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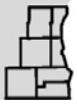

SEWRPC Staff Memorandum

EVALUATION OF PROPOSED STORMWATER QUANTITY MANAGEMENT FOR THE DES PLAINES RIVER WATERSHED PORTION OF THE PROPOSED FOXCONN DEVELOPMENT IN THE VILLAGE OF MOUNT PLEASANT

June 11, 2018

INTRODUCTION

At a January 23, 2018, interagency staff meeting, Wisconsin Department of Natural Resources (WDNR) and Wisconsin Department of Transportation (WisDOT) staff requested that the Southeastern Wisconsin Regional Planning Commission (SEWRPC) prepare a floodplain evaluation for that portion of the proposed Village of Mount Pleasant Electronic & Information Technology Manufacturing (EITM) Zone that is located within the Des Plaines River watershed (Map 1). That zone includes the proposed Foxconn manufacturing campus and possible future supporting businesses. The analysis was requested to assess the impact of the development on the regulatory flood discharges and stages along receiving streams, taking into account both the increased runoff rates and volumes from the development as well as local stormwater management requirements to limit the impact of those increased rates and volumes.

Subsequent to that meeting, SEWRPC staff prepared a scope for services for the requested study.[1] The following tasks were performed under this study as identified in the scope of services:

- Modify the regulatory Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) hydrologic model to reflect the increased level of development

- Revise the hydrologic model to reflect stormwater controls consistent with the recommendations of the SEWRPC Des Plaines River watershed study[2] and the Village of Mount Pleasant ordinance requirements that include applying release rates of 0.04 cfs/acre for the 50-percent-annual probability (2-year recurrence interval) event and 0.3 cfs/acre for the 1-percent-annual probability (100-year recurrence interval) event

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[1] SEWRPC Staff Memorandum – *Scope of Work for Floodplain Evaluation of the Foxconn Development in Mount Pleasant,* January 29, 2018, revised March 15, 2018.

[2] SEWRPC Planning Report No. 44, *A Comprehensive Plan for the Des Plaines River,* June 2003.

- Run the revised hydrologic model to compute flow values for the 50- through 1-percent-annual probability flood events.

- Compare the post-development 50-percent and 1-percent flows to the FEMA FIS regulatory flows.

DESCRIPTION OF STUDY AREA

As shown on Map 1, the EITM zone consists of a tax incremental district (TID) with four distinct areas indicated for development purposes. The area within the Des Plaines River watershed is located within TID Areas 1 and 2, which are bounded by CTH KR on the south, STH 11 on the north, IH-94 on the west, and CTH H on the east, and also within a small part of TID "North Area." The eastern portions of Areas 1 and 2 are located within the Pike River watershed and, therefore, were not considered in this analysis.

Within the Des Plaines River watershed, the study area includes the headwater reach of the Kilbourn Road Ditch along with portions of Unnamed Tributary 15 (UT 15) and Unnamed Tributary 18 (UT 18) to the Kilbourn Road Ditch. Regulatory floodplains have been established for all three of these streams, although the floodplain for UT 15 only covers the downstream portion in Kenosha County.

The initial phase of the Foxconn development is located in that portion of TID Area 1 that is located east of the Kilbourn Road Ditch

HYDROLOGIC ANALYSIS

Model Description

The regulatory FIS hydrologic and hydraulic models were originally developed by SEWRPC as part of the comprehensive planning effort for the Des Plaines River watershed. The hydrologic model is the U.S. Environmental Protection Agency Hydrologic Simulation Program-Fortran (HSPF) continuous simulation program. It reflects SEWRPC recommended plan land use and then-existing (year 2003) channel conditions within the watershed. The model is used to simulate continuous streamflow using recorded precipitation for the period of 1940-1994. Simulated annual peak discharge values are obtained from the model and fitted to a Log Pearson Type III probability distribution to derive flow-probability relationships at various stream locations. The peak flood discharge values are obtained from these probability relationships.

Land Use

As noted above, the regulatory model reflects planned land use conditions as recommended by SEWRPC in Planning Report No. 44 (Map 2). That land use plan included a much lower degree of development within the Mount Pleasant EITM zone than what is currently envisioned. For this analysis, the land use assumptions were revised to reflect an expanded degree of industrial development, along with the proposed expansion of CTH KR and Braun Road, and construction of Wisconn Valley Way. Consistent with the Mount Pleasant Year 2035 Master Plan,[3] it was assumed that current natural areas consisting of secondary environmental corridor and isolated natural resource areas, along with the regulatory floodplain, would not be developed. The revised planned land use assumed for this analysis is depicted on Map 3.

