



December 11, 2019

Mr. Lowell Baumgarn
71203 350th Avenue
Round Lake, MN 556167

Dear Mr. Baumgarn:

RE: JD 24 Improvements and Final Engineer's Report Independent Review

Following the continuance of the Final Petition Hearing for the Jurisdictional Ditch 24 (JD24) improvements on September 23, 2019, you requested RESPEC evaluate the following items:

1. Confirm the validity of the original petition request;
2. Evaluate the need for ditch improvements on Branch B;
3. Consider the impacts of the proposed WASCOB on the existing Branch B tile;
4. Review Minnesota Statute (MS) 103E; and
5. Consider the downstream impacts of the increased flows at the outlet.

This letter summarizes the results of our analyses and provides several recommendations for the County Commissioners to consider at the next Continued Final Petition Hearing on December 13, 2019.

1. VALIDITY OF ORIGINAL PETITION

A continuing discussion throughout these hearings has been the argument over the original petition, as to whether the requirements of M.S. 103E.215 Subd. 4. have been met. Improvements to a drainage system can be petitioned if the petitioners meet one of the following requirements:

1. At least 26% of the owners of the property are affected by the proposed improvements;
2. At least 26% of the property owners that the proposed improvement passes over;
3. The owners of at least 26% of the property area affected by proposed improvement; or
4. The owners of at least 26% of the property area that the proposed improvement passes over.

A summary of the four requirements is provided below, however using available parcel data information, the original petition appears to meet the requirement under #4 above.

1. There are 324 affected parcels and 13 of those parcels have petitioned the County for improvements, meeting only 4% of the requirement.
2. There are 27 parcels that the proposed improvements pass over and 6 of those parcels have petitioned the County for improvements, meeting only 22% of the requirement.
3. Of the 324 parcels affected by the proposed improvements, the petitioners own 1,448 acres of the total 6,036 acres, meeting only 24% of the area requirement.
4. Of the 27 parcels the proposed improvements pass over, the petitioners own 1,145 acres of the total 3,403 acres, totaling 34% of the area and meeting the requirements above.

It also should be noted that the original petition provided in the 2018 Final Engineers Report includes Exhibit A, a map of the "Petition Passing Over Ownership" which was prepared by Bolton & Menk, Inc., the same firm that also represents Jackson County as Drainage Engineer. It would be helpful if Bolton & Menk can provide additional information on the development of the original petition to alleviate any concerns about conflicts of interest.

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2. NEED FOR DITCH IMPROVEMENTS

Following the June 17, 2019 Final Public Hearing, the Board directed the Drainage Engineer to prove the system was in disrepair and the County Auditor to compile the repair costs over the last 10 years for presentation at the August 19, 2019 Continued Final Hearing. We confirmed the number of repairs provided in the August 12, 2019 Supplemental Information to the Final Engineer's Report using the Jackson County Ditch Map and Work Order Request Web Map (Table 1).

Table 1. Number of Repairs on Petitioned Branches of JD 24 System

TILE	NO. REPAIRS (SINCE 2009)	NO. REPAIRS (ALL TIME JACKSON CO.)	TELEVISED?
B	0	0	NO
Q	12	18	NO
S	2	13	NO
T	5	10	YES
U	2	2	YES

There is no record of any repairs ever having been made to the Branch B system; looking at the Jackson County Work Order Request Web map, it would appear that there have been a number of repairs made on Branches K, N, and P which have had a similar number of repairs made as Branches Q, S, T, and U, but are not part of the proposed improvements. In addition, only two of the branches were televised to inspect and confirm the condition of the tile system (T and U). Before replacing all the tile, it should at least be confirmed to be in "disrepair."

Finally, following the November 15, 2019 exploratory excavation work on Branch B, in a supplemental information letter to their Final Engineer's Report dated November 26, 2019, the Drainage Engineer noted that the "tile located in the field is concrete tile and from visual inspection appears to be in relatively good condition," contrary to the original petition. The sizes of the existing tiles were also found to be different from the assumed information in the 2018 Final Engineer's Report (Table 2).

