

Review of Meena Application Materials Received on May 17, 2023

This review is being prepared at the request of abutters William Bartoswicz (1 Blueberry Lane, Ossipee) and Tammy McPherson (5 Blueberry Lane, Ossipee). Geoscience Solutions LLC requested the most recent Meena application on May 16 and received immediate access to the documents. They represent the fourth in a sequence of submittals dating from March 2021. The following report documents environmental concerns related to the proposed building of a gas station at the Meena site, 41 Route 25 in Effingham NH.

Regional Setting

The site lies within an old abandoned gravel pit located on the south side of a kame delta built into Glacial Lake Ossipee approximately 15,000 years ago. The water level of the lake was controlled by a spillway on the north side of Green Mountain at an elevation of approximately 460 ft. Finer grained lake sediments lie to the south of the kame delta while kettle holes forming Broad Bay and Leavitt Bay occur to the north. The well-sorted, coarse, glaciofluvial sediments making up the kame delta form the primary groundwater recharge area for the Ossipee Aquifer in this region. (See Newton letter to the Planning Board dated September 2022 for a complete explanation). Because this site lies within the primary recharge area, it represents one of the most sensitive sites within all of Effingham's Groundwater Protection District.

Public Water Supply Well

The site includes a convenience store with food service and several apartments that are supplied water from a public water supply well located on the property (PWS #738030). Regulation Env-Or 407.06 (e) clearly states that Underground Storage Tanks (USTs) for gasoline installed after February 2, 2005, MUST be located more than 500ft from a public water supply well and 250 ft from a non-public water supply well.

- (e) At any new UST site at which installation of a UST system is proposed on or after February 2, 2005, no UST system shall be installed closer than the applicable distance specified in Table 407-1:

Table 407-1: Minimum Distance from UST System to Water Supply Wells

Contents of UST	Public Water Supply Well	Non-Public Water Supply Well
Gasoline	at least 500 feet	at least 250 feet
All other regulated substances	at least 400 feet	at least 75 feet

The proposed location for the tanks is less than 200 ft from the well. They use regulation Env-Or 407.06 (f) to justify this. The key part of the argument rests on whether or not this site represents an **existing** UST facility. DES documents clearly show that the Meena site was **permanently** closed as a UST facility on September 15, 2016. There is a DES procedure (Env-Or 408.05 through 408.10) that must be followed to permanently close a UST facility and that procedure was followed in this case. The removal of the USTs was done under the auspices of DES using DES funds. All work followed the procedures outlined in ENV-Or 408.05 through 408.10 for the permanent closure of a UST facility. Nobis Engineering filed a report **UNDERGROUND STORAGE TANK CLOSURE REPORT: BOYLE'S MARKET** on December 10, 2015. This was followed by a second Nobis report filed on June 29, 2016 entitled: **INITIAL SITE CHARACTERIZATION Boyle's Family Market**. These two reports fulfilled all the reporting criteria of ENV-Or 408.10 and the closure was approved on September 15, 2016 in a letter to David Boyle of Boyles Family Market Inc signed by John Pasquale of the DES MtBE Remediation Bureau who stated:

"DES approves the report as meeting the requirements of New Hampshire Code of Administrative Rules Env-Or 408.10 and Env-Or 602.15."

With that, the Boyle's Market UST facility was officially **permanently closed** and any new UST facility will have to locate its tanks 500 ft from the public water supply well. It should also be noted that the well's status as a Public Water Supply well was established AFTER the tanks were removed in 2015.

DES has determined that a separation of at least 500 ft is needed between a UST storing gasoline and a Public Water Supply well in order to ensure the health and safety of those drinking water from that well. DES allows for the replacement of old tanks located less than 500 ft from a public water supply well with new tanks located at that same distance. This makes sense as the new tanks will be less likely to leak than the old tanks and this will have the effect of reducing the health risks to people drinking water from the well.

The current situation is completely different as there are no old USTs to replace. The USTs were removed almost 8 years ago. Installation of new USTs less than 500 ft from the public water supply well will only increase the health risk to people drinking water from this well. (See Newton letter to Planning Board dated March 27, 2022 for a complete explanation).

