

DATE: 10/18/2023

FILE REF: NA

TO: Nicole Krueger, Limit Calculator; Nick Lent, Compliance Engineer

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

SUBJECT: Grand Geneva Resort & Spa, Wetland channel (SWIMS Station 10058272) to Como Creek (WBIC 757600), Walworth County

Overview of issue

In preparation for reissuance of the Grand Geneva permit, staff were requested to do a site visit to determine the appropriate stream classifications for the receiving waters. Grand Geneva is a continuous discharger, with an annual average design flow of 0.4 MGD (0.62 cfs), with an actual average around 0.1 MGD (0.15 cfs).

Grand Geneva's effluent flows into a holding pond which has an outlet structure on the northeastern corner from which flow splits into two directions (see maps/aerial images below). The majority flows through a pipe that goes north under the golf course to discharge via an outfall pipe in the woods directly north of the facility. A portion of the effluent may flow from the holding pond northeast to a larger pond ("golf pond"), which has a dry overflow channel that connects to the outfall pipe area. The pipe discharges in the woods to a very short wooded stretch which flows to the wetland to its north (Segment 1, SWIMS Station 10058272). The wetland is adjacent to both Como Creek (Segment 2, WBIC 757600) and the White River (WBIC 751200); Como Creek is a tributary to the White River, and the wetland is situated immediately southwest of the confluence of the two. Depending on the flow path that the effluent takes through the wetland before reaching Como Creek, the distance from the outfall to Como Creek is likely between .25 and .4 miles. The White River eventually flows into the Southeast Illinois Fox River. Upstream of the outfall is a small rock-lined channel that may carry overflow from a golf pond occasionally. None of the segments are listed as Limited Aquatic Life or Limited Forage Fish (LAL, LFF) in ch. NR 104, Wis. Adm. Code.

The facility's previous permit limits were based on LAL for a wetland contiguous with Como Creek and the White River. No downstream protection limits for phosphorus or ammonia were included because it was assumed that the effluent doesn't make it to downstream waters. However, we revisited that assumption with this site visit, as the Fox-IL TMDL necessitates a determination of whether the TP is reaching those streams/ivers.

The facility has BOD limits of 15 weekly average and 10 monthly average, these are more stringent than standard limits for LAL or LFF but less stringent than for warmwater; these limits would need to be retained due to antibacksliding. The facility discharges relatively low BOD. They have DO limits of 4 based on LAL but have had problems meeting those. Adding re-aeration after clarification might be useful to address remaining DO issues.

Rachel Sabre and Loretha Jack did a site visit and fish survey on 7/24/2023. The main objectives of this site visit and accompanying review were to:

- Determine whether the receiving water is appropriately classified as wetland and whether LAL-based limits are appropriate, based on fish and habitat surveys in the channelized portion before entering the larger wetland.
- Consider whether there is enough connectivity through the wetland that effluent is likely to enter Como Creek and/or the White River, for purposes of wasteload allocation and phosphorus limits under the Fox-IL TMDL.

Summary of recommendations

- **Segment 1 (most upstream, SWIMS Station 10058272): Channel from outfall to larger wetland**
 - *Codified designated use:* Not individually listed as LAL or LFF in ch. NR 104, but could be LAL based on Wetland category
 - *Classification used for previous permit issuance:* LAL-Wetland.
 - *Previous stream class recommendations:* NA
 - *Modeled Natural Community:* NA
 - *New recommended Natural Community and Designated Use:* LAL-Wetland designated use (we don't currently have an NC for wetlands but the Macroinvertebrate NC may apply).
- **Segment 2: Wetland between outfall channel and Como River**
 - *Codified designated use:* Not individually listed as LAL or LFF in ch. NR 104, but could be LAL based on Wetland category
 - *Classification used for previous permit issuance:* LAL-Wetland.
 - *Previous stream class recommendations:* NA
 - *Modeled Natural Community:* NA
 - *New recommended Natural Community and Designated Use:* LAL-Wetland designated use (we don't currently have an NC for wetlands).
- **Segment 3: Como Creek (WBIC 757600) from wetland to White River**
 - *Codified designated use:* Warmwater (Not in code as LAL/LFF; not Trout water)
 - *Classification used for previous permit issuance:* Not considered in permit (there are no limits based on downstream protection).
 - *Previous stream class recommendations:* NA
 - *Modeled Natural Community:* Warm Headwater
 - *New recommended NC & DU:* Not surveyed. We recommend that downstream protection limits for phosphorus are included in the permit for Como Creek and the White River.

