

**JOHNSON VILLAGE WASTEWATER
POST JULY 2023 FLOOD
TREATMENT PLANT ASSESSMENT
LAMOILLE COUNTY, VERMONT**

**NPDES PERMIT NUMBER VT0100901
STATE OF VERMONT PERMIT NUMBER 3-1149**

August 9, 2023

This report was prepared based on observations made during July 13th, 17th and 18th site visits by Heather Collins, VT DEC, WSMD, WWMP in conjunction with Army Corps of Engineers and US EPA Region 1 representatives.

REPORT LIMITATIONS

This report was prepared from visual observations and operator conversations during site visits. No testing of equipment or measuring of components was performed.

MAIN PLANT

FACILITY DESCRIPTION

The facility is a conventional two-basin Sequential Batch Reactor (SBR) treatment plant. Influent flows by gravity through a manually a set of bar racks, then through the grit channel with multiple pitchforks for further solids removal. From the grit channel influent flows via gravity to the wet well where two submersible pumps pump influent to the SBR tanks, which then decant to an open channel ultra-violet (UV) disinfection system. The sludge is pumped from the SBR tanks to a belt filter press located on the top floor of the main building. The main building also houses a lab and a motor control center (MCC) with nearly all pump and motor starters, variable frequency drives (VFDs), and branch circuit breakers. The plant's automatic transfer switch (ATS), main SBR control panel, lab, spare pump and motor storage, grinder hydraulic power pack, chemical feed (alum and polymer), backup generator, mechanical room, maintenance area and staff break room are also located on the main level of the main plant building. The main building's basement houses sludge transfer pumps including an in-line grinder and two 20,000-gallon sludge holding tanks.

OBSERVATIONS

Except for the SBR actuators and belt filter press, the entire plant was inundated and submerged with flood water. High water marks were observed near the top of the ceiling mounted headworks ventilation blower, near the top of the top buckets of the MCC, near the top of the SBR control panel, and over halfway up the wall mounted lab cabinets (approximately 7-8ft)

The motor control center (MCC) including nearly all pump and motor starters, variable frequency drives (VFDs), branch circuit breakers, and electrical conduits were inundated and likely destroyed. The same is true for the plant's heating and hot water system, meters, analytical monitors, recorders, laboratory equipment and supplies, and automatic samplers. The UV system is obsolete and repair parts are not able to be sourced. It is likely a complete loss. The plant's automatic transfer

switch (ATS), main SBR control panel, grinder hydraulic power pack, chemical feed pumps and tanks (alum and polymer), decant motors, and backup generator will also require complete re-build or replacement. The plant's lawn tractor with snow blowing attachments was also submerged in flood waters. The sludge press room (elevated) received minor inundation; high water mark was roughly one foot above the finished floor. Impact to the sludge press and its MCC is undetermined.

No physical damage to structures was visually observed.

The plant was inoperable; at the time of the site visits and flow was being pumped from the wet well to the outfall with a portable pump thus only providing primary screening.

PUMP STATIONS

RIVER ROAD WEST PUMP STATION

FACILITY DESCRIPTION

The River Road West Pump station (Formerly Railroad St. Pump Station) was recently reconstructed in 2022 and consists of a conventional, duplex, submersible wastewater pump station with precast wet well, precast valve vault, control panel, and remote monitoring panel.

OBSERVATIONS

The main components of the wastewater pump station were left unharmed. Damage was limited to the partially submerged control panel, partially submerged remote monitoring system, electrical components, silt and debris accumulation, erosion around the site, tilting control panel mounting rack (due to erosion around post foundations), and likely damaged conduits. The wet well interior appeared unimpacted. The pump station was not operable during the site visits. A portable pump was in place and staff were manually operating the pump to pump off the decant to the Lamoille River while allowing solids to settle in the tank.

HIGHLAND HEIGHTS PUMP STATION

FACILITY DESCRIPTION

The Highland Heights Pump Station consists of a conventional, duplex, submersible wastewater pump station with precast wet well, precast valve vault, and control panel.

OBSERVATIONS

The main components of the wastewater pump station were left unharmed. Damage was limited to the partially submerged control panel, electrical components, silt and debris accumulation, and likely damaged conduits. The wet well interior appeared unimpacted. The pump station was back online and operable during the July 13, 2023, site visit.

