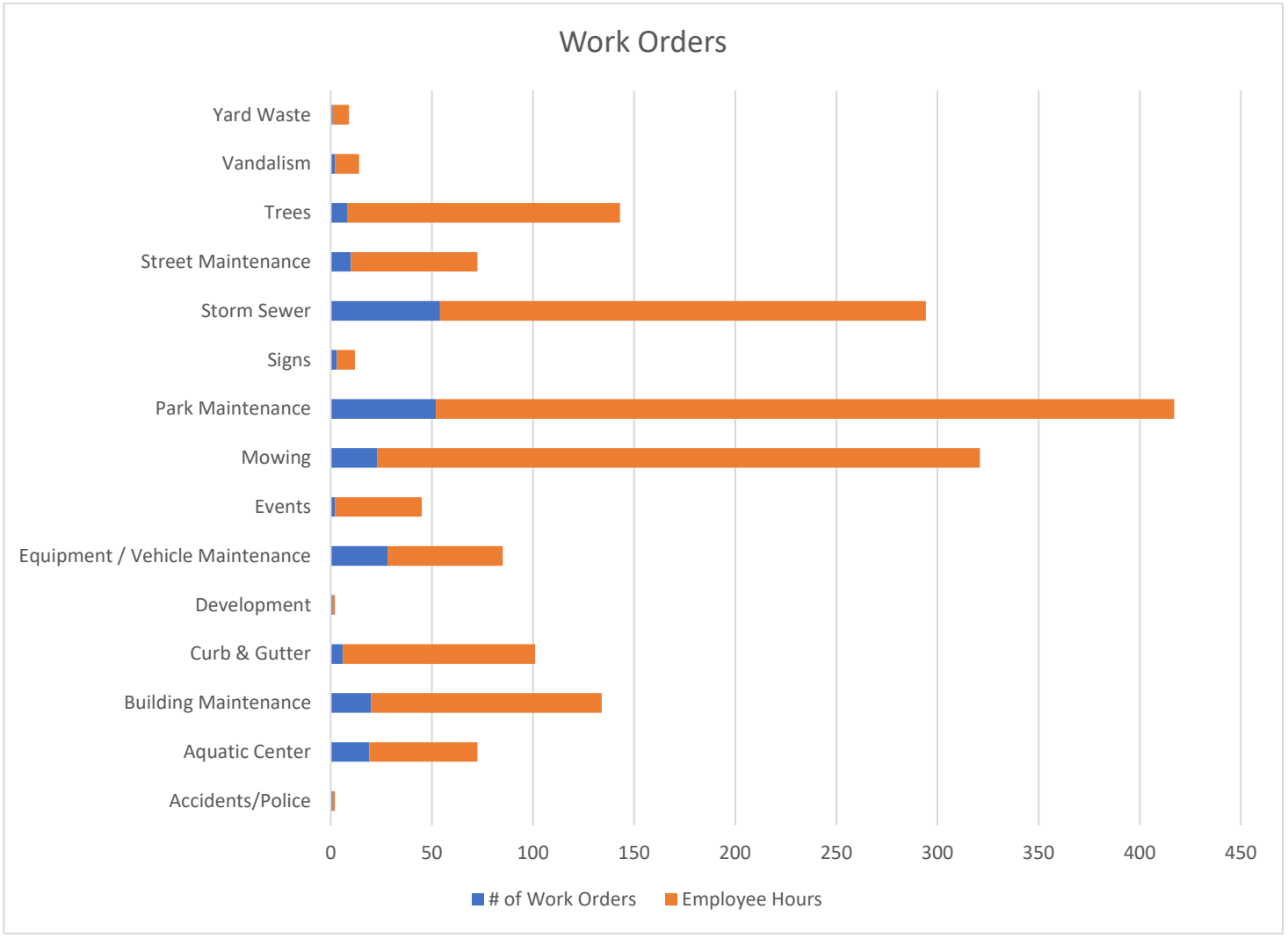
Assumes on-site disposal of excavated material
Assumes no bedrock
Assumes no groundwater dewatering
Assumes no pond liner required

