GEI Consultants

May 21, 2021
Project 2101248.2.1

Gino Carrier
Carrier Construction
161 Birch Street, Suite B
Southington, CT 06489

Consulting
Engineers and
Scientists

Dear Mr. Carrier:

Re: Geologic Assessment
1040 Main Street
South Glastonbury, CT

GEI Consultants, Inc. (GEI) was retained by Carrier Construction to conduct a geologic assessment of the property located at 1040 Main Street, South Glastonbury, CT (Site). The town of Glastonbury has inquired whether a hill located on the western portion of the Site could be an esker. The purpose of our assessment was to determine whether significant geologic features such as an esker, herein after referred to as significant geologic features, are present on the Site.

The town of Glastonbury Subdivision and Resubdivision Regulations, Effective June 1, 1993 and amended May 28, 1996 (Glastonbury, 1996) require that any significant geologic features be depicted on the Site Development Plans (Section 5.7(20)) and Sections 10.7 (Preserving the Integrity of the Area) and 14.0 (Landscaping and Preservation of Existing Resources) require that, if present, significant geological features should be preserved to the greatest extent possible.

Summary of Findings

The evaluation of geologic features on the Site was conducted by Mr. David B. Terry, Professional Geologist (NY and PA), GEI Vice President. Mr. Terry holds a B.A. and an M.S. Degree in Geology and has been practicing in the geosciences as a consultant for 31 years. Mr. Terry's resume is attached in Attachment A.

GEI did not identify any significant geologic features located on the Site as defined by the Glastonbury Subdivision and Resubdivision Regulations. This conclusion, discussed in further detail below, is based on:

- Review of historic aerial photographs.
- Review of historic topographic maps.
- Review of geologic maps.
- A site visit conducted on May 19, 2021 evaluating the geomorphic features (landscape forms) and examination of soils associated with the geomorphic features.

Referenced cited as part of this Assessment are included in Attachment B.

Assessment and Interpretation

Based on the Site topography, two geomorphic features (landscape forms) were evaluated to determine if they may represent eskers or other significant geologic features. These features are shown as Figure 1. Geomorphic Feature 1 is a hill located on the western portion of the Site with a maximum elevation of approximately 150 feet. Geomorphic Feature 2 is a curvilinear hill with a maximum elevation of approximately 130 feet, located adjacent to a wetland and former pond area.

GEI Consultants, Inc.
455 Winding Brook Drive, Suite 201, Glastonbury, CT 06033
860.368.5300 fax: 860.368.5307

