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The Use of Green Pond Conglomerate as Building Stone in Morris County, New Jersey

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Abstract

Green Pond Conglomerate (GPC) is a maroon colored quartzite with white quartz pebbles, a classic "puddingstone". GPC derives from a NW-SW-trending sliver of Paleozoic sediments, the "Green Pond Outlier", surrounded by older metamorphic and igneous rocks of Morris and Passaic Counties. Buildings, retaining walls, field fences, and monuments incorporate the durable and attractive stone, in a distinct geographic area of Morris County. Several instances of structures completely constructed or faced with GPC occur in and around Morristown, limited to affluent houses and one prominent church. In these cases, GPC stones were dressed and faced, a labor-intensive effort. Elsewhere in the county, GPC forms decorative accents to fences and walls, or in most cases, comprises a portion of the undressed rounded fieldstones in buildings and field fences.

No historic GPC quarries are noted, so the source of the building stone is from glacial sediments. The Pleistocene continental ice advances crossed and eroded the Green Pond outcrop from the north and northwest, depositing GPC boulders to the Illinoian and Wisconsin moraines, terminating just north and east of Morristown. Isolated Pre-Illinoian deposits exist as far south as Somerset County, which may contain rare GPC cobbles. From Morristown and south, GPC as a building stone would likely have been imported. North of the terminal moraines, GPC is common and probably proportional to distance from the bedrock source. Ongoing research seeks to quantify the proportional frequency of GPC in human structures and in the glacial sediments.

About Green Pond Conglomerate (hereafter GPC):

- ❖ Silurian age (~428-443 million years old), "red arkosic quartz-pebble conglomerate (medium to coarse grain) and quartzite;... grades downward into gray, very dark-red, or grayish-purple, medium- to coarse-grained bedded pebble to cobble conglomerate" (Harper, 1826). Up to 1000ft (~300m) thick, steeply folded (Figs 1 and 3).
- ❖ Outcrops in a geographically thin line of Paleozoic sedimentary bedrock, the "Green Pond Outlier" (Fig. 2), surrounded by igneous and metamorphic rocks of the New Jersey Highlands physiographic province. Contiguous with similar Schunemunk Conglomerate in New York (Orange County). Type locality near Green Pond, northern Morris County.
- ❖ Resistant GPC rock forms prominent NE-SW elongated ridges (Fig. 2), such as Green Pond Mountain, Coppers Mountain, Kanouse Mountain, and Bearfort Mountain (Kummel and Weller, 1901). These ridges were over-run and eroded by continental glaciers, from the north or northeast direction, based on striations observed on polished surfaces (Fig. 3).
- ❖ Because of its resistance to weathering and abrasion, GPC cobbles and boulders persist within glacial and glaciofluvial sediments lee of the GPC outcrops. GPC boulders and cobbles comprise ~35% of the boulder lithology in Wisconsin moraines near Denville and Boonton, NJ. GPC erratics are found as distant at the Watchung Mountains of Essex and Union counties, and in isolated pockets of Pre-Illinoian ("Jerseyan") glacial sediments of Morris and Somerset counties.

Fig. 1. Erratic as monument, Presbyterian Cemetery, Morristown



Green Pond Conglomerate as a "cultural stone" (Pope et al. 2002)

- ❖ Attractive, very hard and resistant (and difficult to work).
- ❖ Unique and identifiable, widely referred to as "puddingstone" (here as well as locations around Boston, MA and England).
- ❖ Research so far reveals no quarries for GPC.
- ❖ Unlike similar Shawangunk Conglomerate of Kittatinny Ridge (NJ) & Shawangunk Mountains (NY), no evidence that GPC was ever used for millstones.
- ❖ Use as a building stone probably limited to source of glacial boulders and cobbles (also noted by Harper, 2013).
- ❖ Stones were most commonly used as-is (rounded cobbles, Fig. 4), less commonly as faced but irregularly shaped stones (polygonal rubble, Fig. 5), roughly dressed as dimension stone (ashlar, Fig. 14f), or veneer (Fig.6).

