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Mr. Steven Hyde
President & CEO
Genesee County Economic Development Center
99 MedTech Drive
Batavia, New York 14020

SUBJECT: STAMP WASTEWATER TREATMENT FACILITY FORCE MAIN DISCHARGE INTO OAK ORCHARD CREEK GENESEE COUNTY, NEW YORK

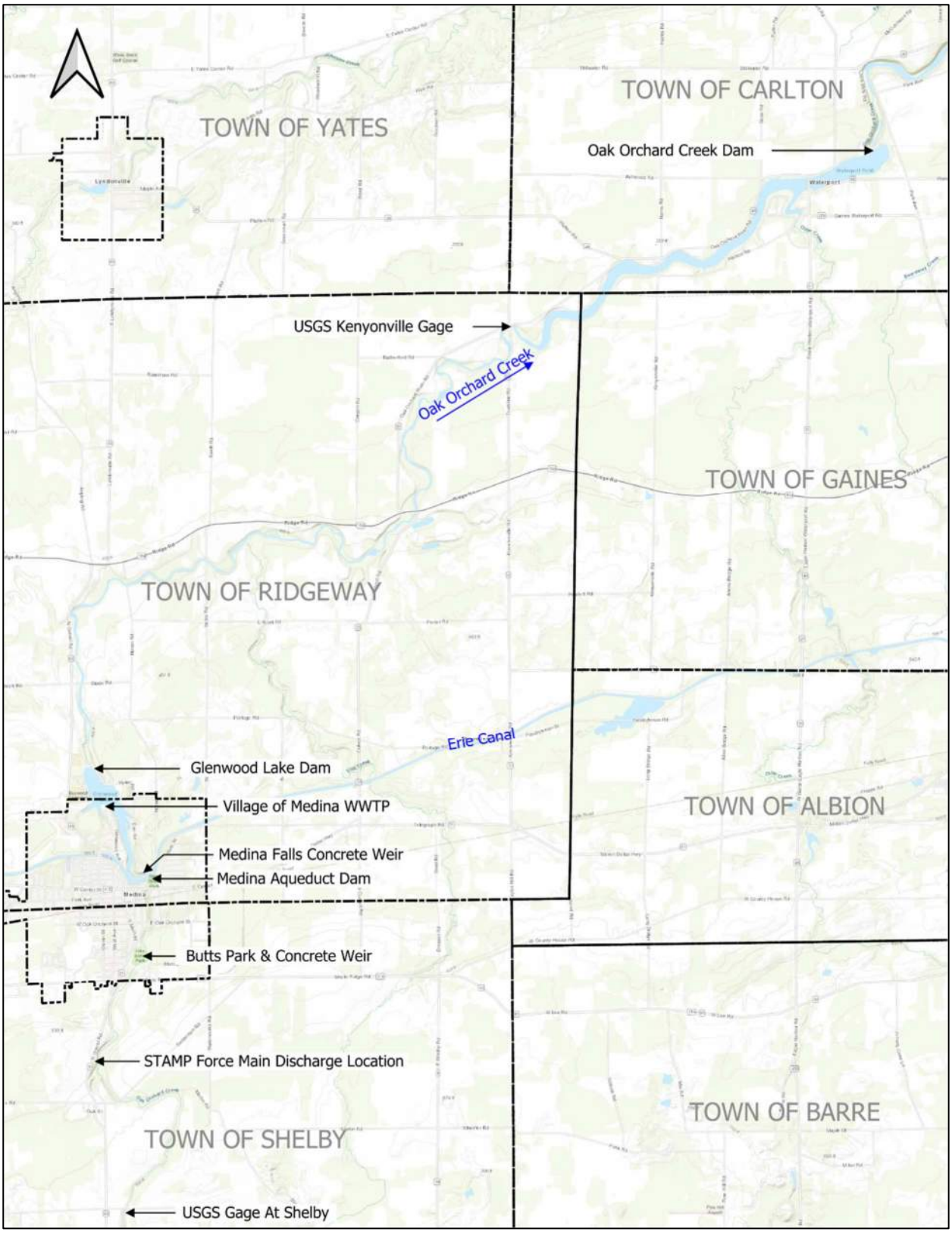
Dear Mr. Hyde,

As you are aware, JM Davidson Engineering, D.P.C., (JMD) was a subconsultant to CPL Architecture, Engineering, and Planning (CPL) during the design of the wastewater treatment facility (WWTF) for the Science & Technology Advanced Manufacturing Park (STAMP) located in Genesee County. Our role in the project was to perform a hydrologic and hydraulic analysis of Oak Orchard Creek to determine if the proposed discharge from the STAMP WWTF would have an impact on flooding in areas downstream of the force main discharge location. The details of that study are presented in the *STAMP Discharge Analysis to Oak Orchard Creek* report dated May 22, 2020, prepared by JMD for the Genesee County Economic Development Center (GCEDC). The report summarized that the proposed peak discharge from the STAMP force main of 6 MGD (9.3 cfs), which is roughly a 0.4% increase to the 100-yr discharge in this area, will likely result in a 0.01-ft increase in downstream water surface elevations during the 100-yr event and, as such, will have limited to no impact to downstream flooding. Subsequent to the submission of that report, several interested parties have expressed concerns related to the STAMP project and areas of known flooding and bank erosion downstream, as well as the future functionality of the Medina Wastewater Treatment Plant (WWTP) located in the Village of Medina. The purpose of this letter is to further address some of these concerns. The information presented in this letter is strictly publicly available information; no further detailed analysis has been conducted.

Oak Orchard Creek Flooding Concerns

The proposed design calls for the STAMP force main to discharge into Oak Orchard Creek roughly 2,000-ft downstream of the Main Street bridge crossing in the Town of Shelby, Orleans County, see Figure 1. In this area, as Oak Orchard Creek flows north, roughly parallel to S Gravel Road, the channel is largely entrenched and surrounded by forested, undeveloped area. Based on the hydraulic analysis, no structures appeared to be flooded