
MEMORANDUM

TO: Ben and Amy Pirri
FROM: Todd P. Morey, P.E.
SUBJECT: Ferns Redevelopment – Wastewater Disposal
DATE: June 11, 2026

We have reviewed the various limitations and constraints related to wastewater disposal for the redevelopment of the Ferns Country Store. Any system that is proposed will need to conform to not only Massachusetts Title 5, but also to the Town of Carlisle Board of Health Regulations, which contains a few additional provisions that are more restrictive than the Title 5 regulations.

Estimated Design Flows

You had noted that the redevelopment will result in a 2-bedroom apartment and a 49-seat café. It is our understanding that there will also be a country store component to the overall plan, and we would recommend including flows in the overall total to cover that use as well. The flow for general retail is relatively minor (50 GPD per 1,000 sf) but it will ensure that you are covered. For this analysis, we assumed a total of 2,000 square feet would be retail space, but even if that were to be slightly higher or lower, it would not alter the results of our analysis. In addition, the Town of Carlisle requires the design flow for residential uses to be 165 gallons per day per bedroom.

Using the above parameters, we calculate the design flow to be approximately 2,145 gallons per day based on:

- 2-bedroom apartment – $2 \times 165 \text{ gpd/bedroom} = 330 \text{ gpd}$
- 49-seat café (assumed full service) – $49 \times 35 \text{ gpd/seat} = 1,715 \text{ gpd}$
- 2,000 sf retail store – $2 \times 50 \text{ gpd/1,000 sf} = 100 \text{ gpd}$

There will also need to be a grease trap installed for the kitchen equipment. This would be plumbed offline from the main sanitary piping and would capture only kitchen flows in an accessible tank. The effluent from the tank would then pipe back into the sanitary line for disposal. We mention this at this point because it is covered in a cost discussion later in this summary.

Nitrogen Loading Limitations

As you are aware, the property is located within an IPWA and a Zone II wellhead protection district. 310 CMR 15.215 defines this location as a Nitrogen Sensitive Area. 310 CMR 15.214 limits wastewater discharge to 440 gpd per acre in these areas unless there are aggregate flow agreements in place or there is an enhanced nitrogen removal system designed to effectively treat the wastewater to a Safe Drinking Water Act nitrate standard of 10ppm, in which case the restriction is lifted.

Due to this restriction, even if there were space on the property to place a system, the effluent would need to be treated through the use of an onsite treatment system. This portion of the system alone could cost in the range of \$100,000 to \$200,000, depending on other components of the wastewater.

Onsite Siting of System

An onsite subsurface disposal field would be impacted by several setbacks dictated by both Title 5 and the Town of Carlisle regulations. The setback from the well that serves the building is 150 feet. There are also 10-foot property line setbacks. Ignoring any monitoring wells present (they could be relocated if necessary) that leaves an envelope of approximately 1,900 square feet of land on the north side of the property where a system could be located. The existing system is 1,400 square feet in size and is approved for 970 gallons per day. A new onsite system would also need a new septic tank, a pump chamber (over 2,000 gpd must be pressure dosed) and new piping from the building to the system.

Using a chamber system for space efficiency and assuming sandy soil, we would need just over 100 chambers for the subsurface system. With a footprint of 22.2 feet per chamber, the required footprint would be just over 2,200 feet, which exceeds the 1,900 square feet available.

Onsite disposal would not be achievable even if the nitrogen loading limitations could be overcome.

Offsite Connections

During our original review, we began to assess the potential connection to the school system. This would have involved the installation of a grease trap, a septic tank and a pump station on your property, followed by a force main that would run to the school, an estimated distance of 1,200 feet as reported in one of your documents. Earlier today, we were forwarded an article from the Carlisle Mosquito in 2010 that discusses a very interesting proposal for a Town Center Sewer Extension. That proposal would have linked the library and the Village Court community to the school, taking advantage of the excess capacity in the school treatment system. There was also discussion about future expansion of the system to nearby residences and municipal facilities. This proposal was abandoned sometime after the article was written.

The article indicates that the flows to the school are quite low compared to the design flow of 13,500 gpd. The article noted a high flow of 3,491 gpd in March 2010. The Facilities Supervisor

indicated that the flow could expand to as high as 5,000 gpd as the student population expands. In 2008 the student population was 766, dropping to 72 in 2009 and 698 in 2010. That population was reported as 612 in 2025 and 609 in 2026, or a decrease of nearly 13% since the figure of 3,491 gpd was reported. The general student population trend is expected to continue to decline over the next 10 years; therefore, flows should continue to decrease.

The article notes the library adds about 450 gpd, the Village Court development adds about 4,500 gpd in an expanded (from 2010) condition and the Ferns Redevelopment would add 2,145 gpd. Adding 5% for Inflow and Infiltration (I/I) results in a total of around 7,450 gpd. That leaves just over 6,000 gpd for the school, which is above the peak noted at the higher enrollment.

The Town Center Sewer Extension would consist of a gravity sewer from your property to a central pump station located at the library. The Village Court would also flow via gravity to the library pump station. The library pump station would discharge via force main to a new pump station at the school which would direct flows to the school's treatment plant.

Our opinion of cost for this entire system includes the following:

- One grease trap
- 1,150 feet of 8" gravity sewer
- Eight 4' diameter sewer manholes
- 1,250 feet of 3" force main
- 4 air release valves
- One 10,000 gpd pump station (Library)
- One 15,000 gpd pump station (School)
- 25% Contingency
- Design and Permitting Costs
- 10% Contractor Fees
- No generators are included

We project the total cost for this system to be \$900,000 to \$1,000,000.

The article mentions discussion of a future Sewer Commission to oversee the system during and after construction. All indications pointed toward support from municipal officials for this extension as well as allowing for future expansion to nearby residences and municipal buildings. Funding would come from multiple sources, including the Ferns project, and would also likely need to wait for Town Meeting approval.

This would also be a big advantage for the Ferns property. Gravity sewer discharges are always preferred over mechanical or pumped means due to minimal maintenance and the lack of need for backup power. There would need to be backup power at the library and potentially a new generator at the school for the new pump station.

Conclusion

Onsite wastewater disposal does not appear to be a viable option due to limitations on effluent volume and special limitations imposed by the presence of the IWPA and Zone II WPD combined with the relatively small lot size.

A second option would be to connect to the school directly from Ferns with your own pump station running up the edge of the paved right of way. This option is technically feasible and the rough opinion of cost for this option would be \$600,000 to \$750,000. This would be funded entirely by the Ferns project.

We believe the best option for the long-term success of the Ferns Redevelopment project is the creation of the Town Center Sewer Extension. This would be more cost effective than connecting to the school with a pump station on your property and running the force main to the school because there would be a certain amount of cost sharing between Ferns and the Town of Carlisle sourced funding. The Town Center Sewer option would also provide for a gravity system from your building to the main system, minimizing the amount of ongoing operation and maintenance costs.