COLLECTION SYSTEM

RAILROAD STREET BRIDGE CROSSING

FACILITY DESCRIPTION

The facility consisted of an insulated, 8" ductile iron, wastewater transmission main, installed at grade for gravity flow, suspended below the Railroad Street Bridge.

OBSERVATIONS

During the peak of the flooding a car floated down the Lamoille River and almost completely tore off the Railroad St Bridge 8" ductile iron sewer crossing. Most of the piping had been destroyed and was no longer present and most of the supports were significantly bent or missing. Flow was running directly into the Lamoille River.

Overall, the collection system received a large amount of grit/silt/debris.

RECOMMENDATIONS

IMMEDIATE

- Continue using the wet well to provide some settling of solids. Set up temporary disinfection provided by chlorination while working on short term recommendations below.
- Pump and truck waste from the River Rd. West Pumpstation until temporary/permanent repairs can be made so that untreated waste is no longer discharged.
- Straightening / supporting of the control panel mounting rack, conduit & wiring check, panel, or component replacement.
- Perform temporary/permanent repairs to the Railroad St Bridge Crossing so that

untreated waste is no longer discharged.

SHORT TERM

- Clean/remove debris from SBR chambers and inspect components for damage.
- Attempt to restore power to at least SBR actuators and blower(s) and apply a near full level of treatment, utilizing temporary chlorination for disinfection. This option would be contingent on the ongoing cleaning, testing, and replacement of key mechanical and electrical components.
- Evaluate electrical components, wiring and conduits. All may need replacing.
- Complete replacement or professional rehabilitation of all electrical and mechanical equipment and instrumentation below the high-water mark which show evidence of water intrusion. Even equipment quickly brought back into operation may suffer shortened life due to silt and containments in flood waters. This is a significant amount of equipment including all control panel and MCC components (complete panel replacement may be more economical), meters, analytical monitors and recorders, chemical feed pumps, all motors, generator, UV disinfection system, decant motors, automatic samplers, and likely blowers. Pumps which show evidence of water intrusion in bearing grease or oil should be replaced or reconditioned.
- Replacement of remote monitoring transmitter, fill replacement & compaction, possible foundation reinforcement (additional concrete) of control panel mounting rack at the River Rd. West Pump Station.
- An appreciable amount of grit and sediment from the upstream collection system inundation was likely conveyed into the wet well. Subsequently, pump performance should be checked for accelerated wear. Replace or recondition if found for both the River Rd. West and Highland Heights Pump Stations.
- Replacement of Railroad St. Bridge Crossing with in-kind pipe. Install more substantial pipe supports which would be more impact resistant.
- Jetting and camera inspection of low-lying collection system areas as the collection system received an appreciable amount of Grit/silt/debris. Camera inspections should be explored to ascertain collection system damages.
- Have Reduced Pressure Zone Backflow Preventers (RPZBP) at the facility inspected and tested to ensure they are properly functioning.

LONG TERM

Long term recommendations to potentially mitigate future flooding impacts include:

- Due to the low site elevation, the treatment plant has been and will continue to be subjected to repeated flooding during severe events. Conduct a cost and life cycle analysis to determine if relocation is a better option than reconstruction. Repair/reconstruction costs could exceed \$2M or more. If the plant were to be

located at a higher elevation, the current plant could be converted to a flood proofed pumping station with appurtenant storage. Elevating the MCC / control panels, blowers, and generator. This would require a significant undertaking as an additional building floor or new elevated building would be required. Replace sludge pumps with either immersible units in their existing location or add submersible pumps directly to the SBR basins.

- Investigate possibility of replacing river crossing pipe with a depressed sewer / siphon type crossing. Installation of such an alignment may be difficult. It is questionable if sufficient horizontal setback is present to allow horizontal directional drill installation. The riverbed appeared rocky which would make open cut excavation slow and difficult. Furthermore, the appreciable vertical difference in the alignment could present regular maintenance problems due to solids accumulation if sufficient regular flow isn't present. This option requires further detailed investigation and consideration to determine feasibility.
- Investigate possibility of replacing the gravity line with a pump station and force main, with the force main suspended closer to road grade elevation, similar to the intact water main, thereby offering protection from the bridge structure. Adding a pump station to the system would however create an additional O&M expense and itself could be equally prone to flood damages. This option requires further detailed investigation and consideration to determine feasibility.

