Appendix D.5 – Cultural and Historic Investigation and Evaluation Jewell Watershed Dam Sites #1, #2, #3 and #5
Supplemental Watershed plan and Environmental Assessment

January 10, 2023

Attachments:

1. Archaeological Resource Assessment,
2. Jewell Brook Dam Phase IB Report 7/28/2022
3. Jewell Brook Dams VARI
4. Jewell Brook Dams Site 2 Phase IB Addendum letter 11/2/2022
5. Tribal Consultation email correspondence

HARTGEN
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ARCHEOLOGICAL RESOURCE ASSESSMENT

Jewell Brook Watershed Sites 1, 2, 3 & 5

Town of Ludlow
Windsor County, Vermont

HAA # 5521-11

Submitted to:
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October 2020

MANAGEMENT SUMMARY

SHPO Project Review Number:
Involved State and Federal Agencies: *United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS)*
Phase of Survey: *Archeological Resource Assessment*

LOCATION INFORMATION

Municipality: *Ludlow*
County: *Windsor*

SURVEY AREA

Site 1: Length: *2604 feet (794 m)*
Width: *2005 feet (611 m)*
Area: *88.2 acres (35.7 ha)*

Site 2: Length: *1716 feet (523 m)*
Width: *856 feet (261 m)*
Area: *28.2 acres (11.4 ha)*

Site 3: Length: *2084 feet (635 m)*
Width: *1021 feet (311 m)*
Area: *51.3 acres (20.8 ha)*

Site 5: Length: *1773 feet (540 m)*
Width: *1435 feet (437 m)*
Area: *48.5 acres (19.6 ha)*

RESULTS OF RESEARCH

Archeological sites within two miles: *Site 1, 0 sites; Site 2, 0 sites, Site 3, 13 sites and Site 5, 0 sites*
Surveys in or adjacent: *Two*
NR/NRE sites in or adjacent: *SR structures adjacent to Site 1 and within Site 3*
Precontact Sensitivity: *Moderate*
Historic Sensitivity: *Low*

RECOMMENDATIONS

The project is a dam rehabilitation plan to determine the effects of rehabilitation of the four dams on cultural resources. Each of the four sites has archeological sensitivity areas within the defined Area of Potential Effects (APE). If those areas can be avoided during construction, no further archeological review is recommended. If those areas cannot be avoided, Phase IB archeological reconnaissance survey is recommended for sensitive areas that will be disturbed.

Report Authors: *Thomas R. Jamison, PhD, RPA #16566*
Date of Report: *October 2020*

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Map List

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ARCHEOLOGICAL RESOURCE ASSESSMENT

1 Introduction

Hartgen Archeological Associates, Inc. (Hartgen) conducted an Archeological Resource Assessment for the proposed Jewell Brook Watershed Dam Rehabilitation Project (Project) located in the Town of Ludlow, Windsor County, Vermont. The Project requires approvals by the United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS).

This investigation was conducted to comply with Section 106 of the National Historic Preservation Act and will be reviewed by the Vermont Division for Historic Preservation (VDHP). The investigation was conducted according to the Vermont State Historic Preservation Office's (SHPO) *Guidelines for Conducting Archeology in Vermont* (2017).

2 Project Information

2.1 Project Location

The project is located in the southern half of the Town of Ludlow and includes dams at Sites 1, 2, 3 and 5, all located in Jewell Brook watershed along the west side of Route 100 (Map 1). From south to north, Site 1 is located on Jewell Brook (Map 2a), Site 2 is located on Grant Brook (Map 2b), Site 5 is located on Sanders Brook (Map 2d) and Site 3 is located on several seasonal drainages adjacent to Jewell Brook (Map 2c).

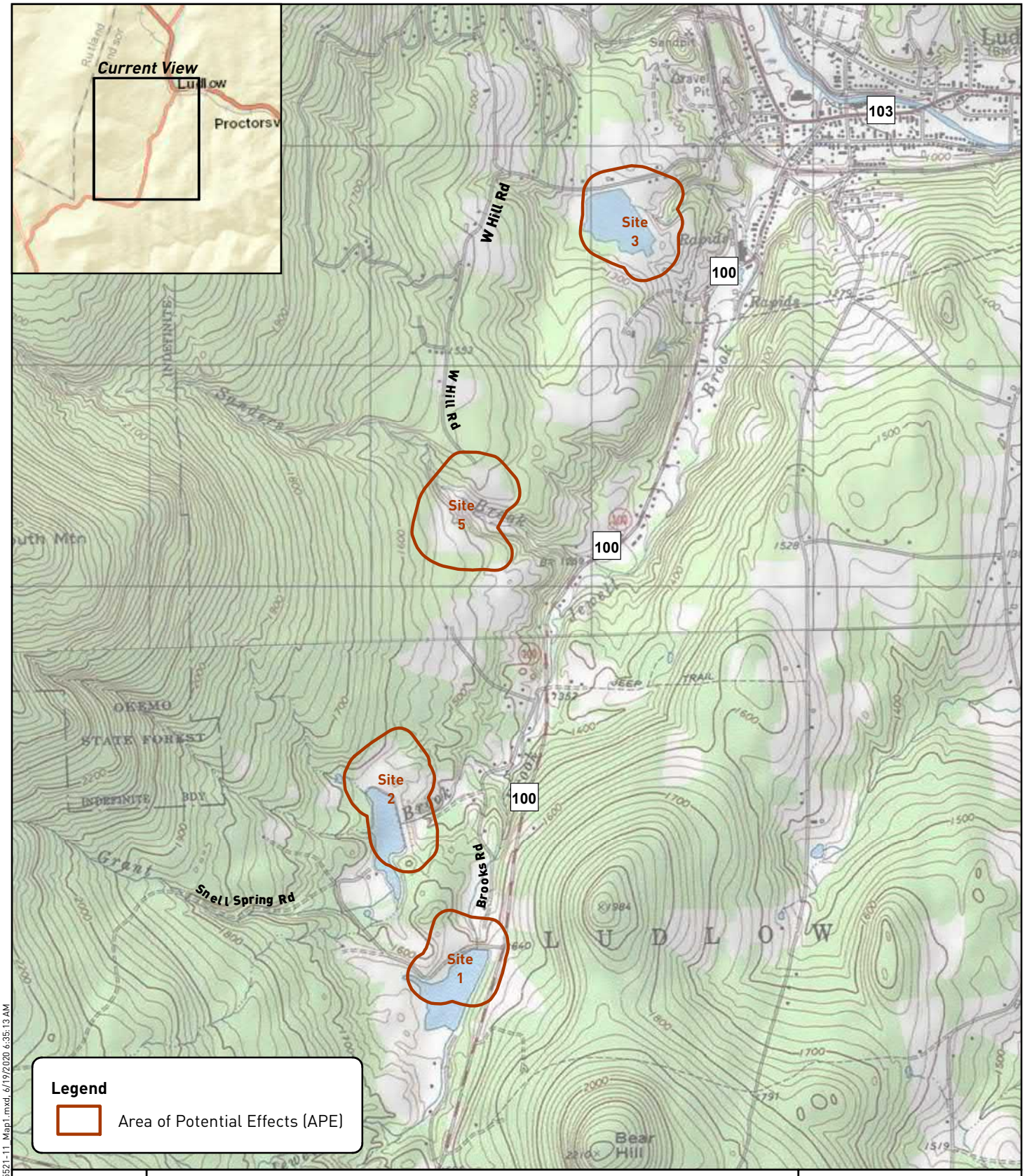
2.2 Description of the Project

The project consists of the potential rehabilitation of the four flood control facilities to improve the facilities reliability and safety.

2.3 Description of the Area of Potential Effects (APE)

The area of potential effects (APE) includes all portions of the property that will be directly altered or impacted by adjacent construction activities, by the proposed site rehabilitation measures, as defined by DuBois & King, Inc. and shown on project Maps 2a to 2d:

- Site 1 APE encompasses approximately 88.2 acres (35.7 ha)
- Site 2 APE encompasses approximately 28.2 acres (11.4 ha)
- Site 3 APE encompasses approximately 51.3 acres (20.8 ha)
- Site 5 APE encompasses approximately 48.5 acres (19.6 ha)



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Note: Contour interval is 20 feet.

Project Location

GIS Services Accessed 6/19/2020: Environmental Systems Research Institute, Inc., World Street Map; USGS The National Map

HARTGEN archeological associates inc

Map 1

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- Photo Angle
- Archaeologically Sensitive Area (ASA)
- Area of Potential Effects (APE)

Project Map - Site 1

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

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Map 2a

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Photo Angle
Archaeologically Sensitive Area (ASA)
Area of Potential Effects (APE)

Project Map - Site 2

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

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Map 2b

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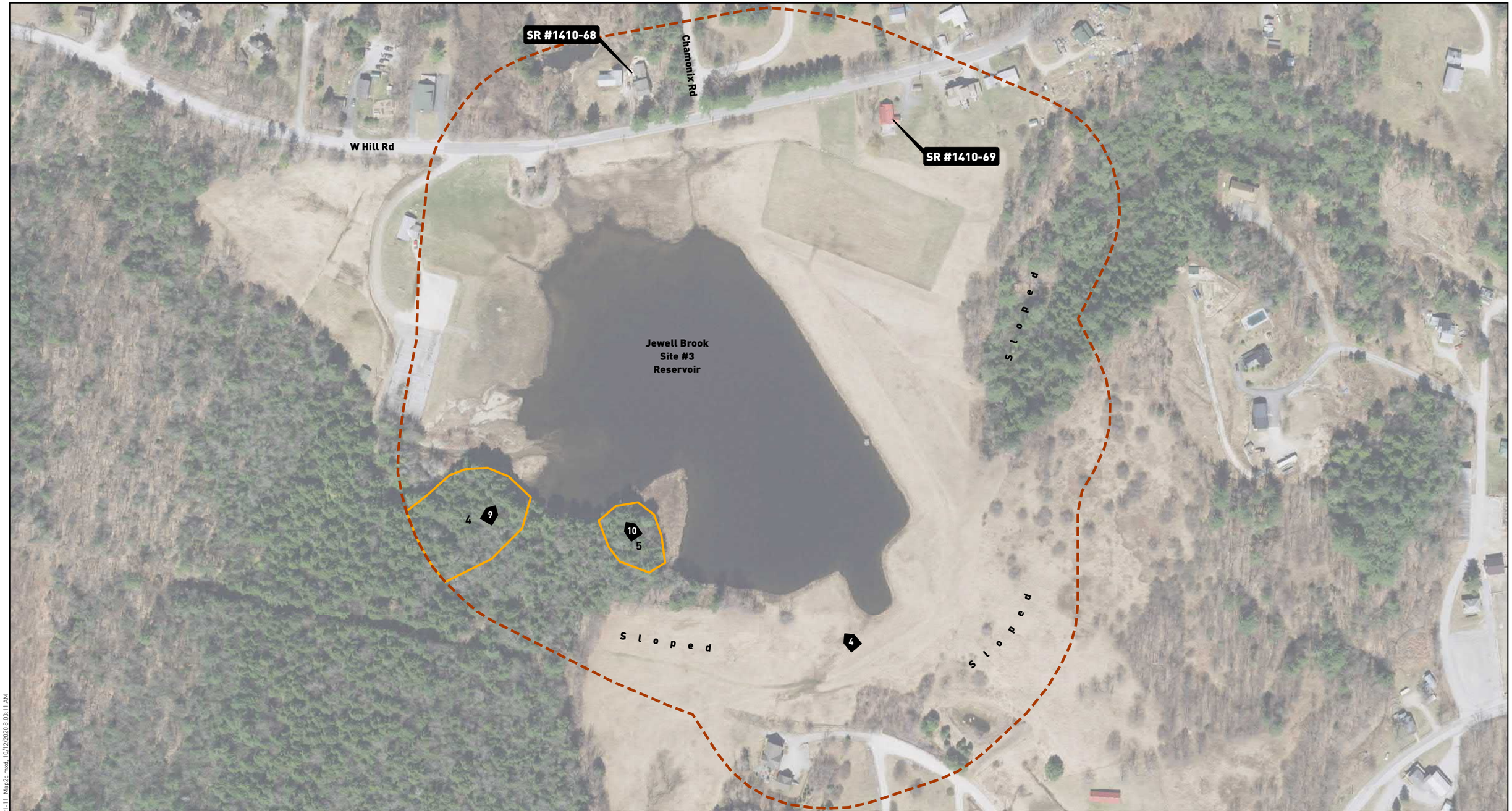

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- Photo Angle
- Archaeologically Sensitive Area (ASA)
- Area of Potential Effects (APE)

Project Map - Site 3

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

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Map 2c

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Photo Angle
Archaeologically Sensitive Area (ASA)
Area of Potential Effects (APE)

Project Map - Site 5

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

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Map 2d

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3 Environmental Background

The environment of an area is significant for determining the sensitivity of the Project Area for archeological resources. Precontact and historic groups often favored level, well-drained areas near wetlands and waterways. Therefore, topography, proximity to wetlands, and soils are examined to determine if there are landforms in the Project Area that are more likely to contain archeological resources. In addition, bedrock formations may contain chert (common stone used for making stone tools) or other resources that may have been quarried by precontact groups. Soil conditions can provide a clue to past climatic conditions, as well as changes in local hydrology.

3.1 Present Land Use and Current Conditions

A site visit was conducted by Thomas R. Jamison on September 21, 2020 to observe and photograph existing conditions within the Project Area. The four project sites are currently utilized for flood control with existing reservoirs and engineered landscapes to channel precipitation into holding areas for gradual release into the drainage system, and all four sites are used as open space.

3.1.1 Site 1

Site 1 is on a relatively broad area with steep slopes up to Route 100 to the east and more varied topography extending to the north, south and west surrounding the reservoir, beyond which the landscape slopes down to the north and up steeply to the west and south (Photos 1 and 2). The reservoir, built in 1966, is held back by a large earthen embankment along the north side of the reservoir with the water returning to Jewell Brook to the north of the embankment through a toe drain. A road is located on top of the embankment to provide access to properties to the west of the reservoir. In order for this facility to be constructed, the alignment of Route 100 was shifted to the east to its present location. The former alignment of Route 100, now known as Wright Road south of the reservoir and Brooks Road to the north, extends north and south of the reservoir, but a section was flooded by the reservoir. A secondary spillway is located west of the reservoir, extending in a northern direction to pass below and west of the State Register listed 1830 Joseph Harris Farm (VHSSS #1410-89). Wooded areas are present around much of the edges of the APE. To the east of the reservoir a steep wooded slope rises to Route 100. There are wooded areas along most of the north side of the APE that generally slope down to the north. A small wooded area in the southwest corner of the APE retains some level terraces with intact soil stratigraphy with a small dried up beaver pond and some wet areas at the base of those terraces.

Photo 1. Site 1. Note heavily modified landscape. View to the east.

Photo 2. Site 1, existing reservoir in area of the farmstead and schoolhouse. View to the south.

3.1.2 Site 2

Site 2 is located directly north of Site 1, but is oriented perpendicular to Grant Brook that flows from the west toward Jewell Brook to the east (Photo 3). The site was constructed in 1969, according to a plaque at the entrance to the site. The reservoir is a long narrow body of water behind the dam that rises to the east, with a relatively small open area around the dam. A secondary spillway curves around the north end of the dam in a broad swath. As with Site 1, construction at Site 2 removed a section of a 19th-century road from use, creating Snell Spring Road to the east and Site 1 Road to the west, on each side of the south end of the reservoir.

Remains of concrete features on the south side of the entrance appear to have been some sort of water diversion channel that may have been related to Ludlow's water supply during the early 20th century. Wooded areas are located at the edges of the APE with a large area on the west that gently slopes up away from the reservoir. At the northeast corner of the APE the topography slopes down to the east. A high ridge is located along the east side of the APE, north of the entrance road. A small concrete bridge crosses a low wet area at the west end of the entrance road.

Photo 3. Site 2, overview of reservoir and dam to the right. View to the north.

3.1.3 Site 3

Site 3 is located adjacent to the south side of West Hill Road and hosts the West Hill Recreation Area (Photo 4). The reservoir is used for swimming and fishing, there are basketball courts, picnic pavilion, hiking trails and other facilities. Hiking trails run around the reservoir through wooded and open areas. The dam is located along the northeast side of the reservoir with two small drainages flowing into the area from the west. Most of the area is surrounded by open fields, largely modified during construction of the facility. However, the southwest area of the APE is wooded around the drainages that feed the reservoir.

Photo 4. Site 3, note wooded area on the left with recreation area in the center background. View to the northwest.

3.1.4 Site 5

Site 5 is located south of Site 3, along Sanders Brook (Photo 5). It consists of a small reservoir surrounded by a monumental dam to the northeast and two secondary spillways to the northwest and southeast. Most of the periphery of the APE is wooded with outlet channel being in a generally cleared corridor. Most of the wooded areas around the edges of the APE are fairly level or gently sloped while the two sides of Sanders Brook upstream of the reservoir form steep drops to the brook before it enters the reservoir. A steeply sloped landform near the center of the APE is also wooded.

Photo 5. Site 5, note heavily modified landscape. View to the northwest.

3.2 Soils

Soil surveys provide a general characterization of the types and depth of soils that are found in an area. This information is an important factor in determining the appropriate methodology if and when a field study is recommended. The soils information was collected from the USDA soils website (USDA 2020).

3.2.1 Site 1

According to the USDA, the soils of the Site 1 APE range from poorly drained recent alluvium along Jewell Brook to excessively drained outwash sediments around the north and west sides of the APE. Although there are areas defined as recent alluvium along Jewell Brook upstream of the reservoir, the As Built plans indicate that at the time of construction the area was stripped and filled over so that any archeological sensitivity has likely been severely compromised. The areas of glacial outwash are generally sloped with the exception of the wooded area in the southwest quadrant where there are relatively level terraces overlooking a wetland (Table 1). In part due to disturbance related to the facility construction, none of these soils have the potential for deeply stratified archeological deposits.

Table 1. Soils in Site 1 APE

Symbol	Name	Textures	Slope	Drainage	Landform
24	Podunk	Fine sandy loam	0-3%	Moderately well drained	Recent alluvium
28	Udorthents and Udipsamments	Variable	Variable	Variable	Disturbed soils
33	Rumney	Fine sandy loam	0-3%	Poorly drained	Recent alluvium
68C	Monadnock and Berkshire	Fine sandy loam	8-15%	Well drained	Glacial till
68D	Monadnock and Berkshire	Fine sandy loam	15-25%	Well drained	Glacial till
70C	Adams	Loamy sand	8-15%	Excessively and somewhat excessively drained	Outwash plains, deltas and lake plains
70D	Adams	Loamy sand	15-25%	Excessively and somewhat excessively drained	Outwash plains, deltas and lake plains
71B	Croghan and Sheepscot	Fine sandy loam	0-8%	Moderately well drained	Outwash plains, deltas and terraces

3.2.2 Site 2

The soils of the Site 2 APE are dominated by a large swath defined as disturbed in relation to construction of the high embankment. Surrounding wooded areas within the APE comprise areas of glacial till and outwash (Table 2). None of these have the potential for deeply stratified archeological deposits.

Table 2. Soils in Site 2A APE

Symbol	Name	Textures	Slope	Drainage	Landform
28	Udorthents and Udipsamments	Variable	Variable	Variable	Disturbed soils
63E	Monadnock and Berkshire	Fine sandy loam, very stony	35-60%	Well drained	Glacial till
68D	Monadnock and Berkshire	Fine sandy loam	15-25%	Well drained	Glacial till
70D	Adams	Loamy sand	15-25%	Excessively and somewhat excessively drained	Outwash plains, deltas and lake plains
77D	Cheshire-Holyoke	Fine sandy loam and gravel	15-35%	Well drained	Supraglacial till on uplands

3.2.3 Site 3

The soils of the Site 3 APE include a large area of disturbed soils through the north, east and west portions of the APE. These soils are quite similar to those of Site 1 with the exception of lack of alluvial soils and addition of areas of glacial till (Table 3). None of these soils have the potential for deeply stratified archeological deposits.

