CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 5-6-2024 FILE REF: NA

TO: Mike Polkinghorn, Limit Calculator; Arthur Ryzak, Compliance Engineer

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

SUBJECT: Village of Gilman, Wetland Tributary (no WBIC) to Yellow River, Taylor County

Overview of issue

In preparation for reissuance of the Village of Gilman permit, staff were requested to do a site visit to determine the appropriate stream classifications for its receiving water. Village of Gilman is a continuous discharger, with an annual average flow rate of 0.125 MGD (0.193 cfs). Its receiving water is in ch. NR 104 as LAL-Diffuse surface water (length ~ ¼ mile). There are no permit limits for downstream protections for the Yellow River, under the assumption the effluent doesn't reach the Yellow River.

On October 18, 2023, Jon Kleist and Arthur Ryzak conducted a site visit and fish survey. The main objectives of this site visit were to determine whether (a) the wetland has become channelized, (b) the wetland/channel is capable of supporting fish, and/or (c) whether effluent would be likely to reach the Yellow River. This information is necessary for determining whether LAL is an appropriate classification and whether downstream protection limits for phosphorus are needed for the Yellow River. The facility has not been given phosphorus downstream protection limits in previous permits.

Summary of recommendations

- **Segment 1 (most upstream): Wetland Tributary from outfall to Yellow River**
  (Note that there is also a very short (~20-30 ft) channel from the outfall to Segment 1, which is also appropriately LAL.)
  - *Codified designated use:* LAL-Diffuse surface water: "Drainage area from Gilman lagoon to Yellow River"
  - *Classification used for previous permit issuance:* LAL
  - *Previous stream class recommendations:* 2003 recommendations were to keep the same extent as LAL but change the terminology to "Wetland tributary to Yellow River"
  - *Modeled Natural Community:* NA
  - New recommended Natural Community and Designated Use: Recommend maintaining LAL designation. Natural Community is recommended as macroinvertebrate. There is a defined stream channel present in the wetland. No fish were captured or observed in the survey from the point of discharge to a steep rocky channel near the Yellow River. The steep rocky channel is a physical barrier that prevents fish passage from the Yellow River upstream.
- **Segment 2: Yellow River (WBIC 2154500)**
  - Codified designated use: Not listed in ch. NR 104 as LAL or LFF, and not a Trout stream; defaults to full fish and aquatic life-Warmwater.
  - *Classification used for previous permit issuance:* No downstream protection limits were applied.
  - *Previous stream class recommendations:* NA
  - *Modeled Natural Community:* Cool-warm mainstem
  - *New recommended NC & DU:* Not assessed during this visit.

