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HISTORICAL AND ARCHAEOLOGICAL ASSESSMENT

FOR

PROPOSED POND LILY DAM REMOVAL

ON WEST RIVER, NEW HAVEN, CONNECTICUT

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prepared for:

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I. INTRODUCTION

The Connecticut Fund for the Environment's Save the Sound (CFE-STS) program proposes to remove approximately half the spillway of the Pond Lily Dam on the West River in New Haven, Connecticut, in partnership with the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service, Restore America's Estuaries, Trout Unlimited, the New Haven Land Trust, the City of New Haven and the Town of Woodbridge. Project objectives include restoring free-flowing river habitat, enabling passage of target diadramous fish species, mitigating the danger of potential dam failure, and enhancing habitat and recreational use of the 14-acre Pond Lily Nature Preserve owned by the New Haven Land Trust. Federal assistance, and permits required by the U.S. Army Corps of Engineers and the Connecticut Department of Energy and Environmental Protection (CTDEEP), brings the project under the purview of acts and regulation protecting cultural resources eligible for the National Register of Historic Places from adverse project effects.[1] The State Historic Preservation Office (SHPO) noted the potential eligibility of the dam and the possibility of archaeological resources in project areas, and requested a historical and archaeological assessment (letter, David Bahlman to Shawn Goulet, December 1, 2011). The Connecticut Fund for the Environment retained Raber Associates to prepare the assessment, to standards of the SHPO *Environmental Review Primer for Connecticut's Archaeological Resources*, and the Secretary of the Interior's "Standards for Archaeology and Historic Preservation" for Identification, Evaluation and Planning. Assessment objectives included:

> determination of the eligibility of the Pond Lily Dam to the National Register;
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> identification of any known or possible archaeological resources in the area of potential project effect, based on available background material and field surface inspection;
>
> assessment of the known or potential eligibility of such archaeological resources to the National Register;
>
> development of recommendations on the need for any additional investigations to document the dam or determine the eligibility of other cultural resources, and for measures to avoid, minimize or mitigate potential adverse effects on known, possible, or eligible resources.

To be eligible for the National Register, cultural resources must possess physical integrity and meet at least one of the following criteria:

A. Association with important historic events or activities;
B. Association with important persons;
C. Distinctive design or physical characteristics, including representation of a significant entity whose individual components may lack distinction;
D. Potential to provide important information about prehistory or history.

Assessment methods included:

> review of published and unpublished background literature, historic maps, site files maintained by the Connecticut State Archaeologist, and dam site data maintained by CTDEEP's Dam Safety Section (personal communications, Kartik Parekh);
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> detailed field inspection of all areas within proposed project limits.

Michael S. Raber acted as principal investigator and researcher. Background and field investigations were conducted in February and March 2013.

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[1] National Historic Preservation Act of 1966 (PL 89-655), the National Environmental Policy Act of 1969 (PL 91-190), the Archaeological and Historical Preservation Act (PL 93-291), Executive Order 11593, Procedures for the Protection of Historic and Cultural Properties (36 CFR Part 800); Connecticut Environmental Policy Act (Connecticut General Statutes Section 22a-1 *et seq*).

II. ENVIRONMENTAL CONTEXT AND EXISTING CONDITIONS

The West River, with headwaters in Bethany, Connecticut, is an approximately 34.5-square-mile drainage tributary to Long Island Sound at New Haven, with approximately half the drainage area upstream of the project area. In the project area vicinity, the river emerged as a late-glacial channel through ice-contact stratified drift of sand, gravel, and silt deposited on Triassic sedimentary arkose, between the Triassic igneous traprock of West Rock Ridge to the east and till deposited on pre-Triassic Wepawaug schist to the west. Along the river, well-drained silt or sandy loam soils developed during Holocene times. Prior to construction of numerous dams, of which the Pond Lily Dam was probably among the earliest, the West River appears to have had plentiful populations of freshwater and diadromous fish species including blueback herring, alewife, sea lamprey, American shad, American eel, and white sucker. These species once fed Native American and Euroamerican people, and remain in diminished numbers today. As discussed below, original Holocene terrain at the dam and pond vicinity has been obscured by industrial and post-industrial development, associated channel modification, and the approximately 4-acre pond above the dam. However, topography of the pond and dam vicinity suggests that the channel above the dam once flowed through a low floodplain amenable to ponding by a impoundment built between higher ground at the dam site. Although greatly modified since World War II, the channel below the dam drops sharply, suggesting that the dam was built at a natural rapids at which fish capture was an attraction into at least the late 18th century. It is also possible the original floodplain upstream of the dam site included some wetlands which could have served as habitat for game birds and mammals, but considerable sediment deposition since dam construction has obscured any wetland development more than approximately 50 years old (Figures 1-2; Flint 1965; U.S. Department of Agriculture 1979; Rodgers, comp. 1985; Stone *et al.* 1992, 1998; Whitworth 1996; Apse *et al.* 1999; Piana *et al.* 2009; Milone & MacBroom, Inc. 2011a; personal communication, Peter Spangenberg).

The Pond Lily Dam is a gravity structure immediately east of Whalley Avenue (Route 69) with a 250-foot-long earthen section adjacent to the road, and a 190-foot-long spillway. The dam is not well documented, and has been partially obscured by reconstruction of a large industrial site downstream of the dam for a commercial shopping and parking area in the late 1990s. There are no known low-level outlets. Visible conditions and historical images indicate the earthen section has a vertical masonry upstream face, including approximately 70 feet of mortared rubble between the spillway and an inaccessible former gate opening, and a concrete wall which now angles upstream to enclose fill added after c1996. At least one cast-iron pipe projects from the masonry face near the spillway. The concrete wall sections replaced earlier rubble masonry. It is possible the earthen section has no foundations, but is instead a modified edge of original land along the floodplain. The earliest, undated image of the site located for this study suggests the base of the embankment originally extended beyond the masonry face, perhaps as an original slope onto which the masonry wall was built (Figures 2, 5; Anonymous n.d.; Spangenberg and Parekh 2011).

The dam spillway crest is approximately 2 feet lower in elevation than the adjacent earthen section, and consists of a sloped embankment with a deteriorating vertical masonry downstream face 4.3-6.1 feet above the riverbed. Below a 1-foot-thick, 4.5-foot-wide concrete cap, the spillway face appears to be mortared rubble. The embankment has an approximately 7-foot-wide base sloping into the pond upstream of the spillway crest. Embankment material and structure are not well documented, but appear to consist of rock, cobble and/or compacted earth. There are no data on spillway foundations, or on any embankment structures retaining the coarse fill. At the east bank, the spillway has a mortared-rubble, 2-foot-thick training wall approximately 15 feet long at about the same elevation as the earthen embankment. The comparable structure at the west end is formed by an extension of the earthen embankment face, although the upper portions of the west training wall have been replaced with concrete. There is a steel Alaskan steeppass fish ladder at the west end of the spillway, installed in 2001 (Figures 2-4; Apse *et al.* 1999; Piana *et al.* 2009; personal communication, Peter Spangenberg).