Within the HSPF model, land use is represented as a combination of pervious and impervious land covers. The Des Plaines River watershed model utilizes three pervious land cover categories and one impervious. The pervious categories consist of drained cropland, woodland, and a general pervious land. For the EITM zone, industrial land was assumed to consist of 80 percent impervious and 20 general pervious. The

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[3] *As amended November 13, 2017.*

proposed roadway expansion along CTH KR, Braun Road, and Wisconn Valley Way were assumed to be 79 percent impervious and 21 percent general pervious. These percentages are consistent with the assumptions used by the SIGMA Group, Inc. in the design of stormwater detention basins for the initial phase of the Foxconn development.

Stormwater Controls

Within the Des Plaines River watershed, the Village of Mount Pleasant stormwater ordinance calls for the application of release rates that were developed for the Des Plaines River watershed by SEWRPC under Planning Report No. 44 and were recommended to be adopted into local stormwater management ordinances. For the 50-percent-annual probability (2-year recurrence interval) event the release rate is set at 0.04 cfs per acre of development. For the one-percent-annual probability (100-year recurrence interval) event the release rate is set at 0.3 cfs per acre of development.

Although the regulatory HSPF model reflects planned future land use conditions in the watershed as envisioned at the time of the 2003 SEWRPC Des Plaines River watershed study, it does not reflect application of stormwater controls for future development. Since the goal of this analysis is to determine whether or not the Mount Pleasant stormwater controls are adequate to address increased runoff from the Foxconn development, the model was revised to reflect such controls, but only within the EITM zone. As seen from comparison of Maps 2 and 3, there is now a significant increase in the level of development proposed in the EITM zone relative to that assumed for the regulatory model.

For the initial phase of the Foxconn development, draft information related to proposed stormwater detention basins designed to meet the Village's ordinance was obtained from the SIGMA Group, Inc. on March 20, 2018. Proposed stormwater basins A and E for that phase of development would discharge to Kilbourn Road Ditch. On April 20, 2018, revised design information for these basins was provided that showed different outlet configurations. Both basin designs yielded similar results from the HSPF model. The results presented in this memorandum reflect the more current revised basin design.

For the remaining EITM area, with the exception of the IH 94 expansion, conceptual stormwater controls were developed by SEWRPC staff using the same approach as used to develop the release rates recommended under the the Des Plaines River watershed plan. WisDOT typically employs stormwater controls designed for water quality purposes. Where practicable, those controls may also be sized to address water quantity for larger flood events, although that is not always the case. Given that uncertainty, for this analysis it was assumed that stormwater quantity controls would not be employed for IH 94. They were, however, included for the expansion of CTH KR and Braun Road and for the new Wisconn Valley Way as WisDOT has commited to provide water quantity controls for those projects.

In each HSPF model subbasin that extends into the EITM zone, a hypothetical stormwater detention basin was developed for the lands outside of the Foxconn site that are proposed to be developed. Detention basins were sized to control runoff from land located within those areas using the release rates called for in the Mount Pleasant stormwater ordinance. A 24-hour duration design storm based on the NOAA Atlas 14 rainfall amounts and U.S. Natural Resource Conservation Service MSE3 design storm distribution was applied in the HSPF model to estimate initial storage volumes for the basins. The basins were then simulated in the HSPF design storm model to check that they met the target release rates. Volumes were adjusted as needed until the outfall discharge targets were met. The two basins designed by the SIGMA Group, Inc. were also tested in this manner and were found to meet the target outlet release flows as designed.

The hypothetical stormwater basins to control runoff from areas in the EITM zone that are outside the intial phase of the Foxconn development were represented in the hydrologic model used to evaluate the proposed stormwater controls for the initial Foxconn phase.

HSPF Routing Tables

The HSPF model simulates surface and subsurface runoff from the land and then routes that water through the stream system using a series of depth-storage-discharge relationships (F-tables). For the Des Plaines River watershed streams for which flood water surface profiles were developed, these relationships were computed using detailed hydraulic models. Those models represent the floodplain area through a series of cross sections that reflect both the stream channel and adjacent floodplain area.