Table 2. Summary of Drain Tile Diameters from Supplement to Final Engineers Report (Nov. 26, 2019)

	Branch B Upper	Branch B Lower	Branch B1	Branch B2
Historic JD24 Plans	8-in Tile	8-in Tile	6-in Tile	8-in Tile
11/15/19 Field Locate	8-in Tile	12-in Tile	6-in Tile	10-in Tile
Proposed Improvements	10-in Tile	12-in Tile	8-in Tile	10-in Tile

From the field locate information, it should be clear that the proposed work on Branch B Lower (below Branch B1) and Branch B2 are not improvements, as the proposed tile diameters are the same as existing conditions.

Respectfully, the case has not been made that the JD24 Branch B system is in disrepair and warranted for improvements. In addition, the proposed work on Branch B should not be considered an improvement and the Ditch Viewers should revise their drainage benefits and damages prior to the County authorizing the project.

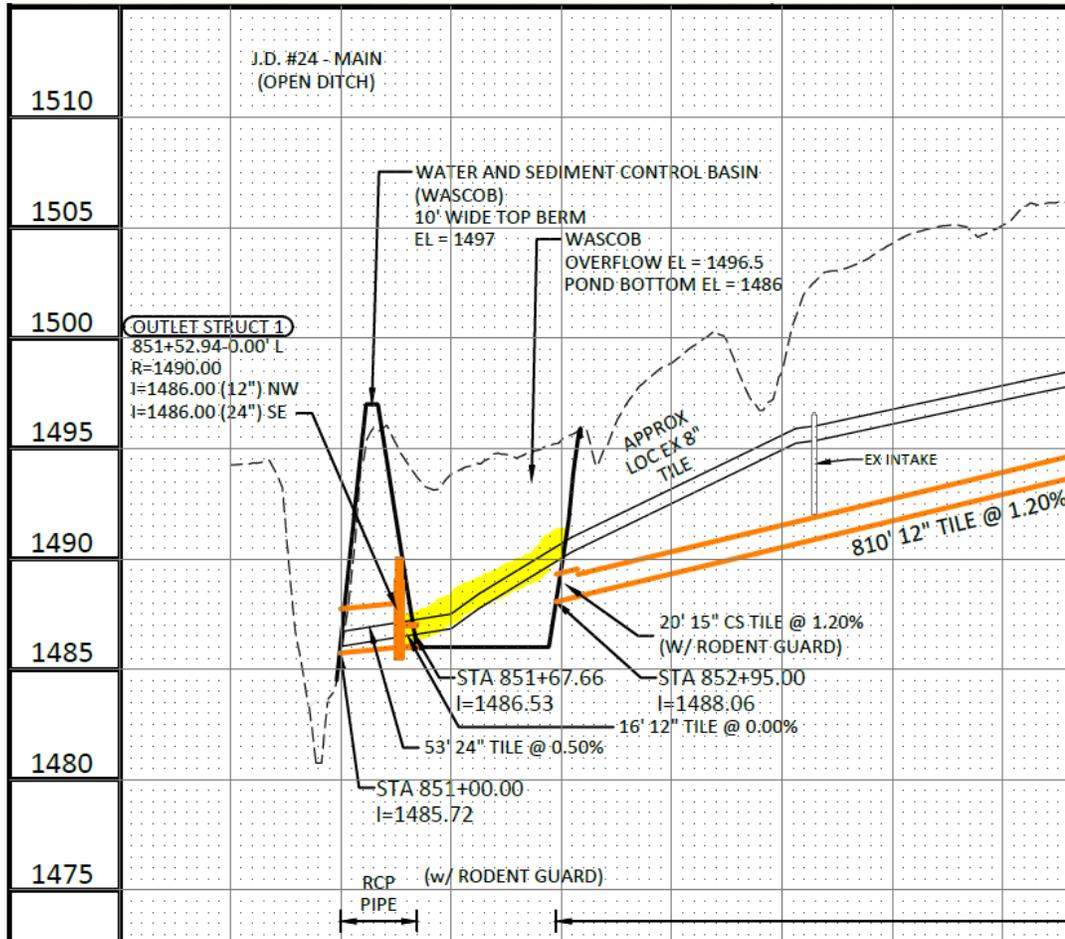
3. IMPACTS OF WASCOB B ON EXISTING TILE

On October 10, 2019, the petitioner's lawyer requested consideration of eliminating Branch B from the proposed improvements, but maintaining the proposed WASCOB at the outfall of Branch B. I have been asked to review if the WASCOB would affect the existing tile and drainage.

