

DATE: 8-23-2023 FILE REF: NA

TO: Mike Polkinghorn, Limit Calculator; Eric DeVenecia, Compliance Engineer

FROM: Madeline Roberts, Stream Biologist; Kristi Minahan, Water Quality Standards; Diane Figiel, Limit Calculator Coordinator

SUBJECT: Clover Sanitary District Permit Reissuance, Tributary (no WBIC) to L. Superior, Bayfield Co.

Overview of issue

Staff were asked to do a site visit in preparation for permit reissuance for the Clover Sanitary District. Clover SD discharges to a dry run which extends about 0.4 miles to Lake Superior. Permit limits have previously been based on protection for L. Superior using a 10:1 dilution ratio (limits did not account for the dry run/overland flow segment). The receiving water is not listed individually in NR 104 as LAL or LFF; however, if it is a diffuse surface water or wetland then it is automatically covered as LAL per ch. NR 104.02(3)(b)1. This discharge location has been described in various documents as a dry run ravine, overland flow, diffuse surface water, wetland, or direct discharge to Lake Superior. During the site visit staff were asked to document which of these best characterize the site. Clover SD is a non-continuous discharger, discharging for 2-3 weeks during the months of March-May, and for a little over a month during Sept.-Nov. The permitted maximum daily effluent flow rate is 0.117 MGD (0.217 cfs).