Floodplain zoning regulations generally restrict development and placement of fill within the one-percent-annual-probability floodplain, but not beyond it, even though that area may provide temporary storage for larger flood events. To account for potential filling of land within the EITM zone that is outside the regulatory floodplain, the HSPF model F-tables were revised by eliminating natural storage beyond the limit of the one-percent floodplain. That approach is consistent with the proposed post-development stormwater management plan for the first phase of the Foxconn development, dated April 20, 2018, which shows no filling within the one-percent-annual floodplain, but which does call for filling outside that floodplain.

Model Simulation and Results

Once the above-noted changes were made, the HSPF model was run for the entire simulation period from 1940-1994. Simulated annual peak discharges were then fitted to a Log Pearson Type III distribution using the U.S. Army Corps of Engineers HEC-FFA software, as was done for the regulatory model. The resulting flood flow estimates were then compared to those from the regulatory model.

Table 1 lists the regulatory (FIS) and post-development flood flows for the 50-percent and 1-percent-annual probability events. The results show that when stormwater controls based on the required release rates are employed, flood discharges along the receiving streams would be maintained and could potentially decrease.

CONCLUSION

The analysis described herein demonstrates that application of the stormwater release rates set forth in the Village of Mount Pleasant stormwater ordinance is sufficient to address increased runoff rates and volumes from development of that portion of the EITM zone within the Des Plaines River watershed with no anticipated increase in downstream flood flows. For the purpose of this analysis it was not necessary to compute new flood profiles for the receiving streams since no increase in flood flow and accompanying flood stage is expected.

While the results shown in Table 1 indicate a potential decrease relative to the regulatory flows, it must be remembered that, with the exception of the initial phase of the Foxconn development, these flows reflect assumed future conditions that may differ from the final design and layout of the remaining development within the EITM zone. Therefore, it is recommended that the current regulatory flood discharges and associated water surface elevations continue to be used for planning and design purposes.

Table 1
Flood Discharge[4] Comparison: Full EITM Development with Stormwater Controls (Mount Pleasant Release Rates)

Kilbourn Road Ditch						
	Flood Event (percent probability)					
	50%			1%		
Location	FIS	EITM with Stormwater Controls	% Difference	FIS	EITM with Stormwater Controls	% Difference
Upstream of confluence with Unnamed Tributary No. 19	162	115	-29	495	356	-28
Upstream of confluence with Unnamed Tributary No. 18	181	113	-38	639	330	-48
Upstream of confluence with Unnamed Tributary No. 15	172	148	-14	541	402	-26
At Somers Road (CTH E)	211	197	-7	772	630	-18
Upstream of confluence with Unnamed Tributary No. 13	217	205	-6	819	674	-18
Upstream of confluence with Unnamed Tributary No. 8	237	229	-3	964	823	-15
At 38th Street (CTH N)	297	292	-2	1370	1300	-5