West of the river and upstream of the dam, the project area includes most historical pond limits extending approximately 700 feet from the dam plus some 300 feet of river channel upstream of the pond. An earthen berm along Whalley Avenue defines most of the original west side of the pond. Downstream of the dam, project areas include a 12-foot-wide level grass area adjacent to the berm intended for project equipment access. The 50-foot-wide river channel running downstream of the spillway's east end is defined by approximately 12-foot-high gabions on both banks for over 250 feet. Immediately east and south of the

spillway, the project area is characterized by moderate to steep slopes with extensive surface coverage of large rocks, possibly artifacts of channel dredging and modification. Further east, project areas include a proposed equipment access road extending over relatively level wooded terrain, and three potential staging areas on paved or grassy level surfaces on property of the New Haven Housing Authority. Subsurface conditions within the access road and unpaved potential staging areas remain undocumented, but may reflect disturbance associated with 20th-century channel modifications discussed below and the construction of facilities and at the housing authority property (Figure 2; Apse *et al.* 1999; Milone & MacBroom, Inc. 2011a).

III. PROPOSED ACTIONS

Project actions involving excavation include:

removing approximately half (100 feet) of the Pond Lily Dam spillway to full depth, to enable fish passage and reduce flood risks;

partially excavating sediment within the impoundment to create a new channel, at approximate location of channel alignment prior to dam construction, with removal of impounded sediment and not pre-impoundment riverbank material;

grading sediment within the impoundment west of the newly constructed channel to create constructed wetland habitat and vegetated riparian upland, leaving sediment east of the newly constructed channel undisturbed;

using excavated sediment as fill to protect the existing berm along Whalley Avenue as well as the berm immediately downstream of the spillway.

Earlier plans for constructing a haul/access road from New Haven Housing Authority property to the east side of the spillway, and a short equipment access path at the west end of the spillway, involved 8 inches of excavation and placement of gravel on geotextile fabric, along with some tree clearance. Based on discussions among Raber Associates, CFE-STS, and NOAA, current plans call for placement of geotextile fabric and no excavation (Figure 2; Milone & MacBroom, Inc. 2011b; personal communication, Gwen MacDonald).

IV. BACKGROUND DATA AND CULTURAL RESOURCES ISSUES

A. Native American

For prehistoric or historic peoples, the well-drained terraces along the West River offered seasonal hunting resources and fish capture points, and included or were close to quartz sources for stone tool manufacture in local bedrock and glacially-transported pebbles, cobbles and boulders (Sgarlata 2009). Within approximately a mile upstream of Pond Lily Dam, the files of the Connecticut State Archaeologist report sixteen pre-Contact American archaeological sites along or close to West River and Konolds Pond (Nos. 62-06, 62-13, 62-14, 167-01 through 167-03, 167-06 through 167-10, 167-20 through 167-23, 167-26). Although some of these sites are not well documented, temporally-diagnostic artifacts and other information indicate these finds represent several types of settlement pattern covering most periods of Native American occupation, based on archaeological finds made throughout southern New England. Prior to the introduction of agriculture in southern New England late in the first millennium A.D., archaeological evidence suggests there was generally more seasonal movement and less semi-permanent settlement through periods extending back to the earliest Native Americans in this region, who appeared about 12,000 years ago in a period known as Paleoindian. Two of the nearby sites (167-3 and 167-8) had projectile points indicating occupation during Early Archaic times c10,000-8,000 years ago. By Middle Archaic times, some 6,000-8000 years ago, seasonal resource use was well established, and site types included spring fishing camps along major streams. In Woodland and early historic times (c3000-450 years ago), Native American settlement patterns in southern and central Connecticut focused on semi-permanent villages near planting fields, with seasonal movements to hunting or sheltered winter camps, and continual short trips to hunt or collect mammals, fish, shellfish, and a wide variety of plant resources. The larger settlements in these later periods were closer to the coast and the major rivers, with relatively level, well-drained, areas along streams like the West River probably used

for short-term or winter activities and seasonal fish capture. During the early 17th century A.D., the Quinnipiac Indians inhabited the greater New Haven area, from Milford to Madison (Guillette 1979:3). They sold lands to the English in 1638 and moved to the east side of New Haven harbor, where they had a fort and reservation, and remained in this location until the late 18th century (DeForest 1851:163-165).

Reported sites typically occur in well-drained, intact soil strata on slopes of under 20%. Subsurface conditions in project areas have not been documented, but east of the river the proposed access road and potential unpaved staging areas could include intact or partially-intact Branford silt loam soils sensitive for possible Native American materials. As noted above, soil conditions in these areas are not well documented, but no ground disturbance is planned here. Even in small undisturbed areas, newly-discovered Native American resources could provide significant new information given the relative complexity of known Native American settlement patterns and the limited archaeological information available in the project area vicinity (National Register of Historic Places Significance Criterion D). In particular, the use of small sites of seasonal, temporary, or specialized activities, and the relation of such sites to larger, more permanent encampments along major streams remain issues of regional archaeological importance. Avoidance of grading in project areas east of the river should preclude any effects on possible Native American resources.

B. Euroamerican Resources

1. Summary of Project Area Development

New Haven's first English settlers laid out the core of the later city in 1638, balancing the advantage's of the natural harbor at the mouths of the Mill and Quinnipiac rivers, and of the extensive fodder sources in the salt meadows along these streams and the West River, against the need for level, well-drained houselots. Settlement in the later village of Westville began in 1640, when common land west of York Street was first apportioned. Known for a time as Hotchkissvillew after New Haven Sheriff Joshua Hotchkiss, who built a home in the area in 1658, Westville remained relatively isolated into the early 19th century with poor road connections to the harbor and the city center. Industrial development was limited to several mill sites along the West River, beginning with several mid-18th-century grist mills and the earliest paper mill in New Haven built in 1776 downstream of the later Lily Pond Dam. Several paper mills including one at the project site operated in Westville into the late 19th century (Atwater, ed. 1887; Rockey 1892; Welch 1943; Canalori 1979; Polino 1984; Caplan 2009).

Except for the 20th-century parking lot identified as a potential staging area on New Haven Housing Company property, all known Euroamerican development within possible project areas has been limited to the dam, the pond edges where modified, the river channel below the dam, and the area west of the channel in which a variety of industrial operations used pond water for power or processing. The chronology and history of these operations prior to the late 19th century remains incomplete, but is summarized below. All use of the West River at this location probably required a dam across the full width of the river, as opposed to a wing dam, to create a pond high enough to feed races excavated through the face of the earthen dam section. The length and height of the impoundment may also reflect concerns about high-water events. Four dams upstream, constructed in the late 19th or 20th centuries, reduce flows to the Pond Lily Dam spillway, but when first constructed in the 18th century the Pond Lily Dam was the most upstream impoundment on the West River. A wing dam or a lower spillway may have been more subject to potential flooding, and as discussed below one flood event prior to construction of the dams upstream did inflict significant damage (personal communication, Peter Spangenberg).

Until c1951, the river below the dam had a sinuous course up to 200 feet west of the present channel, but relatively long races were required to secure sufficient head to run waterwheels or turbines. The first such project was a grist mill built by Levi Sperry in 1794, probably using a race approximately 300 feet long close to the spillway to create a head of under 10 feet. One image of dam and race arrangements c1850 strongly suggests the spillway at that time is at the same location as the present one, and it is likely the structure was first built for the Sperry mill. Some accounts suggest the grist mill operated into the 1840s, but if so it appears to have been moved to the west end of the earthen embankment c1818 when a much longer race was evidently excavated, possibly to operate a grist mill and a machine shop. The mill does not appear on a

detailed 1811 map showing statewide waterpowered industries, or in 1820 industrial census data. The Sperry family owned the property into the late 20th century and ran the textile plant discussed below, but for most of the 19th century it appears the family leased the site to other manufacturers. By the late 1840s, the firm Hotchkiss & Johnson installed a third race beginning at the middle of the earthen embankment — at the location of the extant gate — to run a triphammer shop, where along with the machine shop to the west they made carriage axles, carriage springs, cotton gins, and other iron products. Their plant burned in 1856, and although some sources claim the operation revived during the Civil War, no evidence reviewed for this assessment confirms such statements. All the antebellum industrial facilities appear to have been located west of project areas (Figures 2, 5; Anonymous n.d.; Warren and Gillet U.S. Department of Commerce, 1820, 1850, 1860; New England Mercantile Union 1849; Rockey 1892, 1: 197; Welch 1943; Canalori 1979; Apse *et al.* 1999).