during the 100-yr event in the study area, which extended downstream to Butts Park in the Village of Medina. Some concerns were presented related to potential increases in flooding at Butts Park, as the stream, whose elevations at the park are a direct result of the low head dam located at the northern end of the park, reportedly flows outside of its banks at times. It should be noted, however, that the flow of streams outside of their banks onto adjacent floodplains is a natural occurrence; it is actually a beneficial occurrence that helps to slow velocities and reduce stress on

Figure 1: Overall Location Map



streambanks. Visually, Butts Creek looks like a natural floodplain, located on the interior side of a large meander and at a lower elevation than the outside channel bank. The lack of development and inhabitable structures make the parkland an optimal use for flood prone areas. And while the additional flow from the STAMP force main could potentially contribute to flooding in this area, based on the hydraulic analysis, even at lower storm events such as the 10-yr storm event, the increase in water surface elevation is still only 0.01 to 0.02-ft (roughly 1/8 to 1/4 inch) in this area.

During the original analysis, a review of the data at USGS Stream Gage 04220048 Oak Orchard Creek Near Shelby, NY was conducted. This gage is located not far upstream of the force main discharge point, just upstream of Harrison Road. The drainage area at the gage is roughly 146 sq. mi. and the drainage area at the force main discharge location is roughly 153 sq. mi. The USGS gage has a detailed period of record extending from 2008 to 2022. Based on this data, the average monthly discharge within Oak Orchard Creek in this area ranges from roughly 16 cfs during September to 343 cfs in March. The additional flow from the force main would have the greatest impact on normal flow within the channel during low flow periods, such as September, when if peak force main discharges occurred, could increase the flow within the channel by 58%. However, the standard deviation of average monthly flows in September over the period of record is 9 cfs, which indicates that the additional flow is not out of the normal realm of natural fluctuations in the channel on a daily basis, and significantly less than the average daily flows in the channel during wetter months, such as March.