An additional stream survey could be done in the future in the short wooded stretch just below the outfall to verify whether it supports a fish community.

Site observations and habitat survey results (if available)

- **Segment 1: Channel from outfall to larger wetland**
 - Segment 1 originates at the outfall and travels north through a short wooded stretch (~40 meters). The outfall has created a small plunge pool approximately 10 foot at it widest and approximately 1 foot in depth. Three small fish (did not identify species) were seen in this pool area. The water flows north through the wooded area meandering in an approximately 4-foot-wide channel with an average 3-4 inches of water depth. Substrate in the channel consisted of mostly soft sediments and sand.
 - Downstream of the outfall approximately 40 meters, the channel enters into a wetland area that the channel meanders through. The channel transitions quickly from sand and small gravel substrate at the beginning of the wetland area to being dominated by soft sediments.

The channel ranges from 1.5 foot to 2.5 foot wide in the wetland area for the 60 additional meters of channel accessed during the survey. On average the water was 1 foot in depth with an average of 5 inches of soft sediment on the bottom. The channel was overgrown with vegetation (reed canary, cattails, nettles, sedges and other wetland plant species) that had to be swept to the side to complete the fish survey. One snapping turtle was found at the start of the survey station in the wetland; it was buried in the soft sediments of the channel. Angelica was also observed which is typically found in areas of groundwater discharge.

- Instantaneous water quality measurements were taken as follows:
 - At the outfall: Temperature: 20.2C, pH:7.84, DO: 4.07mg/L, DO % Sat: 45.5, Spec Cond: 1588
 - 100 meters downstream of the outfall at the start of the fish station: Temperature: 21.2C, pH:7.83, DO: 2.95mg/L, DO % Sat:33.5, Spec Cond: 1593
- The qualitative habitat survey for streams less than 10 meters wide was completed for this segment/station. The score was 55, which is in the Good condition category. Although it had a good score, 30 of those points were contributed by the adjacent undisturbed wetland corridor and well-vegetated banks protecting from bank erosion. However, habitat for fish is severely limited because the channel has minimal flow, extensive sediments, and aquatic vegetation impeding the channel. Habitat survey is attached.
- **Segment 2: Wetland between outfall channel and Como Creek.**
 - Did not enter the wetland beyond the start of the fish survey station, which is described above. Topography shows that there's a consistent slope through wetland toward Como Creek (not a sunken wetland), so effluent should flow through.
- **Segment 3: Como Creek from wetland to White River**
 - Did not observe.

Fish survey results (if available)

A fish survey was conducted on 7/24/2023 in the wetland portion of the stream, for about 60 meters. No fish were captured in this survey. However, the backpack shocker failed at the transition from wetland to woodland and so we were not able to complete the 100 meter survey in the wooded, wider area closer to the outfall (~40 m). A few fish were observed close to the outfall. Fish may occasionally enter this stretch by the outfall from the golf course pond (did not survey) when it overflows via a rocky channel, but limited habitat upstream and downstream from this stretch likely prevents a fish community from establishing.

Discussion and Designated Use Recommendations

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

- As a result of the surveys completed on 7/24/2023 for fish, water quality, and habitat, the designation of LAL-Wetland is concurred with. We would not expect the short channel to support a fish community. No fish were captured during the electrofishing event; however, 3 small fish were visually observed near the outfall. These fish are most likely highly tolerant species, as the dissolved oxygen levels in the channel ranged from 2.95-4.07 mg/L. It was concluded that most likely the few fish may have entered this area during a previous high flow event that moved fish from the golf pond through an established dry channel (see photos of rock lined channel below) to this outfall channel, and that they were able to survive for a time near the small plunge pool at the outfall. Although it was not observed during the site visit, the channel that enters the wetland most likely becomes diffused and non-channelized enough, and/or highly vegetated with plant material, to prevent fish migration from downstream Como Creek. Because Segment 1 is a short stretch that is mostly wetland and lacks connectivity upstream and downstream to fish sources (except occasionally strays), it is unlikely to support a fish community.