By the late 1860s, James Harper built a small mill at the site making printing paper. The spillway failed during an October 1869 freshet, following a severe storm which led to dam and bridge damage through much of New England. Harper's mill, known as the Pond Lily Paper Mill, was evidently not operating in mid-1870, suggesting at least some of the present spillway dates to a reconstruction completed that year. Census data, a photograph of the mill, and later insurance maps suggest the paper mill was built parallel to the earthen embankment face west of project limits, and used the central race which provided 10 feet of head. Waterpower drove a 30-hp turbine, but was probably insufficient to run the mill's beaters and a Fourdrinier machine during all periods of operation in 1880, when the mill ran six months full time and six months at half time.[2] Several steam engines may have supplemented waterpower as well as perhaps providing steam to the paper machine's drier section. By the early 1890s, John Thompson operated the mill for the manufacture of manilla wrapping paper. It is not known if Thompson still relied on any waterpower. In the apparent absence of a low-level outlet in the dam, sediment probably reducing the storage capacity of the pond, and would have been very difficult to remove. The surviving gate structure in the earthen embankment at the central race is not documented, and its possible function in pond drainage as well as water intake is not known (Figures 2, 6; Beers 1868; U.S. Department of Commerce 1870, 1880; Rockey 1892, 1: 197; Welch 1943; Caplan 2009: 55; Gordon and Raber 2012).

Beginning in 1896, the Sperry family took more direct control of the site, owning and sometimes running the Pond Lily Company which dyed and finished cotton piece goods, shoes, and other fabric until 1978. The steampowered plant used the pond for process water, and retained the central race as an intake as well as a drain for at least industrial wastewater. One or more pipes in the face of the dam embankment may be smaller drains for wastewater or other materials. Initial operations were near the pond edge of the earthen embankment, at the site of the paper mill. By World War II, the plant expanded over most of the area between the West River and Whalley Avenue downstream of the dam. The company re-channeled the river into its approximate present course c1951 for further plant expansion, which appears to have continued until c1960. The present channel below the dam was created as a flood control measure in 1982. The plant was demolished in 1987 after discovery of hazardous waste materials at the former factory, and parts of the site beyond project limits were excavated for soil removal c1995-96 as remediation prior to construction of the present commercial area west of the river. Present subsurface conditions of historic industrial fabric remain unknown, but could include remains of one or more of the races built c1794-1848 (Figures 2, 7-13; Sanborn Map Company 1901, 1923-24; Streuli & Puckhafer 1911; Fairchild Aerial Survey 1934; Welch 1943; Robinson Aerial Surveys Inc. 1951-52; Robinson Aerial Surveys, Inc. 1965; Canalori 1979; Polino 1984; Apse et al. 1999).

Virtually all Pond Lily Company structures, including drains built into the dam embankment face, were south and west of project limits. A c1896 1-story storehouse, machine shop, and carpenter shop was built just downstream of the spillway, at the site of the present 7-foot-high berm which was created after plant demolition. The shop evidently had no basement, and probably has little if any remains. There will be no project excavation in this area, which also included some small sheds built in the 1930s and a large unidentified structure erected to the south c1960. Available images indicate no remains of any of the site's industrial operations other than the spillway will be impacted by project actions (Figures 2, 7-13).

[2]No calculations have yet been made to estimate the seasonal waterpower potential of the site, including pond storage capacity, relative to likely requirements of the prime movers of the gristmill, machine shop, or papermaking operations.

2. Significance of Pond Lily Dam

The basic dam configuration appears to date to the 1794 gristmill development, probably with a spillway of length and alignment similar to the present structure. The original earthen spillway had stone capstones removed by the 1869 flood or during subsequent reconstruction (Caplan 2009: 55), but is otherwise undocumented in sources located to date. This appears to be one of the longest dam spillways in Connecticut, surpassed in length at only about sixty dams in the inventory of the CTDEEP Dam Safety Section, and may have been particularly notable among late 18th-century dams. Connecticut's early industries developed on an unusually dense network of small, generally south-flowing streams with relatively reliable annual flows. By the late 18th century, falls and gradients on the streams allowed for readily developed waterpower privileges used by gristmills, sawmills, fulling mills, wood-turning mills of various kinds, marble-cutting mills, cider mills, forges, blast furnaces, rolling and slitting mills, and modest-sized factories making textiles, paper, small arms, edge tools, and other metal products. By 1811, over 1400 such establishments were in operation, or about one for every four square miles. Most of these sites were in rural villages, and few were on larger rivers. Documentation of the state's 18th-century dams is limited, and rarely distinguishes spillway from other dam components, but among a sample of a dozen other 18th-century dams described in cultural resource reports and National Register of Historic Places nominations, spillway or total dam lengths ranged from approximately 11 to 176 feet. Levi Sperry's spillway 190-foot-long spillway was clearly one of the longest in the state when built (Warren and Gillet 1812; Roth and Clouette 1990; Clouette and Soulsby 1995; Soulsby 1995; Harper and Clouette 1998; Raber 2000, 2005a, 2005b; Raber and Gordon 1997a, 1997b, 2000; Gordon and Raber 2012; personal communication, Peter Spangenberg).

The present spillway face is presumably associated with c1870 spillway reconstruction. The rubble and earth upstream of the spillway face may include components of both construction episodes. Similar structures frequently included rubble-filled timber framing. Footing possibilities on the original sand, gravel, and cobble river channel and banks include large stone footings or an array of timbers. Like many contemporary mill dams in the northeastern United States, this one appears to have been designed and built without professional engineering design. Given the structure's size and age, spillway foundations and embankment design may contain significant information about late-18th- to late-19th-century vernacular engineering of large earthen mill dams, making it eligible for the National Register of Historic Places under Criterion C (cf. James Leffel & Co. 1881; Porter 1885; Wegmann 1918; Gordon and Raber 2012).

V. CONCLUSIONS AND RECOMMENDATIONS

Unpaved project area surfaces east of the river may include undisturbed soils sensitive for Native American archaeological resources. These surfaces include possible staging areas, and the eastern, level sections of the proposed access road to the spillway. Although the extent of disturbance associated with channel modifications and New Haven Housing Authority projects remains undocumented, covering these areas with geotextile fabric and gravel, and as necessary removing the gravel after construction using the fabric as a visual limit to excavation of gravel, will preclude any effects on possible intact soil strata.

The Pond Lily Dam spillway appears eligible for the National Register. Project actions will have an adverse effect on this resource. Recovery of any significant information about dam construction episodes and vernacular engineering should suffice to mitigate this effect. It is recommended that archaeological monitoring and documentation of internal dam structure and design be conducted during spillway removal activities. Documentation should include photography and measurement of exposed components with survey of elevations as appropriate, and preparation of detailed sketch plans.