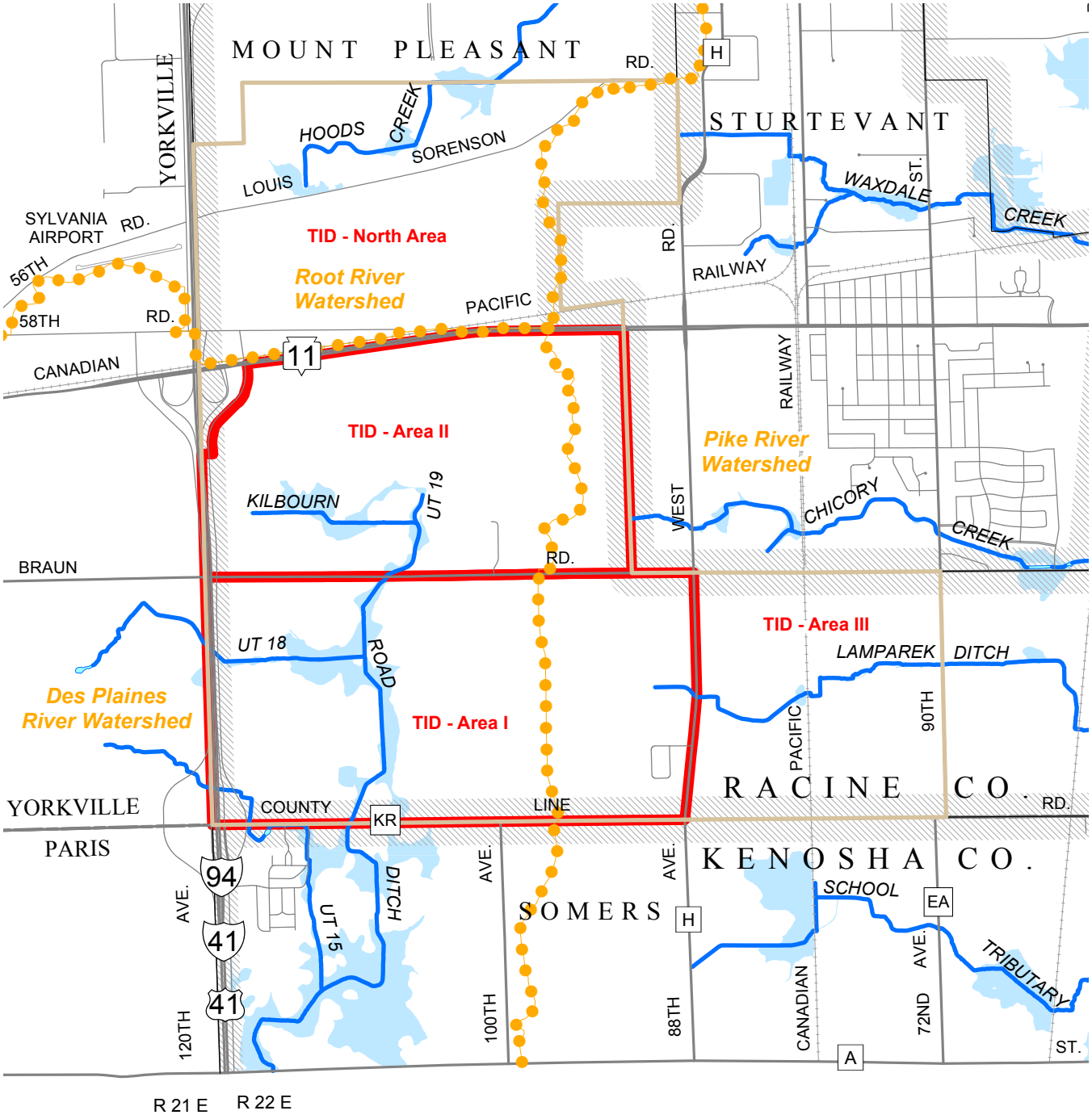
Unnamed Tributary No. 15 to Kilbourn Road Ditch						
	Flood Event (percent probability)					
	50%			1%		
Location	FIS	EITM with Stormwater Controls	% Difference	FIS	EITM with Stormwater Controls	% Difference
0.35 Mile Upstream of Mouth	25	25	0	226	148	-35
At Mouth	26	26	0	219	150	-32

Unnamed Tributary No. 18 to Kilbourn Road Ditch						
	Flood Event (percent probability)					
	50%			1%		
Location	FIS	EITM with Stormwater Controls	% Difference	FIS	EITM with Stormwater Controls	% Difference
At Mouth	108	106	-2	518	470	-9