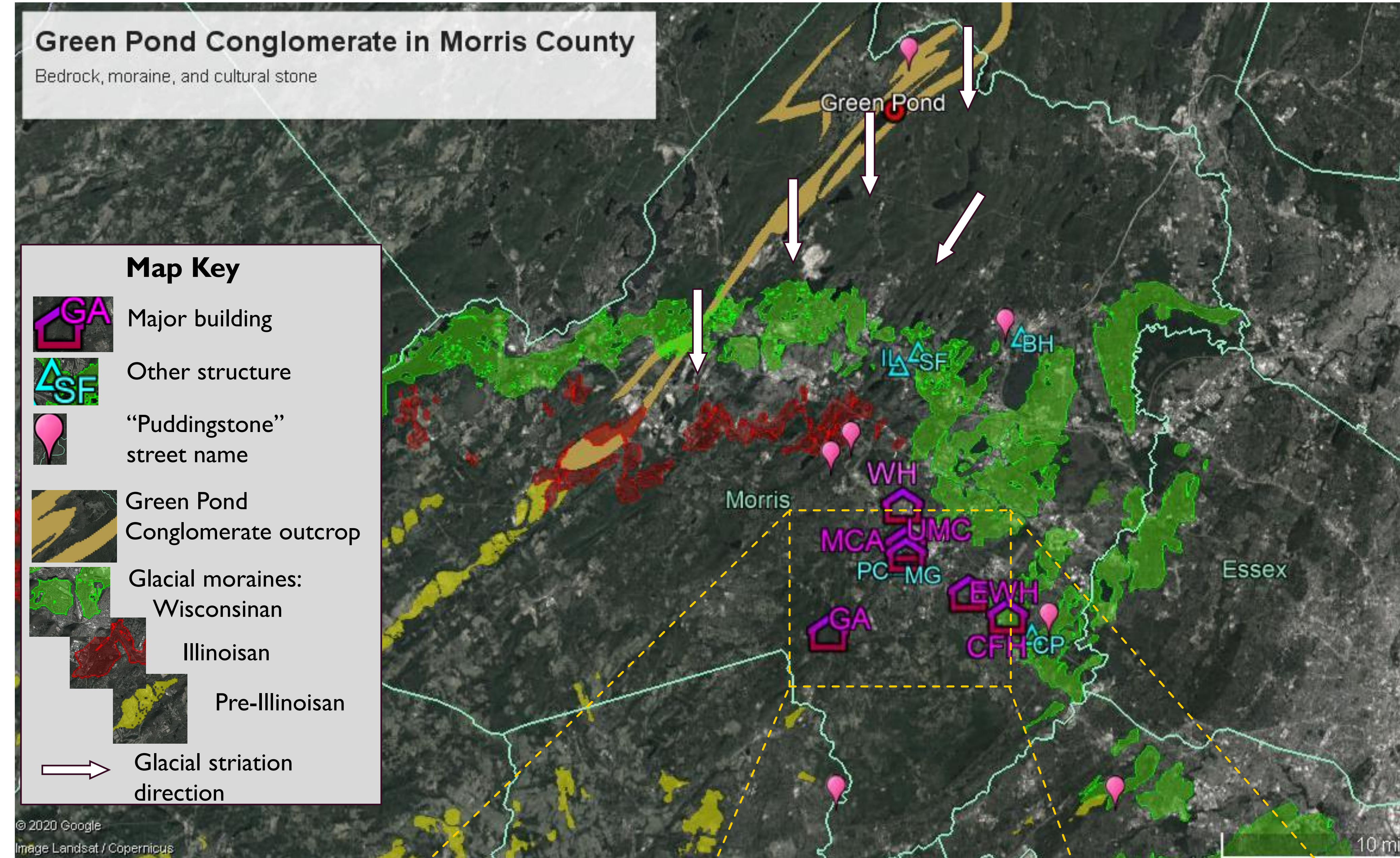