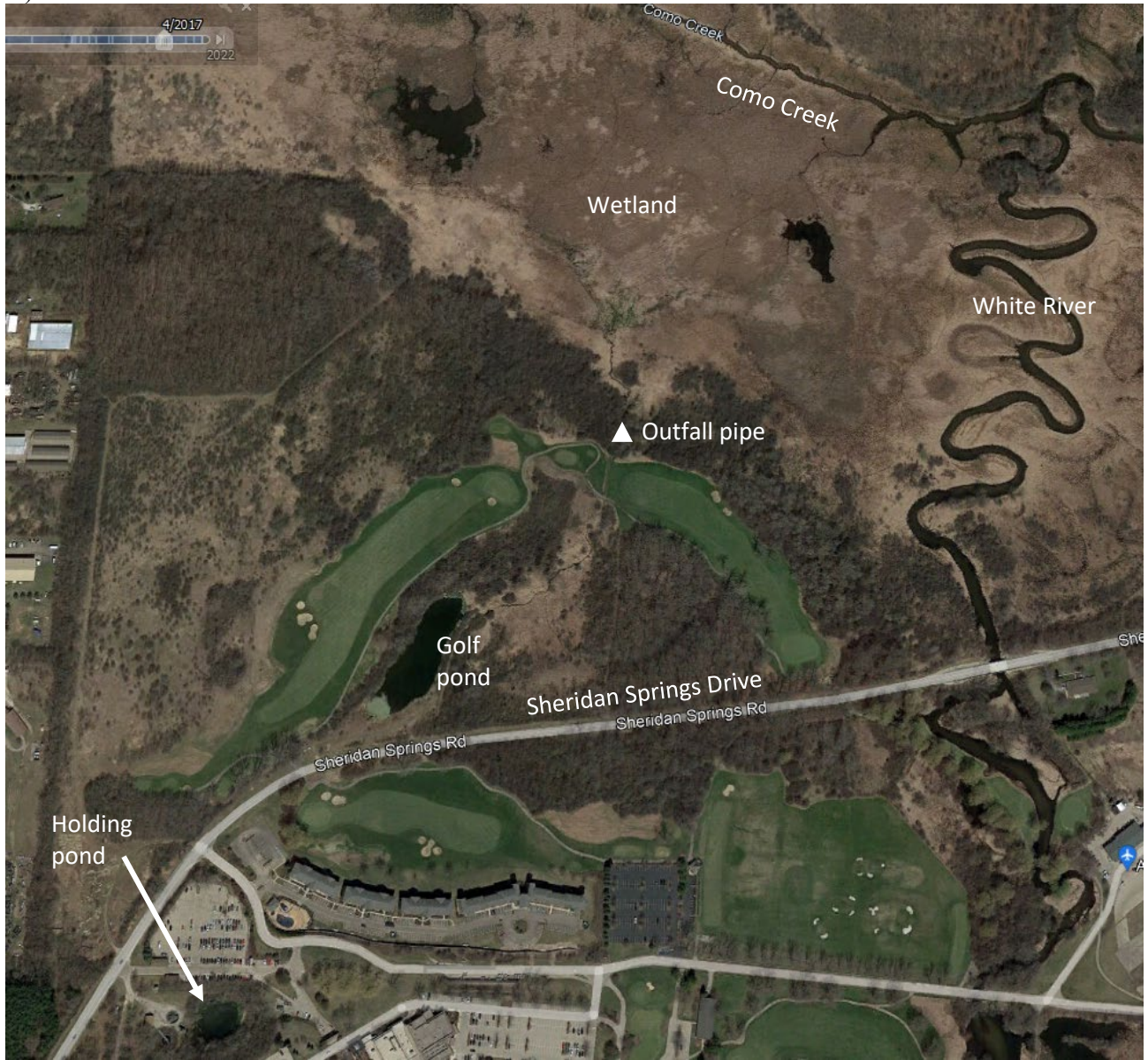
- Channels through the wetland are evident on the aerial maps, and although they may become diffuse through portions of the wetland corridor, the effluent most likely reaches Como Creek due to the short distance to Como Creek. Therefore, permit limits based on downstream protection are recommended.