SITE PLAN Issues

There are a number of features in the site plan that introduce uncertainty concerning the scope of the project. These include questions concerning how much of the site is going to be paved and whether or not there is going to be a canopy over the diesel pumps as is required in a "High Load Area"

- *Reconstructed Pavement*

The plan (SITE PLAN) shows a large area of "Reconstructed Pavement" in areas that were not previously paved. Furthering the confusion, the legend shows two different

symbols both labelled as RECONSTRUCTED PAVEMENT with one of the two also identical to the symbol for EXISTING PAVEMENT (Figure 1). Clearly some of the RECONSTRUCTED PAVEMENT marks the replacement of pre-existing pavement that has been removed during construction. But RECONSTRUCTED PAVEMENT is also shown covering a large area towards the back of the property, as well as a small area towards the front, that are currently unpaved, but have been used for parking etc. (Figure 1). Is this area to be paved? If so, it would represent an increase of approximately 13,500 ft² of pavement. There could be good reasons to do this. It is always better to have cars parked on a paved surface in a critical recharge area as potentially contaminated runoff can then be directed to the stormwater treatment facility. However, the stormwater system must be able to handle the additional runoff and the proposed stormwater system appears to be inadequate even without this new area being added. (See *HydroCad Modeling section of this report*).

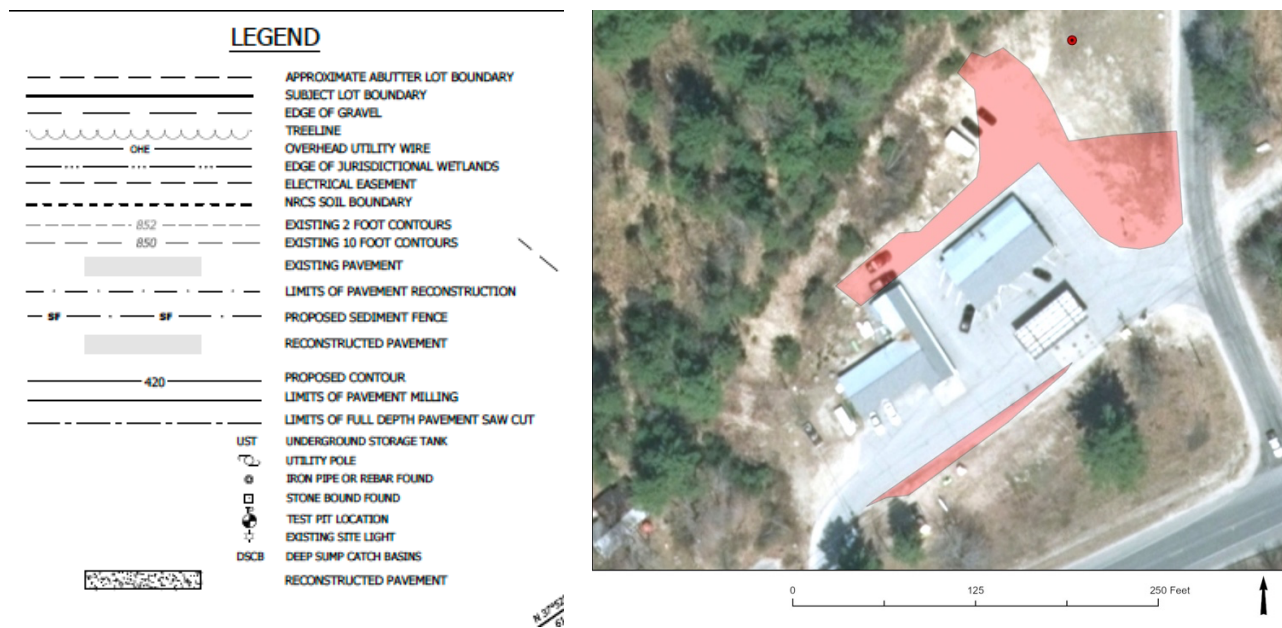


Figure 1. SITE PLAN Legend and orthophoto (2015) of the Meena site showing new areas of RECONSTRUCTED PAVEMENT in red (from the SITE PLAN).

