

Chapter 3

HISTORIC PRESERVATION AND THE INDUSTRIAL HISTORY OF DELAWARE: A CONTEXT FOR WATERPOWER AND MILLING

A. DEVELOPING HISTORIC CONTEXTS

1. The Delaware Comprehensive Historic Preservation Plan

In order to implement the National Register of Historic Places program, the Delaware Historic Preservation Office has issued a set of documents that collectively constitute the state historic preservation plan. These documents include an overall state plan and a series of reports called contexts or thematic studies. Context studies examine the history of a particular subject, and attempt to identify the property types that are associated with that subject. There are contexts for agriculture and for the canning industry in Delaware, to name but two examples. The main context documents are Custer and DeSantis 1986, De Cunzo 1992, and Herman and Siders 1989).

Until a context has been written for a particular subject area, each investigator must create his or her own contextual framework for the project at hand. Because there is no statewide historical context document for Delaware industry or transportation, it is necessary to insert a brief contextual statement in reports such as these that deal with industrial resources.

The plan divides the state into five geographical areas including the Piedmont, where the project lies. For the purpose of creating contexts, the plan identifies five historic periods:

1630-1730 Exploration & Frontier Settlement
1730-1770 Intensified & Durable Occupation
1770-1830 Early Industrialization

1830-1880 Industrialization & Early Urbanization
1880-1940 Urbanization & Early Suburbanization

The plan sets priorities for various elements, based on development and other pressures and the level of knowledge about existing resources (Ames et al 1989: 79-82). Agriculture is the plan's first ranked priority among above ground, or visible, resources, followed by settlement patterns and demographic change. Manufacturing is the third priority for above ground resources. For below ground archaeological resources, the plan identifies settlement patterns and demographic change as the highest ranking priority for preservation attention. Trapping and hunting is second, followed by mining and quarrying. At the bottom of the list, seventh, is manufacturing. In the state regional ranking, the Piedmont Zone is fifth on the priority list for above ground resources and is similarly low on the priority list for below ground resources.

At first glance, therefore, it might be assumed that the archaeological resources from farming and milling in the Piedmont are of high import at the state level. The context for studying agriculture in New Castle County, Delaware, however, has been thoroughly discussed by DeCunzo and Garcia (1992), and as we shall see in Chapter 7, the historical and archaeological evidence from one farmstead can be quite readily placed in a wider framework. Because this is not the case for mill sites, attention is paid to the milling context, which is presented in this and the following three chapters of this report.

State plan priorities notwithstanding, Delaware history is dominated by industrial history, and industrial sites in the state are among the major practical concerns to preservation interests. Studies like this one may contribute to a revision of some of the preservation priorities within Delaware. In practice, manufacturing centers in the Piedmont have received, and continue to receive, relatively lavish preservation attention. In the project area, Greenbank Mill has been preserved, as an example.

Industrial sites are lost in several ways. Sometimes, as with other types of historical resource, industrial buildings may be demolished or their sites may be obliterated by new construction.

Industrial sites also are frequently lost to a mechanism that is considered beneficial in most other areas of historic preservation: adaptive re use. Adaptive re use projects often begin with the complete eradication of all industrial resources on the site, preserving only the exterior appearance of an original factory or warehouse. Such sites have lost their value as industrial artifacts, retaining only the architectural outward appearances that are largely irrelevant to their original manufacturing function.

2. County Preservation Planning

A comprehensive planning study of resources in the Red Clay Valley has been published by the county (New Castle Department of Planning 1989:1 43, 45). The plan states that "the Red Clay Creek has more extant sites associated with the mill industries than any other watercourse in the Delaware Piedmont." The study identified 267 districts and individual properties in its study area.

3. State Park Planning

The Delaware Department of Natural Resources and Environmental Control is responsible for large parkland tracts in New Castle County, including several near the project area. Three of these nearby properties have been examined in cultural resource management plans that might provide useful analogies for the project area (Wise 1985; Wise 1986; Blume, Clark and Dunn 1990).