First, we reviewed the proposed plans for WASCOB B included in the 2018 Final Engineer's Report, Sheet 3.01 which shows the profile of the existing drain tile and the proposed grading for WASCOB B. Based on this profile, the existing tile is incompatible with

the proposed WASCOB as it is between 1- and 4-ft above the bottom of the WASCOB, as shown in Figure 1. The existing drain tile cannot remain in place as-is if the WASCOB is constructed.

Figure 1. Clip of Proposed WASCOB and Relative Location of Existing Tile (yellow) from Final Engineer's Report



From the Minnesota Department of Natural Resources (MnDNR) Advisory Report, dated October 17, 2018, the DNR reviewers stated that the Final Engineer's Report and proposed improvements were acceptable only if the two WASCOBs on Branches B and T were constructed as part of the project and requested the County consider increasing the size of WASCOB T to provide more storage and increase the time between cleanouts, reducing the cost for all landowners.

In order to keep WASCOB B, as proposed and required by the MnDNR, the existing tile must either be re-routed around the basin or broken and allowed to discharge directly into the basin. For the purposes of this evaluation, we have assumed the tile would discharge into WASCOB B. While the Drainage Engineer provided their HydroCAD models of the system, we have evaluated Branch B using EPA SWMM in order to evaluate the existing hydraulics in the current Branch B system as well as the impacts caused by the addition of WASCOB B. The resulting watershed flows from the Branch B SWMM model are different from the HydroCAD models due to the greater detail provided, each inlet and each pipe are included in the model to evaluate the effects of WASCOB B on tile capacity.

The results from this analysis are presented in Tables 3-5 and provide the discharges the Branch B main drain tile entering JD24, as well as the flows and water surface elevations in JD24 at Branch B.



Table 3. Branch B Existing Conditions (using November 26, 2019 revised pipe sizes)

	Rainfall Depth (in)	Branch B Tile Max Outflow (cfs)	JD 24 Flow at Branch B (cfs)	Water Surface Elevation in JD24 at Branch B Outfall
2-yr	2.94	6.23	303	1485.23
5-yr	3.73	6.23	455	1485.77
10-yr	4.46	6.24	610	1486.24
25-yr	5.57	6.18	848	1486.84
50-yr	6.5	6.13	1,059	1487.30
100-yr	7.5	6.09	1,351	1487.87

Table 4. Branch B Proposed Conditions (from 2018 Final Engineer's Report)

	Rainfall Depth (in)	Branch B Tile Max Outflow into WASC OB B (cfs)	JD 24 Flow at Branch B (cfs)	JD24 Change in Flow at Branch B (cfs)
2-yr	2.94	5.31	286	-17
5-yr	3.73	5.32	483	28
10-yr	4.46	5.32	644	34
25-yr	5.57	5.33	881	34
50-yr	6.5	5.33	1,103	44
100-yr	7.5	5.33	1,400	49

Table 5. Branch B Existing Tile with Proposed WASC OB B

	Rainfall Depth (in)	Branch B Tile Max Outflow into WASC OB B (cfs)	JD 24 Flow at Branch B (cfs)	JD24 Change in Flow at Branch B (cfs)
2-yr	2.94	2.26	287	-16
5-yr	3.73	2.29	484	29
10-yr	4.46	2.3	645	35
25-yr	5.57	2.31	885	37
50-yr	6.5	2.31	1,107	48
100-yr	7.5	2.32	1,401	50

The most obvious change is the reduction in peak flow capacity in the mainline Branch B tile. Landowners on Branch B will experience reduced capacity along the mainline Branch B due to the WASC OB affecting the tile outlet hydraulics. The proposed design from the 2018 Final Engineers Report would result in a reduction of approximately 14% of the peak tile capacity. The alternative of combining the proposed WASC OB B with the existing tile worsens the mainline Branch B capacity, causing a reduction of 63% in the peak tile capacity from existing conditions.



4. REVIEW OF M.S. 103E REQUIREMENTS

Drainage ditch projects, improvements, maintenance, and repairs are all regulated by the Minnesota Statutes 103E. As part of this review, we have the following items to bring to the County's attention.