Table 3. Soils in Site 2B APE

Symbol	Name	Textures	Slope	Drainage	Landform
11E	Marlow	Fine sandy loam, very stony	35-60%	Well drained	Glacial till on hills and mountains
17C	Peru, Skerry and Colonel	Fine sandy loam	8-15%	Moderately well drained	Glacial till on hills and mountains
28	Udorthents and Udipsamments	Variable	Variable	Variable	Disturbed soils
54D	Tunbridge-Lyman Complex	Fine sandy loam, rocky	15-25%	Well drained	Glaciated uplands
68C	Monadnock and Berkshire	Fine sandy loam	8-15%	Well drained	Glacial till
68D	Monadnock and Berkshire	Fine sandy loam	15-25%	Well drained	Glacial till
70C	Adams	Loamy sand	8-15%	Excessively and somewhat excessively drained	Outwash plains, deltas and lake plains

3.2.4 Site 5

The soils of the Site 5 APE include a large area of disturbed soils through the north, east and west portions of the APE. Surrounding this area are intact soils that developed in glacial till sediments (Table 3). None of these soils have the potential for deeply stratified archeological deposits.

Table 4. Soils in Site 2B APE

Symbol	Name	Textures	Slope	Drainage	Landform
11C	Marlow	Fine sandy loam, very stony	8-15%	Well drained	Glacial till on hills and mountains
11E	Marlow	Fine sandy loam, very stony	35-60%	Well drained	Glacial till on hills and mountains
18B	Peru, Skerry and Colonel	Fine sandy loam	0-8%	Moderately well drained	Glacial till on hills and mountains
18C	Peru, Skerry and Colonel	Fine sandy loam	8-15%	Moderately well drained	Glacial till on hills and mountains
28	Udorthents and Udipsamments	Variable	Variable	Variable	Disturbed soils
63E	Monadnock and Berkshire	Fine sandy loam, rocky	35-60%	Well drained	Glaciated uplands
68C	Monadnock and Berkshire	Fine sandy loam	8-15%	Well drained	Glaciated uplands

3.3 Bedrock Geology

All four sites are located within a band of the Tyson formation consisting of the Chlorite-muscovite phyllite and schist member and the Quartz-pebble phyllite and wacke member (Ratcliffe 2011). Although the Tyson formation is unlikely to have been utilized for stone tool manufacture, it could have been used on an expedient basis for informal tools.

3.4 Physiography and Hydrology

Steeply sloped areas are considered largely unsuitable for human occupation. As such, areas with a slope in excess of 12% are generally excluded from archeological testing. Exceptions to this rule include steep areas with bedrock outcrops, overhangs, and large boulders that may have been used by precontact people as quarries or rock-shelters. Such areas may still warrant a systematic field examination.

The core of each of the four site areas is a bowl shaped area that holds the reservoir. Surrounding these low points are typically steeply sloped engineered landscapes that direct water into the reservoir or, in the case of secondary spillways, direct water around and downstream of the reservoirs. Each site retains small areas of unmodified natural topography. In most cases, these areas are sloped, but some habitable areas were identified.

At Site 1, a level wooded area is located at the southwest corner of the APE, overlooking a small wetland. The wetland may have been created by construction of the project. At the north end, the APE includes a section of the original road through the area that passes by the 1830 Joseph N. Harris farm (SR #1410-89) located north of the APE. Jewell Brook flows through the APE with small intact sections present at the north and south ends.

Site 2 is somewhat unusual as it is oriented with the dam extending north to south, straddling Grant Brook. The west side of the APE includes some wooded areas that gently slope down to the reservoir, including an old road alignment. The remainder of the area around the core disturbance is quite sloped. Sanders Brook flows west to east through the south end of the APE. At the time of the site visit, the streambed was dry.

The topography around Site 3 is less severe than the other sites with the north and part of the west sides being fairly level. Some of that character is due to construction of the facility, particularly a large borrow area in the northwest now occupied by the Ludlow Recreation facility. The southwest, south and east sections of the APE surrounding the reservoir have much greater slope, in particular with steep drops down to the unnamed brook on the east side. Extending into the southwest side of the reservoir is a point of land that has some level area adjacent to the water.

Site 5 has the most extreme topography of the four sites. It is located on Sanders Brook where the original topography was very steep along the brook. Therefore, the construction of the dam required a quite high embankment to cross the drainage. The two secondary spillways were constructed on the more level high ground further from the brook. Surrounding the disturbed core of the APE, there are wooded areas where the topography varies. The southeast and southwest corners and the north side on either side of West Hill Road there are small areas of relatively level topography.

4 Documentary Research

Hartgen conducted research on the Online Research Center (ORC) maintained by the Vermont Division for Historic Preservation to identify previously reported archeological sites, State and National Register (NR) properties, properties determined eligible for the NR (NRE), and previous cultural resource surveys in the project vicinity.

4.1 Archeological Sites

The archeological site files in the Vermont Archaeological Inventory (VAI) contained 13 sites within approximately two miles of the Project Area (Table 4). Previously reported archeological sites provide an overview of both the types of sites that may be present in the Project Area and relation of sites throughout the surrounding region. The presence of few reported sites, however, may result from a lack of previous systematic survey and does not necessarily indicate a decreased archeological sensitivity within the Project Area.

The sites in the project vicinity reflect precontact use of the area related to hunting and gathering of a variety of faunal and floral resources. In particular, the five precontact sites are focused along the Black River corridor located to the north of the project. Three of these sites are of unknown precontact time period. The Jackson Gore site (VT-WN-0289), in contrast, was occupied during the early Paleoindian period, as well as during the

Middle to Late Woodland. The adjacent precontact site, VT-WN-0273 also likely dates to the Early Paleoindian period based on the presence of red chert flakes, like at VT-WN-0289, that may derive from the Munsungan Lake source in Maine (Doherty, et al. 2000). While VT-WN-0273 and VT-WN-0289 are located on a terrace overlooking the Black River valley, the other precontact sites in the vicinity are located adjacent to the river and were identified based on a few debitage fragments that could not be assigned to a time period. The Black River valley provided a vital travel corridor for Native Americans traveling across Vermont between the Connecticut River and the Champlain Valley. In turn, the same route was an important link for early settlers and military campaigns requiring access between those same areas. The Crown Point Road was constructed in 1759-1760 between Fort Number 4 in Charlestown, New Hampshire and Crown Point in Essex County, New York, passing through Ludlow north of the Black River (Crown Point Road Association 1999). This route served during the French and Indian War and provided access to the area for later settlement.

The town of Ludlow was chartered in 1761 by Benning Wentworth, Governor of New Hampshire. However, the first settlement was not undertaken until 1783-84 when several individual cleared homesteads along the Black River east of the current village (Harris 1988:15). The project area is in a part of town called South Hill, that rises up to the south from the Black River. Jewell Brook is one of several streams that flow down to the river. Jewell Brook, in turn is fed by Sanders Brook and Grant Brook. This area appears to have been first settled during the early to middle 19th century with houses constructed in the project vicinity from c. 1810 to 1840 (Harris 1988:182-186). Another 19th-century site reported for the area is a lime kiln that was said to be located along the Andover Road (approximately the route of Route 100), south of Ludlow (Rolando 2007). However, the exact location of the kiln has not been found and it may have been destroyed by road construction or some other activity. During the early 20th century, a small Finnish settlement, of people escaping harsh conditions and persecution in Finland, grew in Ludlow with a concentration on South Hill. This influx of can be recognized in part by the presence of small sauna structures associated with houses in the area (Coleman 2017). The historic sites in the project vicinity reflect the 19th-century occupation of the area, including farmsteads and small scale industrial activities.

Table 5. Vermont Archeological Inventory sites within two miles of the Project Area

VAI Site No.	Site Identifier	Description	Proximity to Project Area
VT-WN-0125	Grahamville Industrial Complex	Mid-19th to mid-20th-century sawmill/hydro power complex	2 mi/3.2 km N of Site No. 3
VT-WN-0199	Triples	Unknown precontact, quartz reduction flakes	2 mi/3.2 km E of Site No. 3
VT-WN-0204	McKenny Residence	19th-century structure and midden	2 mi/3.2 km to E of Site 3
VT-WN-0206	Mountain View Motel	19th-century cellar hole and artifact concentration	2 mi/3.2 km E of Site 3
VT-WN-0207	Davis Field	Unknown precontact, quartz debitage	2 mi/3.2 km E of Site 3
VT-WN-0262		Unknown precontact, chert and quartzite debitage, cores	2 mi/3.2 km N of Site 3
VT-WN-0270	Ludlow Mountain Logging Area	c. 1903-1905 logging landscape and camps	2 mi/3.2 km N of Site 3
VT-WN-0271	Lawrence Farmstead	19th-century farmstead	2 mi/3.2 km N of Site 3
VT-WN-0272	Bixby Farmstead	19th-century farm vicinity, stone foundation, walls	2 mi/3.2 km N of Site 3
VT-WN-0273		Probable Paleoindian, likely Munsengan Lake chert debitage and utilized flakes	2 mi/3.2 km N of Site 3
VT-WN-0275	Felt Farmstead	Possible location of historic farmstead	2 mi/3.2 km N of Site 3
VT-WN-0289	Jackson Gore	Early Paleoindian, fluted point, Munsengan Lake chert debitage	2 mi/3.2 km N of Site 3
VT-WN-0293	Single Foundation	Unknown historic, foundation, rock piles, skidder road	2 mi/3.2 km N of Site 3

4.2 Historic Properties

An examination of the files at VDHP identified no NR properties, no NRE properties and no properties previously determined to be ineligible within or adjacent to the APE. However, review of the State Register listings for Ludlow identified five SR listed structures that are in close proximity to the project sites (Table 5).

Table 6. State Register inventoried properties adjacent to the APE

VHSSS #	Site Area	Property Name/Address	Description of Building
1410-68	3	"Farmhouse"	c. 1880 vernacular half I-house
1410-69	3	Frank Howard Farm	c. 1830/1930 vernacular
1410-89	1	Joseph N. Harris Farm	1830 vernacular
1410-98	1	Milton Bixby Farm	1864 vernacular farmstead
1410-100	3	Mayo Mills Farm	1820s and late 19th-century farmstead

4.3 Previous Surveys

On file at VDHP are two previous surveys within the immediate vicinity of the Project (Table 5).

In 2009, UVM CAP completed Phase IB testing in four archeologically sensitive areas along a proposed waterline improvement project (Mandel and Knight 2009). The project runs along Route 100 and Jewell Brook, adjacent to the project areas of Sites 3 and 5. No significant archeological deposits were identified during the testing.

The second survey in the project area was a 2012 USDA-NRCS investigation of areas of scour on the face of the dams at Sites 2, 3 and 5 resulting from Tropical Storm Irene (Skinas 2012). The investigation determined the areas to be repaired had been heavily disturbed by the original 1960s and 1970s construction of the dams. No further review was recommended.

Table 7 Relevant previous surveys within or adjacent to the Project

Project/Phase	Summary	Citation
Ludlow Water System Improvements/Phase IB	Shovel testing in four areas along Route 100/Jewell Brook encountered no archeological deposits	(Mandel and Knight 2009)
Jewell Brook Dam Repair/Phase IB	Soil coring determined the areas to be repaired had been previously disturbed by the original 1960s and 1970s dam construction	(Skinas 2012)

5 Historical Map Review

Useful historical maps of the project area are limited to maps dating to 1856 (Doton 1856), 1869 (Beers 1869) and 1932 (USGS 1932). In addition, the As Built plans for the sites, dating from 1966 (Site 1), 1967 (Sites 2 and 3) and 1970 (Site 5) are also informative (Appendix 2). In particular, the As Built plans show contours, drainages, roads and structures that were on the properties prior to construction, as well as the areas of disturbance due to the construction.

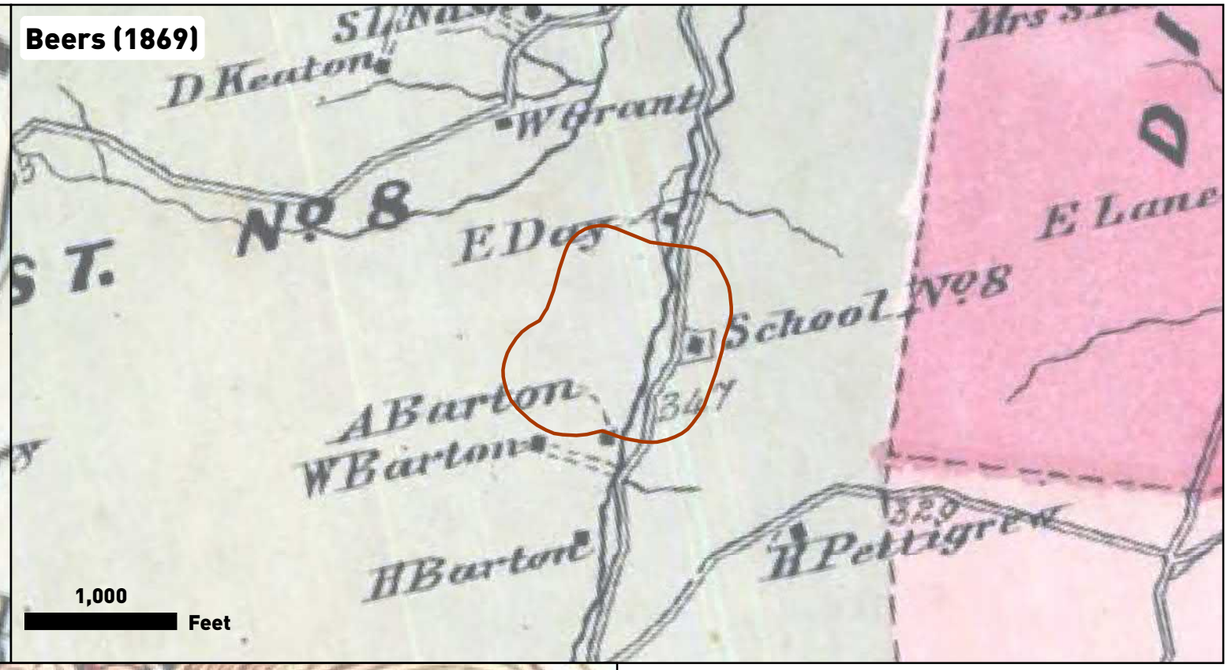
5.1 Site 1

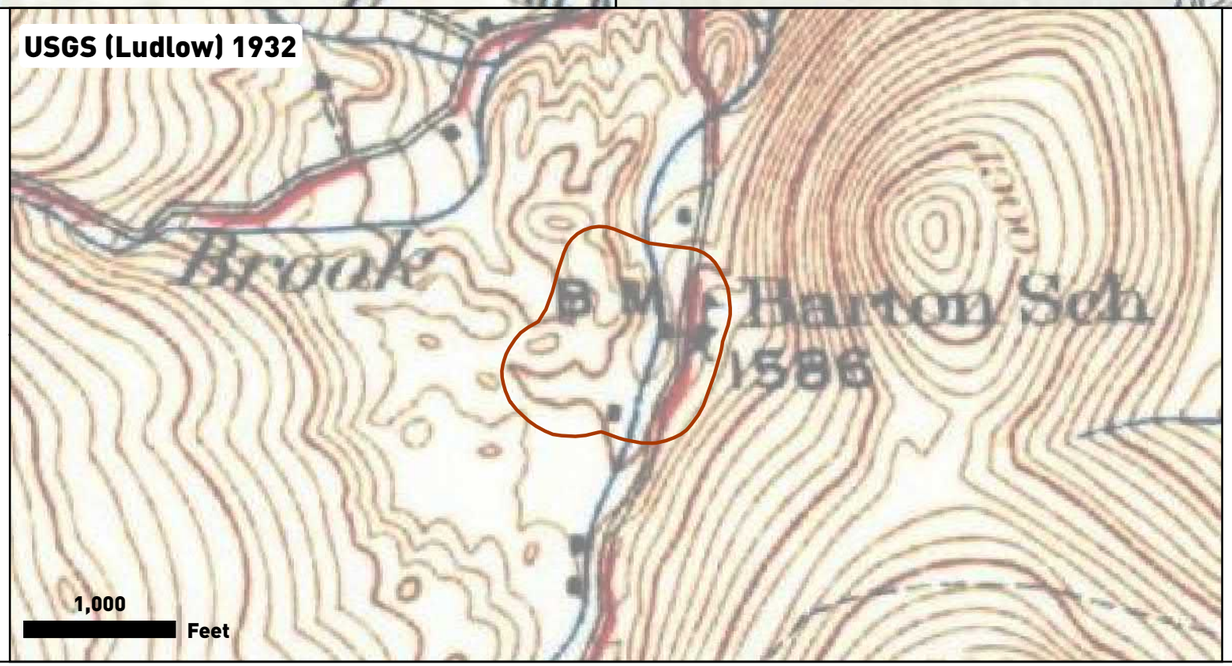
The 1856 Doton map depicts a single structure within the APE for Site 1, labeled Buck (Map 3a). A school house is shown to the south of the APE, along with a residence labeled A. Barton further south. By the time of the 1869 Beers map, the Buck house is gone and there is a house labeled A Barton at the edge of the APE. Two other houses associated with the Barton family suggest the house labeled H. Barton in 1869 may be the house that shows up on the 1856 map as A. Barton. The schoolhouse has been moved to the opposite side of the brook and road. This same pattern is apparent on the 1932 USGS quadrangle, although a structure is shown between the brook and road in the approximate location of the 1856 Buck house. The 1966 As Built plan for this site provides greater detail, depicting the location of the Barton house, barn, two sheds and other infrastructure. In addition, the schoolhouse is shown on the opposite side of the brook and road. These

structures are all indicated to be within the constructed reservoir. The Harris farmstead is also shown north of the APE, straddling the road.

5.2 Site 2

The historic maps for Site 2 depict a road running through the south end of the APE (Map 3b). One structure is shown along the road in the southern end of the APE in 1869 and 1932. It does not appear on the 1856 map. In 1869 it is labeled as S. L. Nash. Other structures are shown outside the periphery of the APE. The Nash house, barn, spring house and shed are also shown on the As Built plan, located in the area of the existing reservoir. Also on the As Built plan is a notation of "existing water supply channel" located parallel to the entrance road on the east side of the site. This feature was apparent and noted during the site visit as a concrete lined channel that remains partially intact.





