HYDROGEOLOGIC INVESTIGATION REPORT

CARRIE E. TOMPKINS ELEMENTARY SCHOOL
8 GERSTEIN STREET
CROTON-ON-HUDSON, NEW YORK

PREPARED FOR:

CROTON HARMON UNION FREE SCHOOL DISTRICT
8 GERSTEIN STREET
CROTON-ON-HUDSON, NEW YORK

PREPARED BY:

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President

HydroEnvironmental SOLUTIONS, INC.
INTRODUCTION

HydroEnvironmental Solutions, Inc. (HES), on behalf of Croton Harmon Union Free School District (CHUFSD), completed a Hydrogeologic Investigation (HI) at Carrie E. Tompkins Elementary School located at 8 Gerstein Street in Croton-on-Hudson, New York (the site). The site location is shown on Figure 1. The purpose of the hydrogeologic investigation was to determine if groundwater beneath the site was affecting the lower level of the school building via seepage and water entry through the concrete slab floor or masonry walls.

Hydrogeologic Investigation field activities were conducted on November 15, 2014. Site activities completed by HES included test drilling and monitor well installation at 4 locations on the property, and monitoring water levels on an approximate bi-monthly basis for a period of seven months. The test boring/monitor well locations are shown on Figure 2, and photographs taken during the field activities are shown on Figure 3. The field activities and results of the investigation are presented below.

FIELD ACTIVITIES

As part of the Hydrogeologic Investigation, HES drilled at four locations at the site. HES installed two (2) 1-inch monitor wells around the exterior foundation walls to the north and west of the lower level of the school building. The wells were installed with a Geoprobe® 54DT track mounted drill rig using the direct push drilling method. One test boring was attempted inside the lower level of the school in the rear storage closet of Room 108, known as the Projects Room. During drilling activities, continuous soil samples were collected using a 2.25-inch or 1.25-inch (manual) macro core sampler to varying depths of at least 7-8 feet below grade (ftbg) on the exterior of the building. Shallow refusal (1.75 ftbg) on presumed bedrock was encountered at test boring locations GB-1 and inside the closet of Room 108. The collected soil samples were logged in the field by the on-site HES hydrogeologist, and the Geologic Logs are included in Appendix 1.

Following drilling activities, monitor wells were set in each of the two exterior test borings. The wells are constructed of 1-inch schedule 40 PVC 20 slot well screen and solid riser pipe. The annular space around the well screen was backfilled with No. 1 filter sand to at least one foot above the well screen and a 1-foot bentonite seal was placed atop the well screen. The wells were set flush with grade in water tight protective manholes. The monitor wells were installed at these locations to determine the
relationship between the concrete slab and floor of the school building to the groundwater table.

HYDROGEOLOGIC INVESTIGATION RESULTS

Site Geology

The Town of Croton-on-Hudson lies mostly on till as identified by the Surficial Geologic Map of New York, Lower Hudson Sheet (Cadwell, 1989). Till is defined as clay, silt, sand and boulders, in poorly sorted diamict with depths ranging from 3 to 75 feet (Cadwell, 1989). According to the Geologic Map of New York State, Lower Hudson Sheet (Fisher, 1970), the bedrock beneath the site is comprised of the Bedford Gneiss Formation, a biotite-quartz-plagioclase gneiss with interlayered amphibolite. According to the United States Department of Agriculture (USDA) Soil Survey for Westchester County, New York, the soils beneath the site are designated as Urban Land-Charlton Chatfield Complex (UIC). These soils are characterized as well-drained sandy loam found on hills and ridges, with slopes of 2 to 15%. The depth to water in these soils is documented as greater than 80 inches.

Groundwater Monitoring

The results of test boring drilling indicate that the site is underlain by poorly sorted fine grained silt and sand with some fine gravel (till). Refusal and presumed bedrock was encountered at test boring location GB-1 and the hand-held test boring attempted in the rear closet of Room 108 at 1.75 ftbg. Additionally, as indicated on the Geologic Logs in Appendix 1, presumed bedrock was encountered at test boring/monitor well locations GB-2 and GB-3 at 7.25 and 8 ftbg, respectively. During drilling activities, no signs of groundwater (saturated soils) were observed.

An HES hydrogeologist returned to the site on November 17 and December 15, 2014 and on January 5, February 11, March 11, March 25, April 24, and June 25, 2015 to measure water levels in the two exterior wells. A sonic water level indicator was used on each monitoring date, and the wells were dry on all of the site visits. The groundwater monitoring data is summarized on Table 1.

Discussion of Results

The results of test drilling and groundwater monitoring indicate that the subsurface conditions are characterized by shallow bedrock (1.75 to 8 ftbg) with unsaturated fine
grained silt, sand and fine gravel (till) overlying the metamorphic bedrock. The groundwater table was not observed during any of the eight monitoring visits. Therefore, the water table is not only absent in the underlying overburden material, but groundwater does not coincide with the bottom elevation of the concrete slab and foundation walls of the lower level of the school building. This is supported by groundwater monitoring data to 8 ftbg where no groundwater was observed. Based on these findings to date, the regional groundwater table appears to be located in the underlying fractured bedrock. Thus, groundwater seepage in the past and at present will not be an issue, and sub slab water entry related to groundwater into the building envelope will not occur.

CONCLUSIONS

1. Test boring drilling confirmed the presence of shallow metamorphic bedrock beneath the subject site at depths ranging from 1.75 to 8 ftbg moving southwest to northeast across the site.

2. The overburden material composed of glacial till was unsaturated. Groundwater monitoring of the two on-site monitor wells on eight separate occasions did not detect measureable groundwater levels.

3. The lack of a water table to well completion depths of 7.25 and 8 ftbg confirm that groundwater seepage into and around the school building is not occurring based on the groundwater monitoring data collected to date.