Site overview maps

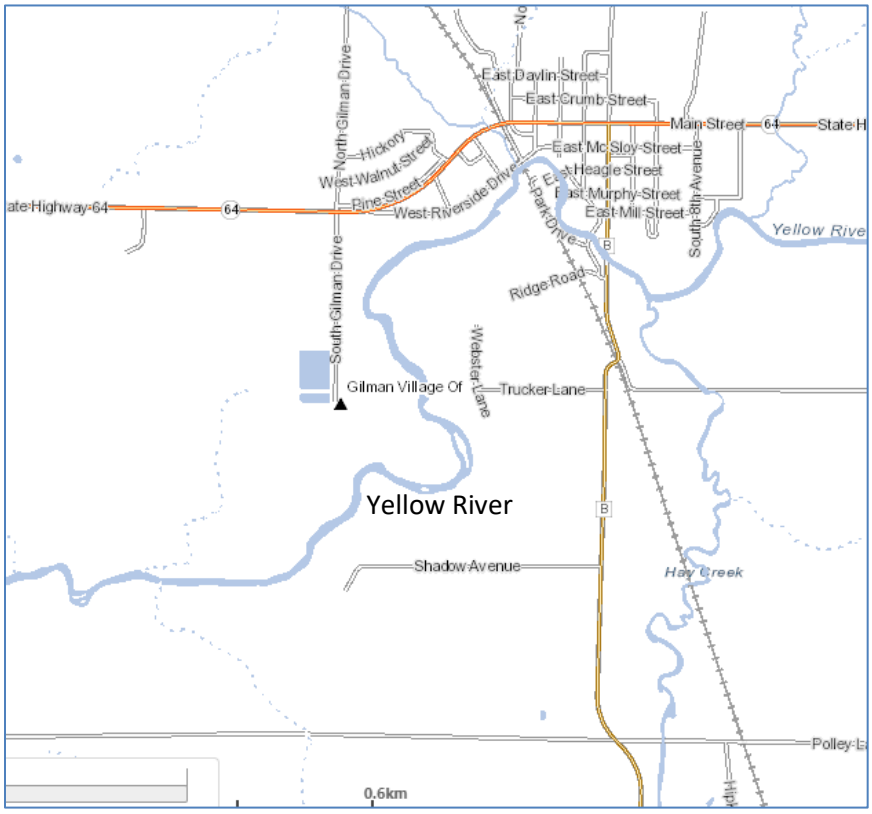

Figure 1. Location of Gilman WWTP relative to Yellow River and village of Gilman

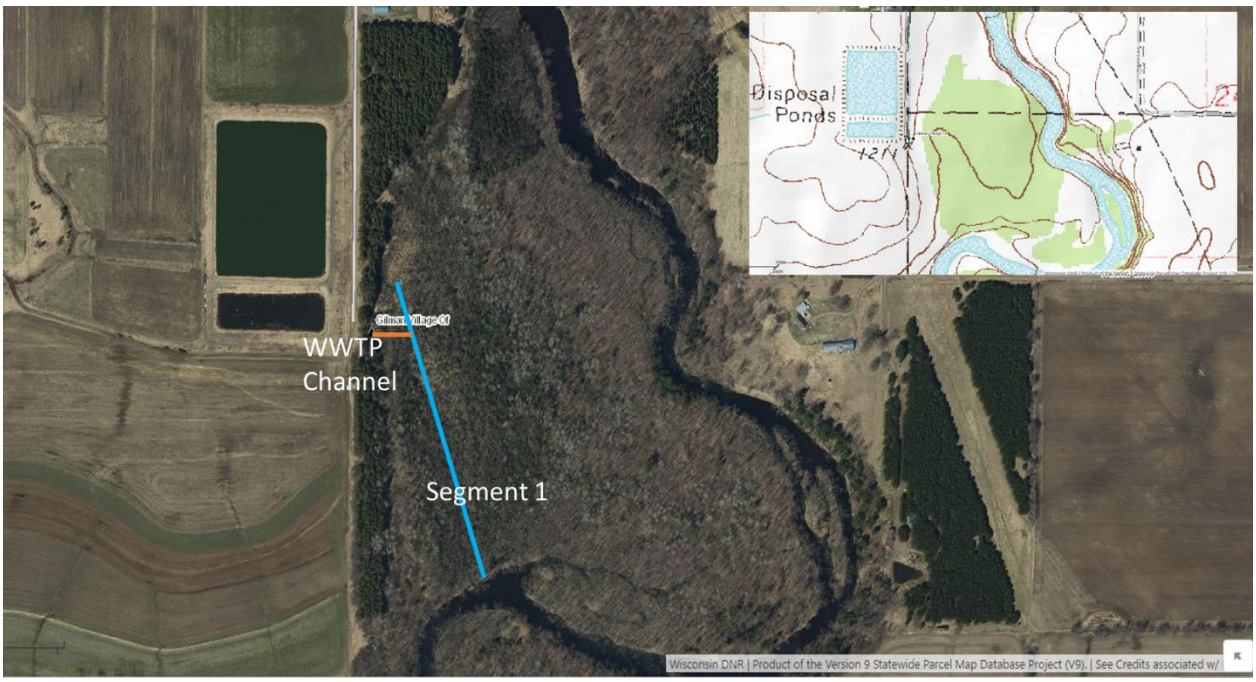

Figure 2. Approximate location of outfall and stream channel from Gilman WWTP to Yellow River

Site observations and habitat survey results (if available)

Segment 1: There is a well-defined channel in the forested wetland to which the WWTP discharges (blue line in Figure 2). The location of the channel is approximate in Figure 2 and is not mapped on the USGS 7.5 minute topography map (Figure 2 inset map). The channel was visible upstream of the point of discharge but increased in size after the addition of the effluent water. The channel was easy to follow from the discharge point to the Yellow River. See Figure 2 and photos.