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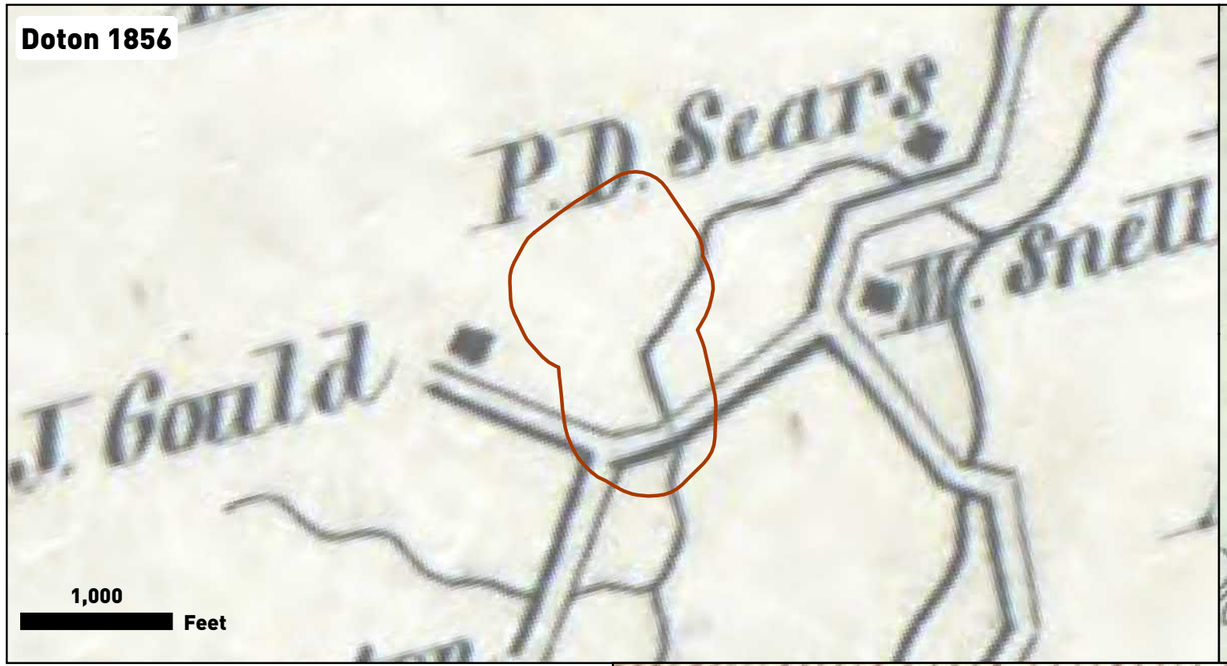
Area of Potential Effects (APE)

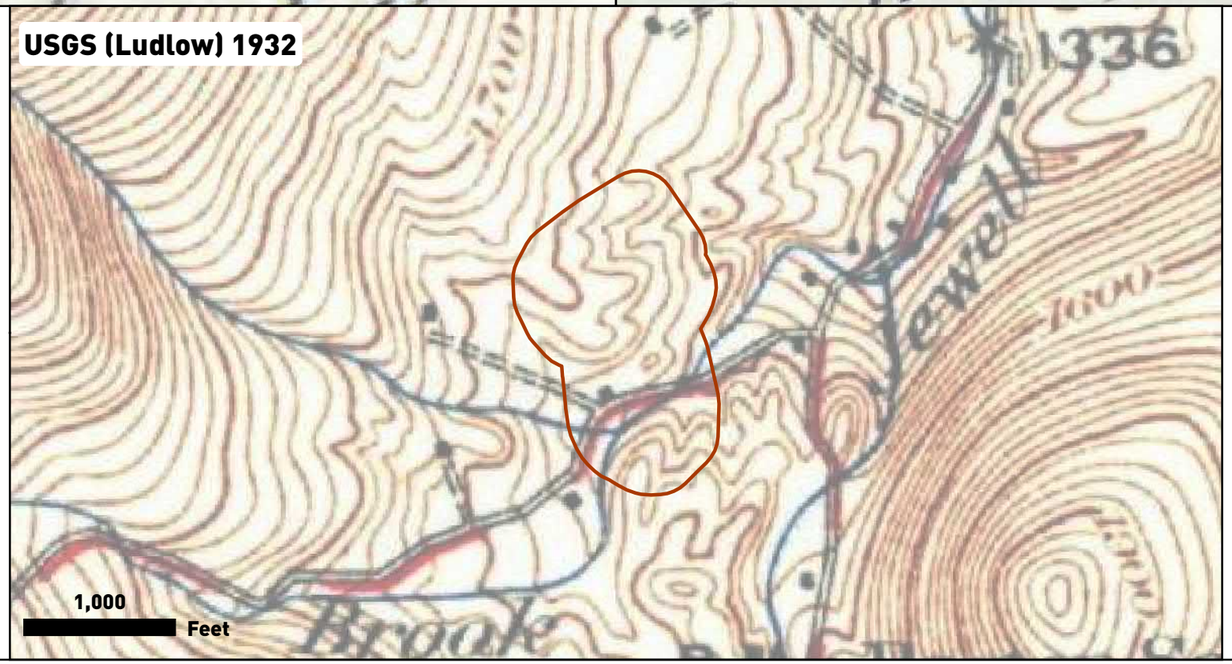
Historical Maps - Site 1

1856-1932

HARTGEN archeological associates inc

Map 3a





Legend

Area of Potential Effects (APE)

Historical Maps - Site 2

1856-1932

HARTGEN archeological associates inc

Map 3b

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5.3 Site 3

At Site 3, the 1856 Doton map shows West Hill Road passing through the north side of the APE and one structure located on the south side of the road in the northeast corner of the APE labeled L. French (Map 3c). By the time of the 1869 Beers map, that property is labeled W. Howard. In 1932, a second property is shown within the north end of the APE, on the opposite side of West Hill Road. This second structure first appears on the 1928 USGS quadrangle. These two structures remain standing and are both listed on the State Register (VHSSS #1410-68 and #1410-69; see Historic Properties discussion above). The As Built plan also shows a shed behind #1410-69 on the south side of the road. Being within the secondary spillway, the shed was removed during construction. A large borrow area is shown encompassing the western end of the APE.

5.4 Site 5

Site 5 is the only one where no structures or roads on the historic maps appear within the APE (Map 3d). Sanders Brook is the only feature that crosses the APE, although there are structures and roads in the surrounding area. West Hill Road, that provides access to the site, was apparently extended to this location to allow for construction access, although it does not appear on the As Built plan.

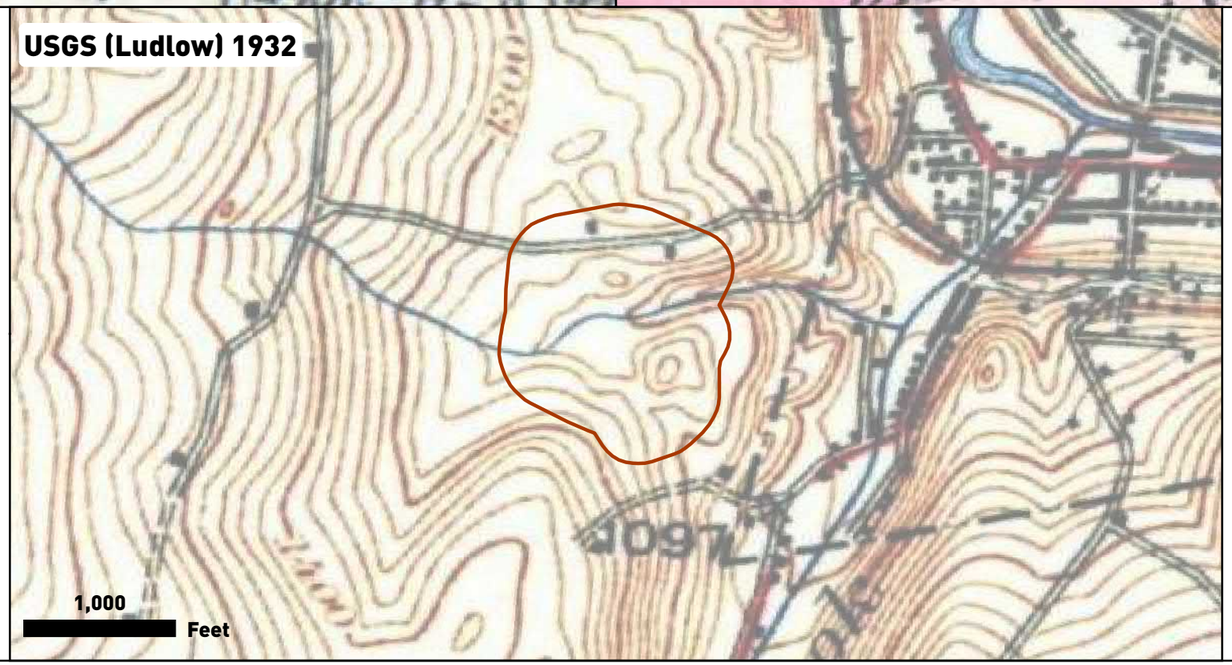
5.5 Map-Documented and Existing Structures

Each past or current structure within the Project Area is assigned a unique structure number. Map-documented structures—those structures that are depicted on one or more maps—are distinguished using the abbreviation "MDS" after the structure number (e.g. Structure 3 (MDS)). Table 6 outlines the structures in each area, as discussed in the historical map section above.

The MDS locations at Sites 1 and 2 have clearly been substantially disturbed by the project construction. Only Site 3 retains standing structures within the defined APE along West Hill Road.

Table 8. Summary of map-documented and existing structures within Sites 1, 2 and 3

Site/Structure #	Doton 1856	Beers 1869	USGS 1932	As Built plans; 1967-1970	Extant (2020)
Site 1					
1	Buck		X		
2		School house	School house	School house	
3		A. Barton	X		
Site 2					
1		S. L. Nash	X	X	
Site 3					
1	L. French	W. Howard	X	X	X
2			X	X	X



Legend

Area of Potential Effects (APE)

Historical Maps - Site 3

1856-1932

HARTGEN archeological associates inc

Map 3c

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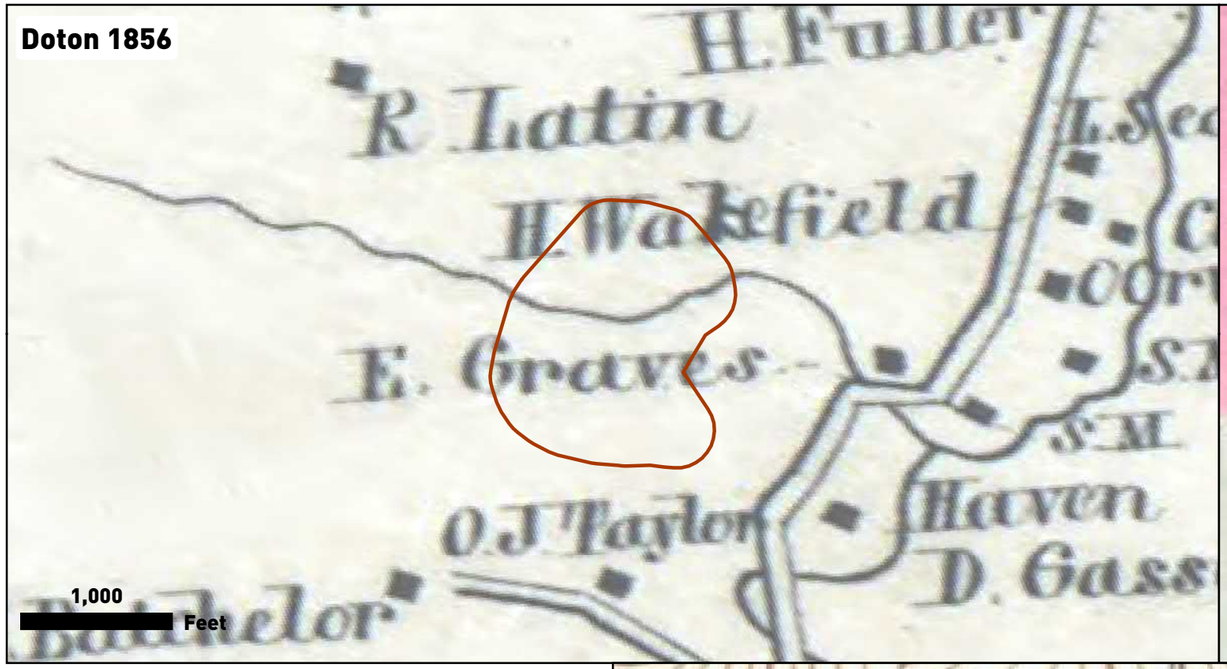
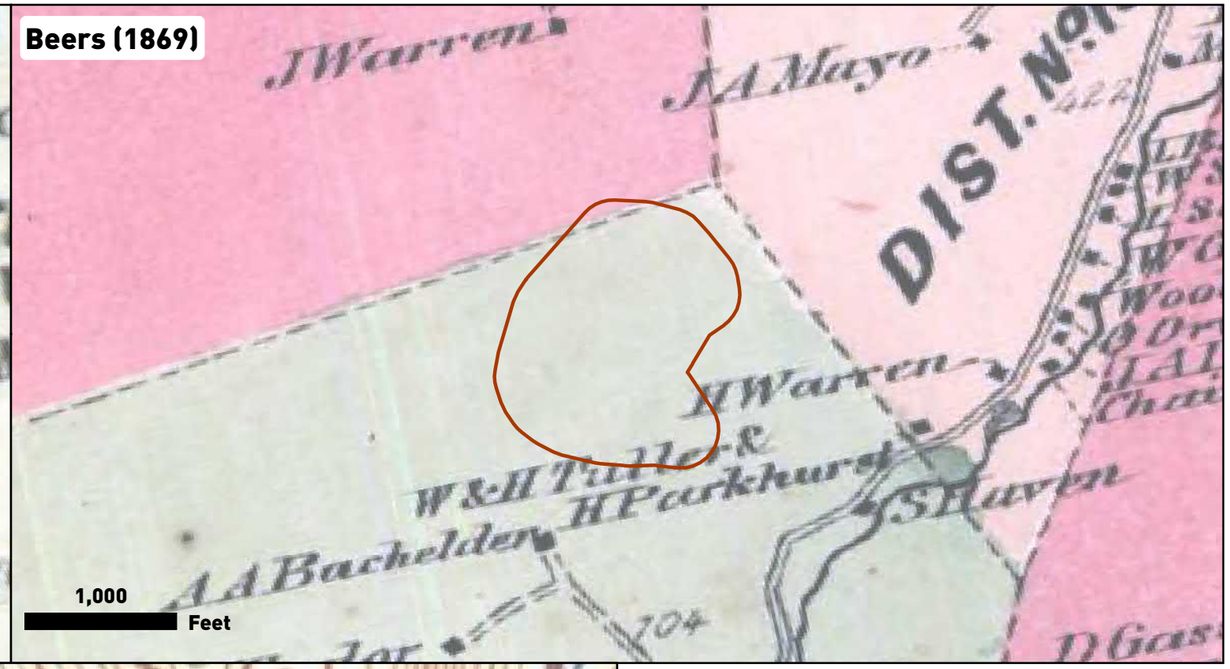
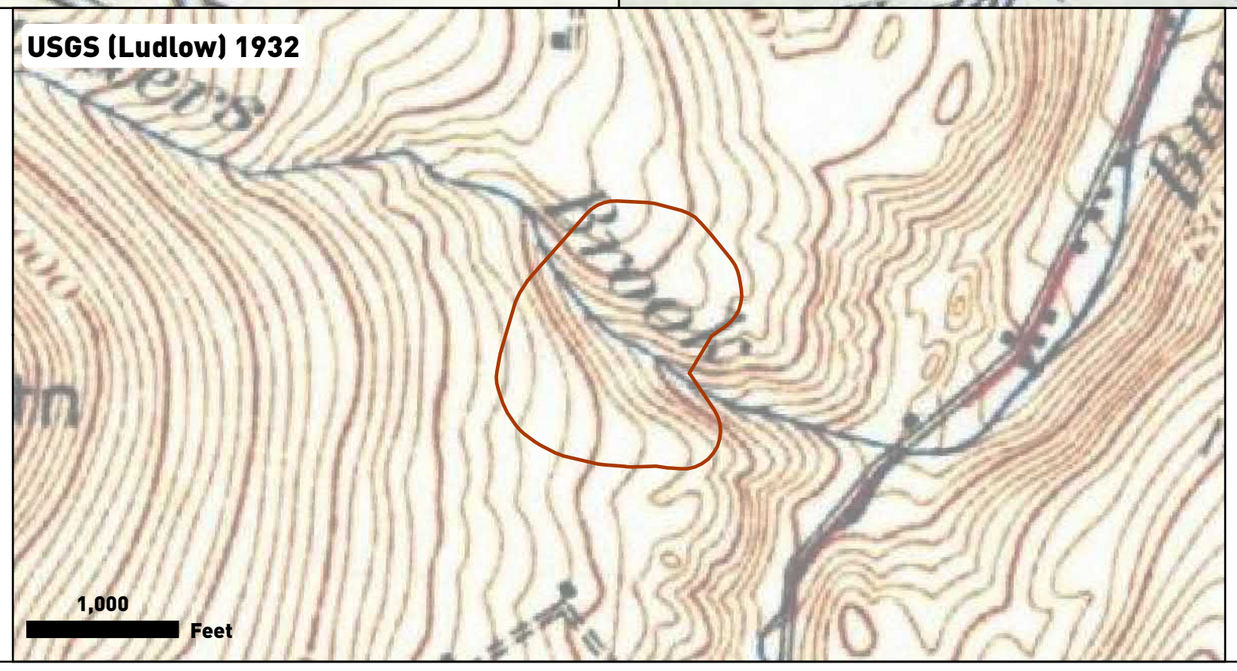
Doton 1856



Beers (1869)



USGS (Ludlow) 1932



N

Legend

Area of Potential Effects (APE)

Historical Maps - Site 5

1856-1932

HARTGEN archeological associates inc

Map 3d

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6 Archeological Sensitivity Assessment

6.1 Precontact Archeological Sensitivity

The precontact sensitivity of an area is based on proximity to previously documented precontact archeological sites, known precontact resources (e.g. chert outcrops), and physiographic characteristics such as topography and drainage. Generally, areas in the vicinity of streams and wetlands are considered to have elevated sensitivity for sites associated with Native American use or occupation because they presented potential food and water sources as well as transportation corridors.

Completion of the VDHP Environmental Predictive Model provides a measure of the precontact archeological sensitivity of the project area (Appendix 1).

6.1.1 Site 1

The Site 1 Project Area is sensitive for proximity to Jewell Brook and a seasonal brook that meet within the APE. In addition, there are some areas of floodplain soils along Jewell Brook and glacial kame soils on the north side of the APE that may have seen limited disturbance. Points were also added for the Project Area being on the travel corridor of the brook. The score was reduced due to significant slope through much of the APE and disturbance related to the project construction. The Project Area has a score of 24. A score of 32 and above is considered to indicate precontact sensitivity.

6.1.2 Site 2

The Site 2 Project Area is sensitive for proximity to Grant Brook and two seasonal brooks that meet within the APE. In addition, there is an area of wetland that may be unrelated to construction n of the project. Points were also added for the Project Area being on the travel corridor of the brook. The score was reduced due to disturbance through much of the APE related to the project construction. The Project Area has a score of 24. A score of 32 and above is considered to indicate precontact sensitivity

6.1.3 Site 3

The Site 3 Project Area is sensitive for proximity to an unnamed brook and a seasonal brook that meet within the APE. In addition, there are some areas of wetland on the west side of the reservoir that may be unrelated to the project construction. Points were also added for the Project Area being on the travel corridor of the brook. The score was reduced due to significant disturbance related to the project construction. The Project Area has a score of 24. A score of 32 and above is considered to indicate precontact sensitivity.

6.1.4 Site 5

The Site 3 Project Area is sensitive for proximity to Sanders Brook that passes through the APE. There are some small falls at the downstream (east) side of the APE, along with the natural travel corridor of the brook. Slope and disturbance from the project construction reduced the score. The Project Area has a score of -32. A score of 32 and above is considered to indicate precontact sensitivity.

6.2 Historic Archeological Sensitivity

The historic sensitivity of an area is based primarily on proximity to previously documented historic archeological sites, map-documented structures, or other documented historical activities (e.g. battlefields).

As outlined in the historic map review and map-documented structures discussion, Sites 1 and 2 had historic occupation prior to construction of the projects. Site 3 retains two historic structures along the north side of the APE. There is no indication of historic occupation at Site 5. These occupations consisted of small farmsteads at Sites 1 and 2 with the structures at Site 3 being in more of a neighborhood setting, less a working farm. In either case, historic archeological deposits associated with those occupations would be present around the structure locations seen on the As Built plans.

7 Archeological Potential

Archeological potential is the likelihood of locating intact archeological remains within an area. The consideration of archeological potential takes into account subsequent uses of an area and the affect those uses would likely have on archeological remains.

The archeological potential of each project site is focused on (1) level areas adjacent to existing or former brooks and (2) level terraces overlooking adjacent wetlands. A few locations have archeological potential due to proximity to historic house locations or along long standing road alignments. Much of each APE has little or no archeological potential due to disturbance from construction of the existing facilities at each site. These disturbed areas were determined based on the As Built plans and the site visits.

The Archeological Sensitivity Areas (ASAs) are defined below and on Maps 2a to 2d.

At Site 1, most of the area has been heavily disturbed. One area of precontact archeological potential (ASA 1) remains along the southwest corner of the APE overlooking a small wetland (Map 2a; Photo 6): The locations of the former farmstead and schoolhouse were destroyed by project construction.

The Site 2 archeological potential is includes ASA 2 to the west side of the APE north of an old road bed (Map 2b; Photo 7). This area becomes increasingly broken up and undulating to the north, but retains potential for precontact and historic archeology. In addition, the concrete water supply channel in the east side of the APE is an archeological feature designated ASA 3 (Photo 8). Elsewhere in the APE is heavily disturbed or sloped.

Site 3 retains precontact archeological potential in two locations along the southwest side of the APE (Map 2c). At the south end of the recreation area there is a trail that enters a wooded area (ASA 4; Photo 9). Level topography on either side of the drainage through that area is sensitive for precontact sites. On a terrace overlooking the former course of the drainage that is dammed by the project is another area of archeological potential (ASA 5; Photo 10). Otherwise, the APE is either heavily disturbed or sloped.

Site 5 is located in an area of generally steep topography that has been heavily modified by the project. However, a few areas of level terrain are found in wooded areas around the south, east and west edges of the APE (Map 2d). These areas are located high above the former brook course (ASA 6 and 7; Photos 11 and 12) and may have been sites of precontact occupation.