Source: SEWRPC

[4] *Discharge units are cubic feet per second.*

Map 1
Tax Incremental District for the Village of Mount Pleasant



FOXCONN PROJECT AREA BOUNDARY

TAX INCREMENTAL DISTRICT BOUNDARY

FEMA 100-YEAR FLOODPLAIN BOUNDARY

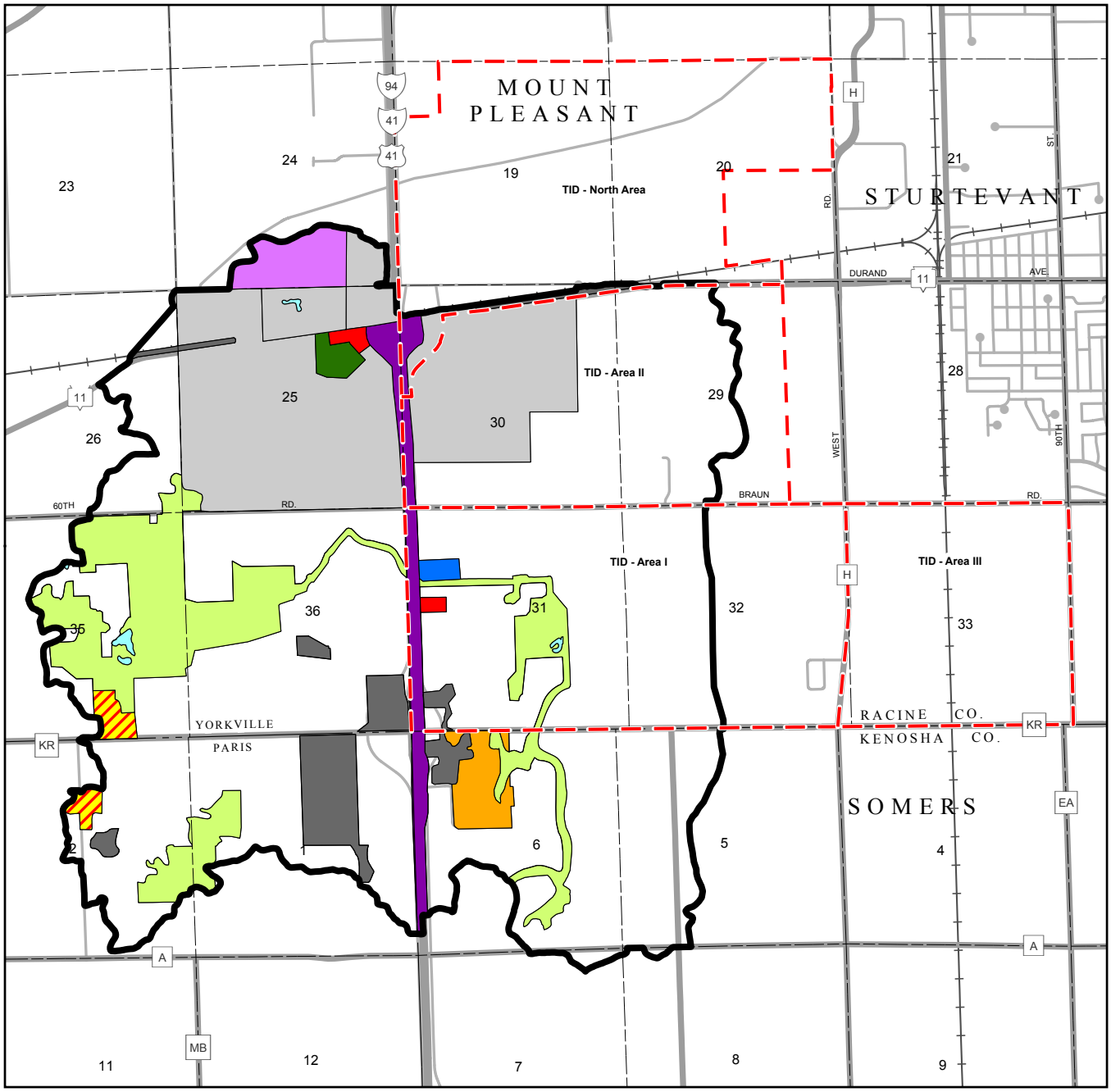
WATERSHED BOUNDARY

N

0 0.25 0.5 Miles

Source: SEWRPC

Map 2
SEWRPC Buildout Land Use for the Kilbourn Road Ditch Subwatershed - Des Plaines River Watershed Plan