- Diesel Pump Canopy**

Item (6) of the STORMWATER MANAGEMENT GUIDELINES in the STORMWATER MANAGEMENT PLAN clearly states “The gas station is considered a HIGH LOAD AREA and the following design methods are required”. The very first item in the list is “Canopies over the fueling areas”. There is a pre-existing canopy over the site for the gas pumps, but there is currently nothing in the area of the new diesel pump. None of the design documents show a plan for a canopy to be built over the diesel pumps (none on any of the previous plan submittals either). A drain line is shown going from the center of the diesel fueling pad to the infiltration basin (Figure 2) and in at least one drawing it is labeled as coming from the canopy over the diesel pumps. Without a clear

design drawing for the canopy, it is impossible to know if this drain is adequate or if the canopy will ever be built. The plan should be modified to show the actual design drawings of the canopy and they should be reviewed by the Planning Board's consulting engineer.

Critically, if no canopy is built, these plans could be misinterpreted to mean that a drain line should go directly from the fueling pad to the infiltration basin. This would be a recipe for disaster as any spills would be infiltrated directly to groundwater with no treatment at a distance less than 250 ft from a public water supply well. Any plan for this site that does not include plans for a canopy over the diesel fueling area must be rejected.

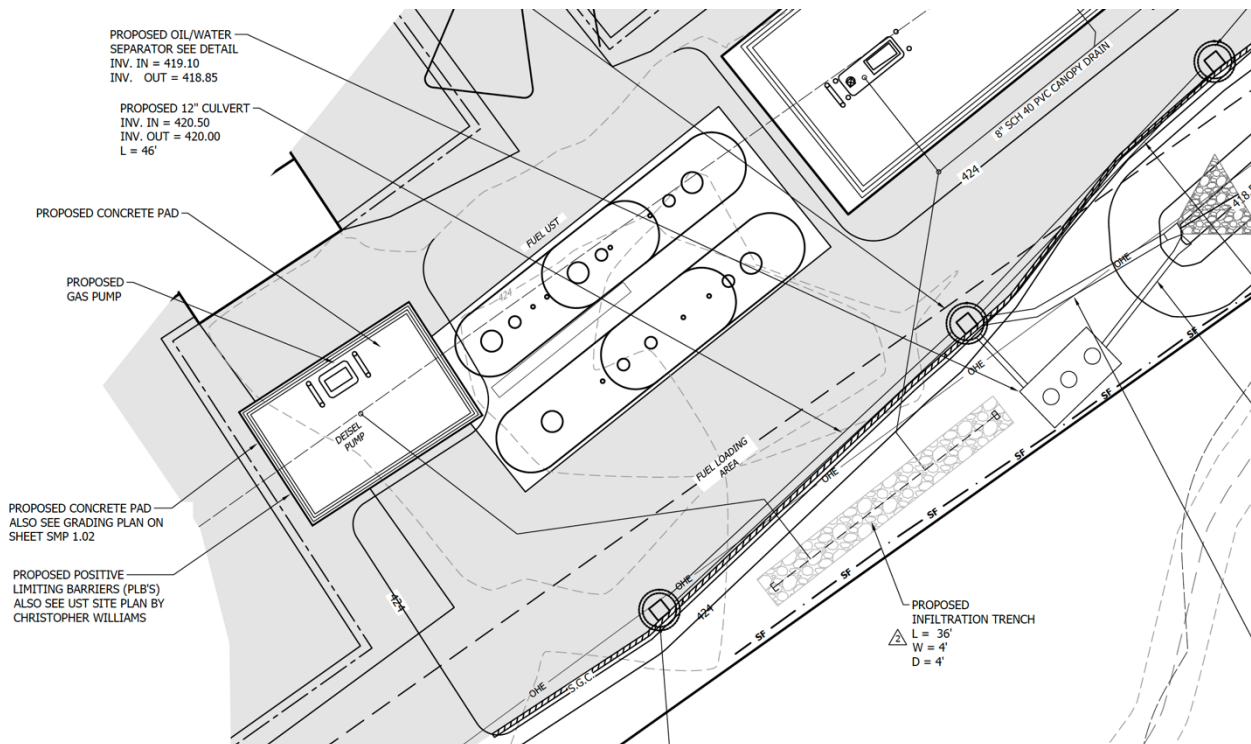


Figure 2. Section of the STORMWATER MANAGEMENT PLAN showing the drain line going from the diesel pad directly to the infiltration basin. Note that there is no reference to the required canopy on this plan.