Photo 6. Site 1, ASA 1, terrace overlooking wetland. View to the southeast.

Photo 7. Site 2, old road bed extending west from the APE. Level terrain of ASA 2 is located to the right. View to the west.

Photo 8. Site 2, water supply channel (ASA 3) adjacent to south side of entrance road. View to the east.

Photo 9. Site 3, ASA 4 terrace along brook and reservoir. View to the east.

Photo 10. Site 3, ASA 5, terrace overlooking reservoir and former brook channel. View to the north.

Photo 11. Site 5, ASA 6 on either side of West Hill Road where it meets the project. View to the south.

Photo 12. Site 5, ASA 7 on the south side of the APE. View to the southeast.

8 Recommendations

Several Archeological Sensitivity Areas (ASAs) of archeological potential were defined for each of the four sites. The limits of these areas are depicted on Maps 2a to 2d. These areas should be avoided during project construction. If avoidance is not possible, Phase IB archeological reconnaissance survey is recommended for those areas or portions of areas that will be disturbed.

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Appendix 1: VDHP Environmental Predictive Model

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name Jewell Brook Dam 1 **County** Windsor **Town** Ludlow
DHP No. **Map No.** **Staff Init.** T. Jamison **Date** 10/5/2020

Additional Information

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m 90- 180 m	12 6	12
2) Distance to Intermittent Stream	0- 90 m 90-180 m	8 4	8
3) Confluence of River/River or River/Stream	0-90 m 90 –180 m	12 6	12
4) Confluence of Intermittent Streams	0 – 90 m 90 – 180 m	8 4	
5) Falls or Rapids	0 – 90 m 90 – 180 m	8 4	
6) Head of Draw	0 – 90 m 90 – 180 m	8 4	
7) Major Floodplain/Alluvial Terrace		32	32
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m 90 -180 m	12 6	
11) Confluence of River or Stream	0-90 m 90 –180 m	12 6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m 90 -180 m	12 6	
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	12

17) Marine/Lake Delta Complex**		12	
18) Champlain Sea or Glacial Lake Shore Line**		32	
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	
20) ☑ Natural Travel Corridor ☐ Sole or important access to another drainage ☐ Drainage divide		12	12
21) Existing or Relict Spring	0 – 90 m 90 – 180 m	8 4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	
23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	
25) High Recorded Site Density		32	
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	-32
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	-32
**** refer to 1970 Surficial Geological Map of Vermont**			
		Total Score:	24
Other Comments :			
0- 31 = Archeologically Non- Sensitive **32+ = Archeologically Sensitive**			

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name Jewell Brook Dam 2 **County** Windsor **Town** Ludlow
DHP No. **Map No.** **Staff Init.** T. Jamison **Date** 10/5/2020

Additional Information

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m 90- 180 m	12 6	12
2) Distance to Intermittent Stream	0- 90 m 90-180 m	8 4	8
3) Confluence of River/River or River/Stream	0-90 m 90 –180 m	12 6	12
4) Confluence of Intermittent Streams	0 – 90 m 90 – 180 m	8 4	
5) Falls or Rapids	0 – 90 m 90 – 180 m	8 4	
6) Head of Draw	0 – 90 m 90 – 180 m	8 4	
7) Major Floodplain/Alluvial Terrace		32	
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m 90 -180 m	12 6	
11) Confluence of River or Stream	0-90 m 90 –180 m	12 6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m 90 -180 m	12 6	12
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	

17) Marine/Lake Delta Complex**		12	
18) Champlain Sea or Glacial Lake Shore Line**		32	
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	
20) ☑ Natural Travel Corridor ☐ Sole or important access to another drainage ☐ Drainage divide		12	12
21) Existing or Relict Spring	0 – 90 m 90 – 180 m	8 4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	
23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	
25) High Recorded Site Density		32	
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	-32
**** refer to 1970 Surficial Geological Map of Vermont**			
		Total Score:	24
Other Comments :			
0- 31 = Archeologically Non- Sensitive **32+ = Archeologically Sensitive**			

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name Jewell Brook Dam 3 **County** Windsor **Town** Ludlow
DHP No. **Map No.** **Staff Init.** T. Jamison **Date** 10/5/2020

Additional Information

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m 90- 180 m	12 6	12
2) Distance to Intermittent Stream	0- 90 m 90-180 m	8 4	8
3) Confluence of River/River or River/Stream	0-90 m 90 –180 m	12 6	12
4) Confluence of Intermittent Streams	0 – 90 m 90 – 180 m	8 4	
5) Falls or Rapids	0 – 90 m 90 – 180 m	8 4	
6) Head of Draw	0 – 90 m 90 – 180 m	8 4	
7) Major Floodplain/Alluvial Terrace		32	
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m 90 -180 m	12 6	
11) Confluence of River or Stream	0-90 m 90 –180 m	12 6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m 90 -180 m	12 6	12
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	

17) Marine/Lake Delta Complex**		12	
18) Champlain Sea or Glacial Lake Shore Line**		32	
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	
20) ☑ Natural Travel Corridor ☐ Sole or important access to another drainage ☐ Drainage divide		12	12
21) Existing or Relict Spring	0 – 90 m 90 – 180 m	8 4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	
23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	
25) High Recorded Site Density		32	
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	-32
**** refer to 1970 Surficial Geological Map of Vermont**			
		Total Score:	24
Other Comments :			
0- 31 = Archeologically Non- Sensitive **32+ = Archeologically Sensitive**			

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name Jewell Brook Dam 5 **County** Windsor **Town** Ludlow
DHP No. **Map No.** **Staff Init.** T. Jamison **Date** 10/5/2020

Additional Information

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m 90- 180 m	12 6	12
2) Distance to Intermittent Stream	0- 90 m 90-180 m	8 4	
3) Confluence of River/River or River/Stream	0-90 m 90 –180 m	12 6	
4) Confluence of Intermittent Streams	0 – 90 m 90 – 180 m	8 4	
5) Falls or Rapids	0 – 90 m 90 – 180 m	8 4	8
6) Head of Draw	0 – 90 m 90 – 180 m	8 4	
7) Major Floodplain/Alluvial Terrace		32	
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m 90 -180 m	12 6	
11) Confluence of River or Stream	0-90 m 90 –180 m	12 6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m 90 -180 m	12 6	
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	

17) Marine/Lake Delta Complex**		12	
18) Champlain Sea or Glacial Lake Shore Line**		32	
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	
20) ☑ Natural Travel Corridor ☐ Sole or important access to another drainage ☐ Drainage divide		12	12
21) Existing or Relict Spring	0 – 90 m 90 – 180 m	8 4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	
23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	
25) High Recorded Site Density		32	
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	-32
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	-32
**** refer to 1970 Surficial Geological Map of Vermont**			
		Total Score:	-32
Other Comments :			
0- 31 = Archeologically Non- Sensitive **32+ = Archeologically Sensitive**			

Appendix 2: As Built Plans

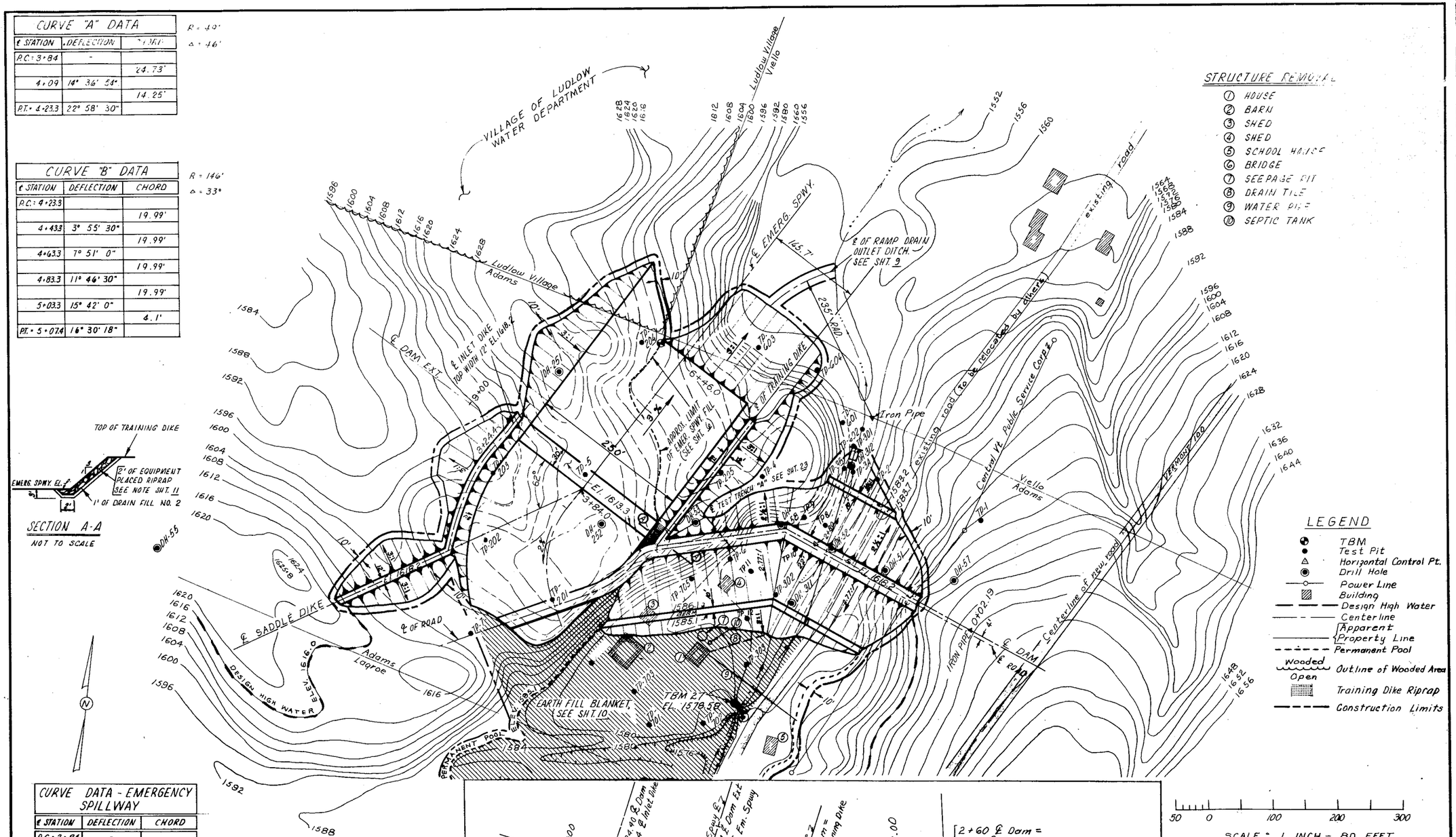
CURVE "A" DATA		
℄ STATION	DEFLECTION	CHORD
P.C. = 3+84	-	
		24.73'
4+09	14° 36' 54"	
		14.25'
P.T. = 4+23.3	22° 58' 30"	

R = 40'
Δ = 46°

CURVE "B" DATA		
℄ STATION	DEFLECTION	CHORD
P.C. = 4+23.3		
		19.99'
4+43.3	3° 55' 30"	
		19.99'
4+63.3	7° 51' 0"	
		19.99'
4+83.3	11° 46' 30"	
		19.99'
5+03.3	15° 42' 0"	
		4.1'
P.T. = 5+07.4	16° 30' 18"	

R = 146'
Δ = 33°

SECTION A-A
NOT TO SCALE



STRUCTURE REMOVAL

1. HOUSE
2. BARN
3. SHED
4. SHED
5. SCHOOL HOUSE
6. BRIDGE
7. SEEPAGE PIT
8. DRAIN TILE
9. WATER PIPE
10. SEPTIC TANK

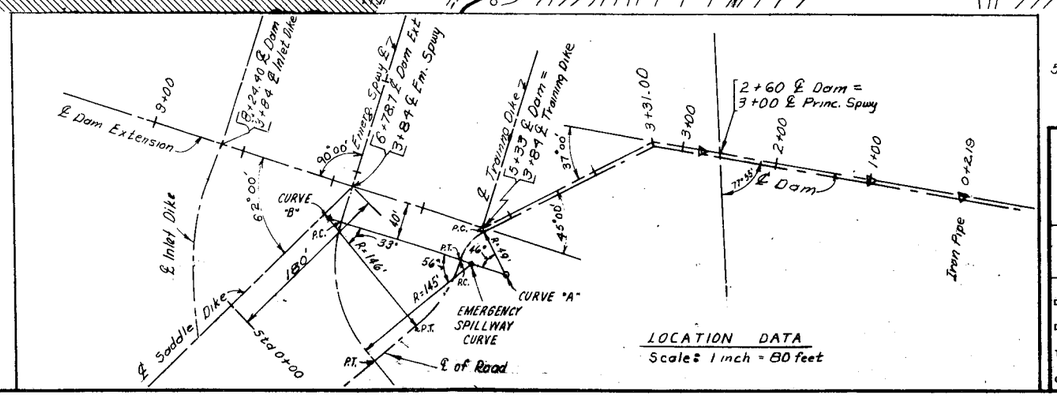
LEGEND

- TBM
- Test Pit
- Horizontal Control Pt.
- Drill Hole
- Power Line
- Building
- Design High Water
- Centerline
- Apparent Property Line
- Permanent Pool
- Wooded / Open — Outline of Wooded Area
- Training Dike Riprap
- Construction Limits

CURVE DATA - EMERGENCY SPILLWAY		
℄ STATION	DEFLECTION	CHORD
P.C. = 3+84	-	
		24.97
4+09	4° 56' 22"	
		24.97
4+34	9° 52' 44"	
		24.97
4+59	14° 49' 6"	
		24.97
4+84	19° 45' 28"	
		24.97
5+09	24° 41' 50"	
		16.69
P.T. = 5+25.71	27° 59' 55"	

R = 145'
Δ = 56°

NOTE: THE EXISTING ROAD, VERMONT ROUTE 100, TO BE RELOCATED BY OTHERS. THE NEW ROAD OVER TOP OF EARTH FILL AND EMERGENCY SPILLWAY ENTRANCE SECTION, TO BE CONSTRUCTED UNDER SEPARATE CONTRACT.



LOCATION DATA
Scale: 1 inch = 80 feet

50 0 100 200 300

SCALE: 1 INCH = 80 FEET
4 FOOT CONTOUR INTERVAL

DAM SITE NO. 1

JEWELL BROOK WATERSHED
LUDLOW, VERMONT

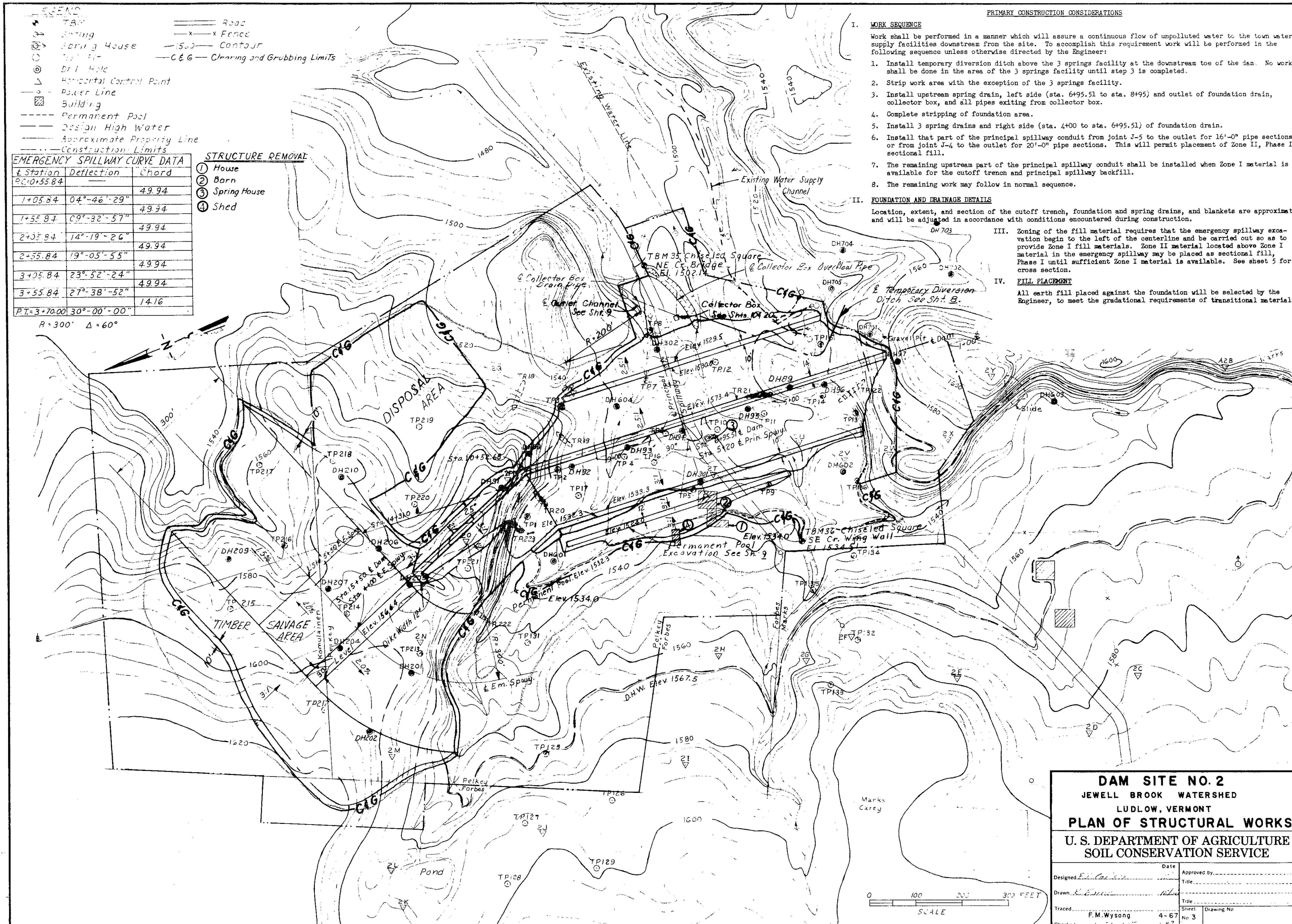
PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Designed JOHN BRYANT / JOE ZURLO	Date 5-66	Approved by	
Drawn DON BALLOU	5-66	Title	
Traced		Title	
Checked J.M. ZURLO	6-66	Sheet No. 3 of 24	Drawing No.

U.S. GOVERNMENT PRINTING OFFICE : 1966 OP—766-766

SCS-313C (9-64)



EMERGENCY SPILLWAY CURVE DATA

℄ Station	Deflection	Chord
P.C.=0+55.84	—	
		49.94
1+05.84	04°-46'-29"	
		49.94
1+55.84	09°-32'-57"	
		49.94
2+05.84	14°-19'-26"	
		49.94
2+55.84	19°-05'-55"	
		49.94
3+05.84	23°-52'-24"	
		49.94
3+55.84	27°-38'-52"	
		14.16
P.T.=3+70.00	30°-00'-00"	

R = 300' Δ = 60°

STRUCTURE REMOVAL

1. House
2. Barn
3. Spring House
4. Shed

PRIMARY CONSTRUCTION CONSIDERATIONS

I. WORK SEQUENCE

Work shall be performed in a manner which will assure a continuous flow of unpolluted water to the town water supply facilities downstream from the site. To accomplish this requirement work will be performed in the following sequence unless otherwise directed by the Engineer:

1. Install temporary diversion ditch above the 3 springs facility at the downstream toe of the dam. No work shall be done in the area of the 3 springs facility until step 3 is completed.
2. Strip work area with the exception of the 3 springs facility.
3. Install upstream spring drain, left side (sta. 6+95.51 to sta. 8+95) and outlet of foundation drain, collector box, and all pipes exiting from collector box.
4. Complete stripping of foundation area.
5. Install 3 spring drains and right side (sta. 4+00 to sta. 6+95.51) of foundation drain.
6. Install that part of the principal spillway conduit from joint J-5 to the outlet for 16'-0" pipe sections or from joint J-4 to the outlet for 20'-0" pipe sections. This will permit placement of Zone II, Phase I sectional fill.
7. The remaining upstream part of the principal spillway conduit shall be installed when Zone I material is available for the cutoff trench and principal spillway backfill.
8. The remaining work may follow in normal sequence.

II. FOUNDATION AND DRAINAGE DETAILS

Location, extent, and section of the cutoff trench, foundation and spring drains, and blankets are approximate and will be adjusted in accordance with conditions encountered during construction.