PHOTOS



1 - High Water Mark on MCC



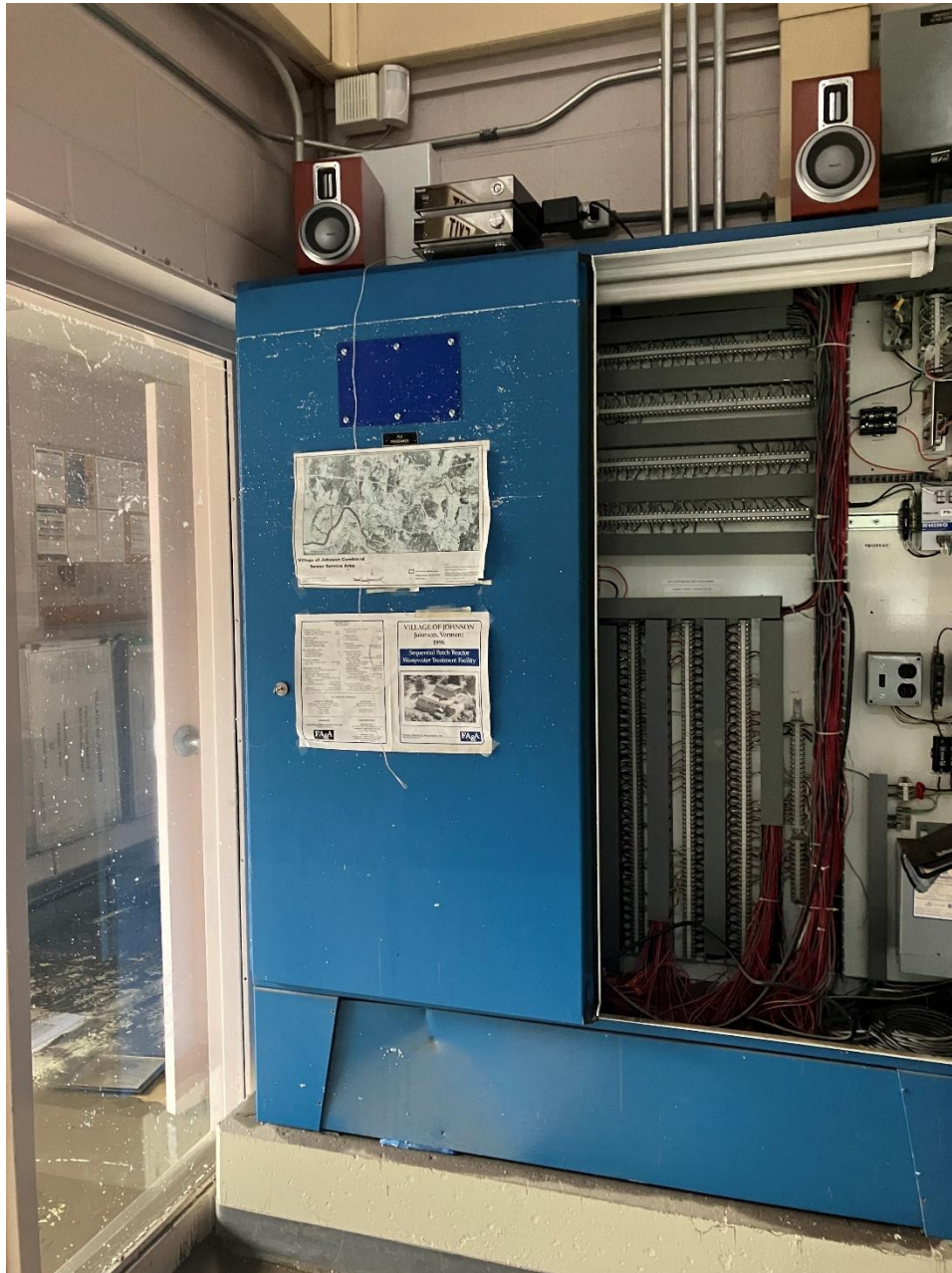
2- High Water Mark in Laboratory Area



3- Post Flood Debris in Control Room



4- High Water Mark on Flow Meter and Chart Recorder



5- High Water Mark on Programmable Logic Controller (PLC) Cabinet



6- Office



7- Breakroom



8- Maintenance Room



9- Blower Room



10- Alum Tank



11- Chemical Feed Room with Tanks and Pumps



12- Chemical Feed Room with Additional Pumps and Feed Lines



13- Plant Generator



14- Plant Generator Top View Showing Residual Floodwater and Silt on Top



15- Sludge Filter Press



16- Sludge Pump Room



17-Influent Dry Well Piping with Influent Pumps Below Water Level



18- Sequencing Batch Reactor (SBR) Chamber with Decanter



19- SBR Chamber After Pumping Out Flood Waters



20- UV Chamber



21- UV Building High Water Mark (Almost Even with Blue Pipe)