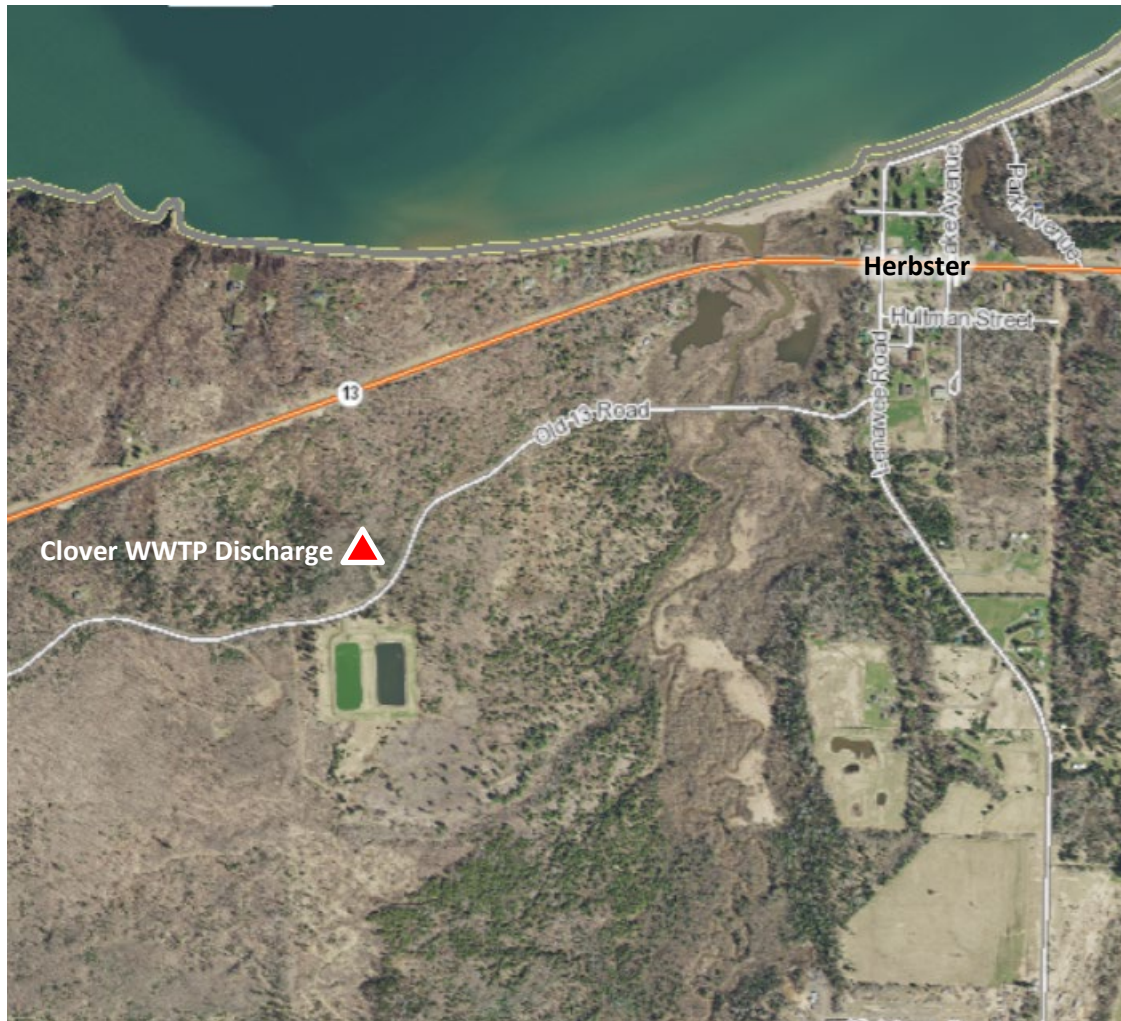
Summary of recommendations

- **Segment 1:** Overland flow (no WBIC) from outfall to dry run at Segment 1 (see Lidar, Map 2)
 - *Codified designated use:* Not listed in NR 104 as LAL or LFF
 - *Classification used for previous permit issuance:* NA (not considered in permit limits, which were based on L. Superior)
 - *Previous stream class recommendations:* The 2003 recommendation proposed LAL-“Diffuse surface water & wetland tributary”. This was based on a 2002 memo from biologist Pamela Stubbe.
 - *Modeled Natural Community:* NA
 - *New recommended Natural Community and Designated Use:* LAL-Diffuse surface water
- **Segment 2:** Unnamed Tributary (“Middle Branch”; no WBIC) upstream (south) of Highway 13 (see Lidar, Map 2)
 - *Codified designated use:* Not listed in NR 104 as LAL or LFF
 - *Classification used for previous permit issuance:* NA (not considered in permit limits, which were based on L. Superior)
 - *Previous stream class recommendations:* The 2003 recommendation proposed LAL-“Diffuse surface water & wetland tributary”. This was based on a 2002 memo from biologist Pamela Stubbe.
 - *Modeled Natural Community:* Macroinvertebrate (not including flow from the discharge)
 - *New recommended Natural Community and Designated Use:* NC: Macroinvertebrate NC. DU: LAL based on low flows, the macroinvertebrate community and wetland characteristics.
- **Segment 3:** Unnamed Tributary (“Main Channel”; no WBIC) from Highway 13 to L. Superior (see Lidar, Map 2)
 - *Codified designated use:* Not listed in NR 104 as LAL or LFF
 - *Classification used for previous permit issuance:* NA (not considered in permit limits, which were based on L. Superior)

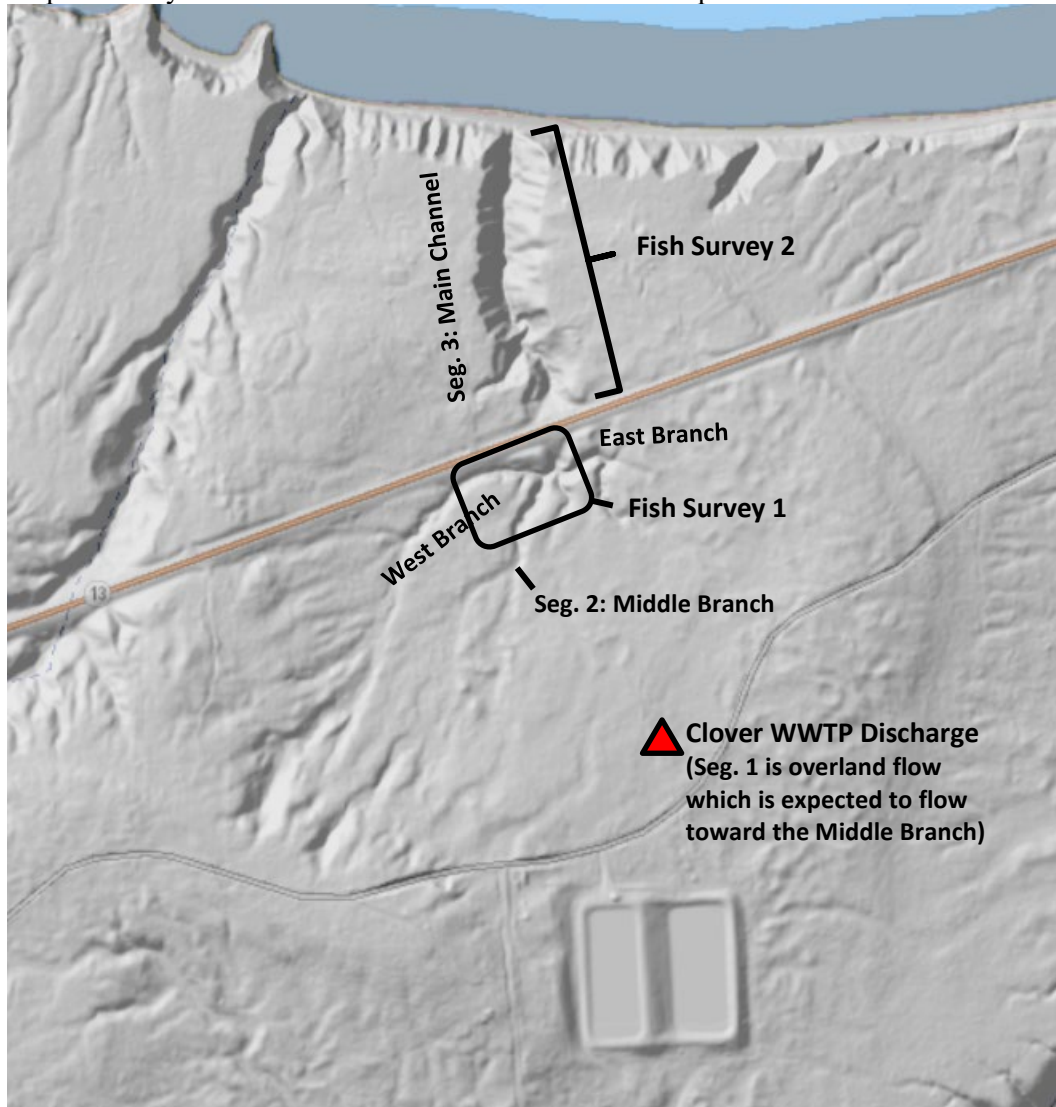
- *Previous stream class recommendations:* The 2003 recommendation proposed LAL-“Diffuse surface water & wetland tributary”. This was based on a 2002 memo from biologist Pamela Stubbe.
- *Modeled Natural Community:* Macroinvertebrate (not including flow from the discharge)
- *New recommended Natural Community and Designated Use:* NC: Macroinvertebrate. LAL based on low flows and macroinvertebrate community
- **Segment 4: Lake Superior**
 - *Codified designated use:* Coldwater (it is also a Class 1 Trout Water)
 - *Classification used for previous permit issuance:* Coldwater (Great Lake)
 - *Previous stream class recommendations:* NA
 - *Modeled Natural Community:* NA
 - *New recommended NC & DU:* No change: Coldwater