4. Historic Bridge Studies

The crossing of Pike Creek is an important component in the development of the vicinity, and background knowledge of the state's bridges is a factor that should be taken into account in this study. Mill Creek Hundred is well known for possessing the state's only two surviving 19th-century covered bridges, but these are by no means the only important spans in the area.

Historic bridges in Delaware have been examined, as a group, at least three times. On two occasions, bridges have been included in studies under the auspices of the Historic American Engineering Record (HAER). A third study was conducted under contract for the Delaware Department of Transportation (Spero 1991). The three studies used different criteria for selection, and are not fully cross referenced. The DelDOT study did not include short spans, because bridges shorter than 20 feet are ineligible for federal highway funding. Historic American Engineering Record (HAER) studies emphasized bridges with significant structural details, regardless of size, but did not survey bridges without perceived engineering history interest. There has been no strictly archaeological survey of bridges in Delaware

5. Contextual and Thematic Studies

Industry in the White Clay drainage has been the subject of several scholarly studies and National Register nominations. Carroll Pursell's 1958 thesis on the Red Clay valley for the Hagley program at the University of Delaware is one of the most thorough examinations, but it is by no means complete (Pursell 1958; Heite 1997).

B. WATER POWER THROUGH TIME

Up to this point, no industrial context or management plan for industrial archaeology has been developed for Delaware in general and its Piedmont in particular. This means that there is no standard mechanism by which to evaluate even the most important industrial sites in perspective. The current project has therefore

created ad hoc contexts to facilitate interpretation. The following fragmentary ad hoc context description of waterpower has been assembled for evaluation purposes using a number of references including Evans (1990 [1795]), Pursell 1958, Gibson 1966a, 1966b, Gray 1961, and Welsh 1973.

Water power in Mill Creek Hundred was first exploited as a pioneer enterprise during the 17th century and persisted as an obsolescent technology into the second half of the 20th century. (For an important comparative study from an adjacent state, referred to the recently-completed doctoral study by Richard Hunter for central New Jersey [Hunter 1999]).

1. Local Service Phase, 1680-1780

The first mills in the region were established by groups of farmers for processing local grains. The first mill, at Stanton, was established by a consortium of local farmers and formed in 1679. The Swedes' Mill at Greenbank followed shortly thereafter. Several other mills were established early in the settlement period, mostly to serve local needs. These operations were not just grist mills; they also included fulling mills, sawmills, and tanyards. By the time of the American Revolution, the best mill seats in Mill Creek Hundred had already been developed; thereafter, new mills would supersede existing installations rather than being placed on new sites.

Delaware became an exporter of grain, ship's bread, and flour during the decades before the Revolution. Products were exported from mills that enjoyed sites convenient to tidal navigation. The Stanton merchant mill was part of a line of near tidewater mills that included the Brandywine Village group, Naamans, and the Richardson Park mills.

2. Major Industrial Period, 1780-1880

Oliver Evans, who owned a share in his family's mill at the present Faulkland Road, revolutionized American industry when he introduced a new milling system in 1790 (Figure 3.1; Evans 1990 [1795]). The automated machinery was installed in the Greenbank Mill and quickly spread throughout the industry.

Generally speaking, Evans machinery could not be conveniently installed in an existing grist mill building. Even large merchant mill buildings were cramped by the new machinery, which mechanized operations that formerly had been completed by hand. The integrated continuous system of power driven conveyors, sifters, bolters, and coolers was