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Kartik Parekh, Dam Safety Section, Inland Water Resources Division, Connecticut Department of Energy and Environmental Protection

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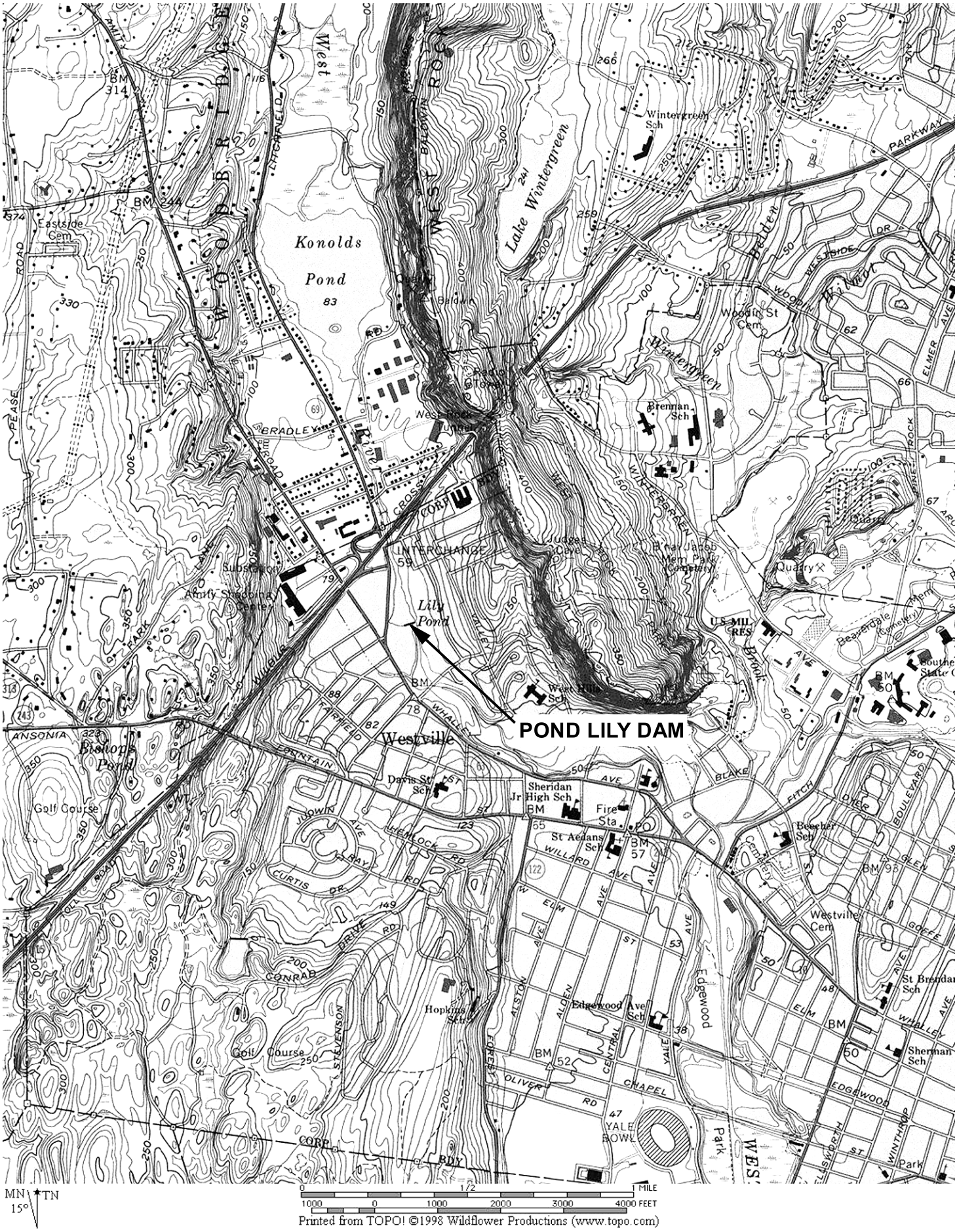


Figure 1. PROJECT AREA LOCATION ON U.S. GEOLOGICAL SURVEY 7.5-MINUTE NEW HAVEN QUADRANGLE

PROPOSED AREA OF POTENTIAL EFFECT
(GRADING LIMITS)

APPROXIMATE MAXIMUM
EXTENT OF FORMER
INDUSTRIAL STRUCTURES
NEAR DAM (typ.)

APPROXIMATE BURIED
FACE OF EARTHEN DAM

RACE c1818-1895

WHALLEY AVENUE (ROUTE 69)

FORMER GATE STRUCTURE

PROPOSED HAUL ROADS

RACE c1848-1940

PROPOSED
ACCESS

FISH
LADDER

POND LILY DAM
MASONRY SPILLWAY

RACE
c1794-1848

RIVER CHANNEL
c1794-1951

PAVED
POTENTIAL
STAGING AREA

PROPOSED
ACCESS

RIVER CHANNEL
c1951-1982

UNPAVED POTENTIAL
STAGING AREAS

WEST RIVER

MOTEL

BANK STREET

HARPER STREET

INTERMITTENT
WATERCOURSE

SCRUB–SHRUB
WETLAND

EMERGENT MARSH

HISTORIC POND EDGE

UPLAND
WOODED AREA

RESIDENTIAL
APARTMENT
COMPLEX

BIT. DRIVEWAY

BITUMINOUS
CONCRETE
PARKING
AREA

LAWN

GRASS

GATE

BERM

FEMA 100-YEAR FLOODPLAIN

FEMA 100-YEAR FLOODWAY

LOW CHORD=78.44

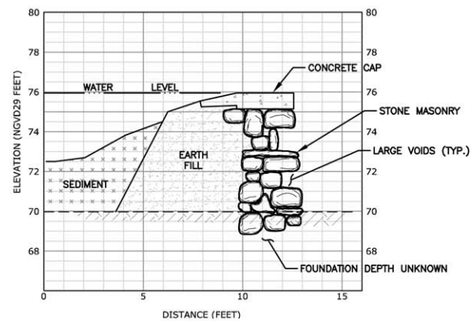
LOW CHORD=78.33

WALGREEN
PHARMACY

BANK OF
SOUTHERN
CT

GABION WALL

CONC
PAD



TYPICAL EAST-FACING SPILLWAY SECTION

Figure 2. PROJECT AREA, PROPOSED ACTIONS, AND APPROXIMATE HISTORICAL CONDITIONS
base map and proposed actions: Milone & MacBroom, Inc. 2011b
historical data: Anonymus n.d.; Sanborn Map Company 1901, 1923-1924, 1950;
Fairchild Aerial Survey 1934; Robinson Aerial Surveys, Inc. 1951-1952; Keystone Aerial Surveys, Inc. 1965

0 100 FT.