- The channel was not ditched; it meandered gently though the wetland. It was approximately 3 to 4 feet wide and had depths up to 1 foot. Channel bottom was soft and mucky, typical of a wetland stream. Woody cover was the main habitat type for aquatic life.

Fish survey results (10-18-2023)

- A standard backpack shocker was used to look for fish through the entire reach from the outfall channel to the Yellow River. The stream was shocked from upstream to downstream due to limited access, which is not a typical survey method (normally surveys proceed downstream to upstream), and the date of the site visit, October 18, 2023, was outside of the index period for an IBI or natural community evaluation. The intent of the site visit was to determine if fish were present in the channel. No fish were observed in the channel. It seemed unusual to have such a large and defined channel without fish being present (Photo 4).
- Approaching the Yellow River, the channel disappeared from the surface and flowed through a cobble/boulder channel down a steep bank (Photo 5) before re-emerging to the surface into a plunge pool-like feature where it then continued about 20 or 30 feet to its confluence with the Yellow River (Photos 6-8) . The current channel condition must prohibit fish from navigating the steep rocky channel on the bank lip and colonizing the stream channel. A review of the floodplain maps shows the area is outside the 100-year floodplain. While it's difficult to interpret from the map panels it's likely the floodplain ends near the contour line at the top of the stream bank (see inset USGS Topo map in Figure 2). A flood event greater than the 100 year event may overtop the stream bank and fish could then navigate upstream into the channel. However, they have not been able to establish or maintain a population or one would have been observed during the October site visit.
- The 20 or 30 foot segment of channel from the base of the steep rocky channel to the Yellow River did have a minnow population present in October of 2023. A couple creek chubs were observed in that segment of channel. Any fish species present in the Yellow River could potentially navigate that small reach of channel.
- A fish habitat evaluation form was not completed as no fish were captured in the survey. The stream has a defined channel with adequate water to sustain a macroinvertebrate community. Natural Community should be a macroinvertebrate stream.

Discussion and Designated Use Recommendations

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

The unnamed tributary to the Yellow River to which the Gilman WWTP discharges has a clearly defined channel that exists upstream of the short outfall channel and extends to the Yellow River. At the October 18, 2023 site visit, the channel flow visibly increased in volume after the addition of the WWTP effluent. The channel dimensions were approximately 3 to 4 feet wide with depths up to a foot or more in places. The stream bed was generally mucky and soft, typical of a wetland stream. Moving downstream, there was a point within approximately 30 or 40 feet of the Yellow River where the topography changed, and the stream gradient increased. The water then left the land surface and flowed down a steep bank between large rocks. The steep rocky bank likely resulted from stream erosion over time exposing the

rocks, and addition of rocks to prevent further erosion. It emerged in a plunge pool at an elevation just slightly higher than the Yellow River. The stream then turned abruptly to the southwest and traveled about 20 or 30 feet to its confluence with the Yellow River.

The entire distance from the point of the WWTP discharge to the Yellow River was surveyed and no fish were observed in the stream channel upstream of the plunge pool near the Yellow River, as previously described (Photo 5). Fish were observed in the short segment of stream between the plunge pool and the Yellow River. The topography prohibits fish from entering the stream (above the steep rocky slope) except during large flood events, and this portion of the stream does not currently support a fish population. The infrequent ability for fish to access the stream from the Yellow River and low flows or low oxygen levels typical of wetland stream likely keeps a fish population from being established. Currently the stream should be classed as a macroinvertebrate stream and LAL. If the channel dimensions were to change and the rocky channel eliminated to allow fish passage from the Yellow River, a new assessment should be conducted, and the reach should be reevaluated.