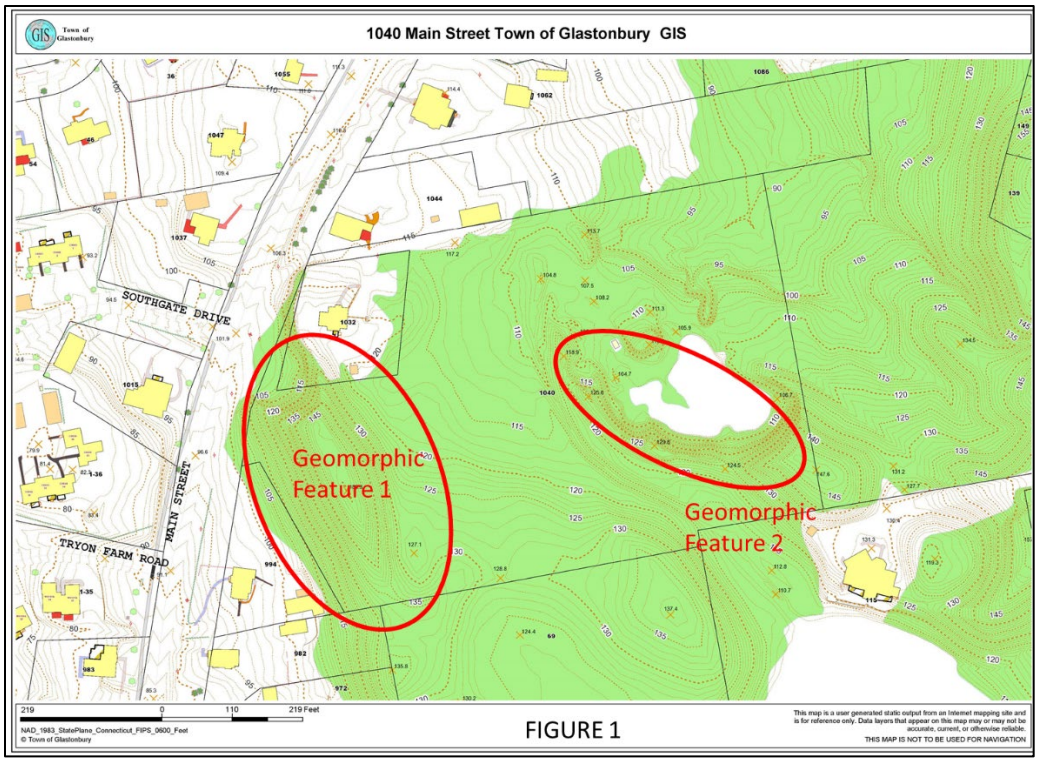

FIGURE 1

Geologic Mapping

The Quaternary Geology of Connecticut (including glacial geology) was most recently mapped and reported by the United States Geological Survey in 2005 (USGS, 2005). Figure 2 presents the mapped glacial geology units surrounding the Site. The surficial geologic unit mapped by USGS at the Site is Dividend Brook deposits (db on the map below). These materials represent successive ice-marginal deltas with a surface altitude of 155-165 feet in the vicinity of the Site. These glacial delta materials (typically sands and gravels) were deposited into a small glacial lake associated with glacial meltwater that temporarily ponded at a slightly higher elevation than glacial Lake Middletown behind the ice-marginal deltas (USGS, 2005).

An ice margin position is depicted by the red line with solid tick marks at the eastern edge of the Site. At this defined ice margin, as the glacial ice melted the ice front was stagnant at this location. This stagnant ice margin likely formed the temporary glacial dam behind which the temporary glacial lake formed, and into which the Dividend Brook (db) deltaic materials (sand and gravel) were deposited.

The USGS does not map any eskers or other significant geologic features at the Site.

