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LAND USE DEPARTMENT

This report was prepared at the request of the Applicant to determine any affects the proposed operation may have on the local groundwater and drinking water wells in the vicinity of the project.

Existing and Proposed Conditions

The site is located at 1340 Baldwin Hill Road in Ledyard, CT and consists of approximately 20.6 acres as depicted on a site plan entitled "Plan Prepared to Accompany Special Use Permit Application of B&R Holding Company, LLC, 1340 Baldwin Hill Road, Map 134, Block 140, Lot 1340 Ledyard Connecticut" revised July 7, 2023, prepared by Dieter & Gardner. Additionally, the associated files accompanying the application and posted on the Town of Ledyard website were reviewed. According to notes from the Town planner, the Property is currently being used for the removal of rock, stone, gravel, sand and other material to provide aggregate to support the off-shore wind project in New London. The current use has been ongoing since prior to the adoption of Zoning Regulations in 1963. More than half the site is involved in the current operation. Recent activity has included blasting of the ledge.



Topography on the site ranges from an elevation of approximately El 82 at the floor of the existing exaction to El 220 in the southwestern corner of the property. The proposed work consists of extending the excavation operations to the south of the current operation. The largest proposed cut is approximately 160 feet northeast of the southwest corner with a depth of cut of approximately 80 feet, with the base at El 110.

A site walk on September 8, 2023 and review of available mapping was done to determine the geology of the area and identify any potential impacts to the local groundwater system as required by Ledyard Zoning Regulations 8.16.M.2 (F) as well as ensuring that the 'proposed use does not cause any unreasonable pollution, impairment or destruction of the air, water and other natural resources of the state'.

Surficial and Bedrock Geology

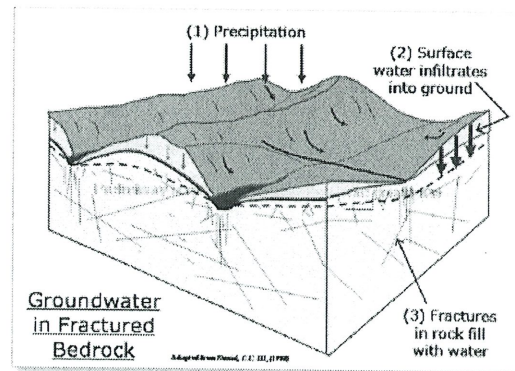
Surficially, the site is overlain by a thin to medium/thick layer of till and is underlain by two bedrock formations; the Plainville formation, an interlayered quartzite, schist and gneiss formation in the north and eastern portion of the site, and the Potter Hill Granite Gneiss Formation in the western portion of the site. Generally, the thicker till areas coincide with the Potter Hill Formation. Gneiss is a metamorphic rock with a banded formation. It is

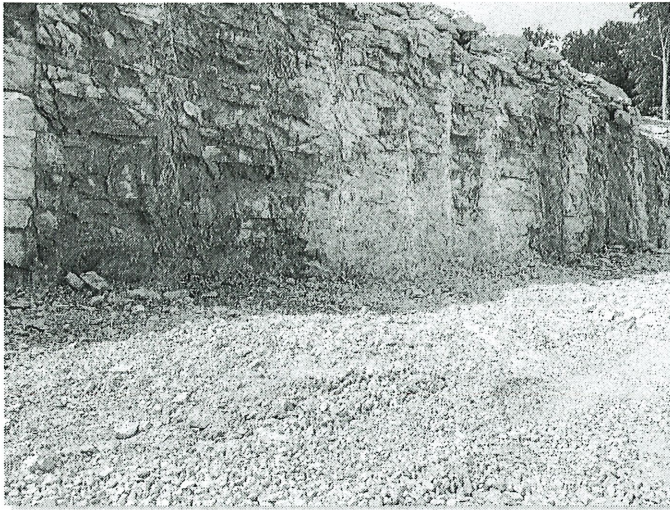
typically coarse grained and consists of feldspar, quartz and mica. Till is a residual glacial mix of rocks, sand, silt and clay. The photograph below shows the current rock face.



Groundwater System through Bedrock

Groundwater flow through hard crystalline rocks is found in the water-bearing fractures and faults and the abundance of water in bedrock aquifers is related to the nature of the structural deformations. Water enters the bedrock formation through fissures and travels along them. The figure to the right gives a schematic representation of water in a bedrock aquifer. It can be noted that the fissures and fractures carrying the bedrock do not always connect.





In the photograph to the left, showing a portion of the rock face, groundwater can be seen in some portions of the rock and other areas are dry. The amount of water from these fissures flowing into the excavation are small and does not require pumping. At the time of the visit, there was no standing water on the floor of the excavation, indication that the cuts do not intersect a standing water table in the area and the only water is flowing in from the faults in the bedrock.

Drinking Wells and Blasting

Private drinking wells in the area are generally drilled to a depth of 400 feet below the ground surface as noted in a well drilling log for an neighboring property. As noted earlier, bedrock wells tap the fissures in the bedrock where water is carried through the aquifer. These fissures vary in size and location within the bedrock formation. Bedrock wells are sealed at the ground surface to eliminate the intrusion of groundwater into the well and any possible contamination. Water yield in these wells are therefore dependent on number and size of fissures they intersect. Bedrock well yield varies widely across a region and even in the same rock formation.