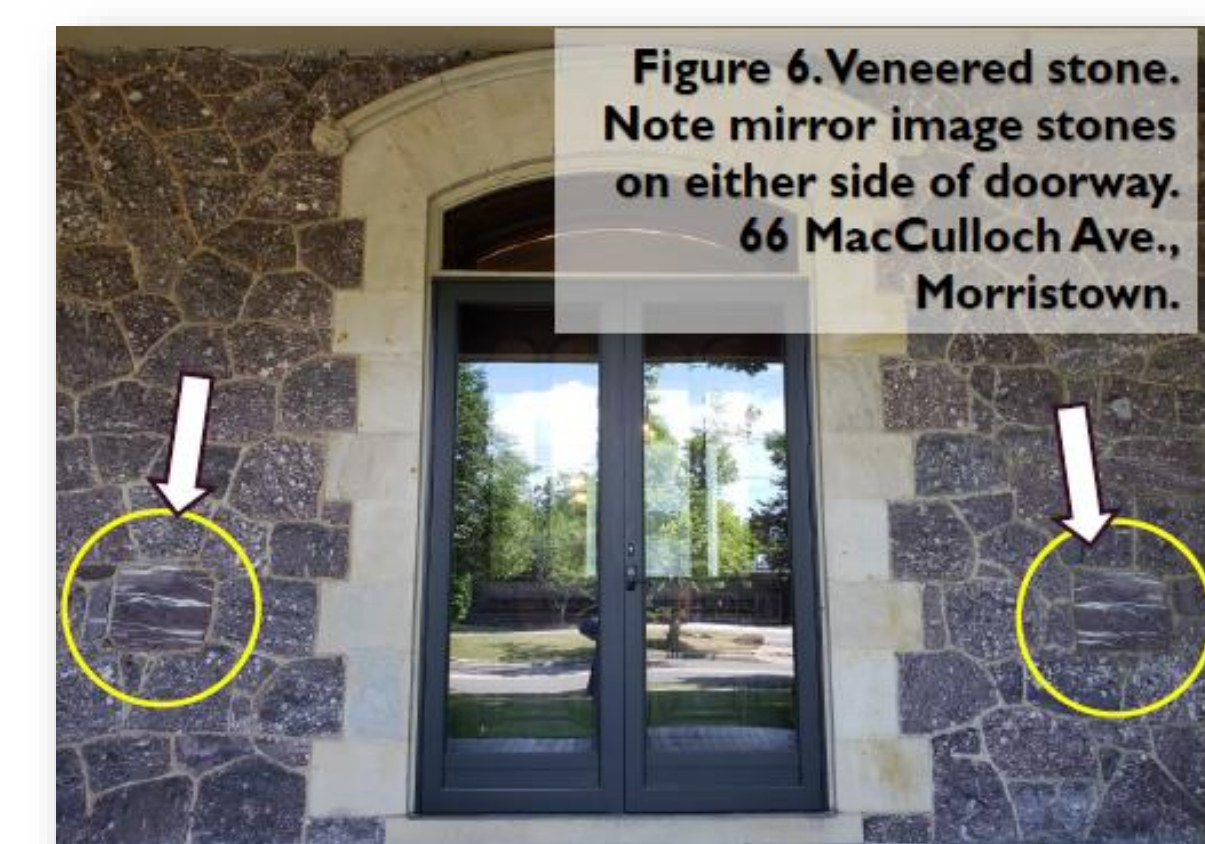
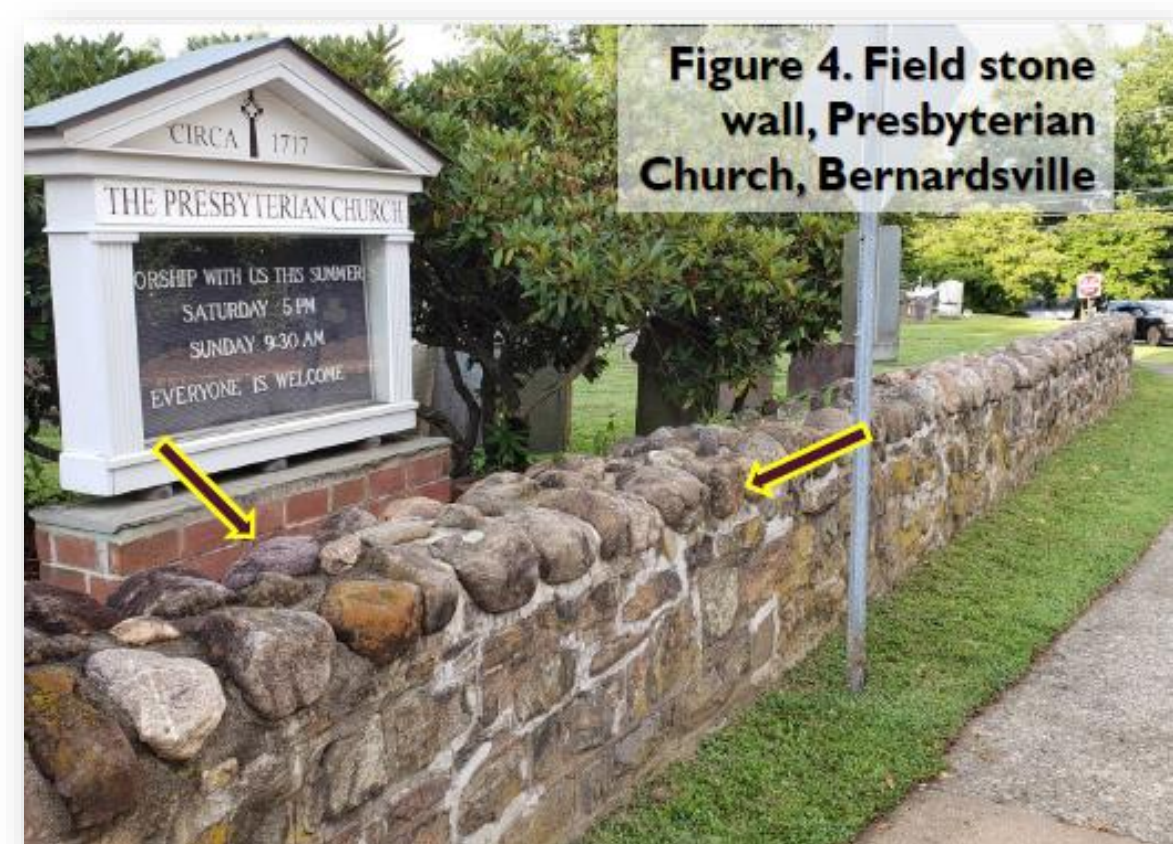