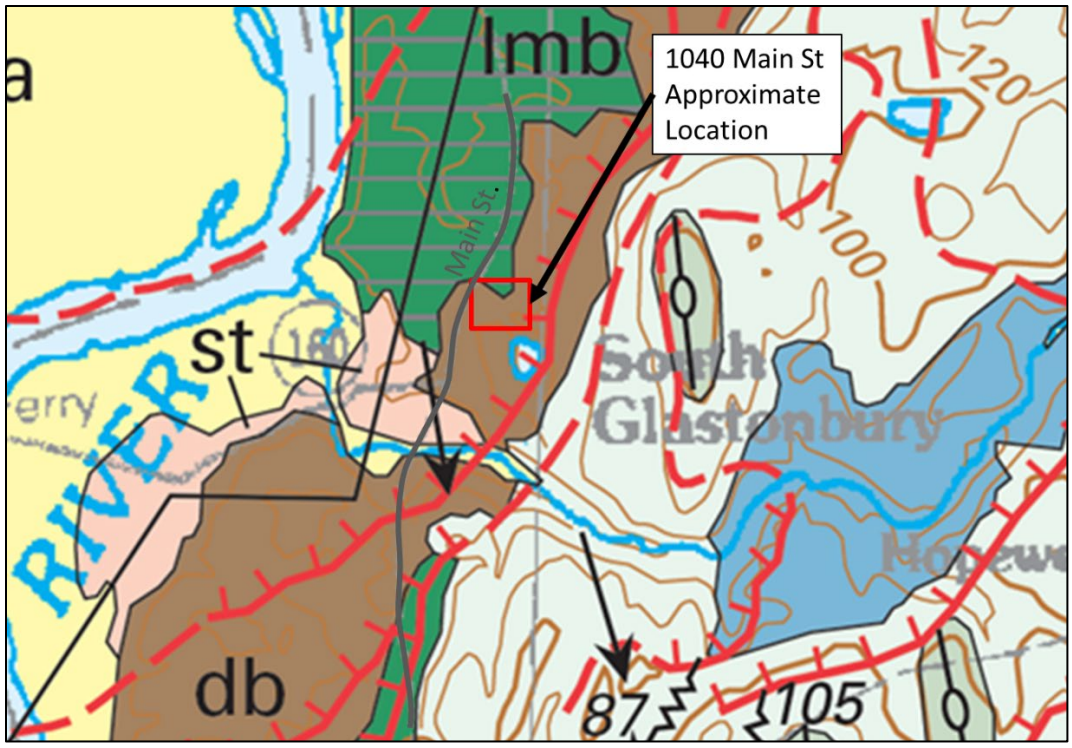

FIGURE 2 (SOURCE: USGS 2005)

Site Topographic History

Eskers are typically long, narrow, sinuous deposits of sand and gravel formed by meltwater transporting sediments, within, under or on top of glacial ice. When the ice melts, the former meltwater streambed deposits collapse, forming an esker (a positive relief feature) where the stream formerly existed, within, under or on the ice. Given that eskers are identified by their geomorphic features, an assessment of changes to topography and land use caused by human activities is required to determine if geomorphic features are natural or caused by excavation or filling through history.

A review of the 1934, 1952, and 1970 aerial photographs for the Site show that significant changes in the Site's use and topography appear to have occurred. Attachment C presents the Aerial Photographs with the approximate Site outlined. In 1934, the central portion of the Site appears to have been used as an orchard, with a stream crossing the Site from South to North, draining the large pond located near the southeast corner of the Site. The 1952 aerial photograph shows that the orchard is apparently no longer present, a field has been cleared on the north-central portion of the Site, and adjacent to the stream, an area of excavation is present just to the east side of the stream. The 1970 aerial photograph shows that much of the Site is now forested and the excavation area east of the stream contains a small pond.

Historic topographic maps from 1900, 1946, 1953, 1964, and 1992 were reviewed and are included in Attachment D with the approximate Site boundary depicted. The largest change in Site topography appears to be a change between 1900 and 1946. In 1900, a northerly flowing stream crosses the Site. However, by 1946, the topography has been modified to show an easterly oriented valley near the eastern end of the Site and the stream is no longer depicted. This change is consistent with the excavation observed in the 1952 aerial photograph.

Field Assessment

On May 19, 2021, Mr. David B. Terry from GEI conducted a site visit to evaluate geomorphic Features 1 and 2 to determine if they could represent eskers. In addition, soils on both features were examined to determine if the soil type is consistent with the soils expected from the USGS mapped Dividend Brook ice-marginal deltaic deposits or may be more indicative of an esker.

Geomorphic Observations

Geomorphic Feature 1 – Field observations confirmed that the hill located along the western boundary of the Site is a relatively short, isolated hill. This shape is not consistent with the geomorphology of an esker, which is a long (sometimes miles long), sinuous steep-sided, narrow hill.

Geomorphic Feature 2 – Field observations confirmed that the curvilinear hill located in the eastern part of the Site is steep sided to the northeast side of the hill, where excavation had occurred between 1946 and 1952 based on historic aerial photograph and topographic map evidence. To the southwest side of the feature, topography drops off less steeply. The slope on the southwest side of the feature appears to have been created by a current intermittent drainage (likely the formerly mapped, northerly-flowing stream). An erosional bench above the axis of the stream bottom was observed adjacent to the curvilinear geomorphic feature indicating the stream formerly flowed closer to the geomorphic feature. Additionally, the topographic high elevation of approximately 130 feet on the feature is nearly identical on the opposite side of the former stream, indicating that the stream has downcut into the geologic deposits creating the small erosional bench and the slope on the southwest side of the feature. On the northeast side of the curvilinear feature, the steep slope was clearly created by excavation that occurred sometime between 1946 and 1952. At the eastern end of the feature, the topography rises to approximately 145 feet near the eastern property boundary and the curvilinear feature broadens into a wide hill. As such, the curvilinear feature appears formed from excavation on the northeast and a downcutting stream on the southeast. The feature therefore does not represent an esker.