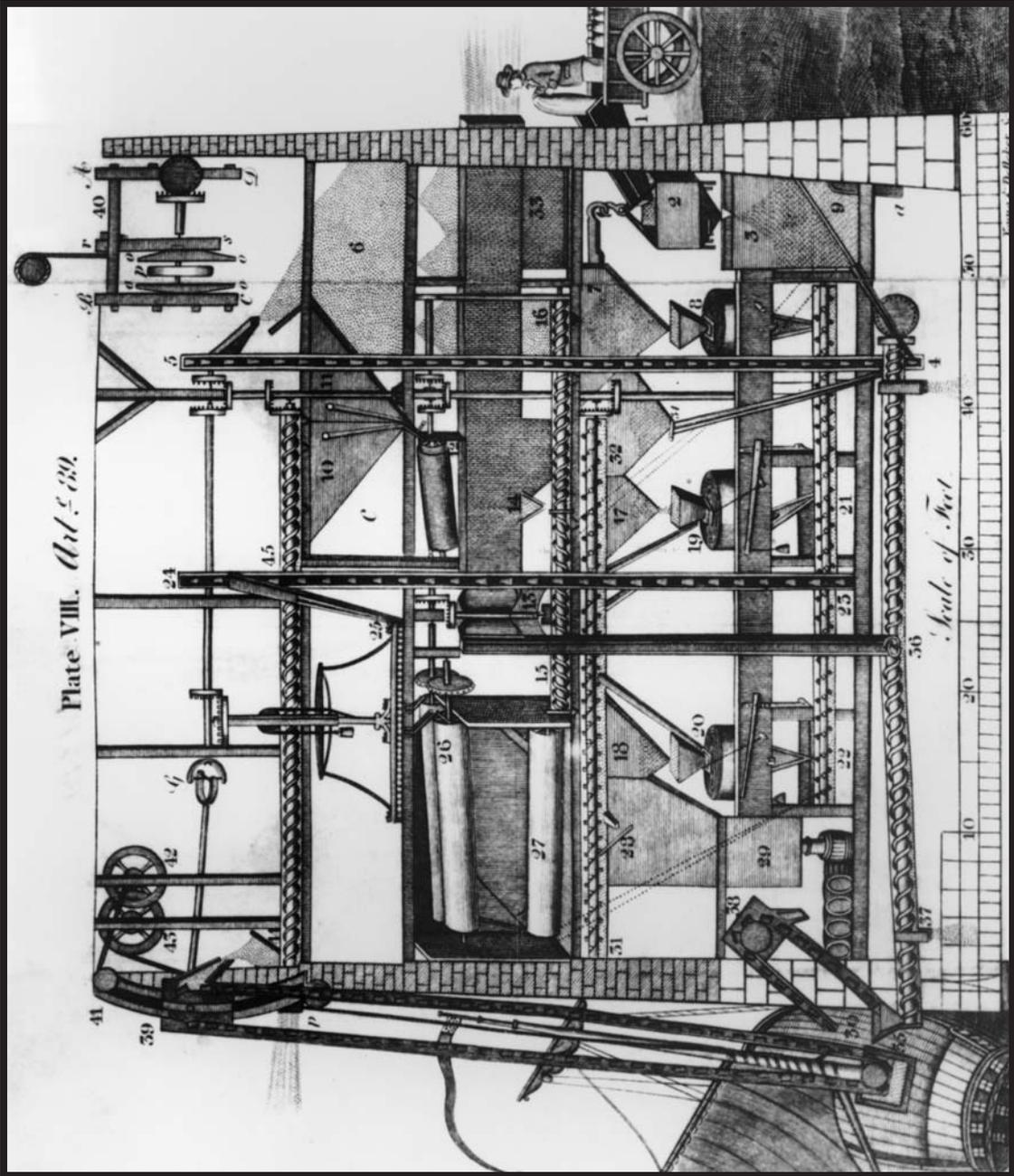


Figure 3.1. Illustration of Oliver Evans Milling System from His Book *The Young Mill-Wright & Miller's Guide*. Source: Evans [1990] 1795 Plate VIII.

too large for many mill buildings of the period. Indeed, after Oliver Evan's invention, flour mill buildings were part of the machinery around which they were designed. A wholesale reconstruction of American merchant mill buildings followed the Evans invention, in tandem with improved dams, races, and water wheels to provide added power to drive the new machinery. Evidence for such reconstructions, or lack of them, is an important mark of the increasing industrialization and capitalization of American milling in a given area or region.