RECOMMENDATIONS

- HES recommends no additional groundwater monitoring of the existing on-site monitoring wells as groundwater has not been present in the wells since November 2014.

- HES recommends that the on-site monitoring wells be abandoned in accordance with NYSDEC regulation within the next 6 months.
REFERENCES
References

Cadwell, Donald H., Editor, 1989, Surficial Geologic Map of New York, Lower Hudson Sheet, New York State Museum – Geological Survey, Map and Chart Series #40


Seifried, Stefan T., 1994, Soil Survey of Putnam and Westchester Counties, New York, United States Department of Agriculture, Soil Conservation Service in coordination with Cornell University Agricultural Experiment Station.
TABLES
### Table 1

**CARRIE E. TOMPKINS ELEMENTARY SCHOOL**  
**8 GERSTEIN STREET**  
**CROTON-ON-HUDSON, NEW YORK**  
**HYDROGEOLOGIC INVESTIGATION**

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FIGURE 3
CARRIE E. TOMPKINS ELEMENTARY SCHOOL
8 GERSTEIN STREET
CROTON-ON-HUDSON, NEW YORK

Photograph of the rear closet area of Room 108 where a test boring was attempted.

Photograph of rear of the school where test boring GB-1 was attempted.

Photographs taken during test boring drilling activities on November 15, 2014.
HydroEnvironmental Solutions, Inc., One Deans Bridge Road, Somers, New York 10589
Photograph of test boring location GB-1 located at the side of the building.

Photograph of 1-inch PVC monitor well set in borehole designated MW-2.

Photographs taken during test boring drilling activities on November 15, 2014.
HydroEnvironmental Solutions, Inc., One Deans Bridge Road, Somers, New York 10589
APPENDIX 1:

GEOLOGIC LOGS
### GEOLOGIC LOG

CLIENT: CHUFSD

WELL NO.: GB-1

PAGE 1 OF 1 PAGES

| SITE LOCATION: | 8 Gerstein Drive  
Croton-on-Hudson, NY |
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**REMARKS:** Hydrogeologic Investigation

**ABBREVIATIONS:** SS = split spoon  
W = wash  
C = cuttings  
G = grab  
ST = Shelby tube  
REC = Recovery  
PPM = parts per million  
ftbg = feet below grade  
MC = macro core sampler

### DEPTH (FEET)

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<p>| 0 |
| 1.75 |</p>
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ORGANICS (0 - 0.75 ftbg) SILTY SAND (fine to coarse)  
(0.75 - 1.0 ftbg) STONE with crushed STONE (1.0 - 1.75 ftbg)

| Refusal at 1.75 ftbg |
GEOLOGIC LOG

CLIENT: CHUFSD

WELL NO.: MW-2

PAGE 1 OF 1 PAGES

SITE LOCATION: 8 Gerstein Drive
Croton-on-Hudson, NY

SCREEN SIZE & TYPE: - Schedule 40 P
SLOT NO.: 20      SETTING: 0-4

DATE COMPLETED: November 15, 2014

SAND PACK SIZE & TYPE: - Schedule 40 PVC

DRILLING COMPANY: HES

SETTING: 4-7.25

DRILLING METHOD: Geoprobe® 54DT

SETTING: 2'-7.25'

SAMPLING METHOD: 2.25-inch MC

SEAL TYPE: - Bentonite

DRILLER and/or OBSERVER: TAB; CLT

SETTING: 1'-2'

REFERENCE POINT (RP): Grade

BACKFILL TYPE: -

ELEVATION OF RP: -

STATIC WATER LEVEL: -

STICK-UP: -

DEVELOPMENT METHOD: -

SURFACE COMPLETION: -

DURATION: -      YIELD: -

REMARKS: Hydrogeologic Investigation

ABBREVIATIONS: SS = split spoon   W = wash   C = cuttings   G = grab   ST = Shelby tube
REC = Recovery   PPM = parts per million   ftbg = feet below grade   MC = macro core sampler

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<td>-</td>
<td>ORGANICS (0 -0.75 ftbg) SILTY SAND (fine) with slight crushed STONE (small, angular) (0.75 - 3.75 ftbg); SILTY SAND (fine) with clasts (medium, angular) (3.75 - 3.95 ftbg); Brown; Dry</td>
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<td>4 8</td>
<td>MC</td>
<td>-</td>
<td>3.25</td>
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<td>SILTY SAND (fine to coarse) with crushed STONE (4.0 - 7.25 ftbg); Brown and Grey; Dry</td>
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Refusal at 7.25
GEOLOGIC LOG

CLIENT: CHUFSD

WELL NO.: MW-3

PAGE 1 OF 1 PAGES

SITE LOCATION: 8 Gerstein Drive
Croton-on-Hudson, NY

SCREEN SIZE & TYPE: - Schedule 40 P
SLOT NO.: 20 SETTING: 0-4

SAND PACK SIZE & TYPE: - Schedule 40 PVC
SETTING: 4-7.25

CASING SIZE & TYPE: #2 Filter Sand
SETTING: 2'-7.25'

DRILLING COMPANY: HES

SEAL TYPE: - Bentonite
SETTING: 1'-2'

REF: Grade
BACKFILL TYPE: -

ELEVATION OF RP: -
STATIC WATER LEVEL: -

STICK-UP: -
DEVELOPMENT METHOD: -

SURFACE COMPLETION: -
DURATION: - YIELD: -

REMARKS: Hydrogeologic Investigation

ABBREVIATIONS: SS = split spoon W = wash C = cuttings G = grab ST = Shelby tube
REC = Recovery PPM = parts per million ftbg = feet below grade MC = Macro core sampler

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