The site visit confirmed that the effluent from the WWTP reaches the Yellow River, and therefore downstream protection limits should be applied. This was confirmed visually in the field and by the amperage and voltage readings on the backpack shocker. A multimeter with a conductivity probe was placed in the effluent channel at the discharge pipe and the readings were over 1000 µS. This is a very high conductivity value for this area. A typical conductivity value for streams in the area would be expected to be around 100 to 200. The conductivity of the effluent water would affect the voltage and amperage values of the backpack shocker (as conductivity increases, fewer volts are needed to get higher amps). Based on the volts and amps, conductivity values likely remained high throughout the unnamed tributary. Both the volts and amps dropped significantly (indicating lower conductivity) when the backpack shocker probe was placed in the Yellow River where the water from the Yellow River diluted the effluent. This confirmed that the effluent reached the Yellow River.

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

The unnamed tributary is already in code as LAL-Diffuse surface water. Because the channel is not able to support fish due to the steep rocky gradient, LAL is appropriate to maintain. However, with continuous flow from the facility, the site doesn't meet the definition of diffused surface waters, so the hydrologic category should be changed from diffuse surface water to continuous. Note that because of the existing channelized flow, it should be considered a stream designated use rather than having the "wetland" designated use applied. Neither of these points change the application of the LAL designated use in this case.

Photos

The first three photos are from Arthur Ryzak's Wastewater Facility Inspection Report dated 6-28-2023; photos taken during his 6-22-2023 site visit. The remaining photos are from Jon Kleist and Arthur Ryzak's site visit on 10-18-2023 visit.

Photo 1 (Ryzak, 6-2023). Effluent outfall.

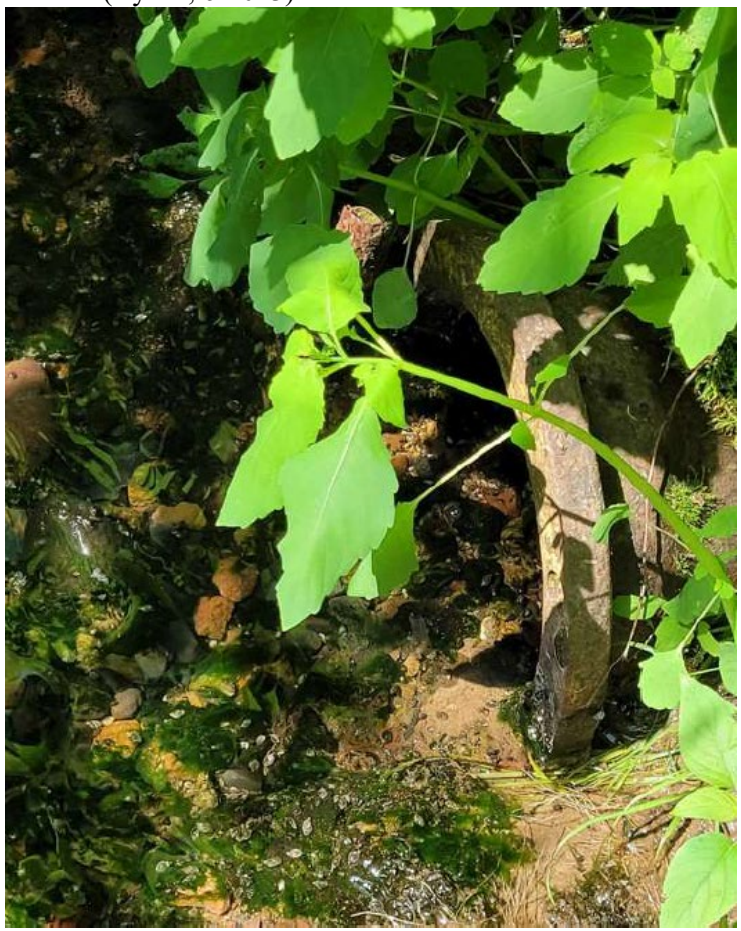

Photo 2 (Ryzak, 6-2023). Effluent outfall water detail.