Soils Observations

During the Site visit on May 19, 2021, three shallow test pits were hand-dug to evaluate the nature of the soils. Test pit TP-1 was dug into the eastern slope of Geomorphic Feature 1, TP-2 was dug into the eastern slope of Geomorphic Feature 2, and TP-3 was dug into the hillside slope west of the intermittent stream adjacent to Geomorphic Feature 2 to evaluate if the materials on Geomorphic Feature 2 were similar to those on the other side of the drainage. Photographs of the test pits and soils are included in Attachment E.

Soils at TP-1 (Geomorphic Feature 1) consisted of loose, dark red-brown coarse to very coarse sand with some gravel and few angular cobbles. These materials are consistent with ice-marginal deltaic deposits as mapped by the USGS.

Soils at TP-2 (Geomorphic Feature 2) consisted of loose, red-brown medium to fine sand with little gravel and trace cobbles. These materials are consistent with ice-marginal deltaic deposits as mapped by the USGS.

Soils at TP-3 (located west of the intermittent drainage adjacent to Geomorphic Feature 2) were similar to those observed at TP-2 and consisted of loose to moderately dense red-brown fine to coarse sand with little gravel. These materials are also consistent with ice-marginal deltaic deposits and the similarity with the materials at TP-2 support that the intermittent stream downcut through the deltaic deposits creating the southwestern slope of Geomorphic Feature 2.

Conclusions

There is no evidence of an esker or other significant geologic feature being located on the Site. The soils at the Site represent deltaic sands deposited into a temporarily dammed glacial lake.

The elevated Geomorphic Feature 1, on the western side of the Site is not consistent with the anticipated geomorphology of an esker. The elevation of this feature (150 ft) is consistent with the elevation of the delta deposits reported by USGS for the mapped Dividend Brook deposits (USGS, 2005) and the soils on this feature are consistent with ice-marginal deltaic deposits.

The elevated Geomorphic Feature 2 located on the eastern portion of the Site has been formed by excavation on the northeast side of the Site sometime between approximately 1946 and 1952 and a downcutting stream on the southwest side of the Site.

Overall, the surficial materials at the Site represent glacial deltaic deposits and the topographic relief at the Site has been largely formed by stream erosion and by excavation and reworking at the Site.

GEI appreciates the opportunity to support Carrier Construction with our geologic services. If you have any questions, please call Doug Brink at (860) 368-5410.

Sincerely,

GEI CONSULTANTS, INC.

Charles D. Brink, LEP
Senior Project Manager
cbrink@geiconsultants.com

David B. Terry P.G., LEP
Vice President, Principal, Branch Manager
dterry@geiconsultants.com

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Enclosures:
Attachment A – Resume
Attachment B – References Cited
Attachment C – Aerial Photographs
Attachment D – Historic Topographic Maps
Attachment E – Test Pit and Soils Photographs

ATTACHMENT A

RESUME

David B. Terry, P.G., LEP
Vice President

David Terry is an environmental consultant and past member of GEI's Board of Directors. Since 1999, Mr. Terry has been a client account manager and team leader. He is currently the Branch Manager for GEI's Glastonbury, CT office. He has spent over 20 years assembling and directing multi-disciplinary project teams to assess, design, and implement solutions to complex DNAPL related problems migrating through complex geologic settings while working under state and federal (CERCLA and RCRA) regulatory programs. Mr. Terry's technical expertise is derived through his educational background as a geologist and a hydrogeologist and through a career spent evaluating and remediating contaminated sites.

Mr. Terry has been responsible for guiding and conducting hundreds of Remedial Investigation/Feasibility Study (RI/FS) projects throughout the Eastern United States. He has also been responsible for designing and managing site remediation projects, risk exposure assessments, and assisting clients in evaluating financial liability allocations at sites involving multiple PRPs.