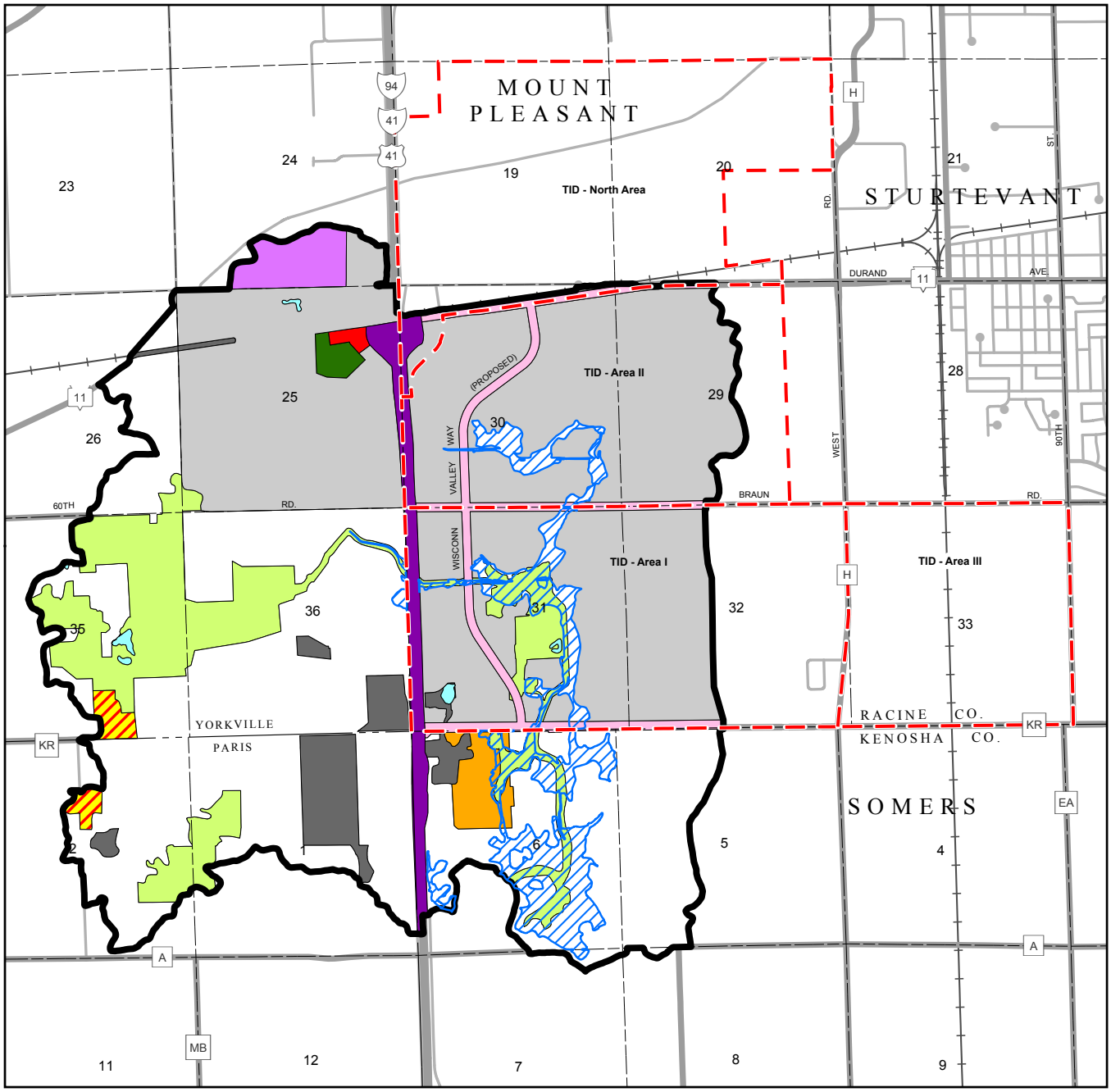
- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- FREEWAY
- OTHER TRANSPORTATION, COMMUNICATION, AND UTILITIES
- GOVERNMENTAL AND INSTITUTIONAL
- PARK AND RECREATION
- SECONDARY ENVIRONMENTAL CORRIDOR
- ISOLATED NATURAL RESOURCE AREA
- AGRICULTURAL, RURAL RESIDENTIAL, AND OPEN LANDS
- SURFACE WATER

N

0 1 2 3 Miles

Source: SEWRPC

Map 3
Revised SEWRPC Buildout Land Use for the Kilbourn Road Ditch Subwatershed - Mount Pleasant EITM Floodplain Evaluation



- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- FREEWAY
- ARTERIAL STREETS AND HIGHWAYS
- OTHER TRANSPORTATION, COMMUNICATION, AND UTILITIES
- PARK AND RECREATION
- SECONDARY ENVIRONMENTAL CORRIDOR
- ISOLATED NATURAL RESOURCE AREA
- AGRICULTURAL, RURAL RESIDENTIAL, AND OPEN LANDS
- SURFACE WATER
- FEMA 100-YEAR FLOODPLAINS

N

0 1 2 3 Miles

Source: SEWRPC