Figure 3. VIEW NORTHEAST OF SPILLWAY FACE AND FISH LADDER

Figure 4. VIEW NORTHWEST OF SPILLWAY FACE AND EAST TRAINING WALL

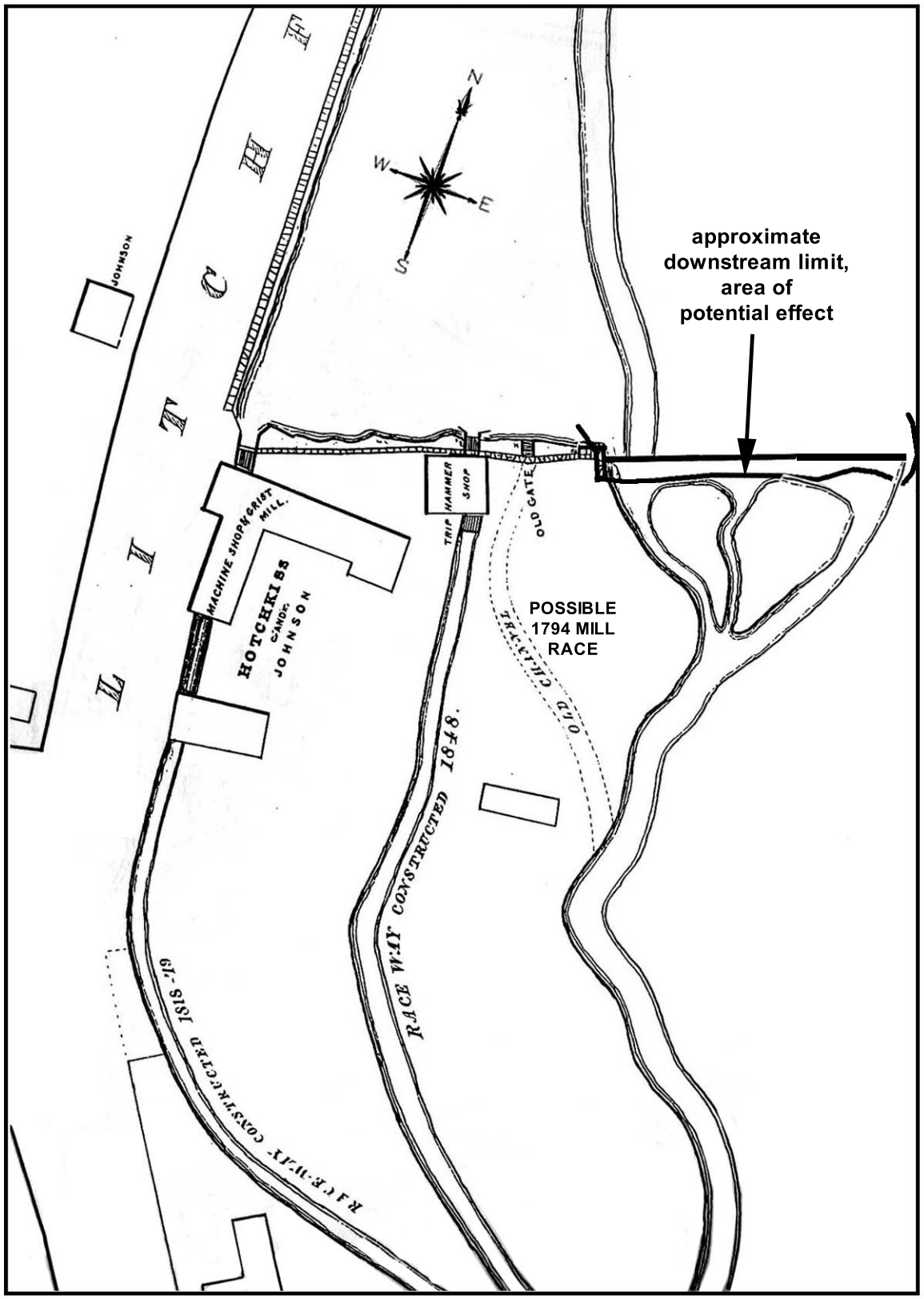


Figure 5. DAM, MILLS, AND RACES c1850
Source: Anonymus n.d.

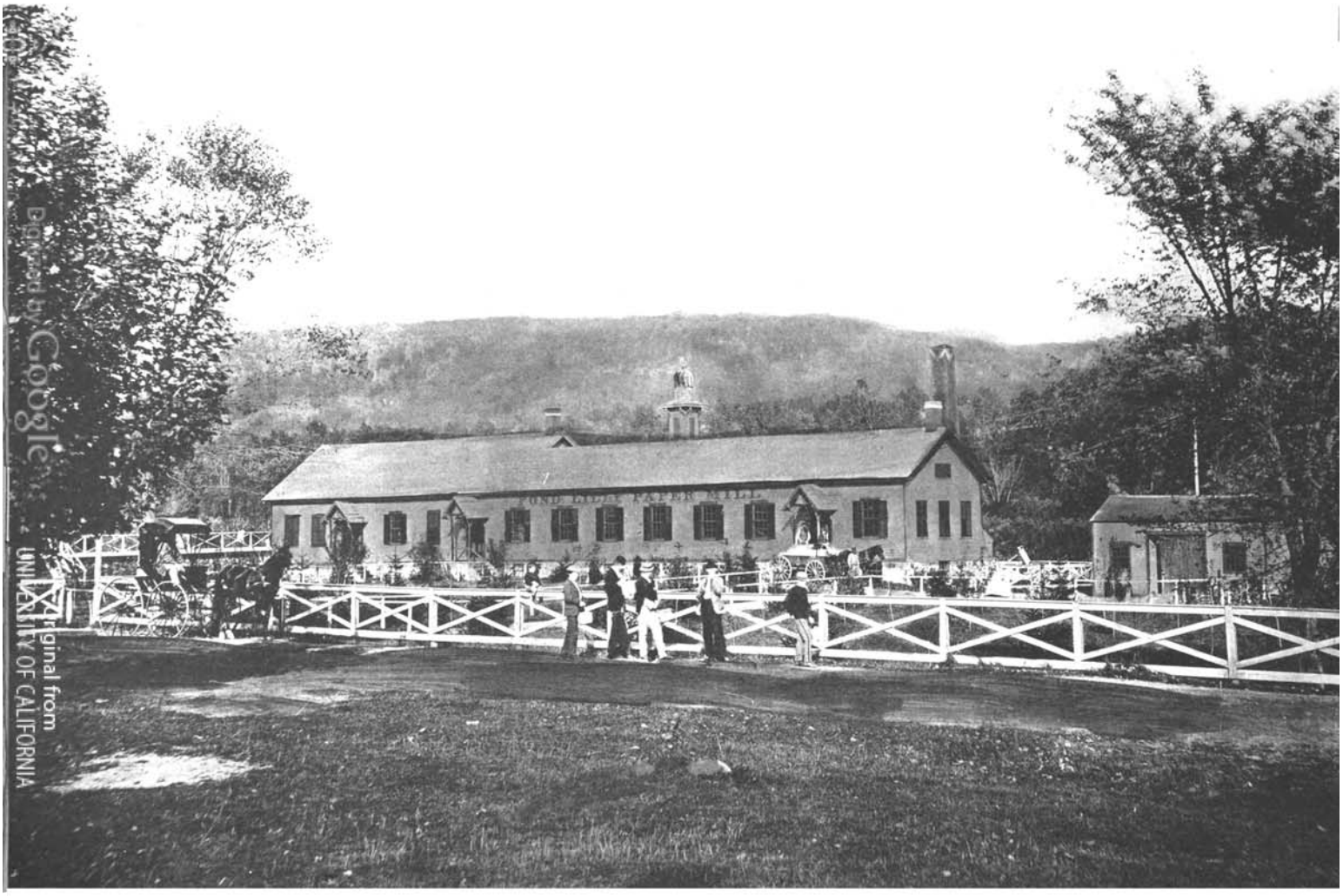


Figure 6. POND LILY PAPER MILL IN LATE 19TH CENTURY
Source: Welch 1943
View is probably to north, with pond beyond mill.