A. RE-ESTABLISHMENT OF COUNTY DITCH RECORDS

At the August 19, 2019 Continued Final Hearing the Drainage Engineer presented to the Board that the existing tile was "no longer delivering its originally designed flow and is in need of repair" (Bolton & Menk 2019b). The Final Engineer's Report, Supplement to the Final Engineers Report (August 12, 2019), and Final Engineers Report Summary (August 19, 2019) all make reference to the "original design capacity" or "original design flow" however it is not explicitly stated what the original design was in 1917. These reports seem to assume the original design flow is based on the USDA Natural Resources Conservation Service (NRCS) recommendation for newly installed agricultural tile drainage. Given the assumed construction date of 1917, applying modern NRCS standards does not seem appropriate to assume the "original design flows."

At the Final Petition Hearing on September 23, 2019, it was noted that the original county ditch as-built records had been destroyed at some point in time and were no longer available. The landowners on Branch B have contested that while the design drawings show the system to be part of the JD24 system, those proposed improvements were never made, and the Branch B tile remains private. The Ditch Viewer recommended that following the fall harvest, that the Branch B tile be excavated to determine the size and location, on the basis that if a 12-inch tile was found, then the improvements must have been made in the 1950s when the landowners' easements were recorded and the system would be deemed private. If an 8-inch tile was found, as shown on the historic JD24 construction plans, then the system would be assumed public and part of the JD24 system.

On November 15, 2019 County Board members, Ditch Viewer, Drainage Engineer, and private landowners met on the properties of Marlene Baumgarn, Keith Tordsen, and Clifford Hayman to determine the status of Branch B mainline and laterals B1 and B2. They excavated portions of mainline Branch B and laterals B1 and B2. The results of the excavation showed that the tile size on Branch B was a 12-inch tile, indicating the improvements were made in the 1950s, not as part of the original JD24 construction. Of note, the inlet on lateral B1 was unable to be located at the time, nor was it located when originally surveyed in December 2014 by the Drainage Engineer.

Due to the ongoing dispute over ownership of Branch B, we request the County Board legally re-establish the county ditch records under M.S. 103E.101 Subd. 4a prior to any further improvements of the JD 24 system. It is imperative that the ownership of tile systems be established prior to any assessments or construction to avoid erroneous assessments or inadvertent takings of private property.

B. ADJOINING STATES

Under M.S. 103E.031, if the drainage authority determines it to be necessary to construct a drainage project at or near the boundary with another state, the adjoining drainage authority must pay its proper share of the necessary costs of the construction. In this case, as shown in the 2018 Final Engineer's Report, JD 24 Branch U extends under 100th Street into Osceola County, Iowa, where it is under the jurisdiction of County and Drainage District 1. While the proposed improvements are limited to Jackson County, the tile immediately downstream of 100th Street is proposed to be reduced in size from 8- to 6-inch.

We recommend providing Osceola County and Drainage District 1 with the opportunity to comment on the proposed improvements to avoid adversely impacting the upstream landowners' drainage rights. If it is deemed a benefit to these landowners, then there is an opportunity to further reduce the costs on the Jackson County landowners.

C. PETITION FOR IMPOUNDMENT

The proposed WASCOB on Branches B and T will be impounding water, however a petition for impounding drainage system waters has not been filed, as required under M.S. 103E.227. There are significant concerns that the addition of these



WASCOBs will adversely affect the drainage in the system when the basins are full of water by creating an increased tailwater or causing increased capacity limitations, as discussed earlier for Branch B.