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

We recommend that Segments 1 and 2 be classified as wetland and that LAL is therefore applied to them. Although Segment 1 has a channel, it is a short stretch that is mostly wetland and its lack of connectivity upstream and downstream to fish sources makes it unlikely to support a fish community. We therefore feel that LAL-Wetland is the most appropriate category for this stretch. Section NR 104.02(3)(b) states that LAL includes “all surface waters classified as effluent channel, wetland or diffuse surface water.” Because wetlands are included in the LAL category per code, Segment 1 and 2 do not necessarily need to be added to the NR 104 tables but we recommend that they are added for clarity. The proposed LAL portion could read: “From the outfall at T2 R18E S20 NEQ of the SWQ through the wetland to Como Creek.” This would require a code change.

Site overview maps

Map 1. Aerial photo (Google Earth) showing overview of area and receiving waters. (Closer view in Map 2.)



Map 2. Aerial photo (Google Earth) showing closer view of flow path and which stretch was shocked for fish.



Map 3. Two possible flow paths to Como Creek. Channels through the wetland are evident in aerial photos, indicating connectivity of flow. Path to the left is ~.4 mi; path to the right is ~.25 mi. Google Earth April 2017 image.



Photos

Photo 1. Upstream of the outfall (looking south) is a dry, rock-lined overflow channel from a golf pond across the golf course, to the area where the outfall is located.



Photo 2. The outfall pipe is in a small wooded area adjacent to the golf course area shown in Photo 1. Stream was widest here (10 ft wide, 1 ft deep) and a few fish were observed by the outfall but we were not able to shock this area due to equipment failure.



Photo 3. Runs through a wooded thicket for a short distance (~40 meters).



Photo 4. Channel emerges from wooded area into open wetland area with tall vegetation. Channel becomes very narrow (on average channel was 2.5 ft wide by 1 foot deep with approx. 5 inches of soft sediment on bottom of the channel). No fish found in wetland area.



Photo5. Channel just after entering the wetland area, has some sand/gravel bottom here for a short stretch. Large amounts of duckweed encountered here as well.



Photo 6. Channel through the wetland was covered by vegetation and difficult to find. Mucky bottom. (Here, vegetation has been trampled down to access it.)



Photo 7. Channel in wetland was about 1-1.5 ft deep. One snapping turtle was encountered.



Photo 8. View of wetland, which is very large and continues beyond the stand of trees. Don't know whether/how far channel extends (but see aerial photo, Map 3).



Instructions: Bold fields must be completed. Record all measurements in metric units.

Station Summary

Stream Name <i>Trib to Como Creek</i>	Waterbody ID Code <i>NA</i>	SWIMS Station ID <i>10058272</i>	FH Database ID <i>NA</i>
Date (MMDDYYYY) <i>07242003</i>	Station Name <i>DS of Grand Geneva Outfall</i>		
Latitude - Longitude Determination Method Used			Datum Used <i>SWOV aerial photos</i>

from aerial photos

Start Latitude <i>42.61685</i>	Start Longitude <i>-88.40222</i>	End Latitude <i>outfall</i> <i>42.61607</i>	End Longitude <i>-88.40214</i>	County <i>Walworth</i>
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Water Characteristics

Time (24-hr clock) <i>09:48</i>	Air Temperature (C)	Water Temperature (C) <i>20.2</i>	Conductivity (µs/cm) <i>1588</i>	Transparency (cm) <i>-</i>
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Outfall

Dissolved Oxygen (mg/l) <i>4.07</i>	Dissolved Oxygen % Saturation <i>45.5</i>	pH <i>7.84</i>
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Flow (m³/sec) <i>NA</i>	Water Level (check one - measure distance if Above or Below Normal): <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Below: _____ (m) <input type="checkbox"/> Above: _____ (m)	Water Clarity: <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Turbid <input type="checkbox"/> Stained
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Channel and Basin Characteristics