Progressing further downstream along Oak Orchard Creek, the natural drainage area to the channel only increases, which further diminishes the impact of the 6 MGD (9.3 cfs) peak discharge from the STAMP force main on the overall flow within the channel. In the Village of Medina, Oak Orchard Creek flows under the Erie Canal. At the crossing, a waste weir of the Canal is located on the southern side of the Canal. This waste weir directs flow from the Canal into a reservoir pool for the Medina Aqueduct Dam, which is a hydroelectric facility. This dam discharges flow directly into Oak Orchard Creek just upstream of the Canal crossing. According to the NYS Inventory of Dams, the maximum discharge from the hydroelectric facility is 180 cfs, roughly 20 times more flow than the STAMP force main discharge.

Water surface elevations in this section of Oak Orchard Creek are also controlled by multiple grade control elements along the channel. The channel is naturally steep in areas where there are natural bedrock drops or falls, but there are also controlled drops such as the weir at Butts Park, a concrete weir at Medina Falls immediately downstream of the Canal crossing, and the large concrete gravity dam creating Glenwood Lake. Glenwood Lake Dam is a highly regulated Class C, high hazard dam with flow regulated for the production of hydroelectric power. The discharges from the dam are manipulated (i.e., inflow does not equal outflow discharge) and the water levels fluctuate as a result of the operation of the hydroelectric dam; therefore, flows downstream of the dam are not the same as the natural conditions. According to the NYS Inventory of Dams, the maximum storage capacity of the dam is 2,300 acre-feet, which would easily be able to absorb the additional 6MGD (9.3 cfs) STAMP force main peak discharge into its storage capacity without a significant modification to the operations of the dam.

The other areas of concern for flooding that were relayed by various interested parties were predominantly further downstream in the Oak Orchard watershed. The further downstream in the watershed, the smaller of a percentage of the total flow the STAMP discharge becomes. At the USGS Stream Gage 0422016550 Oak Orchard Creek Near

Kenyonville, NY, where the watershed has increased to 202 sq. mi., the average flow in September is 240 cfs, 15 times greater than at the Shelby gage, and the highest average monthly flow is 487 cfs in April, 42% more than at the Shelby gage. The Kenyonville gage is located near the Yates-Carlton Townline Road crossing, which is also near the upstream limit of Waterport Pond, the pool created by the Oak Orchard Creek Dam, another Class C, high hazard concrete gravity hydroelectric dam with a significant amount of storage that acts to attenuate flows. The flows released from the dam are regulated by the hydroelectric dam and, therefore, inflow to the dam does not necessarily equal the outflow from the dam. The drainage area to the dam is roughly 216 sq. mi., roughly 40% larger than the drainage area at the discharge site.

Village of Medina Wastewater Treatment Plant

The Village of Medina WWTP is located on the western shore of Glenwood Lake. According to their State Pollutant Discharge Elimination System (SPDES) permit, the plant treats flow from a combined sewer system. In a combined system, sanitary sewage and storm flows are collected in the same pipe network; thus, runoff from storm events will directly increase flows to the WWTP. The permitted monthly average flow at the WWTP is 4.5 MGD (7 cfs). According to the Village's Combined Sewer Overflows Annual Report for 2021, the average flow to the WWTP in dry weather is less than 2 MGD (3.1 cfs), and the plant was upgraded in 1985 to bring the new total capacity of the plant to 10 MGD (15.5 cfs). In addition, the Village currently has nine combined sewer overflow (CSO) outfalls, or locations where untreated combined flows discharge directly to adjacent waterways. Eight of the nine CSOs discharge to Oak Orchard Creek.

Based on available LiDAR information, the top of the earthen crest of the Glenwood Lake Dam is roughly 457.0 NAVD 88. Since the dam is a Class C, high hazard dam, according to NYS Dam Safety regulations, the spillway of the dam should be designed to pass the Probable Maximum Flood (PMF), which is a storm typically much larger than the 100-yr event. The dam should be designed such that the PMF event would not be allowed to overflow the earthen portion of the dam; therefore, without access to actual dam records, it is fair to assume that the water surface elevation at the PMF event, and thus also the 100-yr event are lower than elevation 457.0 NAVD88. Also, according to the available LiDAR data, the normal pool of Glenwood Lake is roughly elevation 451.1 NAVD88 and the ground around the secondary system of the WWTP is roughly elevation 464 NAVD88. While the details and hydraulic profile of the WWTP are not readily available public information, it is unlikely, based on these elevations, that the WWTP hydraulic capacity is significantly impacted by the flood elevations in Glenwood Lake.