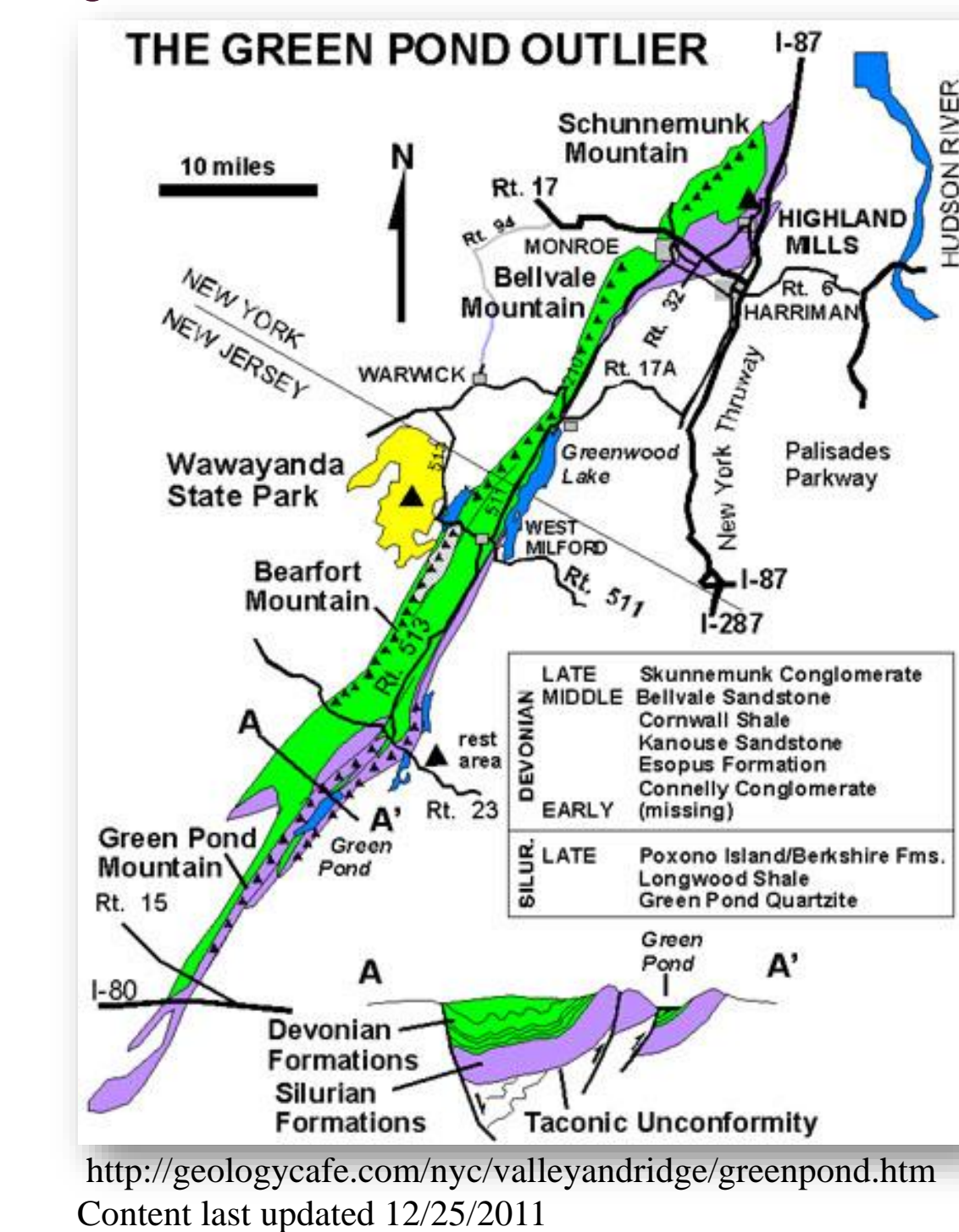