- ***Diesel Pumps too Close to the Building***

The diesel pumps appear to be closer to the building than the required 15 ft specified in Effingham's town regulations. They need to be moved further away or the applicant needs to obtain the appropriate relief from the Town to have them located this close.

Non-conformance with Env-Wq 1508.02 and 1508.07

This plan relies on a bioretention basin for the treatment of water draining out of the oil/water separator. Bioretention basins are often a good option as the vegetation and its soil environment can be effective in removing a wide variety of contaminants. These shallow basins

receive water during runoff events and allow it to slowly infiltrate through the soil, fully draining within 72 hours. Much of the infiltrated water eventually recharges the underlying groundwater and this can be a problem if there is incomplete remediation of toxic chemicals.

The submitted plan for the proposed bioretention basin has a number of problems, principle of which is that it does **NOT** conform to the specifications laid out in ***Env-Wq 1507.02 Criteria for Permanent Methods for Protecting Water Quality***.

Problems with the design and location of the bioretention basin:

- The location of the proposed bioretention basin lies, in part, in the “grave” of the USTs that were removed in 2015. Infiltration of groundwater through this site could release contaminants left behind from the old tanks. Contaminants, in particular naphthalene, were identified during the removal and permanent closure of the site but a decision was made, at that time, to not require active remediation. The site has been covered with asphalt that limits infiltration through the grave. The construction of the bioretention basin over this site increases the likelihood that contaminants will leach into the groundwater.
- Bioretention basins need to be located at least 50 ft from steep slopes where steep slopes are defined as those with a gradient greater than 15%. The proposed basin is located directly adjacent to slopes that are much greater than 15%, and are, in fact, nearly at the angle of repose for sand (58%) (Figure 3).



Figure 3. 2015 orthophoto of the Meena site. The bioretention basin (orange) is located directly adjacent to steep slopes (red) as determined from LiDAR data obtained from the New Hampshire Granite GIS site. The basin should be relocated at least 50 ft from these steep slopes.

- Env-Wq 1508.07 states that filtering practices (bioretention basins) are not allowed in areas of hydrologic soil group A soils without an impermeable barrier. The proposed bioretention basin was not designed with an impermeable barrier.

- Most significantly, the basin does NOT conform to Env-Wq 1507.02. The proposed basin is located within a “High Load Area” and, as designed, is **specifically PROHIBITED** from being located at this site as shown below.

Env-Wq 1507.02 Criteria for Permanent Methods for Protecting Water Quality

(c) Subject to any practice-specific requirement or exception, no infiltration practice, filtering practice, groundwater recharge practice, treatment swale, pretreatment swale, or sediment forebay shall be located in any of the following areas:

(1) Areas where the stormwater comes from:

- a. A high-load area, including but not limited to groundwater protection areas where the stormwater comes from one or more areas where petroleum products are dispensed or otherwise transferred for commercial or industrial purposes;

HydroCAD Modeling

Flow through the stormwater system was modeled using the software package HydroCAD for the 2-year, 10-year, 25-year, and 50-year storm events. The site was subdivided into 7 sub-catchments and flow was routed through all the components of the stormwater system (figure 4).