EDUCATION
M.S., Geology, Kansas State University
B.A., Geology, State University of New York

EXPERIENCE IN THE INDUSTRY
31 years

EXPERIENCE WITH GEI
23 year(s)

REGISTRATIONS AND LICENSES
Licensed Environmental Professional, CT No. 327
Professional Geologist, PA No. PG-003050-G

Working closely with corporate and outside counsel, as well as financial experts, Mr. Terry has used his technical abilities to develop corporate-level strategic decision-making frameworks and liability management approaches.

PUBLICATIONS

- Terry, David, S. Canton, T. Bell. 2008. Stressor Identification – a Key Step in Evaluation of an MGP-Affected Urban Waterway. Third International Symposium and Exhibition on the Redevelopment of Manufactured Gas Plant Sites (MGP 2008). Mystic, Connecticut.
- O'Neil, Matthew, J. Parillo, D. Terry, W. Ryan, T. Leissing, S. Carter, G. Cross, A. Omorogbe. 2008. Evaluation of the Hydrologic Effects of Oxygen Injection for Biostimulation in an Upper Glacial Aquifer on Long Island. 2008 NGWA Conference on Eastern Regional Ground Water Issues. National Ground Water Association.
- Marando, Michael, D. Terry, J. Collins, D. Unites, A. Prophete, T. Bell. 2006. Real-Time Naphthalene Monitoring Using an Ultra Fast Gas Chromatograph. Water Environment Federation. WEF/AWWA Odors and Air Emissions 2006.
- Terry, David, A. Brey, L. Willey, T. Bell, M. McCormick, 2000. Resonant Sonic Drilling at Three Former MGP Sites: Benefits and Limitations. Gas Technology Institute Site Remediation Technologies & Environmental Management Practices in the Utility Industry. December 4-7, 2000.
- Terry, David, K.M. Egers, 1996. Final Report for the Western Maryland Watershed Liming Pilot Study. Maryland Department of Natural Resources, Chesapeake Bay Research and Monitoring Division CBRM-AD-94-6.
- Terry, David, R.M. Price, R.J. Klauda, R.P. Morgan II, and M.L. Bowman, 1994. Watershed Liming and Hydrologic Event Monitoring of an Acidic Stream in Western Maryland. Annual Meeting of the American Fisheries Society in Halifax, Nova Scotia. August 21 - 25, 1994.
- Terry, David, 1990. Geochemistry of Waters in the Dakota Aquifer in Southwestern Kansas: 7th Annual Water and the Future of Kansas Conference, Proceedings. March 7 and 8, 1990.
- Terry, David, 1990. Groundwater Chemistry Analysis of the Dakota Aquifer in Southwest Kansas: 24th Annual Meeting, South-Central Section Geological Society of America, Abstracts with Programs. March 5 and 6, 1990.

ATTACHMENT B

REFERENCES CITED

USGS, 2005. *Quaternary Geologic Map of Connecticut and Long Island Sound Basin. U.S. Department of the Interior, U.S. Geological Survey*. *Scientific Investigations Map 2784*. Janet Radway Stone, John P. Schafer, Elizabeth Haley London, Mary L. DiGiacomo-Cohen, Ralph S. Lewis, and Woodrow B. Thompson.

Glastonbury, 1996. *The Town of Glastonbury Subdivision and Resubdivision Regulations,* Effective June 1, 1993 and amended May 28, 1996.