There have been numerous studies on the effects of blasting on the groundwater levels in bedrock wells and associated water quality: Some major points from these reports are as follows:

- Significant fracturing in the rock around a blast hole is generally limited to a distance of 20-40 blasthole diameters. For the typical 3½ inch drill hole, the zone of damage would generally be 6-12 feet.
- There are little to no significant long-term mechanical changes in an aquifer that could be attributed to blasts detonated at distances greater than 500 feet from the observation wells.
- Blast vibrations are not believed to permanently degrade groundwater quality, but can shake loose silt, sand, and rock particles that may line the fissure surfaces. Turbidity increase is short-lived as these particles wash out quickly. Increases in turbidity do not suggest physical damage to the aquifer or well.
- In tests directly on wells, steel well casings remained intact even charges were detonated as close as 10 feet from the well screen.
- Blast vibrations have been shown in a few cases to improve the long-term water yield in aquifers due to the “flushing out” of fine sediments from between joints, allowing more permeability and overall storage.

- When wells were monitored approximately 900 feet from a blast site, there was no noticeable fluctuation in groundwater levels that could be attributed to the blasting and there was no impact to the hydraulic conductivity of the aquifer.

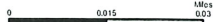
Conclusion

The proposed activity proposed on the site will not cause any unreasonable pollution, impairment or destruction of the air, water and other natural resources of the state. There will be no effects on the groundwater levels or drinking water wells in the area of the project due to the proposed activity.

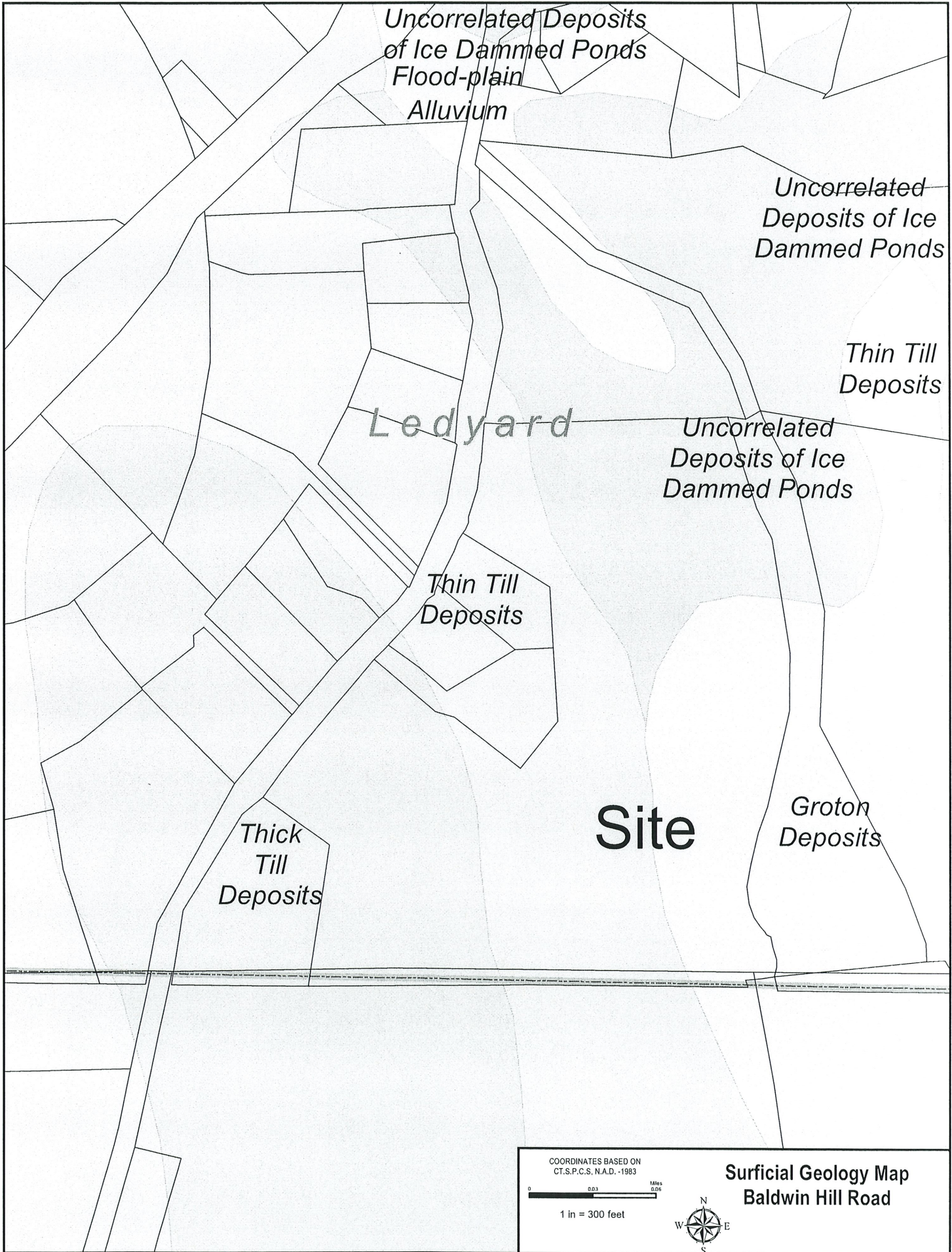


COORDINATES BASED ON
CT.S.P.C.S. N.A.D. -1983

Aerial Photo of Site



1 in = 0 miles



Uncorrelated Deposits
of Ice Dammed Ponds
Flood-plain
Alluvium

Uncorrelated
Deposits of Ice
Dammed Ponds

Thin Till
Deposits

Ledyard

Uncorrelated
Deposits of Ice
Dammed Ponds

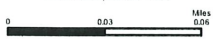
Thin Till
Deposits

Site

Groton
Deposits

Thick
Till
Deposits

COORDINATES BASED ON
CT.S.P.C.S. N.A.D. -1983



1 in = 300 feet

Surficial Geology Map
Baldwin Hill Road