Figure 2



http://geologycafe.com/nyc/valleyandridge/greenpond.htm
Content last updated 12/25/2011

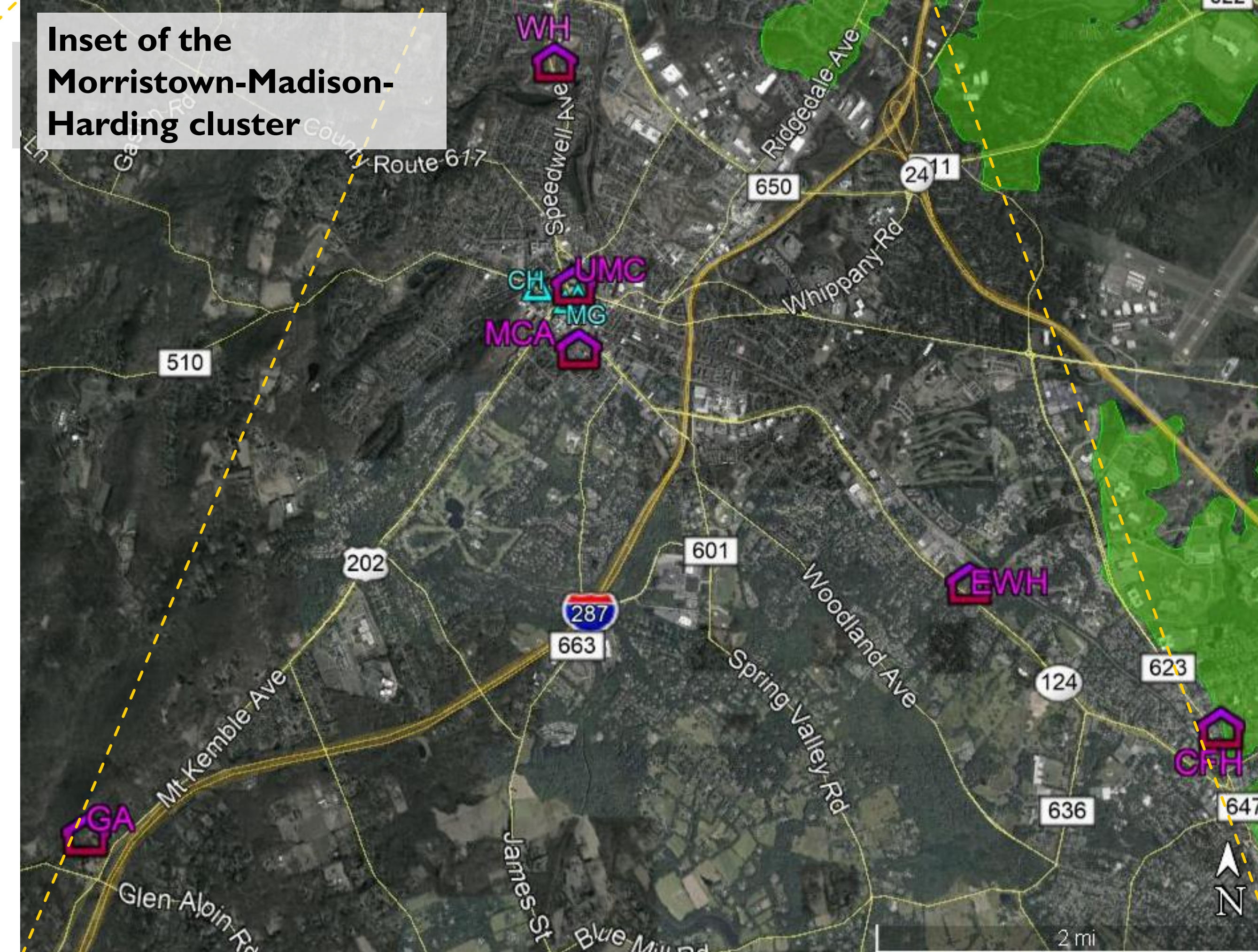


Fig. 14a-f: Other Structures and Monuments

- SF:** Shrine garden, Residences at Saint Francis, Denville. Dominated by GPC (1944?).
- BH:** American Legion memorial plaque affixed to GPC erratic, at Boonton Historical Society, Boonton. 1969?
- IL:** Decorative gate at the entrance to the Indian Lake neighborhood, Denville. Early 20th C. Roughly dressed dimension stone, ~33% GPC.
