SHIMP ENGINEERING, P.C.
Design Focused Engineering

June 29, 2020

Frank Pohl
County of Albemarle
Department of Community Development
401 McIntire Road, North Wing
Charlottesville, Virginia 22902

RE: ZMA2018-018 River's Edge
Pump Station Preliminary Design

Dear Mr. Pohl,

As part of the plan requirements, we have completed a basic preliminary design for the sewer pump stations.

Flow Calculations:

A design population of 100 2-person units has an average design flow of 100 gpd/person = 200 gpd/unit.
(SCAT regs - 9VAC25-790-460-F)
The design peak capacity of the system shall be 2.5 times this avg. design flow.
(SCAT regs - 9VAC25-790-310-D)

Avg Design Flow = 100 units x 200 gpd/units = 20,000 gpd
Peak Design Flow = 2.5 x Avg Design Flow = 50,000 gpd (34.7 gpm)
Minimum design pump rate must exceed 35 gpm to allow for the Peak Design Flow.

Basic Pump Station Design:

The pump station shall be an inline underground wet well with submersible pumps that will pump effluent through a force main at select times when the sewage level reaches set elevations in the wet well. The pump station will consist of a remote monitoring system that will be managed by a contracted professional third party, a backup generator in case of loss of power, and an onsite alarm in case of failure.

Preliminary Wet Well Sizing:

The wet well will be a 60" precast lined watertight manhole. For a wet well with 10' depth well and a design lead pump switch "on" elevation at 6' above the invert, the well storage would reach 834 gal. of effluent before the lead pump engaged. In this scenario, the pump would operate roughly 37 times per day (using the avg. design flow estimate of 20,000 gpd for the 100 units from above). With this basic design, the lead pump would engage on average every 39 minutes. This cycle period minimizes potential nuisance from the pump station by ensuring the sewage does not sit long enough to go anaerobic and also ensures potential adverse noise impacts on future residents are mitigated through cycle frequency management.

Additional Design Considerations:

The following considerations are based on previous design experience with pump stations, and the final design shall account for these considerations.

1. Since the pump station will be handling raw sewage, pumps and force main must be capable of passing 2" solids. Thus, the minimum force main size should be 3". A minimum scour velocity of 2 fps must be achieved within the force main.
2. Two robust pumps shall be chosen to provide redundancy. Multiple switches shall be implemented which will trigger first one, then both pumps when sewer levels reach critical elevations within the wet well.
3. CCS Tracer wire shall be installed along the force main to allow for maintenance to immediately identify the location from above ground.
4. To prevent unpleasant odors, which are mainly caused by sewage going anaerobic, a small air pump and diffuser shall be installed for the wet well.
5. Fencing and vegetative screening shall be provided to make the pump less conspicuous for residents.

If you have any questions please do not hesitate to contact me at your convenience. I can be reached at: justin@shimp-engineering.com or by phone at 434-227-5140.

Regards,

Justin Shimp
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