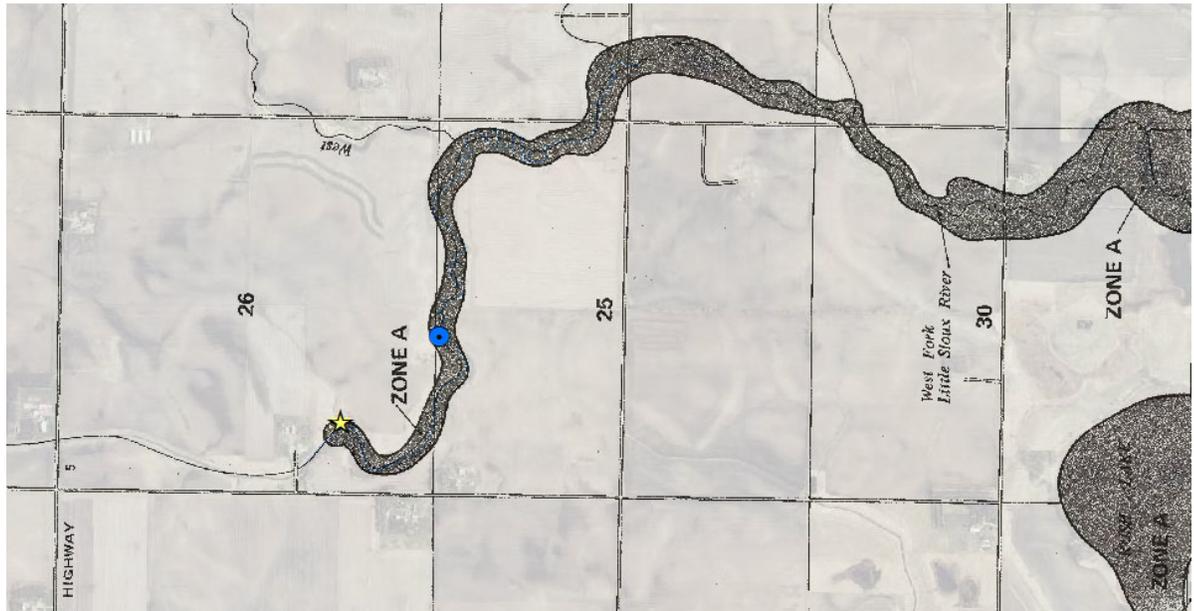
5. OUTLET IMPACTS

The JD24 system is mapped within the FEMA Special Flood Hazard Area Zone A (AKA the 100-year floodplain) of the West Fork Little Sioux River (Figure 2). Because the proposed improvements are not only altering the hydrology, but also the existing landscape with WASCOB B, we have evaluated the hydraulics at the JD24 outfall using HEC-RAS. Using the HydroCAD flows, modified to include the 100-year event, we developed a HEC-RAS model to evaluate the changes at the outfall due to the proposed improvements. The flows are provided in Table 6 below, taken from the outflow at HydroCAD Node 62R, it should be noted that the HydroCAD models became unstable when analyzing the 100-year event due to high water elevations. In particular, Node 59P (330th Ave) has a higher outflow (2,172 cfs) than inflow (1,355 cfs), indicating the model is unable to balance and the HydroCAD results may be invalid. It is recommended that the model be reviewed to increase storage and reduce these instabilities.

Table 6. HydroCAD Flows used in HEC-RAS Modeling

Design Event	Existing Conditions (cfs)	Proposed Conditions (cfs)	Change at JD24 Outfall (cfs)
2-yr	303.77	285.18	-18.6
5-yr	455.86	481.23	25.4
10-yr	610.43	644.00	33.6
25-yr	849.09	884.18	35.1
50-yr	1,061.82	1,106.55	44.7
100-yr	1,351.57	1,405.87	54.3

Figure 2. FEMA 100-Year Floodplain (FIRM Panel 2706320025B) with Proposed WASCOB (yellow star) and JD24 Outlet (Blue circle)



While the Drainage Engineer did not provide the 100-year results, they provided the HydroCAD models used in their analyses. We were able to add the 100-year design event of 7.50-inches of rain over a 24-hour period. This rainfall event was used to simulate the 100-year flood elevations in JD 24 from the Branch B outfall to the JD 24 outlet. The results of the HEC-RAS modeling at the JD24 outlet are provided in Table 7.



Table 7. HEC-RAS Water Surface Elevation Results at JD24 Outfall

Design Event	Existing Conditions	Proposed Conditions	Change at JD24 Outfall (ft)
2-yr	1483.14	1483.03	-0.11
5-yr	1483.79	1483.89	0.1
10-yr	1484.31	1484.4	0.09
25-yr	1484.82	1484.88	0.06
50-yr	1485.14	1485.2	0.06
100-yr	1485.54	1485.62	0.08

The results from the HEC-RAS analysis indicate that the JD24 outfall would experience an increase in water surface elevation of approximately 0.1-foot due to the proposed improvements upstream. At WASCOB B, there is a maximum increase of 0.33-ft due to changes in grading near the JD24 channel.

At the September 23, 2019 Continued Final Public Hearing, there was concern from residents of Sioux Valley Township that this project would increase the flows entering the West Fork Little Sioux River and exacerbate existing flooding concerns. The HydroCAD and HEC-RAS analyses both confirm that additional water would be sent downstream should this project be implemented.