22- Lawn Tractor Stored in UV Building (Snow blowing Equipment in Front of Lawn Tractor Out of View) Note Silt on Top of Engine Cover From Being Completely Submerged



23- River Road West Pump Station



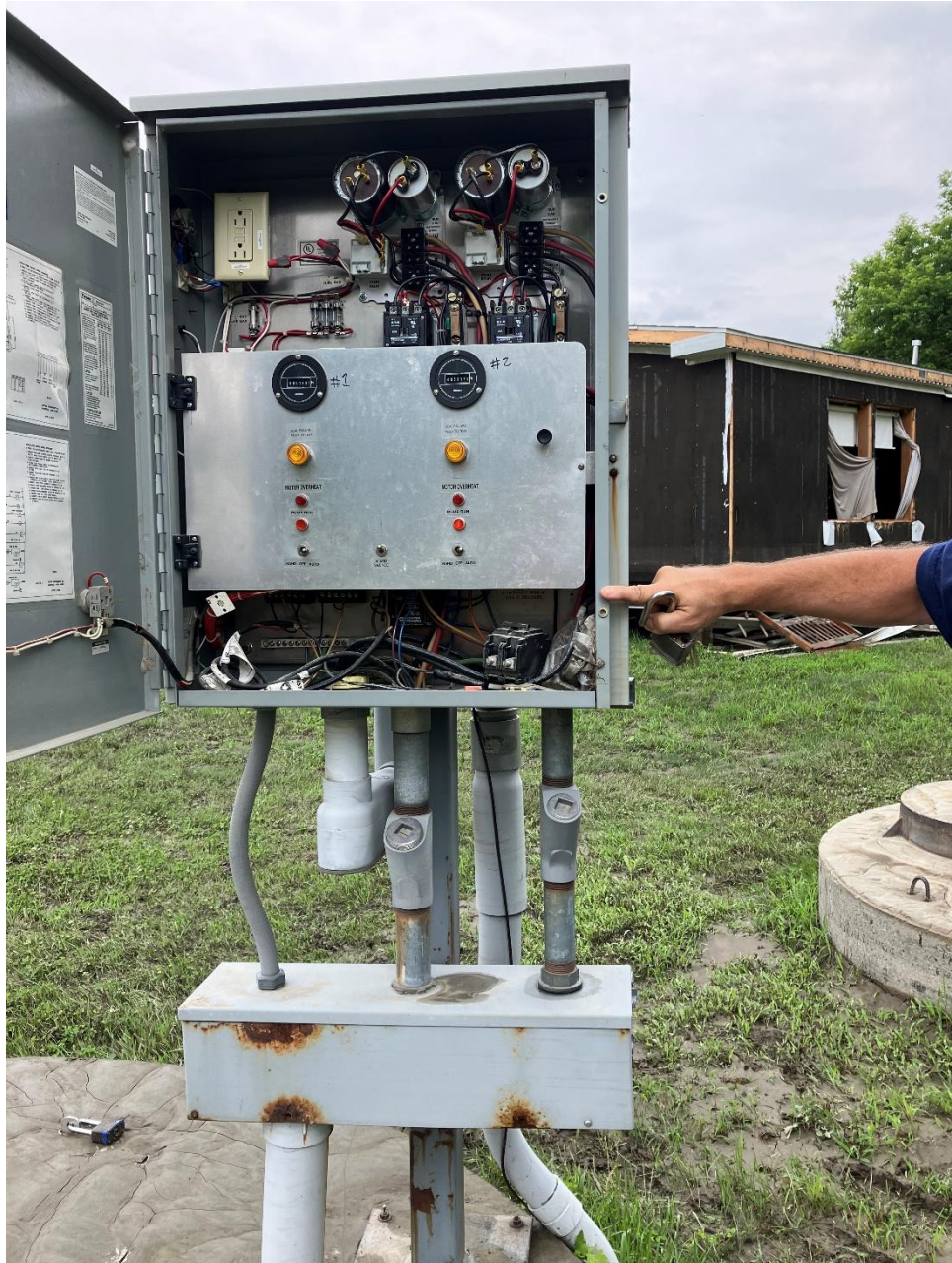
24- River Road West Pump Station Back of Electrical/Control Panel Mount