- PC:** Ford family memorial, notable Revolutionary War patriots, in historic Presbyterian Cemetery, central Morristown (across street from United Methodist Church). Plaque on GPC erratic, erected 1940.
- MG:** Stone bench, dominantly GPC, center of The Green, Morristown. Age? Possibly stones salvaged from United Methodist Church fire.
- CH:** Stone retaining wall along sidewalks surrounding historic Morris County Court House. Dates to at least 1910 or older. Nearly entirely GPC, dimension stone topped by jagged angular GPC.



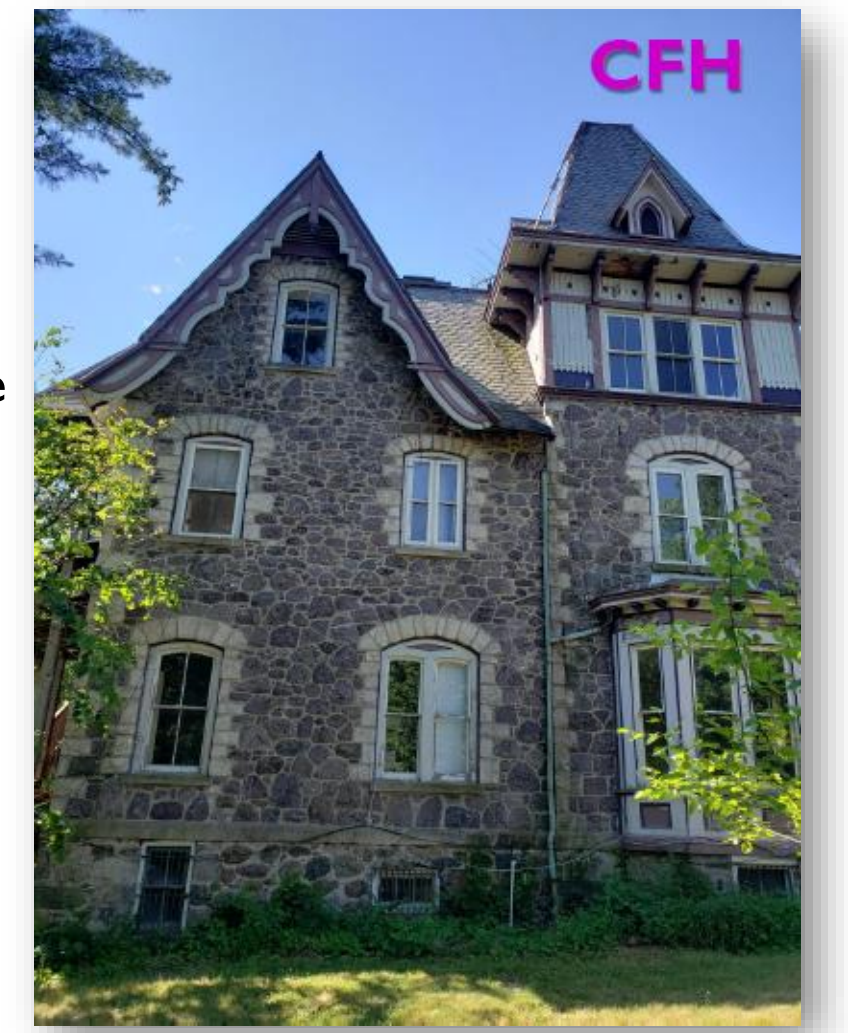
6 Prominent Buildings of Green Pond Conglomerate