III. Zoning of the fill material requires that the emergency spillway excavation begin to the left of the centerline and be carried out so as to provide Zone I fill materials. Zone II material located above Zone I material in the emergency spillway may be placed as sectional fill, Phase I until sufficient Zone I material is available. See sheet 5 for cross section.

IV. FILL PLACEMENT

All earth fill placed against the foundation will be selected by the Engineer, to meet the gradational requirements of transitional materials.

DAM SITE NO. 2

JEWELL BROOK WATERSHED

LUDLOW, VERMONT

PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date	
Designed		Approved by
Drawn		Title
Traced F. M. Wysong	4-67	Title
Checked	67	Sheet No. 3 of 27 — Drawing No.

SCS-313C (9-64)

CONSTRUCTION DETAILS

1. Power line will be relocated by others.

EMERGENCY SPILLWAY CURVE DATA		
℄ Station	Deflection	Chord
P.C.=1+07.11		
		49.66
1+57.11	11°-39'-52"	
		49.66
2+07.11	23°-19'-44"	
		49.66
2+57.11	34°-59'-36"	
		42.68
P.T.=3+00.00	45°-00'-00"	

R = 122.8 Δ = 90°

STRUCTURE REMOVAL

① Shed

LEGEND

- TBM
- Horizontal Control Point
- Test Pit
- Drill Hole
- Building
- Power Line
- Permanent Pool
- Design High Water
- Approximate Property Line
- Construction Limits
- Wooded / Open — Outline of Wooded Area
- Existing Fence
- Existing Stream
- Borrow Limits
- Clearing & Grubbing Area
- Stripping Area

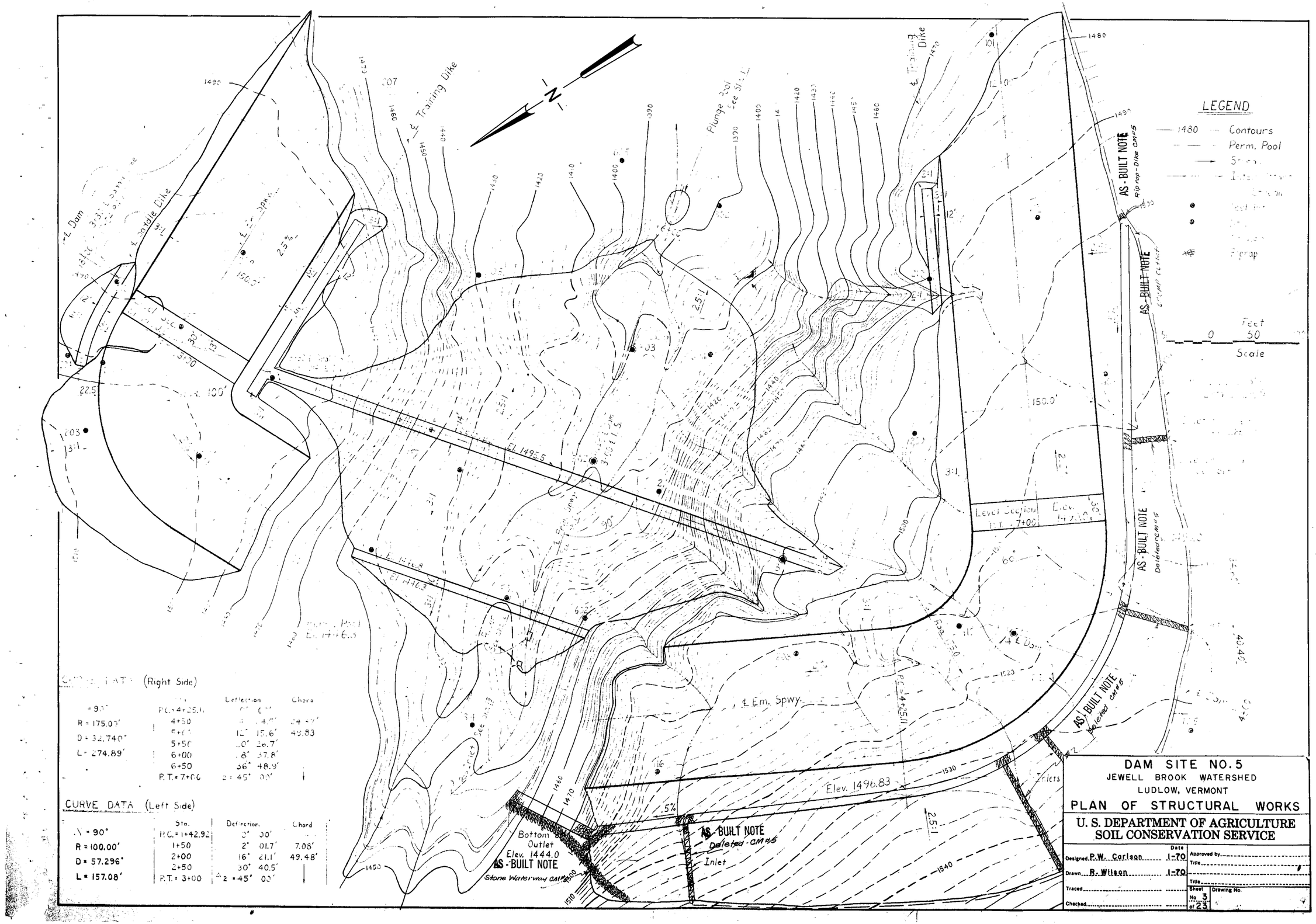
SCALE 100 200 300 Ft.

DAM SITE NO. 3
JEWELL BROOK WATERSHED
LUDLOW, VERMONT
PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed V.H. Bryant / P.N. Carlson	Date	Approved by	
Drawn		Title	
Traced		Title	
Checked F. M. Wysong	11/67	Sheet No 3 of 22	Drawing No

SCS-313 C (9-64)



CURVE DATA (Right Side)

	Sta.	Deflection	Chord
Δ = 90°	P.C. = 4+25.11	0° 0'	
R = 175.00'	4+50	3° 34.7'	24.99'
D = 32.740°	5+00	12° 15.6'	49.83
L = 274.89'	5+50	20° 56.7'	
	6+00	29° 37.8'	
	6+50	36° 48.9'	
	P.T. = 7+00	Δ/2 = 45° 00'	

CURVE DATA (Left Side)

	Sta.	Deflection	Chord
Δ = 90°	P.C. = 1+42.92	0° 00'	
R = 100.00'	1+50	2° 01.7'	7.08'
D = 57.296°	2+00	16° 21.1'	49.48'
L = 157.08'	2+50	30° 40.5'	
	P.T. = 3+00	Δ/2 = 45° 00'	

DAM SITE NO. 5
JEWELL BROOK WATERSHED
LUDLOW, VERMONT

PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed P.W. Carlson	1-70	Approved by	
Drawn R. Wilson	1-70	Title	
Traced		Title	
Checked		Sheet No. 3 of 23	Drawing No.

HARTGEN
archeological associates inc

PHASE IB ARCHEOLOGICAL RECONNAISSANCE SURVEY

Jewell Brook Dam Rehabilitation Project

Town of Ludlow
Windsor County, Vermont

HAA # 5521-21

Submitted to:
DuBois & King, Inc.
28 North Main Street
Randolph, Vermont 05060

Prepared by:
Hartgen Archeological Associates, Inc.

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Putney, VT 05346
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An ACRA Member Firm
www.acra-crm.org

July 2022

MANAGEMENT SUMMARY

SHPO Project Review Number:
Involved State and Federal Agencies: *United States Department of Agriculture, Natural Resource Conservation Service (USDA-NRCS)*
Phase of Survey: *Phase IB Archeological Reconnaissance Survey*

LOCATION INFORMATION

Municipality: *Town of Ludlow*
County: *Windsor County, Vermont*

SURVEY AREA

Dam 2 Archeological Sensitivity Area 3
Length: *200 feet 61 m)*
Width: *113 feet (34 m)*
Area: *0.5 acres (0.2 ha)*

Dam 5 Archeological Sensitivity Area 6
623 feet (190 m)
229 feet (70 m)
3.27 acres (1.32 ha)

ARCHEOLOGICAL SURVEY OVERVIEW

Number and Interval of Shovel Tests: *31 at 10-meter intervals*
ASA 3: *10 stps*
ASA 6: *21 stps*

RESULTS OF ARCHEOLOGICAL SURVEY

Number and Name of Precontact Sites Identified: *None*
Number and Name of Historic Sites Identified: *Ludlow Water Collection System*
Number and Name of Sites Recommended for Phase II or Avoidance: *None*

RECOMMENDATIONS

No further archeological review is recommended for the project.

Report Authors: *Thomas R. Jamison, PhD, RPA #16656*
Date of Report: *July 2022*

TABLE *of* CONTENTS

Map List

Photograph List

PHASE IB ARCHEOLOGICAL RECONNAISSANCE SURVEY

1 Introduction

Hartgen Archeological Associates, Inc. (Hartgen) conducted a Phase IB Archeological Reconnaissance Survey for the proposed Jewell Brook Dam Rehabilitation Project (Project) located in the Town of Ludlow, Windsor County, Vermont (Map 1). The Project requires approvals by United States Department of Agriculture, Natural Resource Conservation Service (USDA-NRCS) and the Vermont Division for Historic Preservation (VDHP). This investigation was conducted to comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and will be reviewed by the VDHP. This investigation adheres to the Vermont State Historic Preservation Office's (SHPO) *Guidelines for Conducting Archeology in Vermont* (2017).

2 Project Information

In October 2020, Hartgen completed an Archeological Resource Assessment (ARA) of four flood control dams along Jewell Brook in preparation for proposed rehabilitation of the facilities, Sites 1, 2, 3 and 5 (Hartgen 2020). That study identified Archeological Sensitivity Areas (ASAs) within the defined project area. Through design of proposed rehabilitation plans, the ASAs that will be disturbed by the project were narrowed down to ASA 3 at Dam 2 and part of ASA 6 at Dam 5. Those areas are the subject of this report.

2.1 Project Location

The project is located along Jewell Brook, a narrow brook that flows north/northeast into the west end of the village of Ludlow to a confluence with the Black River. Dam 1 is located at the head of the Jewell Brook drainage while the other three dams are located on subsidiary drainages to the west that flow into Jewell Brook, Grant Brook (ASA 3), and Sanders Brook (ASA 6).

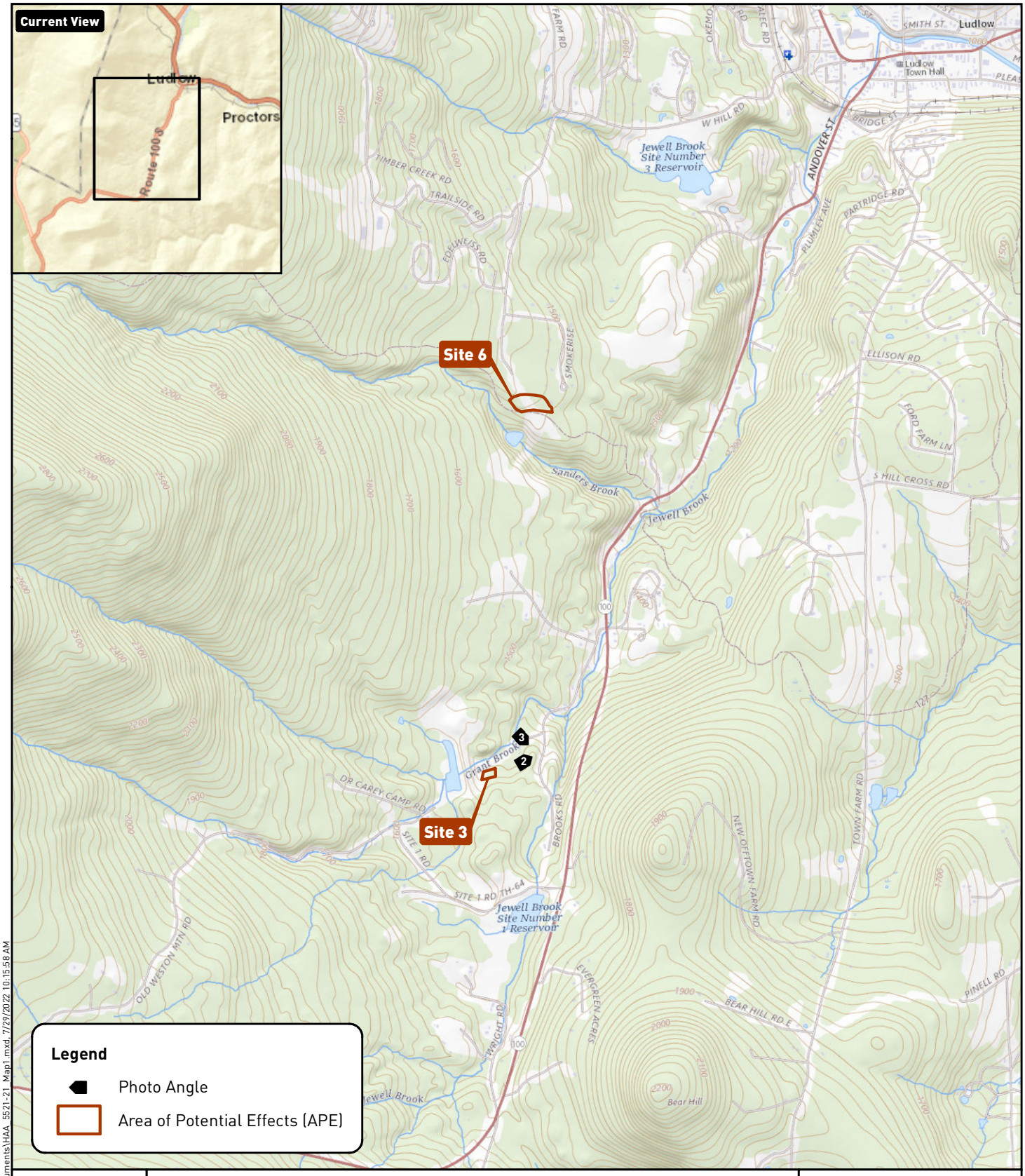
2.2 Description of the Project

Since the project plans call for soil disturbance that will encroach on these two ASAs, the Phase IB archeological reconnaissance survey was developed to examine those areas for potential archeological deposits or features that should be investigated prior to any disturbance. Through consultation among DuBois & King, the NRCS and Hartgen, the scope of work for the project was developed.

2.3 Description of the Area of Potential Effects (APE)

The area of potential effects (APE) includes all portions of the property that will be directly or indirectly altered by the proposed undertaking. Within those areas, the two ASAs to be investigated include:

Dam 2 Archeological Sensitivity Area 3	Dam 5 Archeological Sensitivity Area 6
Length: *200 feet 61 m)*	*623 feet (190 m)*
Width: *113 feet (34 m)*	*229 feet (70 m)*
Area: *0.5 acres (0.2 ha)*	*3.27 acres (1.32 ha)*



1,000 0 1,000 2,000 Feet

300 0 300 600 Meters

Note: Contour interval is 20 feet.

Project Location

GIS Services Accessed 7/29/2022: Environmental Systems Research Institute, Inc., World Street Map; USGS The National Map

HARTGEN archeological associates inc

Map 1

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2.4 Present Land Use and Current Conditions

2.4.1 Dam #2, ASA 3

ASA 3 is currently heavily wooded with extensive disturbance related to construction of the early 20th-century water system features noted during ARA site visit (Photo 1; Map 2a). There are several areas of saturated soil due to the springs that flow from the hill to the west. Those water sources were directed to these features to collect water for the town water system.

Photo 1. Dam 2, ASA 3. Note ditches associated with the early 20th-century town water system (red arrows). The concrete wall is located along the right side of the ditch that runs from middle left to upper center. A ditch that runs from left to right appears to be an overflow drainage. View to the west.

According to Chuck Craig of the Town of Ludlow (personal communication, 2022-07-01), the features identified at ASA 3 are part of an extensive water collection system that the town relied on for its sole water source from the early 20th century until Dam #2 was constructed c. 1967. The system consisted of pipes drawing water from small reservoirs and cisterns located along the foot of the slope southeast of the APE. A system of ditches (earthen and one with a concrete side) and pipes carried water from these features along the south side of Snell Spring Road to a small water treatment building (Photo 3) that once stood on the site of the current large water treatment plant (Photo 4). That original building was moved to the edge of the cleared area around the treatment plant and until recently was used for storage but is now deteriorating.

Photo 2. Dam 2, former water treatment building moved from its original location and used for storage, outside of the project APE. View to the northeast.

Photo 3. Dam 2, current water treatment plant and site of the original treatment building (on left side of photo), outside of the project APE. View to the southeast.

During a site visit with Mr. Craig, many of the features of this system were examined, most located outside of the project APE. Within ASA 3, the features associated with this system include several ditches (Photo 4), the concrete wall along one of them (Photo 5), two alignments of 4-inch iron piping (Photos 6 and 7) and a small reservoir that overlaps the southwest corner of the ASA (Photo 8). That area was the subject of the Phase IB survey at Dam #2 and is illustrated on Map 2b.

Legend

- Shovel Test (ST)
- Photo Angle
- Area of Potential Effects (APE)

N

50 0 50 100 Feet

15 0 15 30 Meters

Project Map - Site 3

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

HARTGEN archeological associates inc

Map 2a

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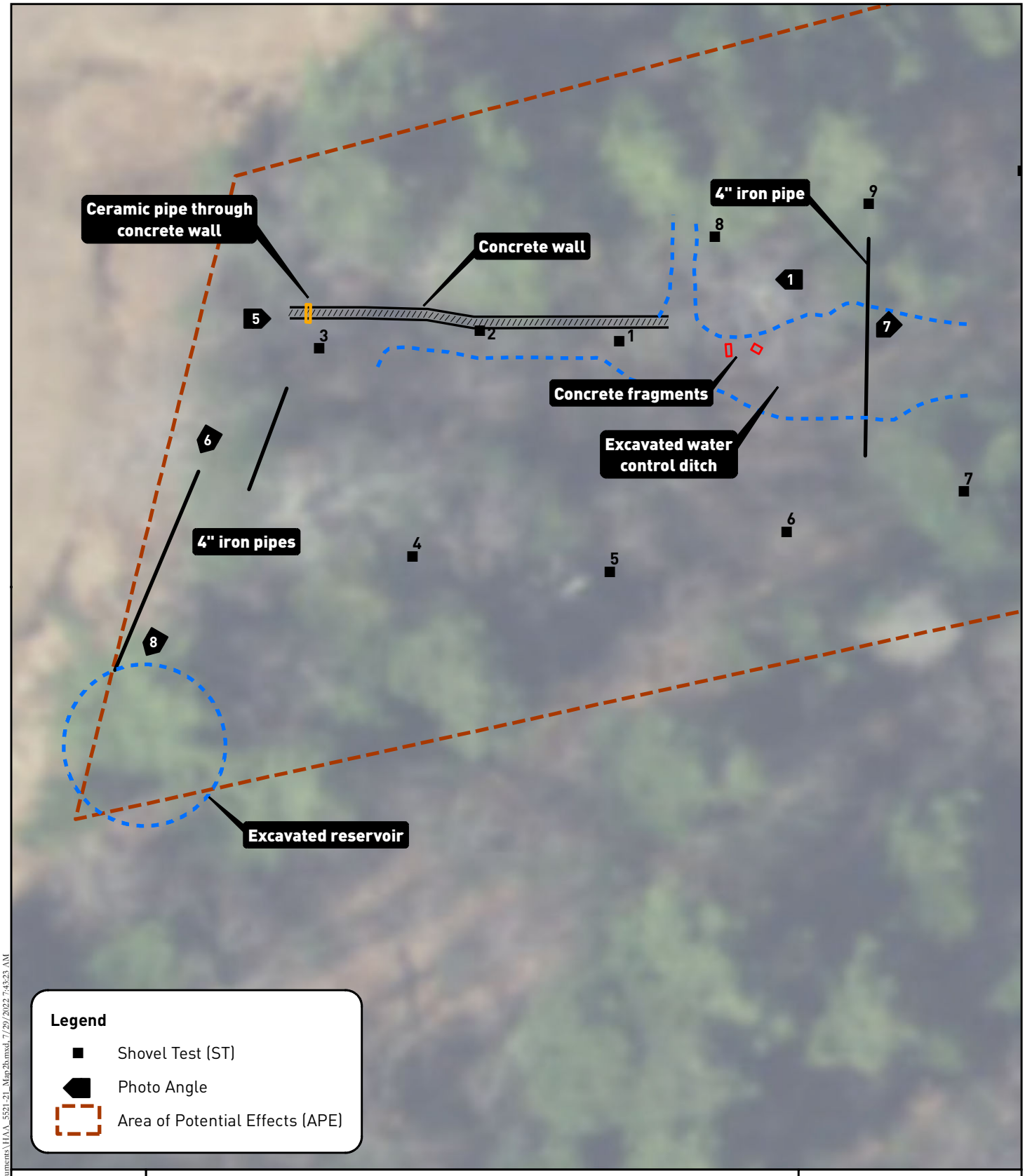

Water System Elements - Site 3

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

HARTGEN archeological associates inc

Map 2b

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Photo 4. Dam 2, excavated ditch to direct surface water toward the water treatment facility, outside of project APE. View to the east.