Mean Stream Width (m) <i>(2 Feet)</i> <i>0.61m</i>	Station Length (m) <i>100m (only checked 60m)</i>
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Channel Condition: (check one) <input type="checkbox"/> Natural <input type="checkbox"/> > 20-year-old Channelization <input type="checkbox"/> 10- to 20-year-old Channelization <input type="checkbox"/> < 10-year-old Channelization <input type="checkbox"/> Concrete Channel

Percent Channelization	Sinuosity	Gradient (m/km)	Stream Order	Basin Area (km²)
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Comments / Notes

Reading @ outfall

DO Start Station

temp.	20.2°C
DO	45.5%
%O	4.07 mg/L
Sp. Cond	1588
pH	7.84

21.2 temp
33.5 %O
2.95 mg/L
1593 spec cond
pH/7.83

Fish by outfall

Notes: No fish data sheet as - no fish captured during electrofishing event. Backpack shocker stopped working around 60m. Did observe a snapping turtle in stream over the start of the station. Also observed 3 small fish @ outfall while taking no measurement with YSI probe. Did not ID fish species.

Wadable Stream Qualitative Fish Habitat Rating for Streams < 10 m wide

Form 3600-532A (R 6/07)

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Rating Item	Excellent	Good	Fair	Poor	Score
Riparian Buffer Width (m) Width of contiguous undisturbed land uses; meadow, shrubs, woodland, wetland, exposed rock	Riparian zone well protected; buffer wide (> 10.0 m)	Riparian zone protected, but buffer width moderate (5.0 - 10.0 m)	Riparian zone moderately disturbed, buffer narrow (1.0 - 4.9 m)	Most of the riparian zone disturbed, buffer very narrow or absent (< 1.0 m)	15
	15	10	5	0	
Bank Erosion Width of bare soil on bank, along transects	No significant bank erosion; < 0.20 m of bank is bare soil	Limited erosion; 0.20 - 0.50 m of bank is bare soil	Moderate erosion; 0.51 - 1.0 m of bank is bare soil	Extensive erosion; > 1.0 m of bank is bare soil	15
	15	10	5	0	
Pool Area % of stream length in pools	Pools common; wide, deep, slow velocity habitat, balanced by other habitats; 40 to 60% of station	Pools present; not frequent or over-abundant; 30 to 39% or 61 to 70% of station	Pools present, but either rare or overly dominant, few other habitats present; 10 to 29% or 71 to 90% of station	Pools either absent or dominant, not balanced by other habitats; < 10% or > 90% of station	0
	10	7	3	0	
Width:Depth Ratio Average stream width divided by average thalweg depth in runs and pools	Streams very deep and narrow; width/depth ≤ 7	Stream relatively deep and narrow; width/depth 8-15	Stream moderately deep and narrow; width/depth 16-25	Stream relatively wide and shallow; width/depth > 25	15
	15	10	5	0	
Riffle:Riffle or Bend:Bend Ratio Average distance between riffles or bends divided by average stream width	Diverse habitats; meandering stream with deep bends and riffles common; ratio < 10	Diverse habitats; bends and riffles present, but not abundant; ratio 10 to 14	Habitat diversity low; occasional riffles or bends, ratio 15 to 25	Habitat monotonous; riffles or bends rare; generally continuous run habitat; ratio > 25	5
	15	10	5	0	
Fine Sediments % of the substrate that is < 2 mm (sand, silt, or clay)	Fines rare or absent, < 10% of the stream-bed	Fines present but limited, generally in stream margins or pools; 10 to 20% of stream bed	Fines common in mid-channel areas, present in riffles and extensive in pools; 21 to 60%	Fines extensive in all habitats; > 60% of stream bed covered	0
	15	10	5	0	
Cover for Fish % of the stream area with cover	Cover/shelter for fish abundant; > 15% of stream	Cover common, but not extensive; 10 - 15% of stream	Occasional cover, limited to one or two areas; 5 - 9% of stream	Cover rare or absent; limited to < 5% of stream	5
	15	10	5	0	
				Total Score	55