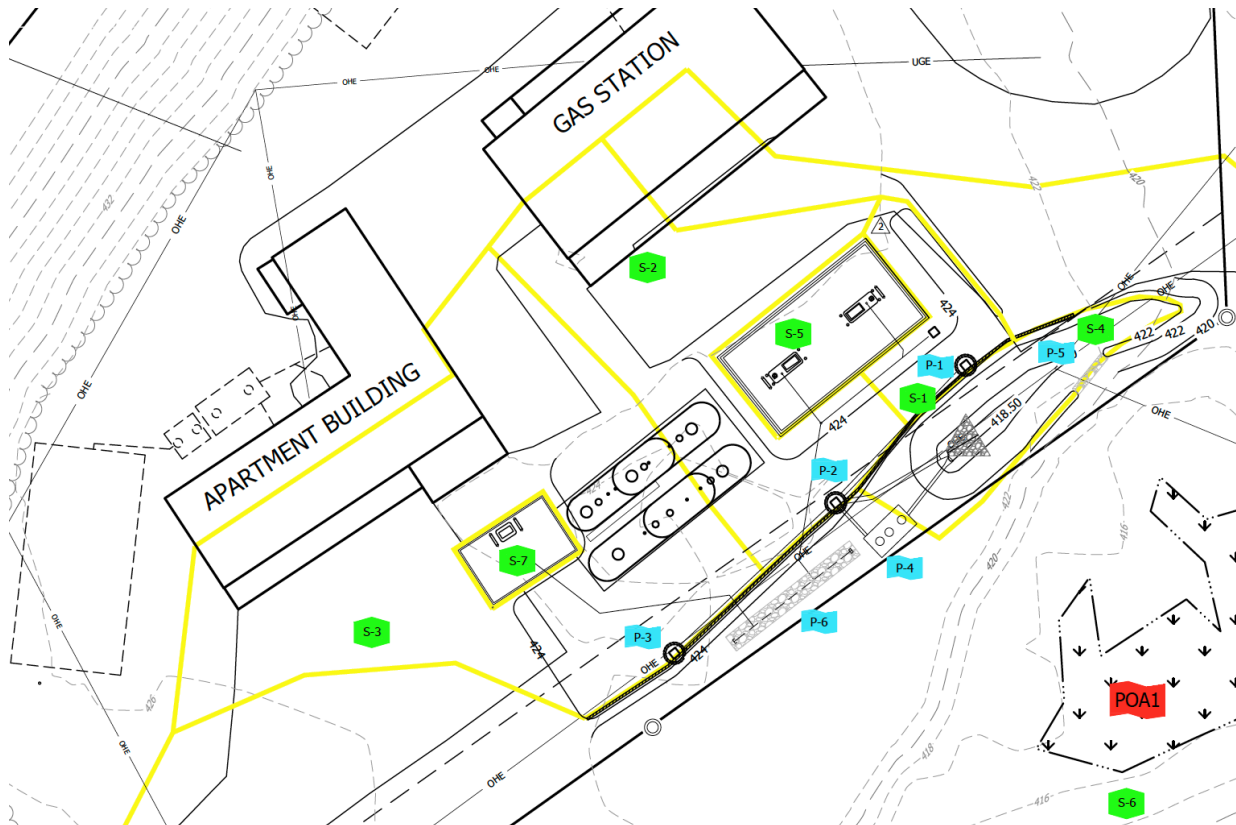


Figure 4. POST DEVELOPMENT DRAINAGE PLAN showing the sub-catchments and principal drainage system components. Note S7 (diesel pump pad) is drained directly to the infiltration basin.

Below is a list of the modeling issues associated with this analysis.

- The sub-catchment divides do not conform well to the contour lines. The lines demarcating the sub-catchments should cross the contour lines at right angles (90°). For example, the S-3 catchment line just below the S-3 symbol should cross the 426 ft contour at a right angle and not at the angle shown. The effect of this is that the estimate for the S-3 catchment area is smaller than it actually is and the amount of runoff would be more than what was modeled.
- There is also a catchment boundary shown going between the apartment building and the store (across the paved parking lot). While this could be valid there is no elevation data presented to support this and in fact the LiDAR data shows that the pavement is all sloped towards the USTs (Figure 5).