Photo 5. Dam 2, north end of ditch system with concrete wall forming the north side of this ditch, in the west end of the APE. View to the east.

Photo 6. Dam 2, western pipe alignment between excavated reservoir and concrete wall, in the west end of the APE. View to the south.

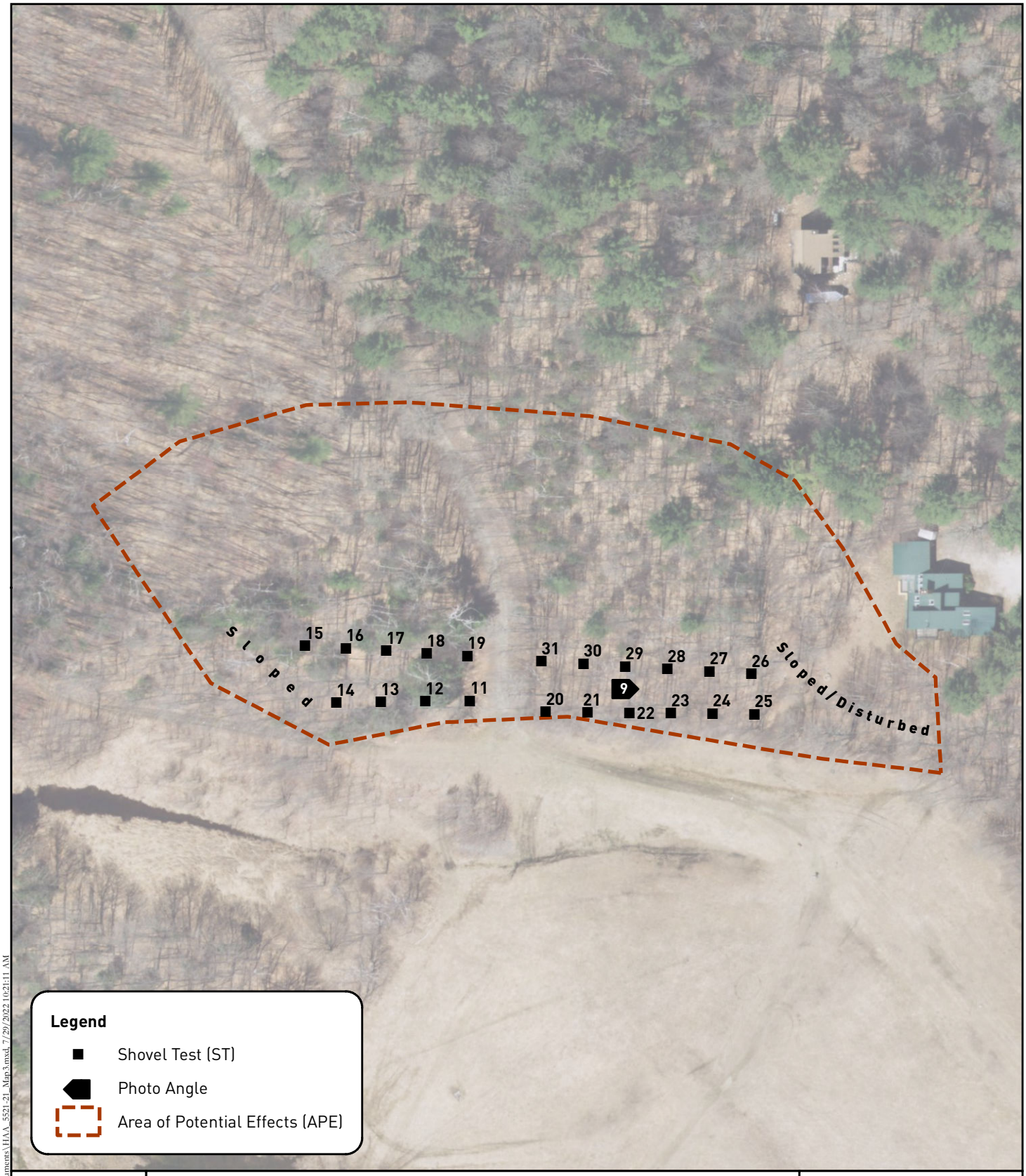
Photo 7. Dam 2, eastern pipe alignment crossing water collection ditch, in the east end of the APE. View to the south/southwest.

Photo 8. Dam 2, western pipe alignment end at small, excavated reservoir in the southwest corner of ASA 3. View to the southwest.

2.4.2 Dam #5, ASA 6

ASA 6 is a broad wooded area overlooking the Sanders Brook drainage (Photo 9; Map 3). Prior to construction of the dam, Sanders Brook flowed through the area to the west and south of ASA 6 with a gradual slope separating ASA 6 from the edge of a terrace directly adjacent to the brook (Hartgen 2020:Appendix). West Hill Road provides access to the facility from the north, passing through ASA 6.

Photo 9. Dam 5, ASA 6. Note level portion of the APE to the left and gradual slope down to the clearing associated with the Dam 5 facility. View to the east.



Legend

- Shovel Test (ST)
- Photo Angle
- Area of Potential Effects (APE)

N

50 0 50 100 Feet

15 0 15 30 Meters

Project Map - Site 6

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

HARTGEN archeological associates inc

Map 3

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3 Phase IB Archeological Survey

The Phase IB archeological survey was conducted at both ASA 3 and ASA 6 to determine if archeological deposits are present. In addition, the water collection features identified at ASA 3 were examined and recorded.

3.1 Methodology

3.1.1 Shovel Testing

Shovel tests were excavated at a standard interval of 10 meters (33 ft). The interval varied somewhat at ASA 3 due to the extensive disturbance related to construction of the water collection system. Each shovel test was 50 centimeters (1.6 ft) square. All excavated soil was passed through 0.25-inch hardware mesh and examined for both precontact (Native American) and historic artifacts. The stratigraphy of each test was recorded including the depth, Munsell color (Munsell Color 2000), soil description, and artifact content. The location of each shovel test was plotted on the project map. Sample test excavations were photographed.

3.1.2 Water Collection System Mapping

The Water Collection System at ASA 3 was mapped through a combination of GPS and measured drawings. Due to the dense tree canopy, the accuracy of the GPS points was unreliable, so the sketch mapping was relied on as the most accurate depiction (Map 2b).

3.1.3 Artifacts and Laboratory

Typically, all precontact (Native American) cultural material identified during the fieldwork is collected. Significant historic artifacts such as glass, ceramics, food remains, hardware, and miscellaneous items are collected. Coal, ash, cinder, brick, and modern materials are noted. Artifacts collected are placed in paper or plastic bags labeled by provenience and inventoried in a bag list. Bags are numbered in the field and transported to the Hartgen laboratory for processing. The lack of artifacts encountered and collected in the testing obviated the need for lab processing. Shovel test records and other provenience information were entered into a Microsoft Access database.

3.2 Results

The Phase IB archeological field reconnaissance was conducted on June 30 and July 1, 2022. The field crew consisted of Adam Gersten, Cindee Herrick and David Wendell, supervised by Thomas R. Jamison. The weather was warm and dry, excellent conditions for conducting the fieldwork.

3.2.1 Dam #2, ASA 3

Shovel tests 1 to 10 were excavated across ASA 3, generally placed between areas disturbed by construction of the water system (Map 2a). However, Test 2 was specifically placed to examine the concrete wall that was constructed along the north side of the ditch that runs through the ASA from east to west.

The tests typically encountered a thick A horizon of very dark brown to black silty loam with gravel ranging from 23 to 68 centimeters (9 to 27 in) in depth with an average of 38 centimeters (15 in). No clear B horizon was identified in any of the tests (Photo 10). The C horizon consisted of yellowish brown to gray sand and gravel. The average test depth was 58 centimeters (23 in). No artifacts were encountered in the shovel tests at ASA 3.

Test 2 was excavated against the concrete wall near its center point and within the ditch. That test encountered dense sand and gravel deposits with no indication of a constructed base to the ditch (Photo 11).

Photo 10. Dam #2, ASA 3, Test 7, north profile. Note thick A horizon over sand and gravel C horizon.

Photo 11. Dam #2, ASA 3, Test 2, placed against the south side of the concrete wall in the north end of the APE. Note dense sand and gravel beneath thin A horizon with concrete resting on gravel within the ditch. View to the north/northwest.

The mapping of the water collection features documented the part within the APE of the extensive system that extends to the east and south of the APE toward the water treatment plant. Within the APE the system relied on excavated ditches and a small reservoir to collect and direct water to the treatment plant. Iron pipes and a concrete wall along the western most segment of ditch also contributed to directing water into the system (Map 2b).

3.2.2 Dam #5, ASA 6

Testing at ASA 6 consisted of two transects of tests on each side of West Hill Road, overlooking the Dam #5 impoundment area to the south (Photo 9; Map 3). The tests were excavated to an average depth of 59 centimeters (23 in) except for a few instances of encountering large rocks or roots. The A horizon was typically a dark brown to very dark brown sandy loam to 21 centimeters (8 in). The B horizon was present in most tests as a dark yellowish brown silty sand to 40 centimeters (16 in) with the underlying C horizon a dark yellowish brown silty sand (Photo 12).

At ASA 6, the area east of West Hill Road was found to have recent trash scattered across the area. These items included a few auto parts, a camp chair and some glass, plastic and ceramics. These items are not deemed to be significant, but likely deposited from impromptu camping and general disposal in the recent past.

Photo 12. Dam #5, ASA 6, Test 30, south profile. View to the south.

4 Discussion and Recommendations

The archeological investigations at Dam #2, ASA 3 included, in addition to shovel testing, mapping and consultation with Chuck Craig of the Town of Ludlow regarding the early town water collection system within the APE. Within the APE that system consisted of a small reservoir, pipes and several ditches to convey surface water toward the site of the former treatment building that is now the water treatment plant outside of the APE. The mapping and photography of these features provide a good account of the system construction and components within the APE. The system is quite rudimentary and is, therefore, adequately documented. No further archeological investigation of the system is recommended. The shovel testing did not encounter any archeological deposits and encountered disturbance related to construction of the water collection system.

The archeological survey at Dam #5, ASA 6 did not encounter significant archeological deposits. This lack is likely due to the distance of the ASA from the original course of Sanders Brook and the edge of the terrace landform of ASA 6. No further archeological investigation is recommended for ASA 6.

5 Bibliography

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2015 World Imagery. Esri, Inc., Redlands, California, http://services.arcgisonline.com/ArcGIS/rest/services/World_Topo_Map/MapServer.

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Munsell Color
2000 *Munsell Soil Color Charts*. GretagMacbeth, New Windsor, New York.

United States Geological Survey (USGS)
2015 USGS The National Map Topo Base Map - Large Scale. USGSTopo (MapServer), The National Map Seamless Server, USGS, Sioux Falls, South Dakota, http://services.nationalmap.gov/arcgis/rest/services/USGSTopoLarge/MapServer.

Vermont Division for Historic Preservation
2017 *Guidelines for Conducting Archaeology in Vermont*. Vermont Division for Historic Preservation, Montpelier, VT.

Appendix 1: Shovel Test Records

552121: Phase IB Archeological Investigation, Jewell Brook Dams

Shovel Test Records, Area 2

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
1	22	1	7.5yr 2.5/1 black	sand loam	roots		
	34	2	2.5y 3/2 very dark grayish brown	sand	gravel, crushed stone		
	39	3	7.5yr 5/4 brown	sand	cobbles	impasse (rocks)	
2	13	1	7.5yr 3/1 very dark gray	silt	cobbles, crushed stone, roots		
	22	2	7.5yr 4/2 brown	silt loam	cobbles, crushed stone, roots		
	44	3	7.5yr 4/3 brown	silt loam	cobbles, crushed stone, roots	subsoil	
3	30	1	10yr 6/4 light yellowish brown	silt sand	gravel, cobbles		
	41	2	10yr 3/2 very dark grayish brown	silt sand	gravel, cobbles		
	60	3	10yr 6/4 light yellowish brown	silt sand	gravel, cobbles		
	67	4	10yr 4/4 dark yellowish brown	sand	gravel, cobbles	impasse (rocks)	
4	23	1	7.5yr 2.5/2 very dark brown	sand loam	roots		
	34	2	10yr 4/4 dark yellowish brown	sand			
	45	3	5y 7/2 light gray	sand	cobbles	bedrock	
5	30	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, roots		
	50	2	10yr 7/3 very pale brown	sand	gravel, cobbles	impasse (rocks)	
6	23	1	10yr 3/1 very dark gray	sand loam	roots		
	60	2	10yr 5/6 yellowish brown	sand	gravel, cobbles		
	82	3	10yr 5/3 brown	sand	gravel, cobbles	depth	
7	50	1	10yr 2/2 very dark brown	sand loam	gravel, cobbles, roots		
	53	2	10yr 5/4 yellowish brown	sand	gravel, cobbles		
	70	3	10yr 6/2 light brownish gray	silt sand	gravel, cobbles	impasse (rocks)	
8	28	1	7.5yr 3/3 dark brown	loam	roots		
	68	2	7.5yr 2.5/1 black	loam	roots		
	78	3	7.5yr 6/1 gray	sand		subsoil	

552121: Phase IB Archeological Investigation, Jewell Brook Dams

Shovel Test Records, Area 2

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
9	13	1	7.5yr 3/2 dark brown	loam	roots		
	42	2	7.5yr 2.5/1 black	loam	roots		
	54	3	7.5yr 6/1 gray	sand		subsoil	
10	30	1	10yr 2/1 black	silt sand loam	roots		
	36	2	10yr 6/2 light brownish gray	sand	gravel		
	53	3	10yr 4/2 dark grayish brown	sand	gravel, cobbles	impasse (rocks)	

552121: Phase IB Archeological Investigation, Jewell Brook Dams

Shovel Test Records, Area 5

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
11	19	1	10yr 3/2 very dark grayish brown	sand loam	roots	bedrock	
12	8	1	7.5yr 2.5/2 very dark brown	loam	roots	impasse (roots)	
13	20	1	10yr 3/2 very dark grayish brown	loam	roots		
	46	2	10yr 5/4 yellowish brown	loam clay	cobbles, roots		
	57	3	10yr 4/3 brown	sand clay		subsoil	
14	18	1	10yr 3/3 dark brown	sand loam	roots		
	24	2	10yr 4/4 dark yellowish brown	silt sand	roots		
	36	3	7.5yr 4/6 strong brown	silt sand	cobbles		
	48	4	10yr 3/6 dark yellowish brown	sand	cobbles	subsoil	
15	20	1	10yr 3/2 very dark grayish brown	sand	gravel, roots		
	30	2	10yr 5/6 yellowish brown	sand	gravel, cobbles, roots		
	58	3	10yr 6/2 light brownish gray	sand	gravel, cobbles	subsoil	
16	28	1	10yr 4/2 dark grayish brown 10yr 5/2 grayish brown	sand loam	roots		
	48	2	10yr 4/6 dark yellowish brown	sand			
	54	3	10yr 5/3 brown	sand	exfoliating bedrock	bedrock	
17	20	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, roots		
	38	2	10yr 5/6 yellowish brown	sand	gravel, cobbles		
	56	3	10yr 6/3 pale brown 10yr 5/4 yellowish brown	silt sand	gravel, cobbles	subsoil	
18	27	1	10yr 3/2 very dark grayish brown	sand loam	roots		
	44	2	10yr 5/6 yellowish brown	silt sand	gravel, cobbles		
	62	3	10yr 6/4 light yellowish brown	sand	cobbles	subsoil	
19	19	1	10yr 3/2 very dark grayish brown	sand loam	roots		
	30	2	10yr 5/6 yellowish brown	silt sand	exfoliating bedrock	bedrock	

552121: Phase IB Archeological Investigation, Jewell Brook Dams

Shovel Test Records, Area 5

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
20	13	1	10yr 3/2 very dark grayish brown	sand loam	cobbles, roots		Steel fencing wire
	32	2	10yr 5/6 yellowish brown	sand	cobbles		
	52	3	10yr 6/4 light yellowish brown	sand	cobbles	subsoil	
21	20	1	10yr 3/2 very dark grayish brown	sand loam	roots		
	49	2	10yr 5/6 yellowish brown	sand	gravel, roots		
	64	3	10yr 6/4 light yellowish brown	sand		subsoil	
22	50	1	10yr 4/4 dark yellowish brown	sand	gravel, cobbles, roots		
	80	2	10yr 6/4 light yellowish brown	sand	gravel, roots	subsoil	
23	36	1	10yr 4/2 dark grayish brown	sand loam	roots		
	65	2	10yr 5/6 yellowish brown	sand	cobbles, roots		
	83	3	10yr 6/4 light yellowish brown	sand	cobbles	subsoil	
24	15	1	10yr 3/2 very dark grayish brown	sand	gravel, roots		
	50	2	10yr 5/4 yellowish brown	sand	gravel, roots		
	68	3	10yr 6/3 pale brown	sand	gravel, roots	subsoil	
25	17	1	10yr 3/2 very dark grayish brown	silt loam	roots		
	50	2	10yr 5/6 yellowish brown	sand	cobbles, roots		
	68	3	10yr 6/4 light yellowish brown	sand	cobbles	subsoil	
26	30	1	10yr 3/4 dark yellowish brown	sand	gravel, roots		
	40	2	10yr 5/6 yellowish brown	sand	gravel, roots		
	60	3	10yr 6/3 pale brown	sand	gravel, roots	subsoil	
27	20	1	10yr 5/4 yellowish brown	loam	roots		
	25	2	10yr 5/3 brown	loam	roots		
	52	3	10yr 5/2 grayish brown	silt loam		subsoil	
28	20	1	10yr 3/6 dark yellowish brown	loam	roots		
	35	2	10yr 5/6 yellowish brown	silt loam	roots		
	80	3	10yr 5/1 gray	silt sand loam		subsoil	

552121: Phase IB Archeological Investigation, Jewell Brook Dams

Shovel Test Records, Area 5

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
29	10	1	10yr 2/2 very dark brown	silt	organics		
	23	2	10yr 4/4 dark yellowish brown	silt fine sand			
	33	3	7.5yr 4/6 strong brown	silt fine sand			
	38	4	10yr 4/4 dark yellowish brown	silt fine sand			
	41	5	2.5y 4/4 olive brown	silt		subsoil	
30	8	1	10yr 3/3 dark brown	silt loam			
	30	2	10yr 4/4 dark yellowish brown	silt sand			Whiteware body frag, undec. (1)
	44	3	10yr 3/6 dark yellowish brown	silt sand		subsoil	
31	16	1	10yr 3/2 very dark grayish brown	loam	roots		
	26	2	10yr 5/4 yellowish brown	loam	cobbles		Whiteware body frag, undec. (1)
	63	3	10yr 5/2 grayish brown	sand loam		subsoil	