ATTACHMENT C

AERIAL PHOTOGRAPHS

1934 Aerial and Approximate Site Boundary

ATTACHMENT C

AERIAL PHOTOGRAPHS

1952 Aerial and Approximate Site Boundary

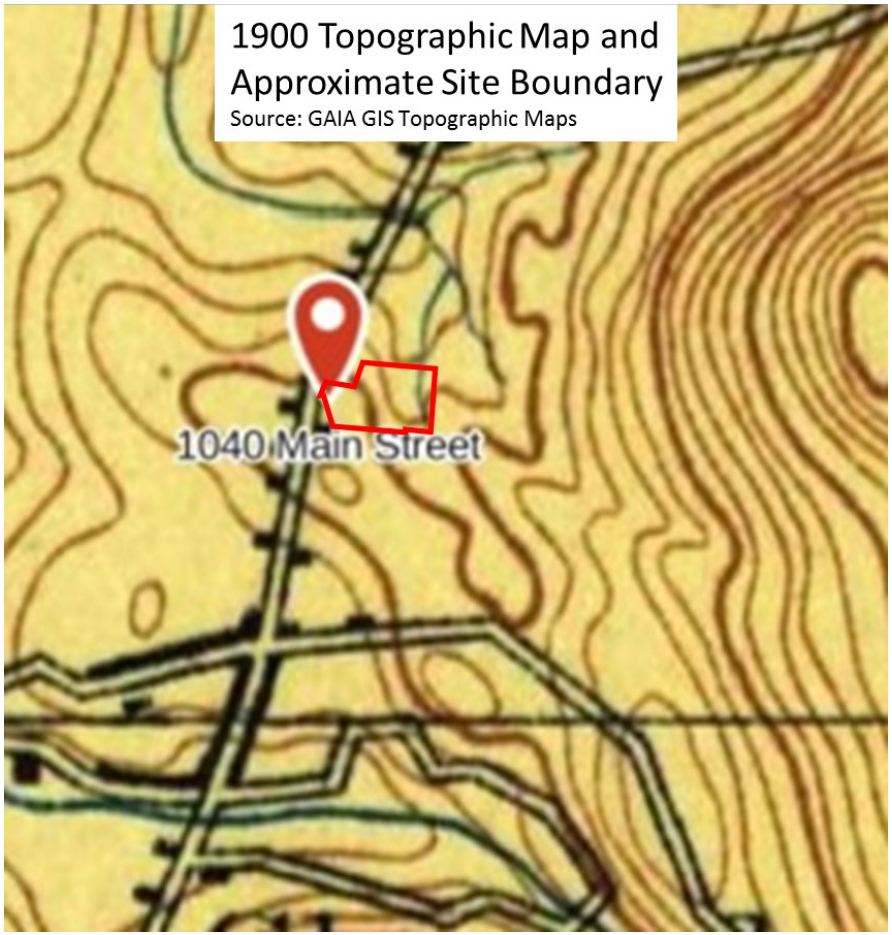
ATTACHMENT C