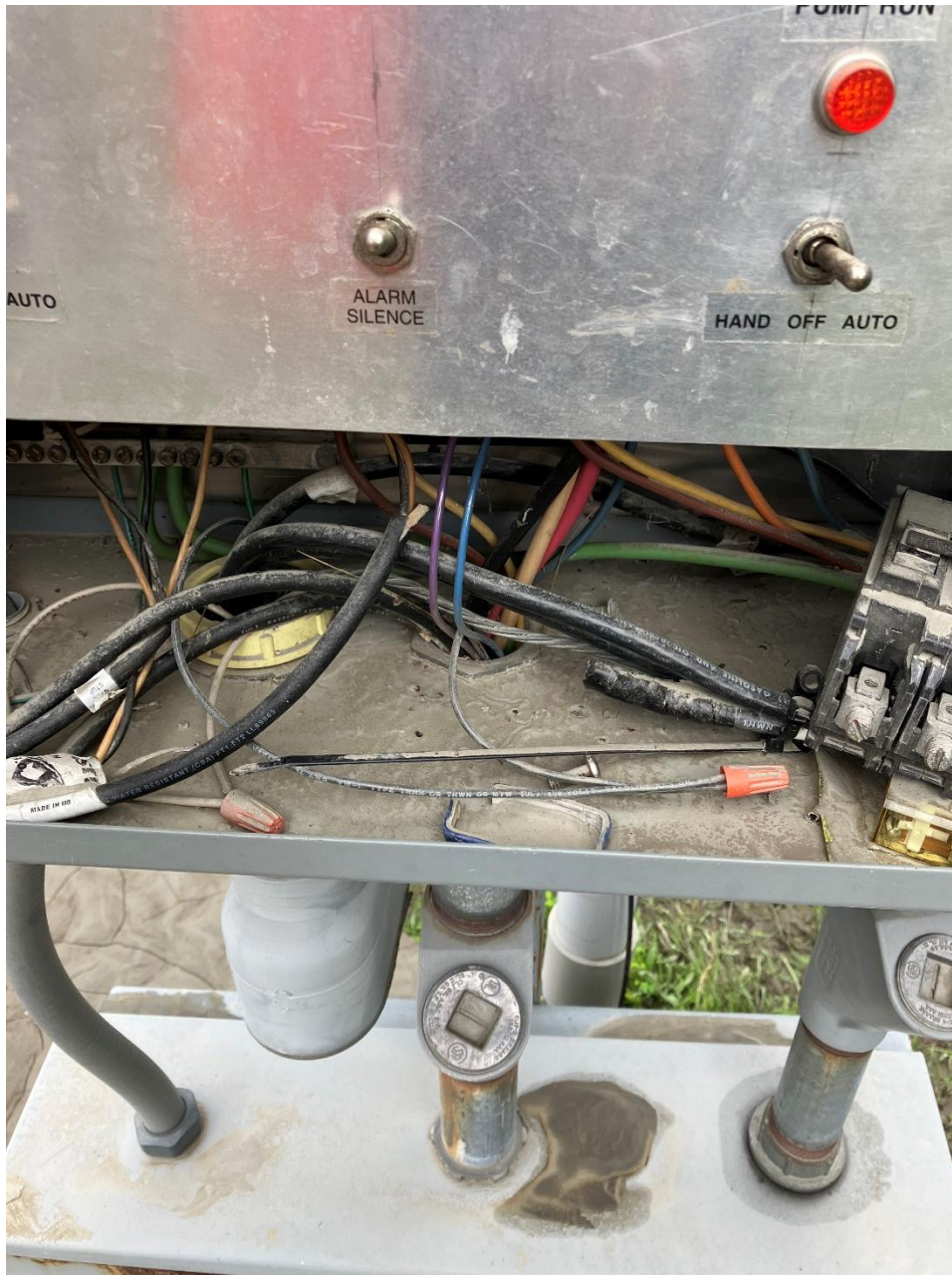
25- Interior View of River Road West Pump Station Wet Well



26- Highland Heights Pump Station



27- Highland Heights Pump Station Control Panel High Water Mark



28- Highland Heights Pump Station Interior View with Residual Flood Water Silt



29- Railroad Street Bridge Severed 8" DI Sewer Crossing