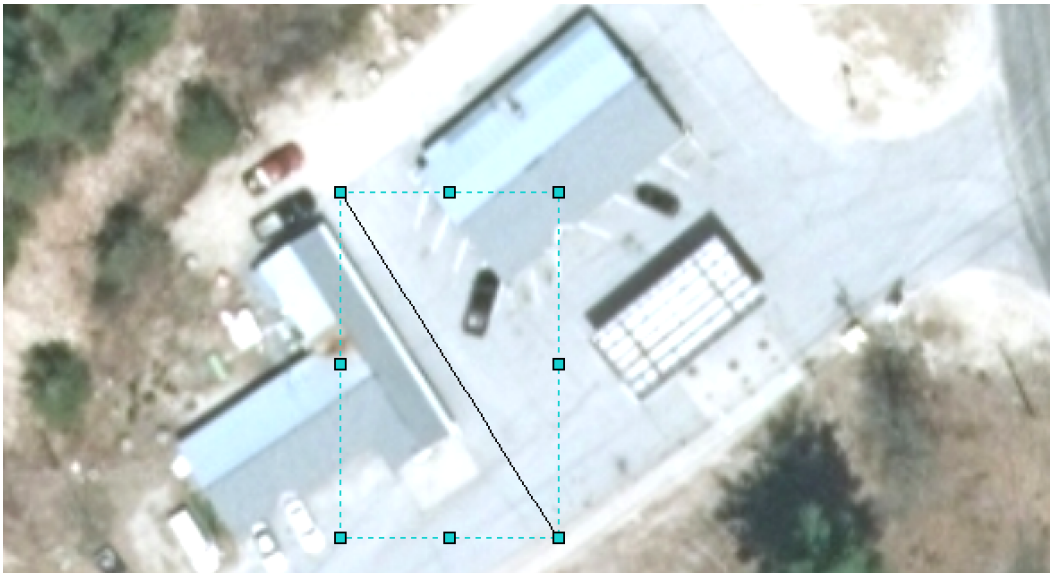


Figure 5a. Line of profile used to extract LiDAR elevations to determine if there is a catchment divide in the area between the apartment building and the store.

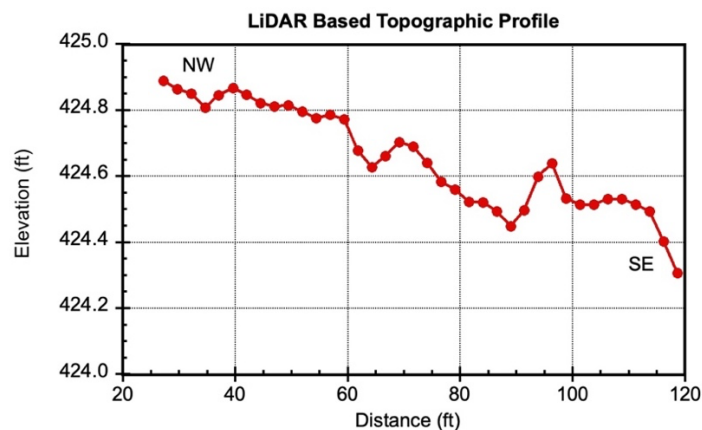


Figure 5b. Line of profile from LiDAR data running from the NW (upper left) to SE (lower right) along the line of profile.

The net effect is again that the catchment size is under estimated so that the modeled stormwater is less than the amount that would actually move through the stormwater system.

- The report only presents detailed analysis for flows within the stormwater system for the 10-year (4.29 in) storm event, but that analysis shows that the system was unable to handle runoff from an event of this size. The model shows that the water level in the bioretention basin gets more than 2.5 ft higher than the upstream oil/water separator. AND it is higher than the outlet inverts further upstream in Deep Sump Catch Basin 2. This backflow situation would likely force all the oil collected in the oil/water separator back out of the system. It would also flood the overflow pipe that goes directly from the Deep Sump Catch Basin 2 to the Bioretention basin. Since this happened during the 10-year storm it will also happen for the 25-year and 50-year storms. This, coupled with the likely underestimation of sub-catchment sizes draining into these structures shows that the drainage system needs a complete redesign.

Conclusion

This project is located in the most sensitive recharge area of the Ossipee Aquifer. There is a Public Water Supply well on site that is located less than 500 ft from the proposed location of the USTs. There are many other private water supply wells located downstream from this site. The project makes no effort to protect their water supply with monitoring wells and regular testing programs to alert them of any contamination. There are required components to the facility (e.g. a diesel pump canopy) that are not included in the project documents. The proposed bioretention basin fails to meet the criteria specified in Env-Wq 1507.02 and Env-Wq 1508.07. The hydrologic modeling of the stormwater drainage system shows the system fails under a 10-year storm. This project must be rejected or redesigned to address these issues.



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