ADDITIONAL CONSIDERATIONS

We offer the final additional items for the County's consideration.

A. EXISTING BRIDGES

In addition, upon review of the Minnesota Department of Transportation (MnDOT) Bridge Inventory, there are two county-owned bridges in the JD24 watershed that would be impacted by the proposed improvements. Bridge 95594 on 330th Avenue and Bridge 32575 on CSAH 5 (350th Avenue), both over JD24. The bridge inventories for these bridges have information regarding the design hydraulics and 100-year flood elevations, provided in Table 8.

Table 8. Comparison of Bridge Design Water Surface Elevations (WSE) and Final Engineer's Report HydroCAD Modeling

Bridge	Design Flow (cfs)	FER Existing Flow (cfs)	Design WSE	FER Existing Conditions WSE	Proposed Conditions WSE	Change from Design (ft)
95594 (330th Ave)						
100-yr	1,660	1,304.68	1502.8	1504.36	1504.64	+1.84
50-yr	1,380	1,036.17	1502.5	1502.74	1503.00	+0.5
32575 (350th Ave)*						
100-yr		1492.85	1492.85	1504.32	1504.62	+11.77

**The HydroCAD model did not have a node at this location – results have been estimated based on the up- and downstream nodes. MnDOT did not have the 50-year design flows or WSE available for Bridge 32575.*

The Supplement to the Final Engineer's Report (Nov. 20, 2019) indicates that proposed conditions will increase the water surface elevation at Bridge 95594 on 330th Avenue by 0.3-ft for the design event (50-years), but it may be closer to 0.5-ft compared to the bridge design elevation. As discussed above, the 100-year event was not provided in the supplemental information but has been estimated with the provided HydroCAD modeling. The drastic change in water surface elevations from the MnDOT Hydraulic Reports and the Final Engineer's Report modeling indicate a need to review the HydroCAD data more closely. Especially since Bridge 32575 is constructed in 2018, we recommend consulting with the Jackson County Engineer to validate the HydroCAD results in order to avoid adversely affecting these bridges.



B. WETLAND IMPACTS

The proposed JD24 improvements will impact 12 wetlands, in particular the wetland at the outfall of Branch B, where the proposed WASCOB B will be located. This wetland will be filled and the hydrology altered, making it likely that the County would need to purchase replacement credits from nearby wetland bank at a cost of roughly \$35,000 per acre of wetland credit. With a 2:1 replacement ratio, this single impact could cost over \$50,000, including the state-required withdrawal fee of \$4,000.

Figure 3. Location of proposed JD24 Improvements (yellow) and National Wetland Inventory wetlands (green)