STATE OF VERMONT Division for Historic Preservation VERMONT ARCHITECTURAL RESOURCE INVENTORY* Individual Property Survey Form	SURVEY NUMBER: (Assigned by VDHP)
	Listed in State Register ☐ Date:
	Determined Eligible for State Register ☐ Date:
	PRESENT FORMAL NAME: Jewell Brook Dams
	ORIGINAL FORMAL NAME:
COUNTY: Windsor	PRESENT USE: Flood control dams
TOWN: Ludlow	ORIGINAL USE: Flood control dams
ADDRESS: Site 1 Road (#1), Snell Spring Road (#2), West Hill Road (#3), and Town Highway 22 (#5)	ARCHITECT/ENGINEER: J. H. Bryant and J. M. Zurlo (Site 1); J. H. Bryant (Site 2); P. W. Carlson (Sites 3 and 5)
COMMON NAME: Jewell Brook Dams	BUILDER/CONTRACTOR:
PROPERTY TYPE: Structure (dams)	DATE BUILT: 1968 thru 1973
OWNER: Town of Ludlow, Vermont ADDRESS: PO Box 359, Ludlow, VT 05149	
ACCESSIBILITY TO PUBLIC: (varies) Yes ☒ No ☐ Restricted ☒	PHYSICAL CONDITION OF STRUCTURE: Good ☐ Fair ☒ Poor ☐
LEVEL OF SIGNIFICANCE: Local ☐ State ☒ National ☐	STYLE: no style

GENERAL DESCRIPTION:

Structural System:

1. Foundation: Stone☐ Brick☐ Concrete☐ Concrete Block☐
2. Wall Structure
   a. Wood Frame: Post & Beam☐ Plank☐ Balloon☐ Platform☐
   b. Load Bearing Masonry: Brick☐ Stone☐ Concrete☐ Concrete Block☐
   c. Metal: Iron☐ Steel☐ d. Other:
3. Wall Cladding: Clapboard☐ Board & Batten☐ Wood Shingle☐ Shiplap☐ Novelty☐ Asbestos Shingle☐ Aluminum Siding☐ Asphalt Shingle☐ Vinyl Siding☐ Brick Veneer☐ Stone Veneer☐ Other:
4. Roof Structure
   Truss: Wood☐ Iron☐ Steel☐ Concrete☐ Other:
5. Roof Covering: Slate☐ Wood Shingle☐ Asphalt Shingle☐ Sheet Metal☐ Built Up☐ Rolled☐ Tile☐ Standing Seam☐ Other:
6. Engineering Structure: 7. Other:

Appendages: Porches☐ Towers☐ Cupolas☐ Dormers☐ Chimneys☐ Sheds☐ Ells☐ Wings☐ Bay Window☐ Other:

Roof Styles: Gable☐ Hip☐ Shed☐ Flat☐ Mansard☐ Gambrel☐ Jerkinhead☐ Saw Tooth☐ With Monitor☐ With Bellcast☐ With Parapet☐ With False Front☐ Other:

Number of Stories:
Entrance Location:
Number of Bays:
Approximate Dimensions:

Criteria for Eligibility: A: Historic☒ B: Person☐ C: Architectural☒ D: Archeological☐

Integrity: Location☒ Design☒ Setting☒ Materials☒ Workmanship☒ Feeling☒ Assoc.☒

Areas of Significance:
Criterion A: Community Planning & Development
Criterion C: Engineering

* Formerly known as the Historic Sites and Structures Survey

ADDITIONAL ARCHITECTURAL OR STRUCTURAL DESCRIPTION:

The Jewell Brook Dams are located in the southern half of the Town of Ludlow and includes dams at Sites 1, 2, 3 and 5, all located in Jewell Brook watershed along the west side of Route 100 (Map 1). From south to north, Site 1 is located on Jewell Brook, Site 2 is located on Grant Brook, Site 5 is located on Sanders Brook and Site 3 is located on several seasonal drainages adjacent to Jewell Brook.

The four project sites and their associated features are characterized as follows:

Site1

Site 1 is on a relatively broad area with steep slopes up to Route 100 to the east and more varied topography extending to the north, south and west surrounding the reservoir, beyond which the landscape slopes down to the north and up steeply to the west and south. The reservoir, built in 1966-1969, is held back by a large earthen embankment along the north side of the reservoir with the water returning to Jewell Brook to the north of the embankment through a toe drain. A road is located on top of the embankment to provide access to properties to the west of the reservoir. In order for this facility to be constructed, the alignment of Route 100 was shifted to the east to its present location. The former alignment of Route 100, now known as Wright Road south of the reservoir and Brooks Road to the north, extends north and south of the reservoir, but a section was flooded by the reservoir. A secondary spillway is located west of the reservoir, extending in a northern direction to pass below and west of the State Register listed 1830 Joseph Harris Farm (VHSSS #1410-89). Wooded areas are present around much of the edges of the site. To the east of the reservoir a steep wooded slope rises to Route 100. There are wooded areas to the north, on a topography that generally slopes down to the north. A small wooded area in the southwest corner of the site retains some level terraces with a small dried up beaver pond and some wet areas at the base of those terraces.

The dam measures 58 feet in height and its berm is 450 feet in length and is more than 250 feet in width at its base. A flat surface at the top of the dam, measuring 22 feet in width, supports an unpaved access road. It is a high-zoned compacted earth embankment with toe/trench drain system and consists of 144,928 cubic yards of fill. It covers a drainage area 1,340 acres in extent, with a capacity to contain 410.8-acre-feet of flood storage before cresting over the emergency spillway.

Associated with the dam is a 320-foot-long saddle dike, located along the western edge of a 250-foot-wide broad-crested trapezoidal earthen auxiliary spillway. The principal spillway system consists of a 254-foot long 30-inch diameter reinforced concrete outlet pipe with 12 reinforced concrete anti-seepage collars and a stilling basin. Additional supply pipes and drains support the function of the facility. The poured concrete two-stage intake riser is 36’-6” high to its intake.

Site 2

Site 2 is located directly north of Site 1, but is oriented perpendicular to Grant Brook that flows from the west toward Jewell Brook to the east. The site was constructed in 1969, according to a plaque at the entrance to the site, but is alternatively given a completion date of 1970.

As with Site 1, construction at Site 2 removed a section of a 19th-century road from use, creating Snell Spring Road to the east and Site 1 Road to the west, on each side of the south end of the reservoir. Remains of concrete features on the south side of the entrance appear to have been some sort of water diversion channel that may have been related to Ludlow's water supply during the early 20th century. Wooded areas are located at the edges of the site with a large area on the west that gently slopes up away from the reservoir. To the northeast, the topography slopes down to the east. A high ridge is located to the east, north of the entrance road. A small concrete bridge crosses a low wet area at the west end of the entrance road.

Site 2 consists of an intermediate sized, high hazard potential (Class 1) compacted earth embankment dam with toe/trench/spring drain system, 1,110 feet in length and 70 feet in height. It was constructed using 237,050 cubic yards of fill. It covers a drainage area 1,113 acres in extent, and has a capacity to contain 278.2-acre-feet of flood storage before cresting over its emergency spillway.

The spillway system consists of a 303-foot long, 30-inch diameter reinforced concrete outlet pipe with 14 reinforced concrete anti-seepage collars and associated pond drains and water supply pipes. A two-stage cast concrete intake riser measures 36'-6" in height to its intake. A 300-foot-wide broad-crested trapezoidal earthen auxiliary spillway is also a feature of this site.

Site 3

Design drawings for Site 3 are dated 1967-1968. Site 3 is located adjacent to the south side of West Hill Road and hosts the West Hill Recreation Area in addition to its flood control function. The dam is located along the northeast side of the reservoir with two small drainages flowing into the area from the west. Most of the area is surrounded by open fields, largely modified during construction of the facility. To the southwest, a densely wooded area surrounds the drainages that feed the reservoir.

The floodwater control features at Site 3 include an intermediate-sized high hazard potential (Class 1) compacted earth embankment dam with toe/trench drain system, 670 feet in length and 64 feet in height. The dam was constructed using 173,500 cubic yards of fill. It serves a drainage area 840 acres in extent and has a capacity of 336.3 acre-feet of floodwater storage before cresting over its emergency spillway.

Associated with the dam is a 300-foot-long saddle dike, located at the southeastern edge of the reservoir. The associated spillway system includes a 273-foot long 30-inch diameter reinforced concrete outlet pipe with 12 reinforced concrete seepage collars and a stilling basin, a two-stage cast concrete intake riser, measuring 35 feet in height to its intake (although largely embedded in the dam at this location), and an associated pond drain. A 200-foot wide broad-crested trapezoidal earthen auxiliary spillway is also a feature of this site.

The reservoir is used for swimming and fishing. There are, in addition, basketball courts, a picnic pavilion, hiking trails, a bathhouse and other facilities. The hiking trails run around the reservoir through wooded and open areas. The design of these facilities was not provided by the Soil Conservation Service engineers, and was presumably overseen by the Town of Ludlow.

Site 5

Site 5 is located south of Site 3, along Sanders Brook. As-built drawings for this facility bear dates spanning 1968-1969. It consists of a small reservoir surrounded by a monumental earthen dam to the northeast and two secondary spillways to the northwest and southeast. The dam is kept clear of all vegetation except grass. And the outlet channel occupies a cleared corridor. The surrounding areas are densely wooded and are fairly level or gently sloped while the two sides of Sanders Brook, upstream of the reservoir, form steep drops to the brook before it enters the reservoir. A steeply sloped landform near the center of the site is also wooded.

Site 5 includes a large high hazard potential (Class 1) earthen embankment dam with toe/trench drain system. The dam measures 660 feet in length and is 112 feet high. The dam was constructed using 235,000 cubic yards of fill and serves a drainage area 1,114 acres in extent. It has a 185.6-acre-feet water storage capacity before cresting over its emergency spillway.

A principal spillway system is associated with the dam. It consists of a 480-foot long 30-inch diameter reinforced concrete outlet pipe with 23 reinforced concrete seepage collars and a stilling basin, an 18-inch diameter RCP pond drain, a single-stage cast concrete intake riser, 33 feet in height to its intake, and two 150-foot wide broad-crested trapezoidal earthen auxiliary spillways.

RELATED RESOURCES: (Describe)

In addition to the built features at the four distinct sites, ongoing, planned, land treatment measures ensure the continued success of flood-controlling capacity of these facilities. Approximately 300 associated acres are maintained as open land, whose ongoing treatment was planned to include “a conservation cropping system, grassland renovation, rotation grazing, obstruction removal, diversions, pasture planting and tile drains.” The treatment measures associated with agriculture are no longer maintained, but the lands identified as “subject to erosion” continue to be maintained as grasslands. Additional lands were initially stabilized through a program of tree planting and forest management encompassing an area approximately 270 acres in extent, and through technical assistance provided to local landowners (Ottauquechee 1964: 17-18).

STATEMENT OF SIGNIFICANCE:

The town of Ludlow was chartered in 1761 by Benning Wentworth, Governor of New Hampshire. However, the first settlement was not undertaken until 1783-84 when several individuals cleared homesteads along the Black River east of the current village (Harris 1988:15). The project area is in a part of town called South Hill, that rises up to the south from the Black River. Jewell Brook is one of several streams that flow down to the river. Jewell Brook, in turn is fed by Sanders Brook and Grant Brook. This area appears to have been first settled during the early to middle 19th century with houses constructed in the project vicinity from c. 1810 to 1840 (Harris 1988:182-186). Another 19th-century site reported for the area is a lime kiln that was said to be located along the Andover Road (approximately the route of Route 100), south of Ludlow (Rolando 2007). However, the exact location of the kiln has not been found and it may have been destroyed by road construction or some other activity. During the early 20th century, a small Finnish settlement, of people escaping harsh conditions and persecution in Finland, grew in Ludlow with a concentration on South Hill. This influx of can be recognized in part by the presence of small

sauna structures associated with houses in the area (Coleman 2017). The historic sites in the project vicinity reflect the 19th-century occupation of the area, including farmsteads and small-scale industrial activities.

According to USDA historian Larry W. Caldwell, the USDA Watershed Programs were initiated by the Flood Control Act of 1936 and were subsequently authorized by the Flood Control Act of 1944, the Watershed Protection and Flood Prevention Act of 1954, and the Resource Conservation and Development Act of 1962. This program has assisted in the implementation of more than 2,100 watershed projects throughout the United States and its territories. Of these, 1,269 projects contain 11,841 dams (Caldwell 2020: 10). Although other projects were initiated, the Jewell Brook Dams represent the only project in Vermont that has been completed to date by this Federally-assisted program.

The Jewell Brook Watershed encompasses an area of 9.2 square miles (5,875 acres) across Rutland and Windsor Counties. The headwaters of the Jewell Brook originate in the Green Mountains and flow down the east slope of that range through the Village of Ludlow where the Jewell Brook outlets into the Black River. Frequent flooding was experienced in the village, with major episodes in the 36 years previous to the initiation of the Jewell Brook Dams project having occurred in 1927, 1936, 1938, 1952, and 1960. The floods of 1938 and 1960, in particular, resulted in significant erosional damage within the Village of Ludlow (Ottauquechee 1964: 1-2, 10-13).

The original work plan provided for "planning and installing land treatment measures and the construction of three floodwater retarding structures, one multiple purpose floodwater retarding and recreation development structure, and 665 feet of diversion channel." The project incorporated recreation facilities, including a camping area, designated swimming area, a bathhouse, a boat dock and a picnic ground at Site 3 as part of the original design. The estimated total cost for these improvements, which were projected to be completed within a three-year period, was just over one million dollars, with Public Law 566 funding covering just over $890,000 of that total; the Town of Ludlow bearing the balance. The project was envisioned as a means to create a "program of proper land use and treatment throughout the watershed" create a "combination of upstream floodwater retarding structures which will bring about a major reduction in floodwater damage" and "create a better living environment for the people living in the area…[and] serve as a stimulus to economic growth of the area and create new jobs for the locally unemployed" (Ottauquechee 1964: 4, 15-16, n. p.).

Local administration of the land use component of the project was by the Ottauquechee Soil Conservation District (established in 1944 and now known as the Ottauquechee Natural Resources Conservation District), who were made responsible for "developing a good land use and treatment program" for the sites. The Town of Ludlow was identified as being responsible for securing sites through purchase, easements and other means, and was designated to operate and maintain the sites after completion of construction (Ottauquechee 1964: 5).

A total of five sites were studied, with four of these being selected as part of the work plan. The fifth site—on South Hill Brook—was abandoned in the initial planning stage due to anticipated problems in the construction of a facility there due to the steep terrain, and the high cost-to-benefit ratio for this aspect of the project. A diversion channel was proposed for this site as an alternative (Ottauquechee 1964: 16).

The completed system of floodwater management was anticipated to "control 75 percent of the Jewell Brook drainage area above the village of Ludlow." Combined, the facilities were planned to

provide for “1,008 acre feet of floodwater detention, 86 acre feet of sediment storage, and 97 acre feet of recreation water.” The system was planned to reduce flood damage by “an estimated 98.7 percent” and to “provide at least a 100-year level of protection to the urban area subject to flooding from Jewell Brook alone” (Ottauquechee 1964; 19, 25).

The construction documents were completed by engineers working for the Soil Conservation Service of the US Department of Agriculture. Three different head engineers were responsible for the design of the four dams, spanning a four-year period. The design of Site 1 was completed by J. H. Bryant and J. M. Zurlo in May 1966 (Bryant and Zurlo 1966). J. H. Bryant was responsible for Site 2, the design of which was completed in April 1967 (Bryant 1967). The design of Sites 3 and 5 were both by P. W. Carlson, and were completed in September 1967 and January 1970, respectively (Carlson 1967 and 1970).

The design of the dams and associated flood controlling features and treatment measures benefitted from the extensive work undertaken by the Soil Conservation Services engineering staff during the 1950s and early 1960s, during which hundreds of watershed projects were completed. Research by the USDA-ARS further “assisted with the development of engineering design criteria” and “influenced the design of dams for years to come” (Caldwell 2020: 103). The design of the Jewell Brook Dams reflected the evolution of a standardized approach that developed as a result of this extensive national program. Planning for the four sites spanned the period 1964-1968, with construction occurring the following five years, being completed in 1973.

The design of a diversion channel housing the South Hill Brook, aligned roughly with Bridge Street and passing under VT Route 100 at its western end, terminating in a culvert opening at the Jewell Brook, was a later addition to the work plan, in 1966. This minor addition to the work scope anticipated the construction of “a completely enclosed diversion” in contrast to the original partially culverted solution (Ottauquechee 1964: 23; Ottauquechee 1966).

Larry W. Caldwell, historian, observes that these facilities are approaching or have exceeded their original design service life of 50 years (Caldwell 2020: 22). Rehabilitation of these facilities has been “authorized under Public Law 83-566 (as amended), and as further amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472).” The proposed rehabilitation of these sites is intended “to address regulatory deficiencies…[and] to bring the dams into compliance with applicable United States Department of Agriculture (USA) Natural Resource Conservation Service (NRCS) and Vermont Department of Environmental Conservation (DEC)—Dam Safety Division criteria and performance standards.” These deficiencies are in part due to “severe erosion as a result of auxiliary spillway flow during Tropical Storm Irene in 2011” which were repaired in 2012 (DDK Engineering 2021: n. p.).

The Jewell Brook Dams are eligible for the State and National Registers of Historic Places under Criterion A and C. Under Criterion A, the four sites are significant for their association with the USDA Watershed Program, a significant national initiative with roots dating back to the 1930s. Although many communities throughout the state had experienced the same significant flood damage that triggered the involvement of the USDA, the Jewell Dams are the only project completed within the state, to date, under the Watershed Program.

Under Criterion C, the Jewell Brook Dams are significant as large-scale earthen dike and dam complexes whose design reflects the advancements and refinements made as a result of the nationwide flood control program, initiated by the passage of the Flood Control Act of 1936 and administered by the USDA. The large scale of that program facilitated the standardization of designs for earthen dams. The Jewell Brook Dams reflect both the advancements in design

attained through access to significant research resources and the brain trust developed by the engineering staff of the program, and the standardization that resulted from the large number of projects undertaken under the program.

The Jewell Brook Dams retain integrity of location, design, setting, materials, workmanship, feeling and association. Each of the four completed sites remains largely as originally constructed, with minimal alterations undertaken since their initial completion, and thus retain a high level of design, materials and workmanship integrity. Integrity of location, setting, and feeling remain at a high level, as the associated landscapes continue to be maintained as originally envisioned, and support the function of each site. Development in the immediate vicinity of each of the four sites has been minimal, and so integrity of setting remains high. Integrity of association remains high, as each of the four sites continues to reflect, in its design, its original (and continuing) function of flood control for the Town of Ludlow.

REFERENCE CITATIONS:

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* Formerly known as the Historic Sites and Structures Survey

Ottauquechee Soil Conservation District et al
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1966 Jewell Brook Watershed. Diversion. Supplemental Watershed Work Plan Agreement. Typescript on file at VT SHPO.

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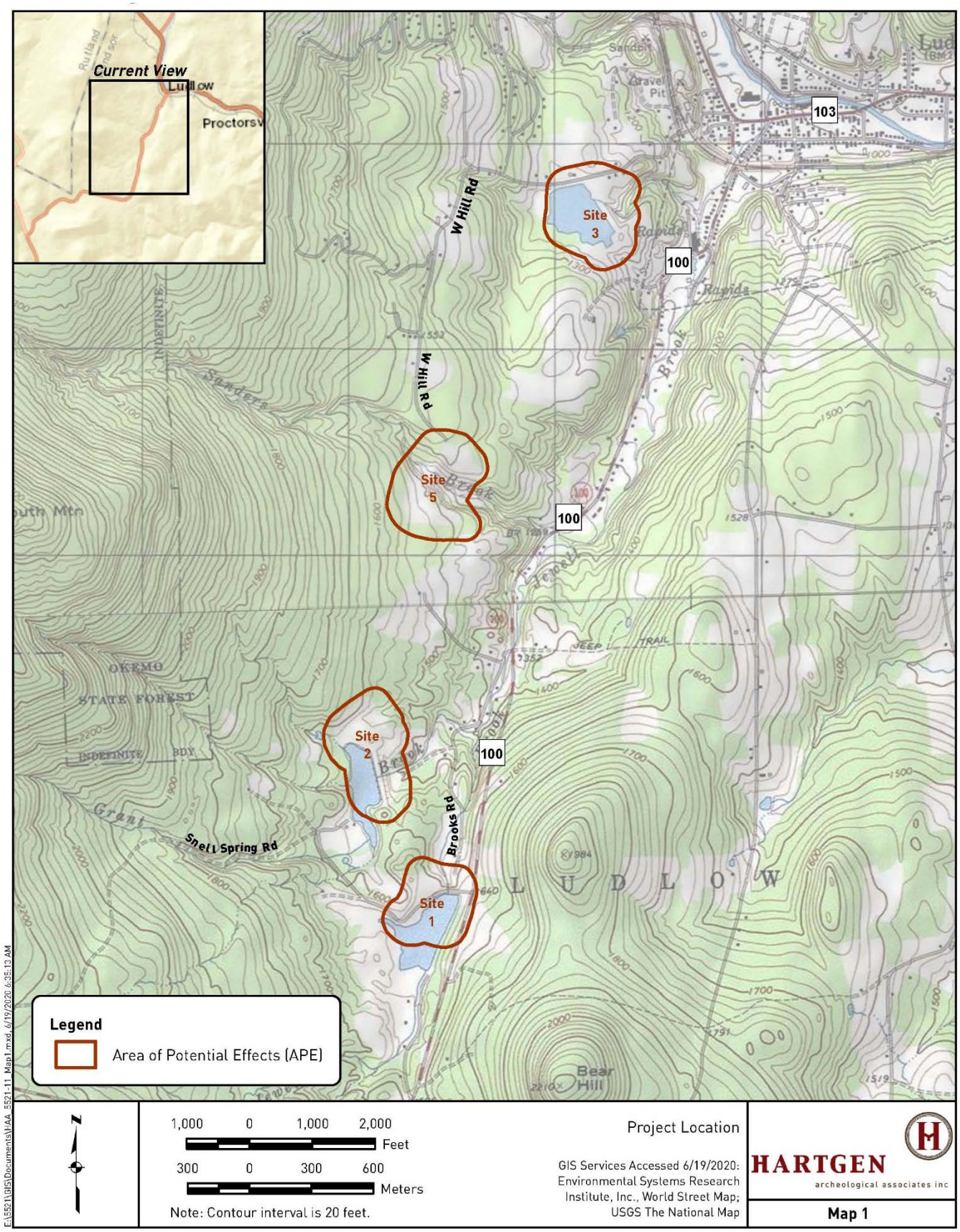
2007 *200 Years of Soot and Sweat: The History and Archeology of Vermont's Iron, Charcoal, and Lime Industries. Addendum A: Update to the 1992 Edition*. Burlington, VT: Victor R. Rolando and the Vermont Archaeological Society, Inc.