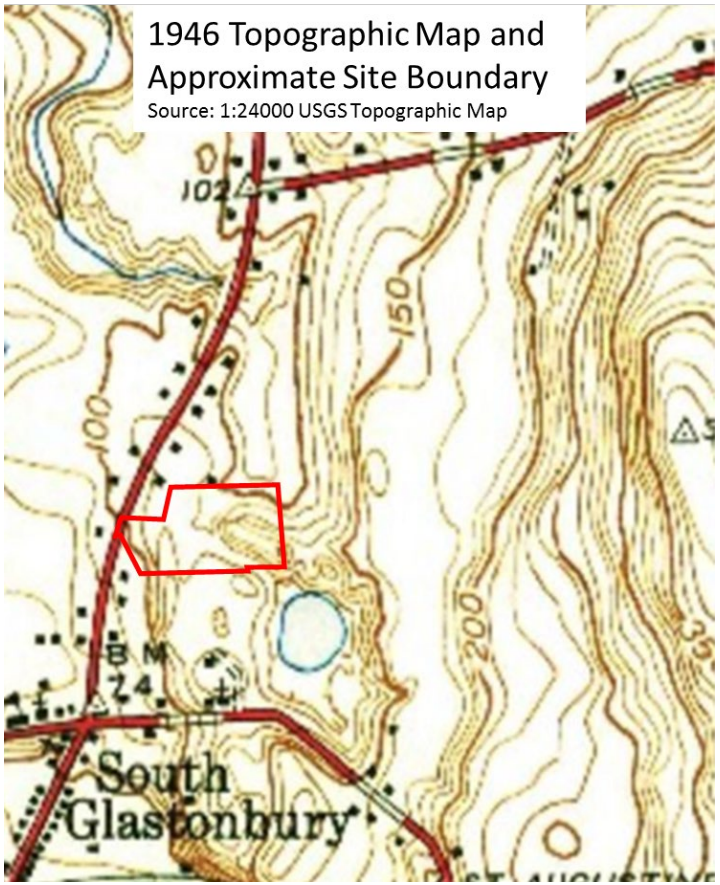
AERIAL PHOTOGRAPHS

1970 Aerial and Approximate Site Boundary

ATTACHMENT D

HISTORIC TOPOGRAPHIC MAPS





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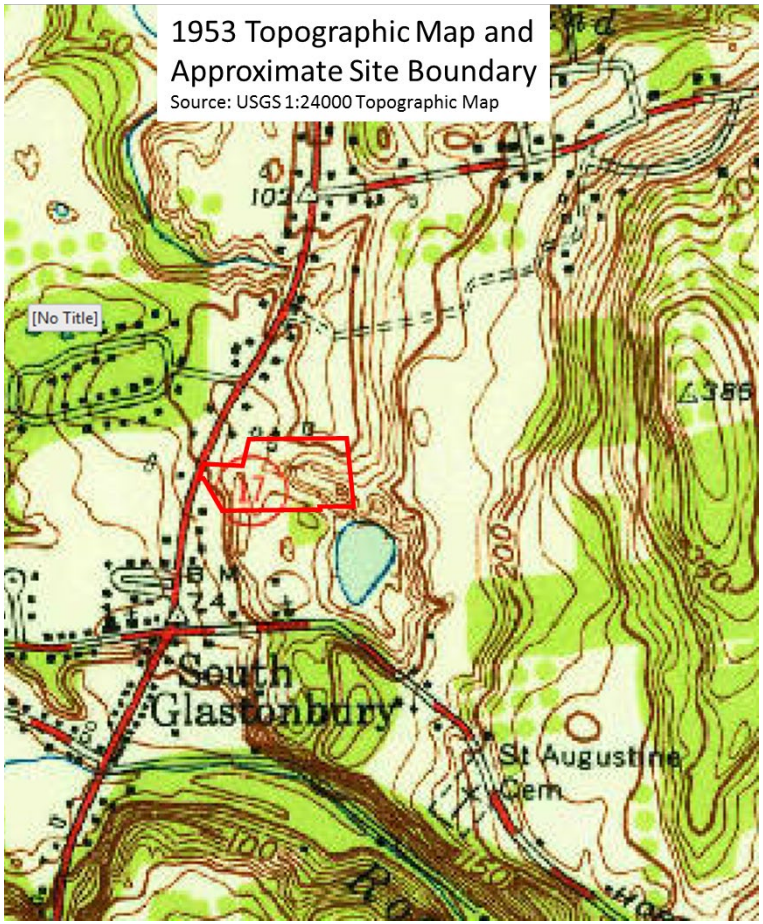