GA Figure 7a & b, **GA = Glen Alpin, Harding Twp. (1847)** 14,000sq ft.; sold to township for \$1.4million in 2004. Designed to "blend in with its natural surroundings... the puddingstone used in Glen Alpin is an example of this belief... "Sometime after the late 1970s, DeCarlo painted the puddingstone white." (!!!) (GlenAlpin.org, 2020)



EWH Figure 9 **EWH = Enos Wilder House, Madison, 300 Madison Ave. (1896)** Now medical offices. Gutted and renovated 1986. Valued \$2.6million (propertyshark.com), 18,500 sq. ft. Designed by D. Burns (Leynes and Wiles, 2015.)



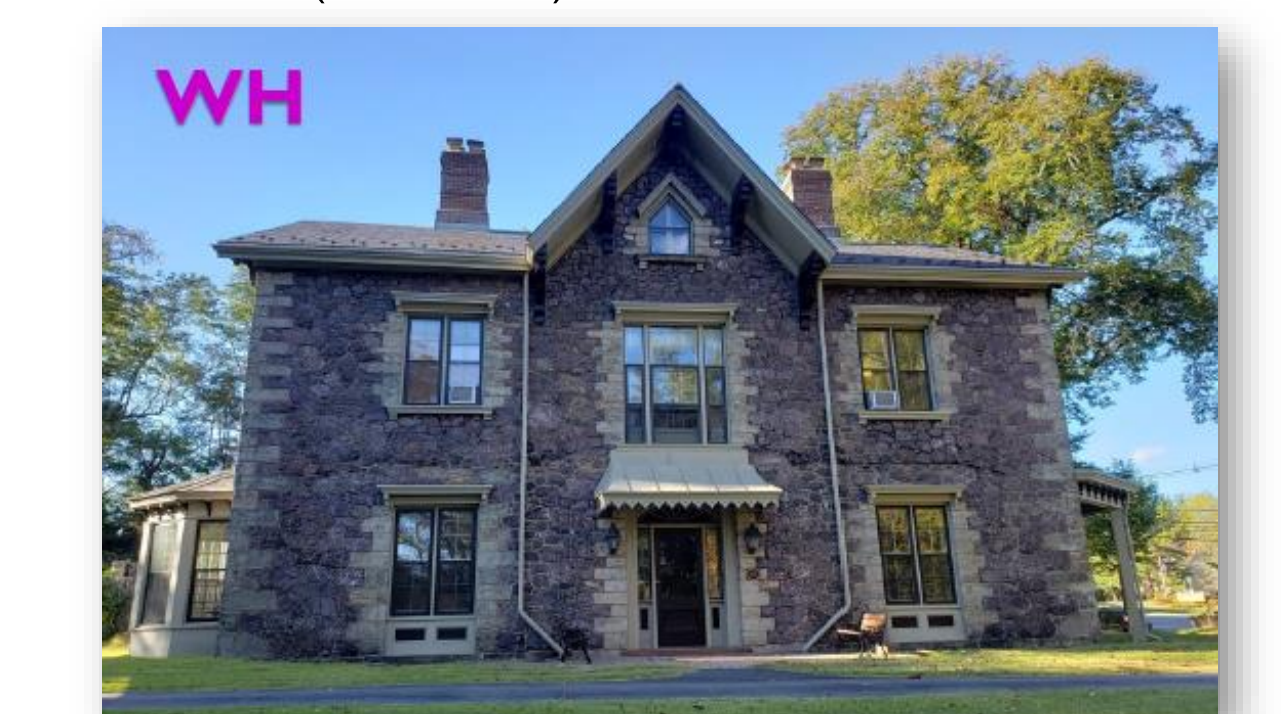
CFH Figure 8, **CFH = Charles Force House, Madison 49 Park Ave. (1880)** Currently for sale, \$1million, 3560 sq. ft., 10 BR 5 Ba (Zillow.com). Divided into apartments after 1929. Designed by D. Burns (same as Enos Wilder House). (Leynes and Wiles, 2015.)

MCA Figure 10, **MCA = 66 MacCulloch Avenue, Morristown.** Built 1896. Faced with GPC veneer. Now offices. 6800 sq. ft.