Additionally, as the Village of Medina WWTP treats a combined sewer system, it is required by the Environmental Protection Agency (EPA) to address the system and treatment capacity. According to their SPDES permit, the Village of Medina WWTP prepared a Long-Term Control Plan (LTCP) that was approved in August 2007 that outlines improvements to their sewer system and treatment facility to minimize and treat CSOs. As part of the LTCP and with potential future development, it is reported that the WWTP could seek to increase its peak permitted discharge by another 10 MGD (15 cfs) at some point in the long-term future. Based on the available data presented herein, the peak discharge from the STAMP force main should not impact the ability of the Village of Medina WWTP to increase its permitted discharge and the storage capacity of Glenwood Lake should be able to attenuate the anticipated increase in flows.

Summary

While flooding and bank erosion are issues within Oak Orchard Creek, and really every stream and waterbody, the multiple grade structures, dams and reservoirs, waterfalls/drops, tributaries, and increased drainage areas throughout the Oak Orchard Creek corridor likely all have much larger impacts to the hydrology and hydraulics within the channel than the discharges from the STAMP force main. While we conduct analyses with discrete numbers, we must also remember that hydrology and hydraulics are not exact sciences. Fluctuations in rainfall patterns, storm durations, debris, antecedent moisture conditions, time of year and growing conditions are all naturally occurring changes that can have significant impact on the actual discharges and water surface elevations within a stream corridor. As a practice, it is not uncommon to round peak discharges up to the nearest tens place and, while we report water surface elevations to the nearest 0.00-ft for regulatory purposes, true sub-foot accuracy in predictions would be difficult to achieve. Even the smallest variations in vegetation, debris, and elevations can have an effect on actual flood elevations. The models we build are a highly simplified view of a very dynamic system. Therefore, if the model reports a change as small as 0.01-ft, in actuality it is likely a very unappreciable change. Additionally, as climate change progresses, we fully expect to see increases in flows as a result of changing rain patterns. New York State Department of Transportation (NYSDOT) has already adopted a procedure to increase peak discharges by 10% within this region for design of bridges to account for the changes anticipated due to climate change over the expected lifetime of a bridge. The 6 MGD (9.3 cfs) peak discharge from the STAMP force main is a 0.4% increase in the anticipated 100-yr discharge in the channel.

While we agree that increases in discharge should not be taken lightly, some increases are unavoidable. Any development at the STAMP facility will be required to follow the SPDES General Permit for Construction Related Activity GP-0-20-001 (General Permit) and the New York State Stormwater Design Manual (NYSSDM), which provide stormwater management requirements for construction activity. The project will be required to provide on-site stormwater detention so as to not increase the runoff generated from the site. Wastewater treatment is also a necessity for the protection of our water quality and general human health. Options for treating wastewater from new development include the construction of a new on-site treatment facility or conveying flows to an adjacent WWTP for treatment; however, the viability of the latter option depends on the proximity of the development to neighboring WWTPs and whether those facilities have the capacity to accept additional flow. Often construction of a new treatment facility with a new outfall is the only feasible option.

Based on the information presented and the previous hydrologic/hydraulic analysis, the discharges from the STAMP force main should not have significant impact on the flood levels within Oak Orchard Creek or diminish the capacity of Oak Orchard Creek such that it would impact future expansion of the Village of Medina WWTP.

We appreciate your concern in this matter. If you have any further questions or comments related to the analysis, please feel free to reach out.

Sincerely,

Krista Greer, PE, CFM
Water Resources Engineer
JM Davidson Engineering, D.P.C.