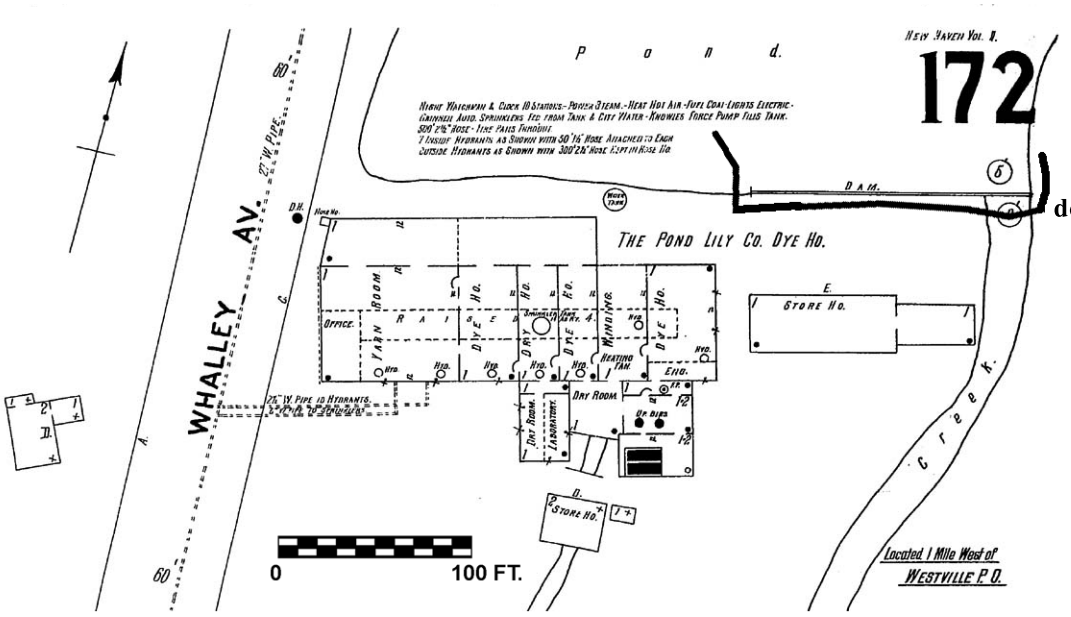


Figure 7. POND LILY COMPANY AT POND LILY DAM c1901
source: Sanborn Map Company 1901
Spillway length not accurately portrayed

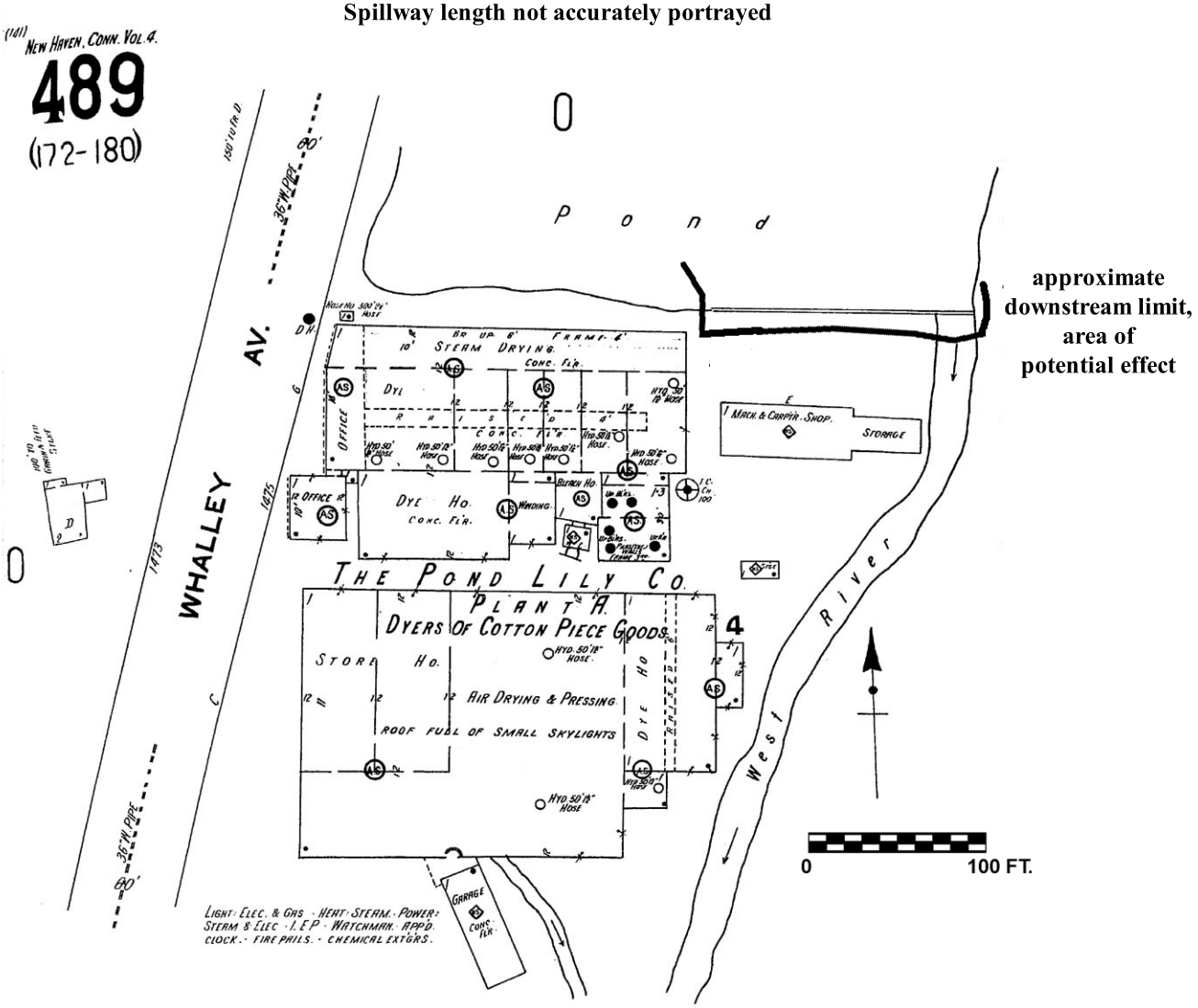


Figure 8. POND LILY COMPANY AT POND LILY DAM c1923
source: Sanborn Map Company 1923-1924
Spillway length not accurately portrayed

Figure 9. POND LILY COMPANY AT POND LILY DAM c1934
source: Fairchild Aerial Survey 1934

0 100 FT.