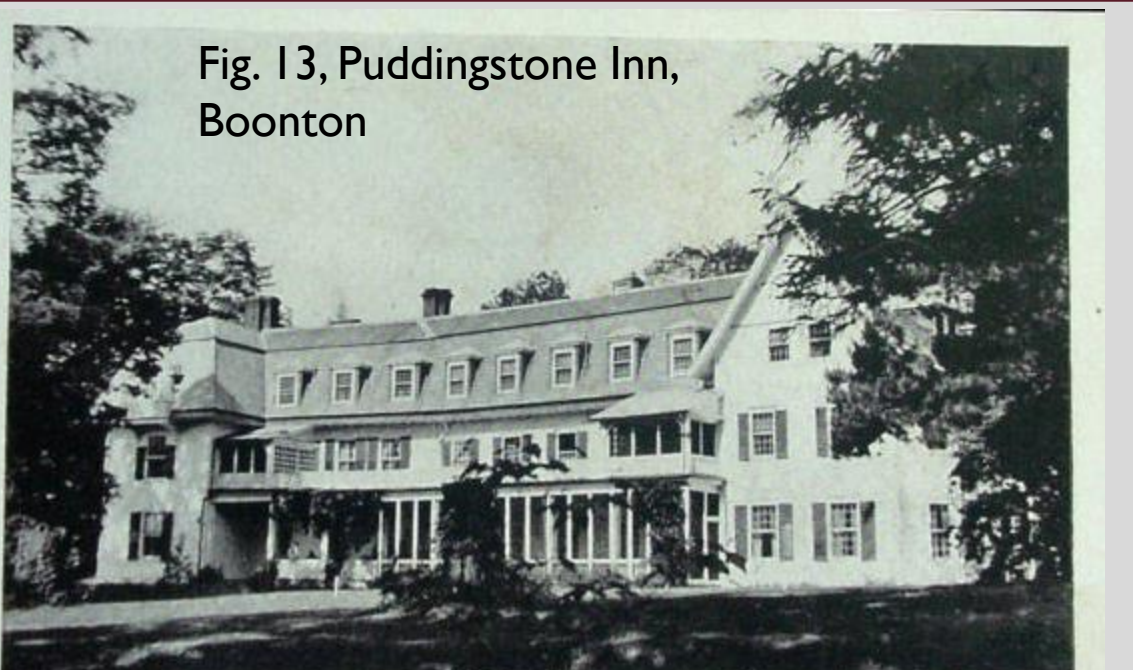
UMC Figure 11. **UMC = United Methodist Church ("Church on the Green"), Morristown.** Built 1866 entirely of polygonal rubble. Fire of 1972 demolished all but front wall and towers; reconstructed in modern style 1974, entirely of salvaged GPC.

WH Figure 12. **WH = Willow Hall (330 Speedwell Ave), Morristown.** George Vail mansion, built 1848, faced on 3 sides (N-E-S) with GPC polygonal rubble. Now offices for non-profit Passaic River Coalition. 6,100 sq. ft., est. \$2million (zillow.com).



"Puddingstone" place and street names

Recognizing the popular name for this type of conglomerate, 7 streets or neighborhoods (pink markers on the map) have "Puddingstone" in the name (e.g. Puddingstone Lane, Puddingstone Heights). A hotel in Boonton, formerly the mansion of foundry owner Cooper Lord, was named the "Puddingstone Inn". The establishment, which burned in 1967, does not appear to be constructed of GPC stones, based on historic pictures.



Key geographic relationships for Green Pond Conglomerate as cultural stone

- ❖ Six buildings known to be entirely faced or constructed, except for trim, with Green Pond Conglomerate.
 - All clustered in Morristown, Morris Township, Harding Township, and Madison.
 - Five are large houses or mansions (>3000sq. ft., valued >\$1million), one is a prominent church.
 - Glacial till is likely the sole source for GPC building stone. Five of the six buildings are located <2 miles from the terminal Wisconsin moraine (Glen Alpin ~6 miles from the moraine).
- ❖ GPC used as decorative stone or for monuments in much of Morris County south and east of the Green Pond outcrop, including Morristown, Denville, Madison, and Boonton.
- ❖ "Puddingstone" as a place or street name can be found throughout Morris County and in some cases beyond, where GPC has been deposited by glacial processes.
- ❖ GPC boulders and cobbles are ubiquitous in field stone fences and small building construction across Morris County. The frequency of GPC in these constructions may be relative to the proportion of GPC in the glacial sediments, part of an ongoing study.

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