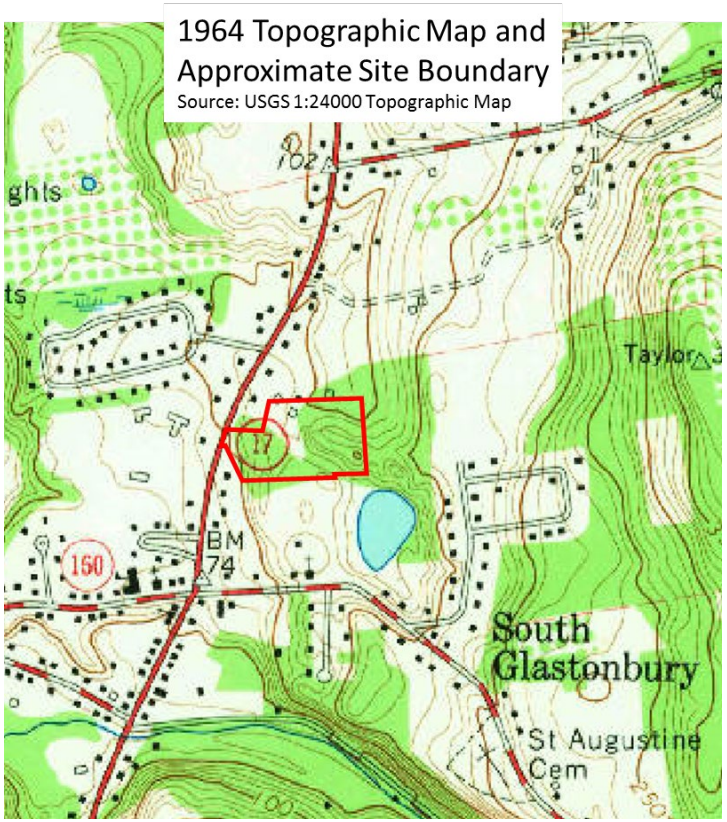

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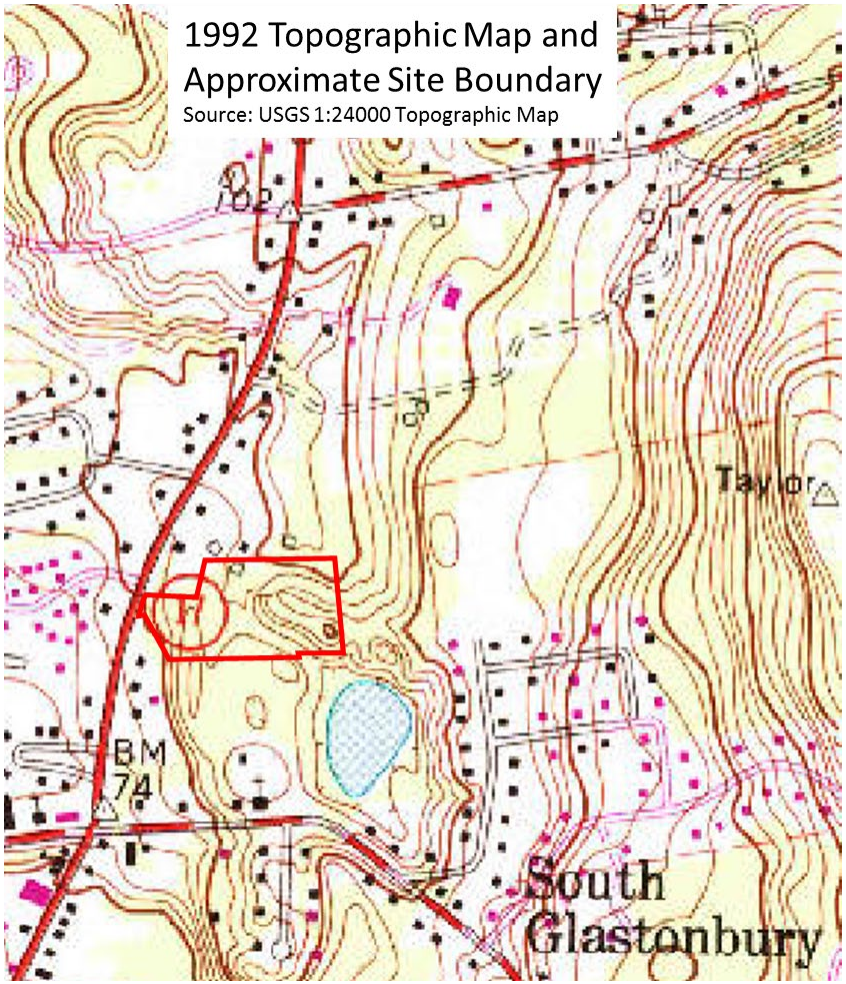

ATTACHMENT E

TEST PIT PHOTOS AND SOILS PHOTOS

Test Pit 1 (East slope Geomorphic Feature 1)

TP-1 Soils - dark red-brown coarse to very coarse sand with some gravel and few angular cobbles

ATTACHMENT E

TEST PIT PHOTOS AND SOILS PHOTOS

Test Pit 2 (East slope Geomorphic Feature 2)

TP-2 Soils - red-brown medium to fine sand with little gravel and trace cobbles

ATTACHMENT E

TEST PIT PHOTOS AND SOILS PHOTOS

Test Pit 3 (SW of Geomorphic Feature 2)

TP-3 Soils - red-brown fine to coarse sand with little gravel