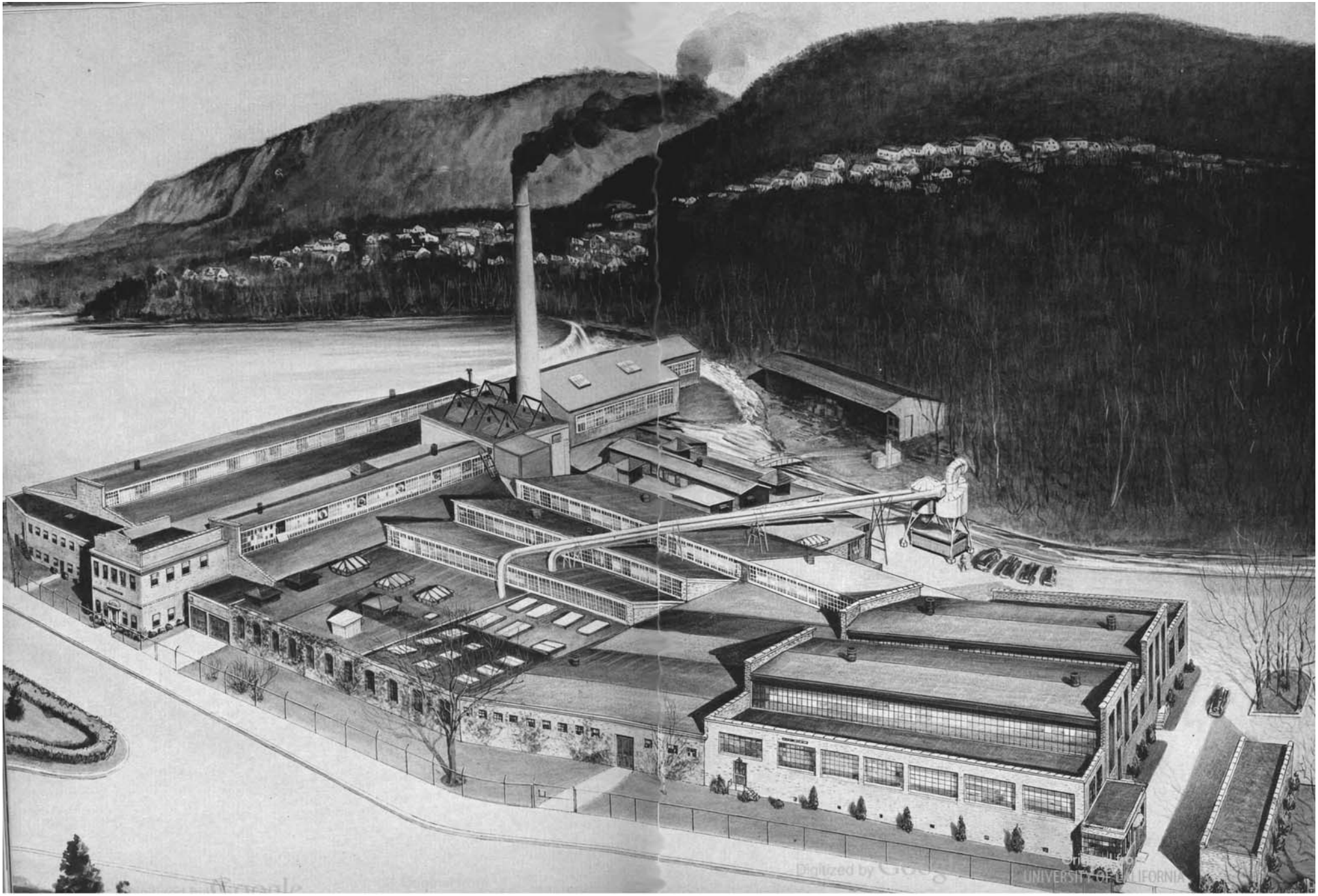


Figure 10. VIEW NORTHEAST OF POND LILY COMPANY AT POND LILY DAM c1943
source: Welch 1943
Spillway alignment, shown as curved, is not accurately portrayed

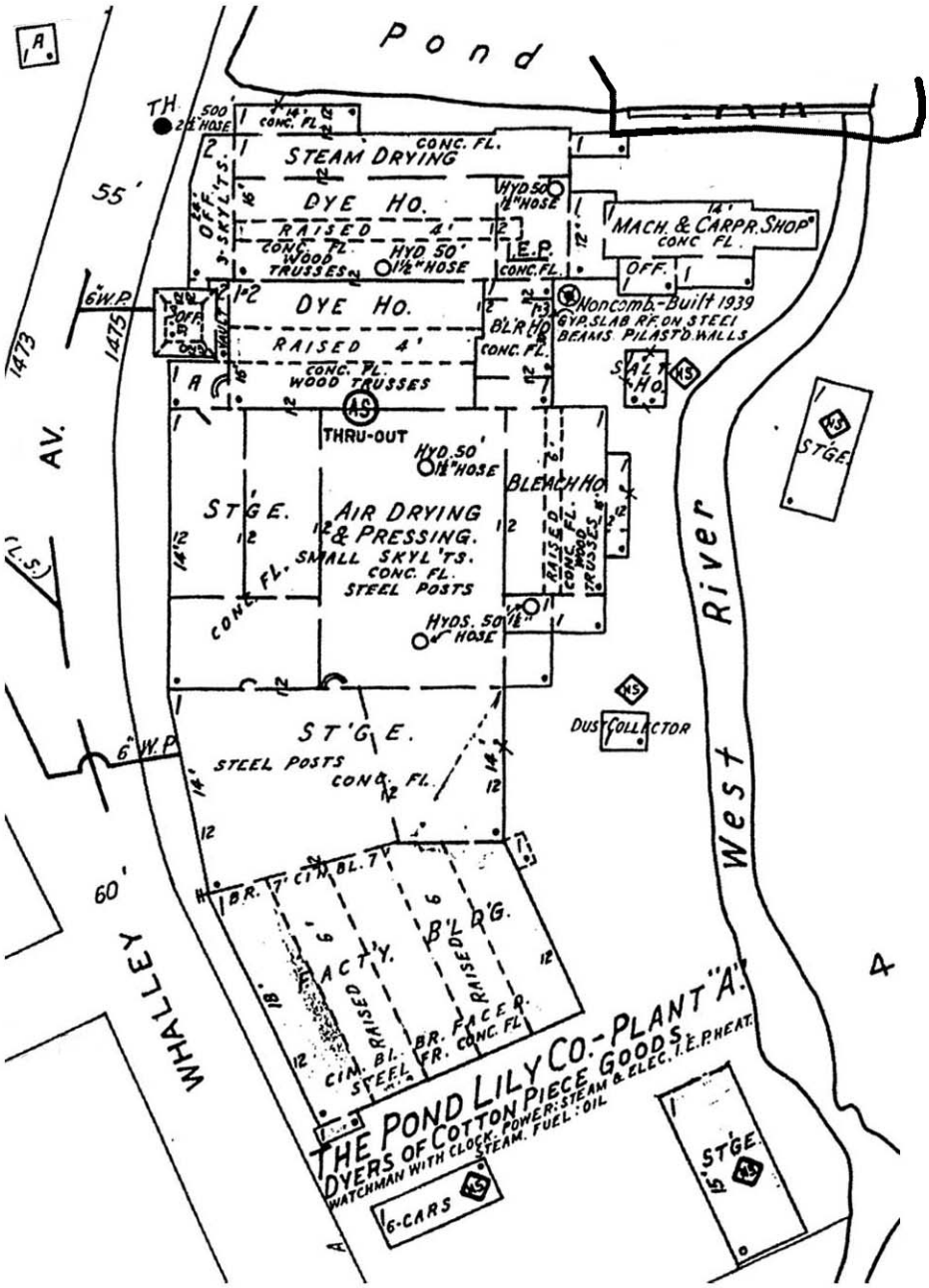


Figure 11. POND LILY COMPANY AT POND LILY DAM c1950
source: Sanborn Map Company 1923-1924, revised to 1950
Spillway length not accurately portrayed

0 100 FT.