June 2025 Report

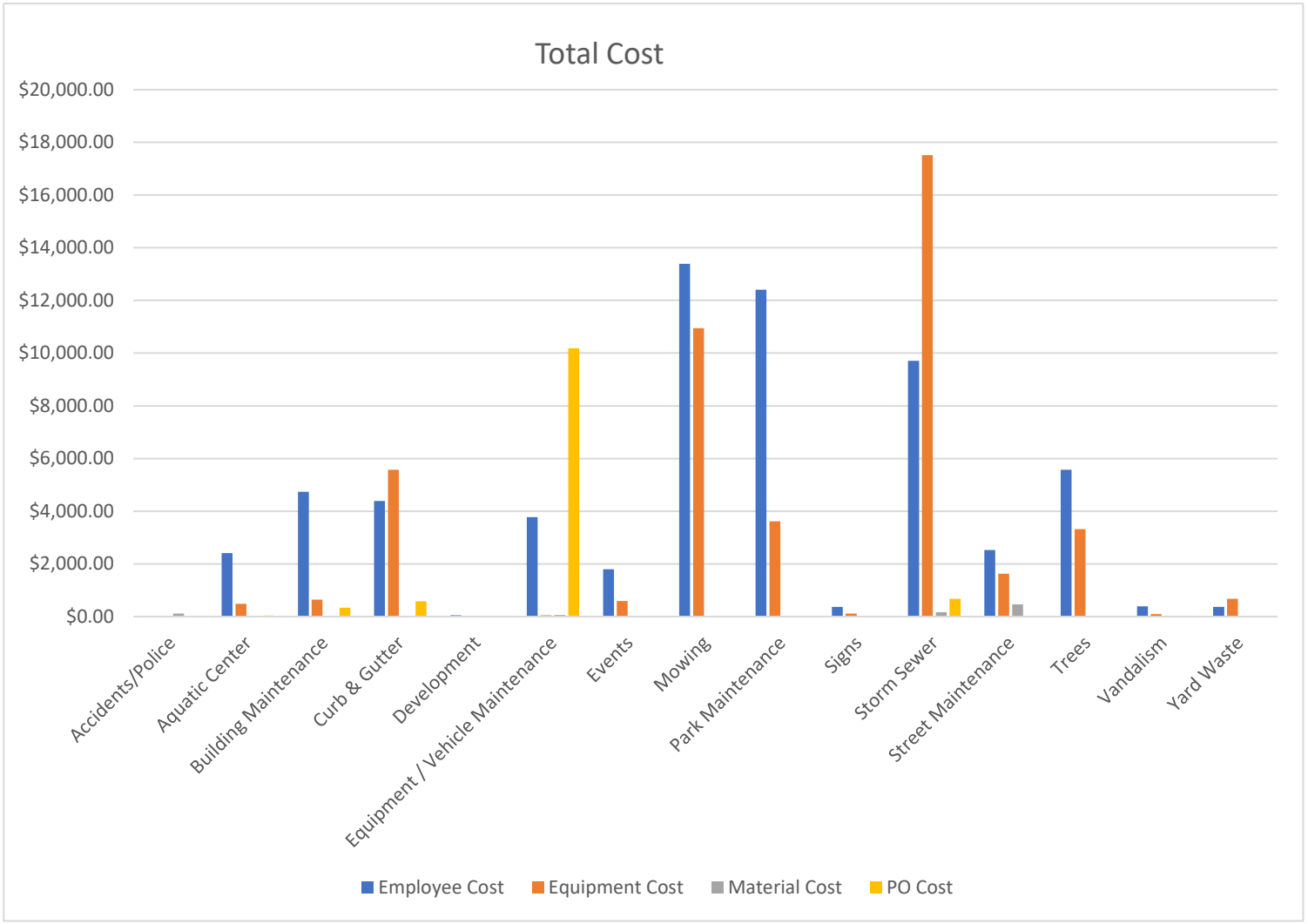



Total Cost
70000
60000
50000
40000
30000
20000
10000
0
Aquatic Center
Building Maintenance
Development
Equipment / Vehicle Maintenance
Events
Mowing
Park Maintenance
Signs
Storm Sewer
Street Maintenance
Training
Trees
Vandalism
Yard Waste
Employee Cost
Equipment Cost
Material Cost
PO Cost

JULY REPORT


Work Orders
Yard Waste
Vandalism
Trees
Street Maintenance
Storm Sewer
Signs
Park Maintenance
Mowing
Events
Equipment / Vehicle Maintenance
Development
Curb & Gutter
Building Maintenance
Aquatic Center
Accidents/Police
0
50
100
150
200
250
300
350
400
450
# of Work Orders
Employee Hours

JULY REPORT


Total Cost
$20,000.00
$18,000.00
$16,000.00
$14,000.00
$12,000.00
$10,000.00
$8,000.00
$6,000.00
$4,000.00
$2,000.00
$0.00
Accidents/Police
Aquatic Center
Building Maintenance
Curb & Gutter
Development
Equipment / Vehicle Maintenance
Events
Mowing
Park Maintenance
Signs
Storm Sewer
Street Maintenance
Trees
Vandalism
Yard Waste
Employee Cost
Equipment Cost
Material Cost
PO Cost