Site overview map

Map 1. Clover discharge location and surrounding area from Surface Water Data Viewer. The tributary is not shown as a waterbody on the Surface Water Data Viewer. See Map 2 for the discharge path.



Map 2. Survey locations on WI DNR LiDAR elevation map.



Site observations

- **Segment 1:** Overland flow (no WBIC) from outfall to dry run at Segment 1
 - The outfall could not be located on May 24, 2023. Clover SD was not discharging this day. The last day Clover discharged was May 7.
- **Segment 2:** Unnamed Tributary (“Middle Branch”; no WBIC) upstream (south) of Highway 13
 - Upstream of Highway 13 the tributary has three channels that combine into one channel before going under Highway 13 (Photo 4). Water was present in all channels, with the west branch having the most water (Photo 3). Iron bacteria were observed by the stream, indicating ground water influence. Marsh marigold were also present, which are a wetland species and indicate ground water influence as well. It is suspected that the middle branch receives the effluent from Clover SD, but that was not verified during this visit.
- **Segment 3:** Unnamed Tributary (“Main Channel”; no WBIC) from Highway 13 to L. Superior

- Downstream of Highway 13 the stream flows through a steep ravine with a limited floodplain. Large bank failures and down trees were present (Photo 7), as were large boulders. The best stream habitat for fish was present in the fish survey downstream of the culvert. Closer to the mouth the stream switched to subsurface flow, then resurfaced to flow into Lake Superior. A woody debris pile was in the main channel at the mouth of the tributary (photo 10), but water flowed under it and over a beach to Lake Superior. The stream characteristics indicate that it receives high volumes of water at times.

Fish survey results (if available)

Fish surveys were conducted on May 24, 2023 using a single backpack shocker (Table 1). This was outside of the standard sampling period, but the goal of the survey was primarily to determine whether a fish community was present to inform whether an LAL classification was appropriate.

Fish survey 1 was conducted upstream of Highway 13. It included the upper portion of the main channel for 25m, the west branch for 25m, and the middle branch for 25m. Because it was suspected that the west branch does not receive the effluent, effort was switched after 25m to the middle branch. After 25m on the middle branch, the stream became smaller and started to flow underground for sections so the survey was ended. No fish were collected. Fish survey 2 was conducted downstream of Highway 13 and was 100m. No fish were collected. Dead slugs were observed in both surveys, and dead frogs were noted in survey 2. Two live macroinvertebrates (dragonfly and damselfly larvae) were observed in survey 2.

Fish Survey Data for Unnamed Tributary to Lake Superior

Site	Water Temp. (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen % Saturation	pH	Conductivity (umhos/cm)	Transparency	Water Clarity	Fish Captured
Survey 1: US of HWY 13	9.0	11.95	104.2	7.4	431	>120	clear	0
Survey 2: DS of HWY 13	9.5	9.6	84.7	7.3	417	>120	clear	0

Table 1. Water Chemistry and fish data for fish surveys conducted on May 24, 2023.