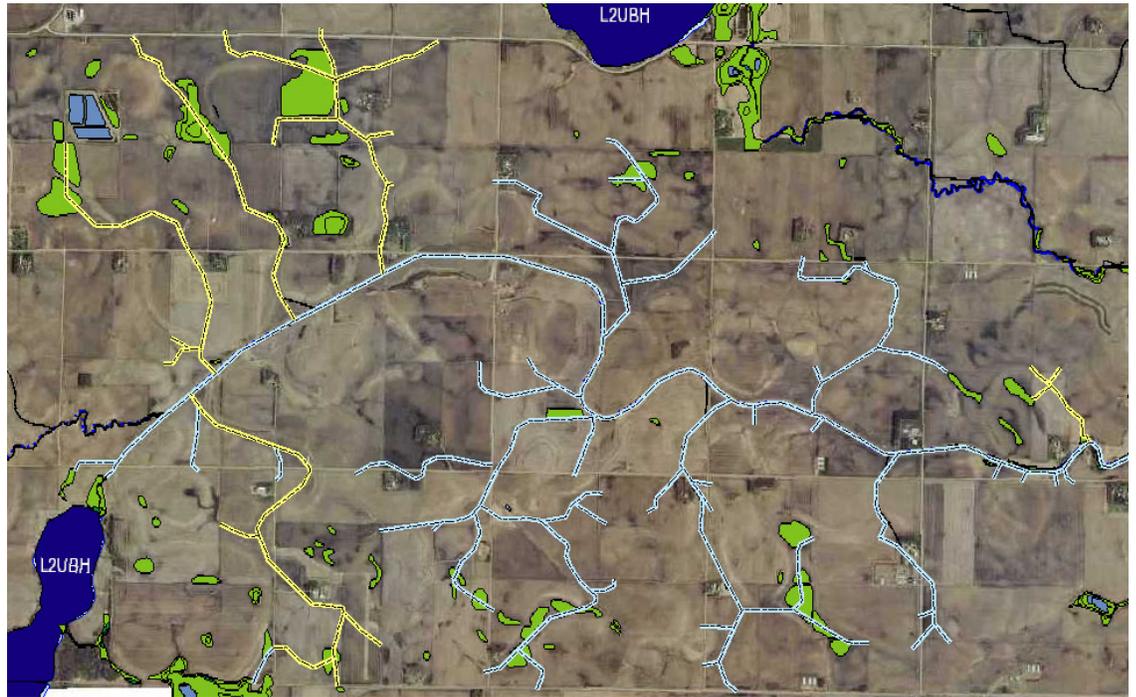
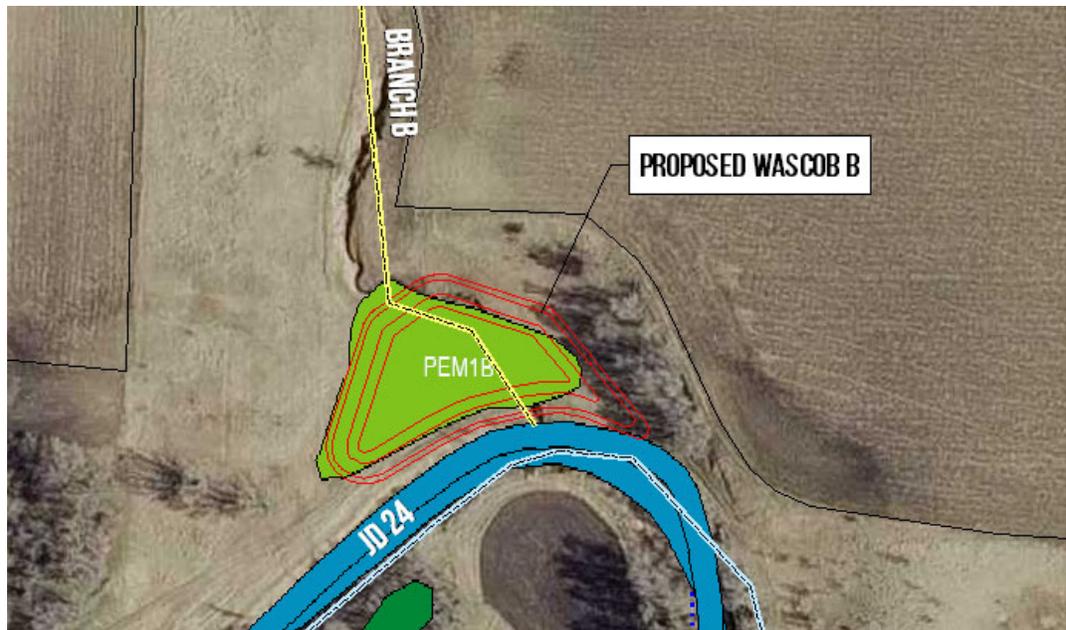


Figure 4. Proposed WASCOB B and National Wetland Inventory wetland impact.





CONCLUSION

We recommend the Board dismiss the petition until the drainage records are re-established and a final ditch profiles for Jurisdictional Ditch 24 and all its laterals are finalized. Without this foundational information it is difficult to say what repairs and improvements are warranted, as well as what the actual impacts of the improvements will be. The ongoing dispute over the status of Branch B is evidence that an impartial evaluation of County and landowner records should be conducted to re-establish the official record for future improvements and repairs.

The additional analyses completed by the Drainage Engineer has not made the case that the JD24 outlet has the capacity to handle the proposed flows without causing damage to downstream landowners. Redesign of the project or additional analyses are warranted to avoid harming these residents' property.

Finally, we recommend the proposed improvements on Branch B be removed from the project, as the November 15, 2019 field locate did not provide evidence of a system in disrepair; rather it showed the tile lines are in good condition and were larger than expected. Regardless, the County should revise the redetermination of benefits based on this new information.

Please do not hesitate to contact me by email (katy.thompson@respec.com) or telephone (612.219.8915) if you have any questions regarding the analysis completed.

Sincerely,

Katy Thompson, PE, CFM
Engineering Manager

KT:
Enclosure