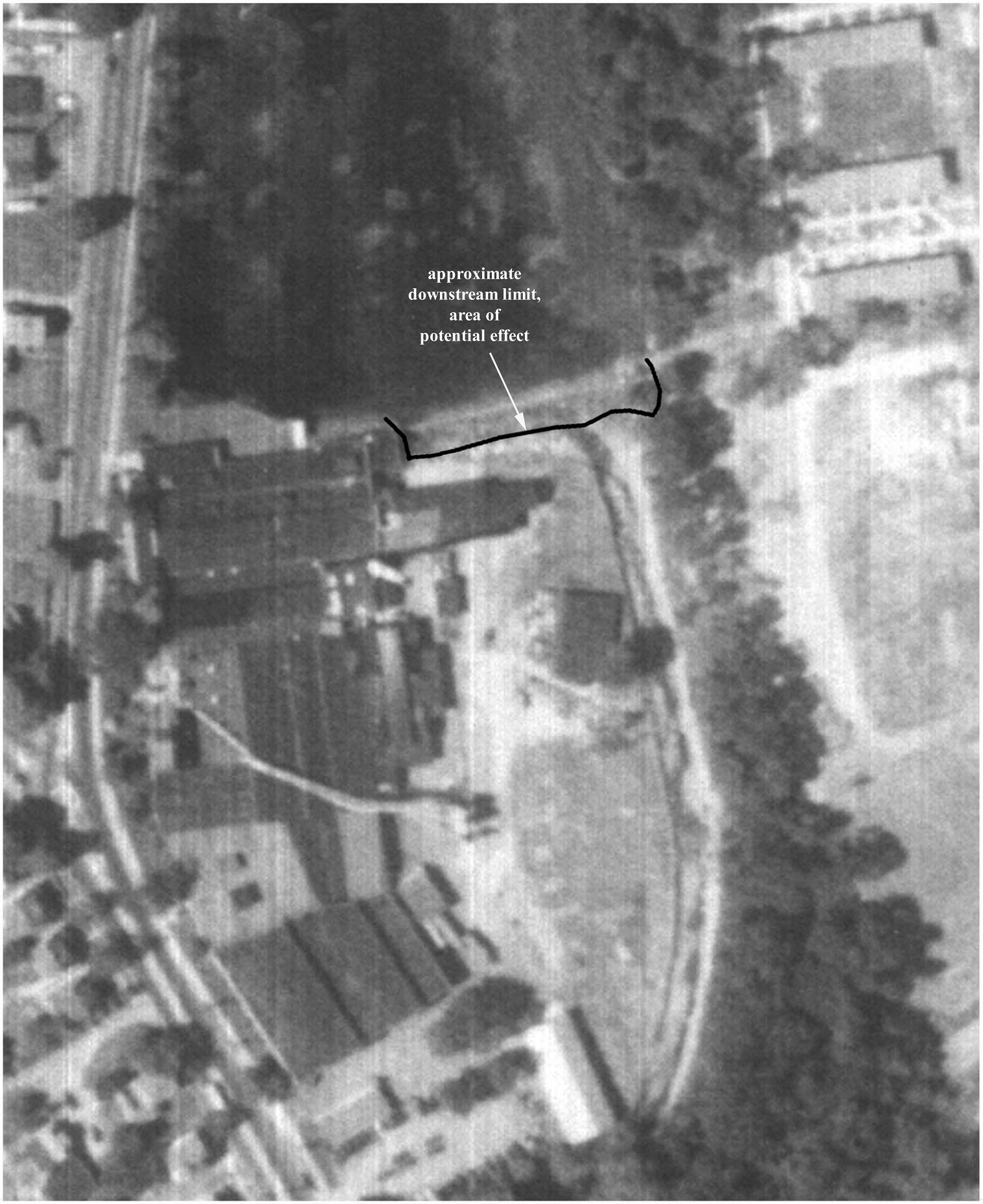
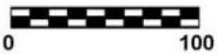


Figure 12. POND LILY COMPANY AT POND LILY DAM c1951
source: Robinson Aerial Surveys, Inc. 1951-52
Channel downstream of dam has been re-located, and pond is filling with wetland



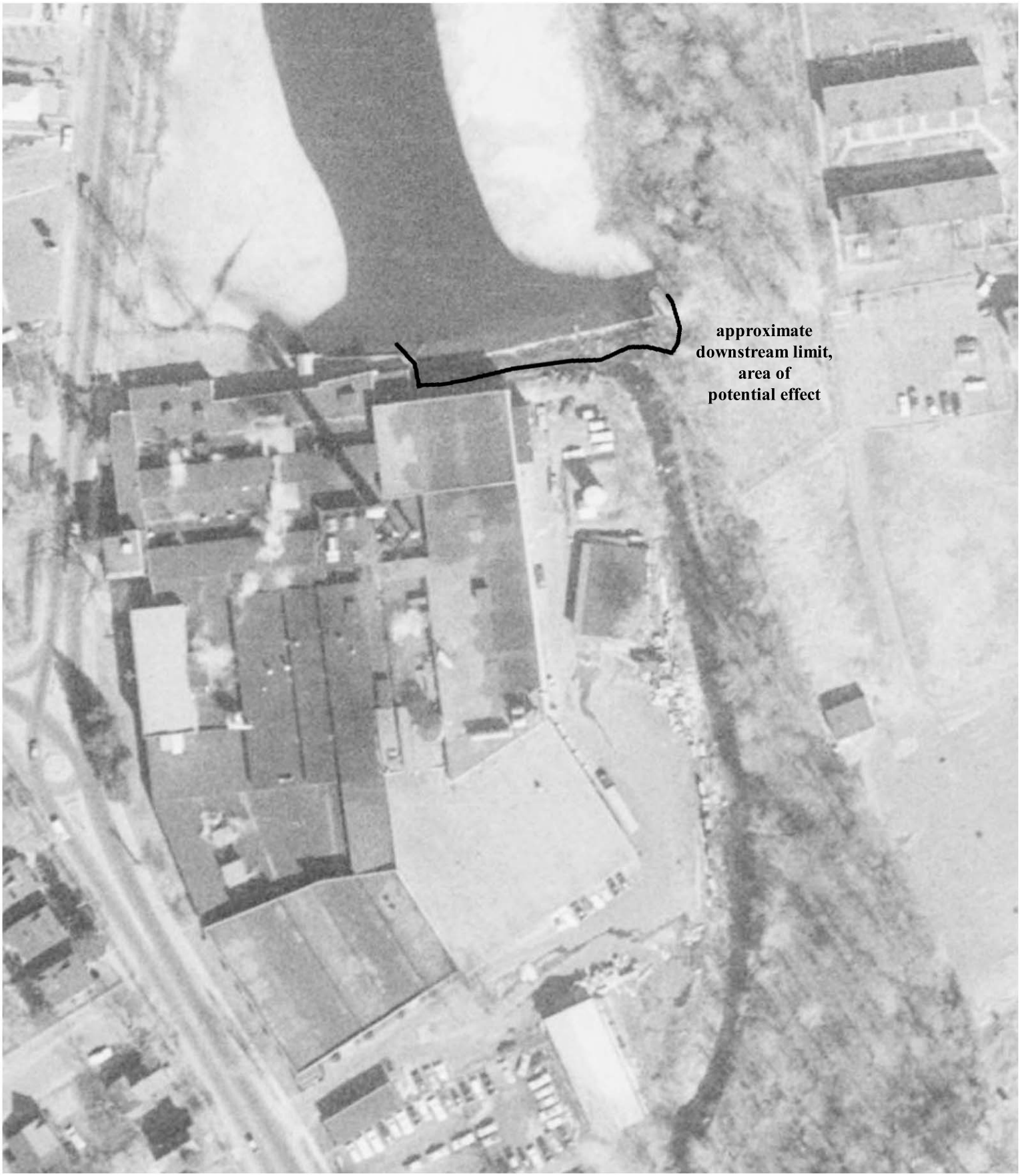


Figure 13. POND LILY COMPANY AT POND LILY DAM c1965
source: Keystone Aerial Surveys, Inc. 1965

N
W
E
S

0 100 FT.