The first water powered textile mill in Delaware began five years later, followed shortly thereafter by rolling mills to produce sheet iron. Mill Creek Hundred was a textile center during much of the 19th century. Cotton mills, carpet mills, and woolen mills replaced grist mills as the main users of water power during the first quarter of the 19th century. They were followed by rolling mills and such specialized operations as spice and snuff mills.

Textile mills generally were driven by horizontal overhead line shafts, which took the rotary power of the water wheel and transferred it to machines by leather belting. Power looms and carders required open floor space and access to power systems, but they could be moved and rearranged more easily than grist mill machinery. Textile mills therefore tended to be multi story open buildings with broad expanses of floor space not especially adapted to any particular function.

Line shafts were at first driven by geared vertical driveshafts that reached from the turbine pit up to the topmost floor. When belts were adapted to this main drive function, the speed and power increased, and weight of the systems decreased. Buildings could become larger and higher. This change occurred around the middle of the 19th century. At mid century many mills converted from water

wheels to turbines, which not only increased the power available at a site, but it also allowed mills to be built on lower heads of water.

There was enough power to go around, as long as it was needed. Steam, and later electric, auxiliary engines were sometimes added to keep mills running during droughts and freeze ups, but water remained a favored source of power.

3. Post Urbanization, 1880-1980

Railroads, steam engines, electric power, and improved food preservation methods were among the factors that contributed to concentration of industry in urban centers during the last decades of the 19th century at the expense of the old water power sites. Rural milling sites did not immediately fall into disuse. In fact, new rural water powered mills continued to be built. Innovations occurred more frequently at the urban sites, while the country mills became technological backwaters. Eventually rural water powered industries could not compete. Some mill seats were preserved when new tenants occupied the old buildings. Some dams were retained as water control structures. A few grist mills struggled along, mostly from force of habit. Owners of obsolete mills died, and the next generation was unwilling to carry on. In time, the smaller mill seats were altogether forgotten. Some formerly water powered mill structures have survived with other functions, including factories, apartment buildings, and offices.

C. CRITERIA FOR EVALUATING INDUSTRIAL ARCHAEOLOGICAL RESOURCES

Having outlined the general historic preservation background and summarized the historic development of waterpower in northern Delaware, the next task is to establish criteria for determining the ways in which the mill sites on Pike Creek may contribute to industrial history. The previous archaeological studies and documentation of No Adverse Effect argued that the mill site was significant under Criterion D because of its apparently well-preserved water-control system and because of its general historic character (Hunter Research Inc. 1996, 1998). The present study provides the opportunity to make some of these criteria more explicit, and this should be useful for any future projects involving mills and waterpower sites.

Criteria for evaluating the importance of industrial archaeological resources generally fall under one of five headings:

- Relative impact on economy
- Technological landmarks
- Innovations represented
- Relative integrity of plant and process
- The Human dimension

All five criteria might be applied in the present project area. One aspect to which the archaeological investigation hoped to pay particular attention was technological innovation: the extent to which improvements in waterpower and milling technology had been applied at this site, at what times, and to what degree.

Industrial sites must be evaluated in the context of the rest of their industry. In terms of textiles, Mill Creek Hundred's mills are important because of scale and integration into the national economy. Mill Creek Hundred's grist mills are historically important in part as the scene of several important innovations. Most obvious of these was the Oliver Evans automated mill. Later, Mill Creek Hundred would become the world center of the vulcanized fiber industry, and some of the last surviving examples of this industry stand in the Delaware Piedmont. In addition to its unique position in these respects, the water power systems of Mill Creek Hundred deserve further examination because the district is so well documented and contains so many potentially revealing sites that can help fill gaps in our understanding of water powered industrial history.