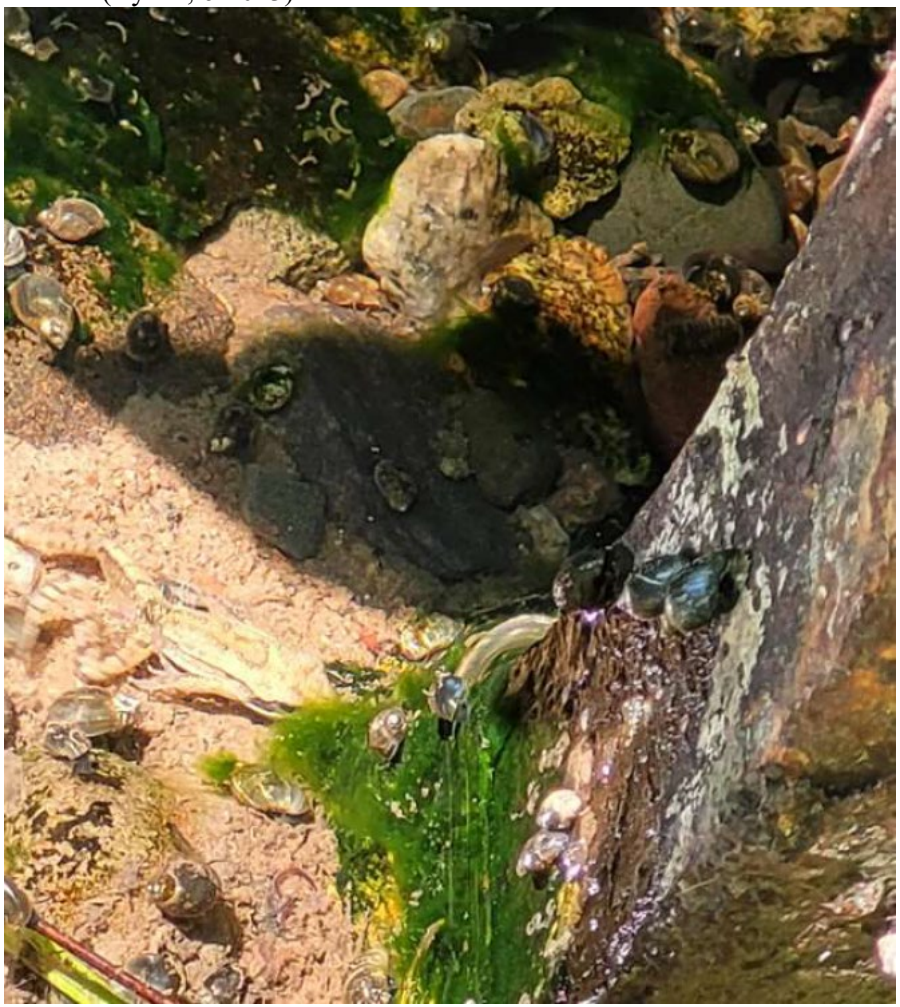

Photo 3 (Ryzak, 6-2023). Outfall to wooded wetland.

Photo 4 (Kleist, 10-2023). Stream in the forested wetland.

Photo 5 (Kleist, 10-2023). View from the bottom of the rocky channel looking upstream at the plunge pool and rocks. Plunge pool in foreground.

Photo 6 (Kleist, 10-2023). Looking upstream midway along the channel from the Yellow River toward the rocky slope. Plunge pool visible top right of photo.

Photos 7-8 (Kleist, 10-2023). Confluence with Yellow River. The connection with the Yellow River at this point allows fish to move upstream to use this small stretch of stream (~20-30 ft) to plunge pool in photos 5 and 6.

Photo 7. Looking downstream mid-channel toward Yellow River.

Photo 8. Confluence with Yellow River.