Habitat Results

Upstream of Highway 13 the tributary was small but had good amounts of riffles and runs for its size (Photo1). Substrate consisted of cobble, gravel, and clayey sand (Photo 2). It has characteristics of a headwater stream. Depth could be a limiting factor for fish in this stretch. The west branch had better depth than the middle branch. Qualitative habitat score was 45 (Table 2). The culvert was in poor condition with the bottom on the upstream end rusted out and water flowing underneath the apron.

Downstream of Highway 13 the stream was larger and had good diversity of habitat within the survey area. Qualitative habitat score was 62. There were many riffles, run, and pools, some of which were deep (Photos 5-6). Depth was sufficient for fish. A lot of boulders, cobble, and gravel were present within the fish survey. The stream often dropped between six inches and up to a foot over boulders to a plunge pool due to the high gradient. These drops could make upstream movement difficult for fish. Downstream of the survey habitat was reduced as flows slowed, the stream became shallow, and then went underground (Photo 8). When the stream flowed again at the surface it was smaller than where the fish survey was

done (Photo 9). Fine sediments also increased downstream of the fish survey. Large bank erosion areas were observed below the fish survey.

Habitat Survey Results for Unnamed Tributary to Lake Superior

Site	Mean Stream Width (m)	Riparian buffer width	Bank erosion	Pool area	Width:depth ratio	Riffle:riffle or bend:bend ratio	Fine sediments	Cover for fish	Overall score
US of HWY 13	0.3	Excellent (15)	Good (10)	Poor (0)	Fair (5)	Good (10)	Fair (5)	Poor (0)	45
DS of HWY 13	0.5	Excellent (15)	Fair (5)	Good (7)	Good (10)	Good (10)	Good (10)	Fair (5)	62

Table 2. Qualitative habitat data for fish surveys conducted on May 24, 2023.

Discussion and Designated Use Recommendations

Note: Recommendations from this site visit are shown at the top of this memo.

- The unnamed tributary to Lake Superior likely has water outside of discharge events. There are indicators that groundwater feeds this system, as seen by the iron bacteria and marsh marigold upstream of Highway 13. In addition, the stream had water flowing during the site visit when no discharge was occurring. The flow may go subsurface at times, but sections of the stream likely still hold water. Dragonfly and damselfly larvae typically take a year or more to complete their life cycles, so their presence indicates that water is maintained in portions of the stream. Thus, the presence of water outside of discharge events and existing habitat currently supports a macroinvertebrate community.

Upstream of Highway 13 depth could be a limiting factor for fish in this area due to the stream's small size. Downstream of Highway 13 there is better depth, but a steep gradient has created boulder riffles and plunge pools with significant drops. The drops would make it difficult for fish to move upstream in this tributary. While there may be times fish could move upstream, currently they are not maintaining a presence in the stream.

Therefore, the current recommendation for DU is LAL as a macroinvertebrate community for the entire length of the unnamed tributary. It is suspected that the middle branch would receive effluent from Clover SD. Confirmation of the receiving channel should be done if listed in code.

- There is no WBIC for this tributary, and therefore no modeled natural community shown in the data viewer maps. Natural Community verification cannot be done at this time.

Are code changes and/or a Use Attainability Analysis needed?

- Segment 1: Overland flow fits the definition of a diffused surface water in ch. NR 104.02(1)(b): “*Diffused surface waters*: This classification includes any water from rains, intermittent springs or melting snow which flows on the land surface, through ravines, etc., which are usually dry except in times of runoff. [...]” Under ch. NR 104.02(3)(b)1, diffused surface waters are automatically classified as LAL per; the code states that LAL “shall be applied to all surface waters classified as effluent channel, wetland or diffuse surface water”. Because it is already covered as LAL in code

under the definition of diffused surface water, it would not necessarily need to be listed individually in code as LAL, but could be added for clarity.

- Segments 2 and 3 are both recommended to be LAL based on the steep gradient and drops making fish passage difficult, though it supports a macroinvertebrate community and has some groundwater influence. Segment 2 had wetland characteristics. We recommend these segments be added to ch. NR 104 as LAL.

Photo 1. "Middle branch" looking downstream.



Photo 2. "Middle branch" looking upstream.



Photo 3. "West branch" looking upstream.



Photo 4. "Main channel" upstream of Highway 13 looking upstream.



Photo 5. "Main channel" downstream of Highway 13 looking downstream.



Photo 6. "Main channel" downstream of Highway 13 looking upstream.



Photo 7. "Main channel" bank erosion downstream of Highway 13 looking upstream.



Photo 8. "Main channel" dry run downstream of Highway 13.



Photo 9. "Main channel" downstream of Highway 13 near the mouth looking upstream.



Photo 10. "Main channel" mouth flowing to Lake Superior.