See attached map	SURROUNDING ENVIRONMENT: Open ☒ Woodland ☒ Scattered Buildings ☒ Moderately Built Up ☐ Densely Built Up ☐ Residential ☐ Commercial ☐ Agricultural ☒ Industrial ☐ Roadside Strip Development ☐ Other:
RECORDED BY: Walter Richard Wheeler	
ORGANIZATION: Hartgen Archeological Associates, Inc.	
DATE RECORDED: 24 August 2022	



Location map.

* Formerly known as the Historic Sites and Structures Survey

Photographs

Site 1

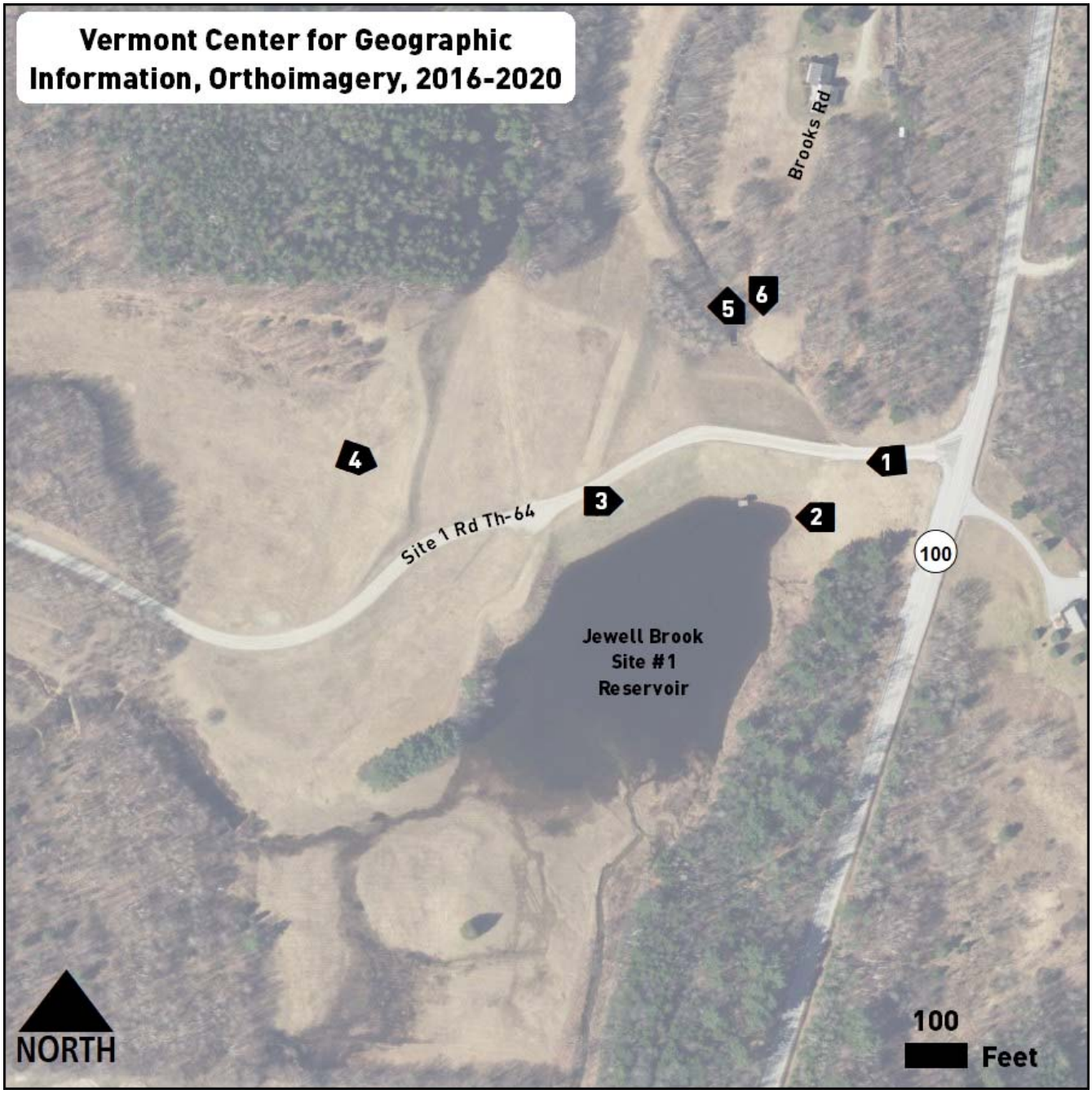


Photo angles, Site 1.

1. View west, showing the earthen dam and reservoir at Site 1. The top of the intake structure is visible at the center of this view, August 2022.

* Formerly known as the Historic Sites and Structures Survey

2. View west, showing reservoir and the intake structure, August 2022.

3. View east, showing the approach road, at center left, and the intake structure, August 2022.

* Formerly known as the Historic Sites and Structures Survey

4. View east-southeast, showing the earthen dam and the approach road, October 2019. A nearby dwelling is seen in the distance.

5. View southeast, showing the stilling basin and outlet, August 2022.

* Formerly known as the Historic Sites and Structures Survey

6. View south, showing the stilling basin and outlet structure, August 2022.

Site 2

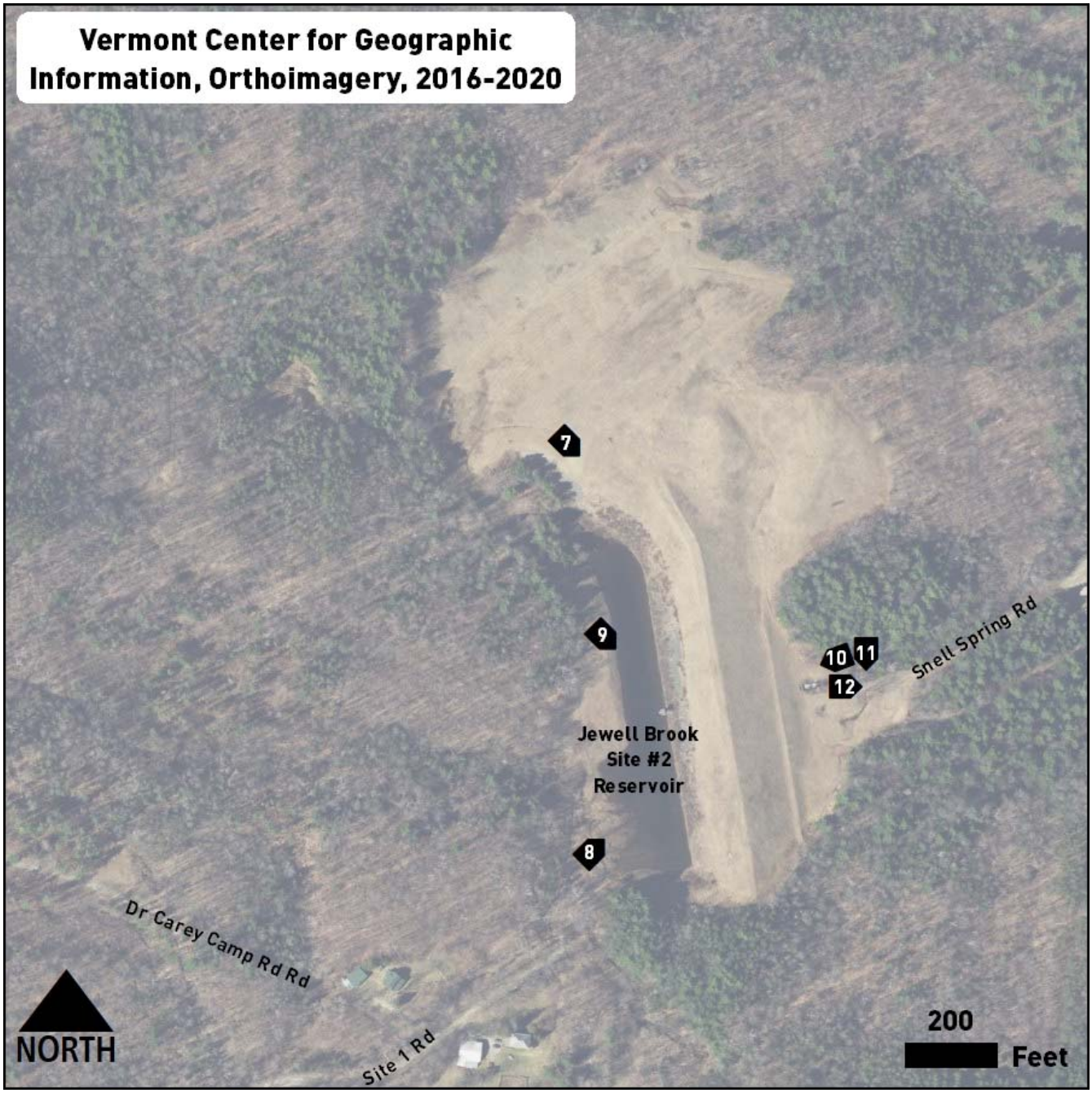


Photo angles, Site 2.

* Formerly known as the Historic Sites and Structures Survey

7. View south-southeast of the earthen dam at Site 2, with reservoir and intake at right, August 2022.

8. View northeast of the earthen dam, showing the landscape context and intake, at center, August 2022.

* Formerly known as the Historic Sites and Structures Survey

9. View of the reservoir with intake structure at center, October 2019.

10. View of the stilling basin and outlet structure, looking west, October 2019.

* Formerly known as the Historic Sites and Structures Survey

11. View of the small approach bridge, showing its north façade and one of two wing walls, looking south, August 2022.

12. View east of the road crossing at the bridge, with concrete and cable railings shown, August 2022.

* Formerly known as the Historic Sites and Structures Survey

Site 3.

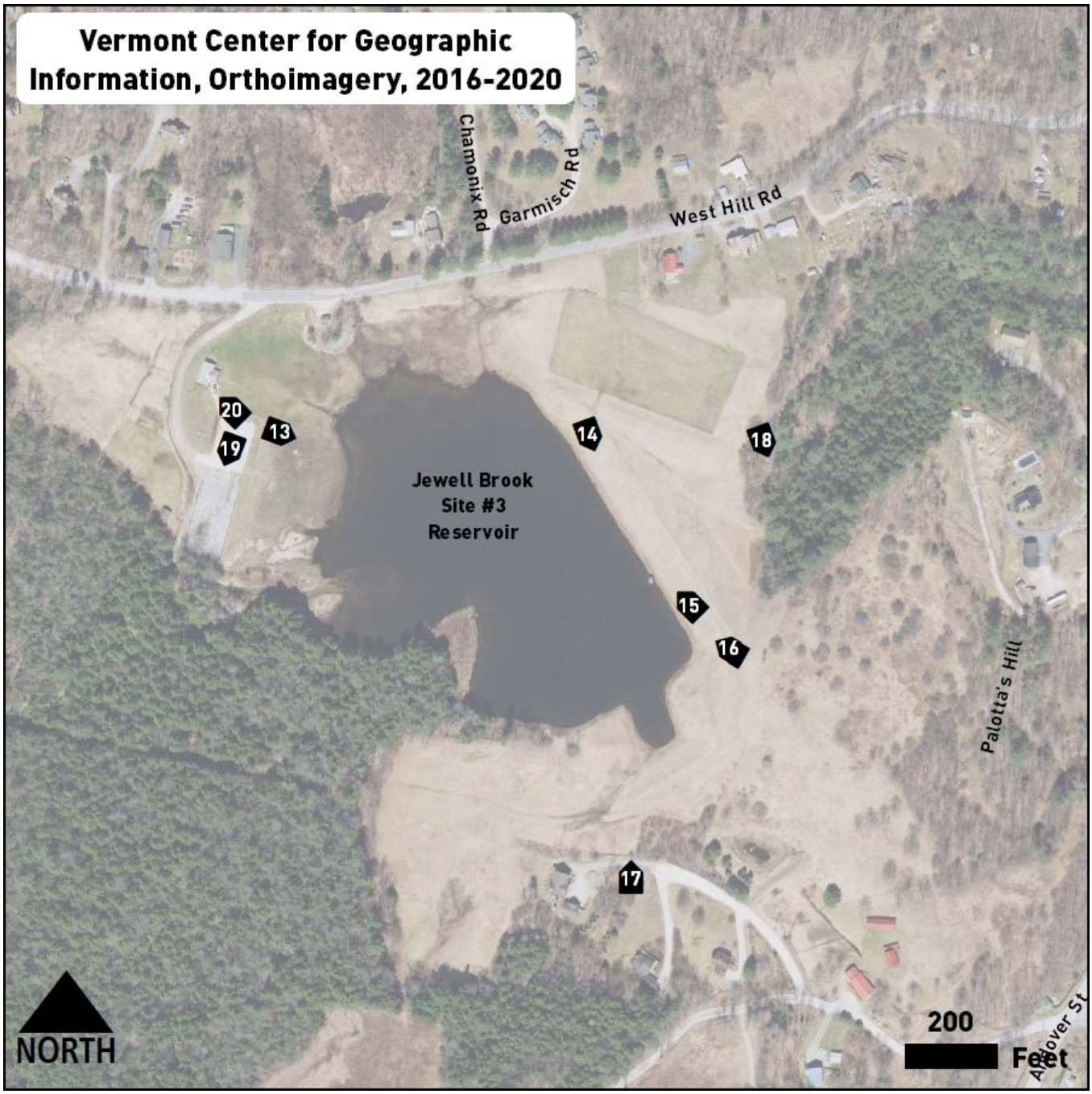


Photo angles, Site 3.

13. View east-southeast of Site 3, showing reservoir and earthen dam, in the background, August 2022.

* Formerly known as the Historic Sites and Structures Survey

14. View south-southeast from top of earthen dam, showing intake structure at center and nearby dwellings, in the background, August 2022.

15. View north-northwest, showing intake structure, August 2022.

* Formerly known as the Historic Sites and Structures Survey

16. View northwest from the dam, looking back toward the recreation area, August 2022. Okemo ski resort is seen in the background, right.

17. View north from a nearby private road, looking toward the reservoir and earthen dam, August 2022.

* Formerly known as the Historic Sites and Structures Survey

18. View south-southeast, showing concrete and corrugated metal outlet pipes, the former embedded in a concrete cradle, August 2022.

19. Recreational facilities at Site 3, looking south. A large parking area, basketball hoops, and a picnic shelter are seen in this view, August 2022.

* Formerly known as the Historic Sites and Structures Survey

20. View northwest showing a service building on the site, August 2022.

Site 5.

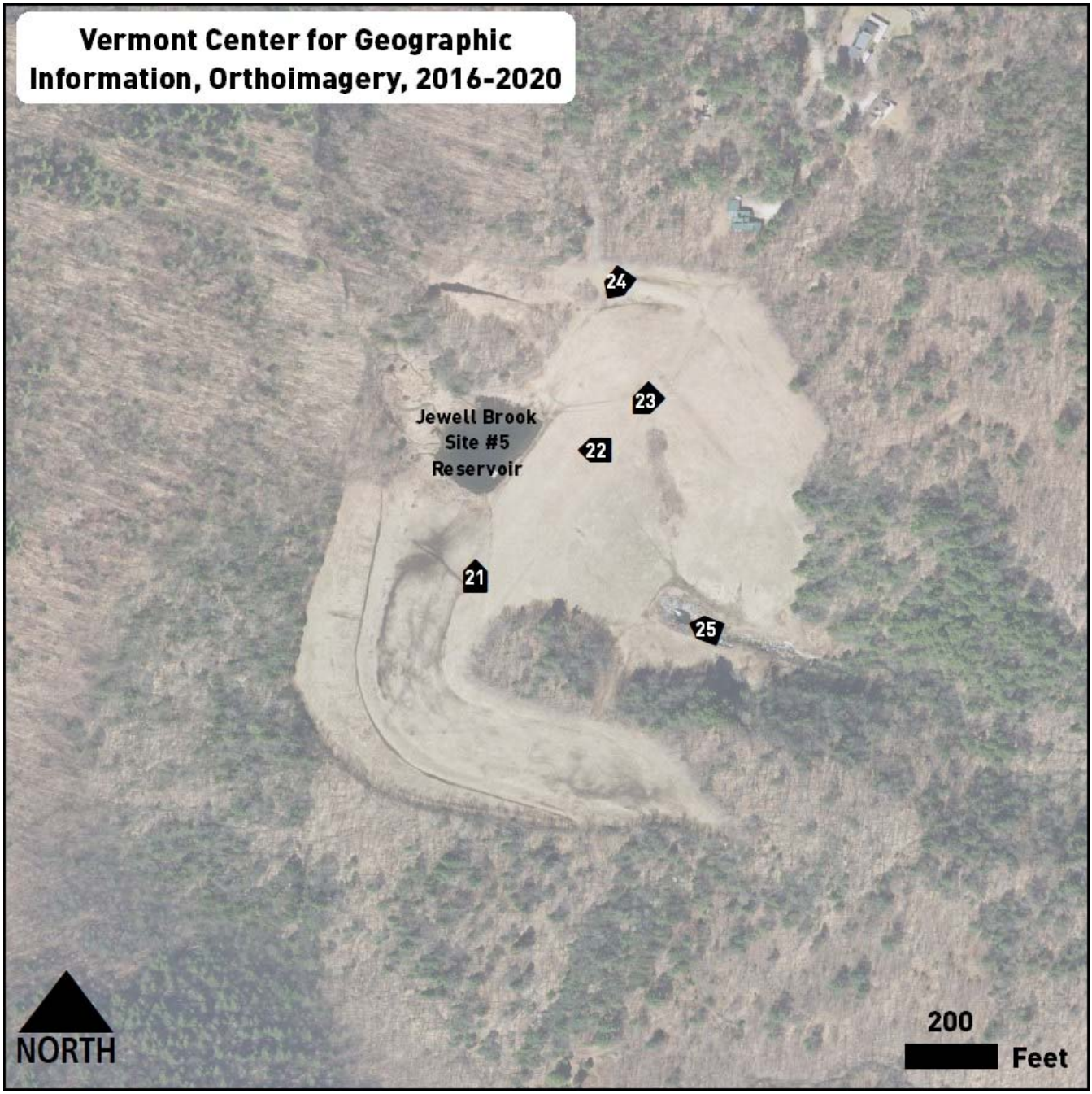


Photo angles, Site 5.

* Formerly known as the Historic Sites and Structures Survey

21. View north from the earthen dam, showing the reservoir with intake structure, at center right, October 2019.

22. View west from the top of the dam, showing the reservoir, with embankment in background, August 2022.

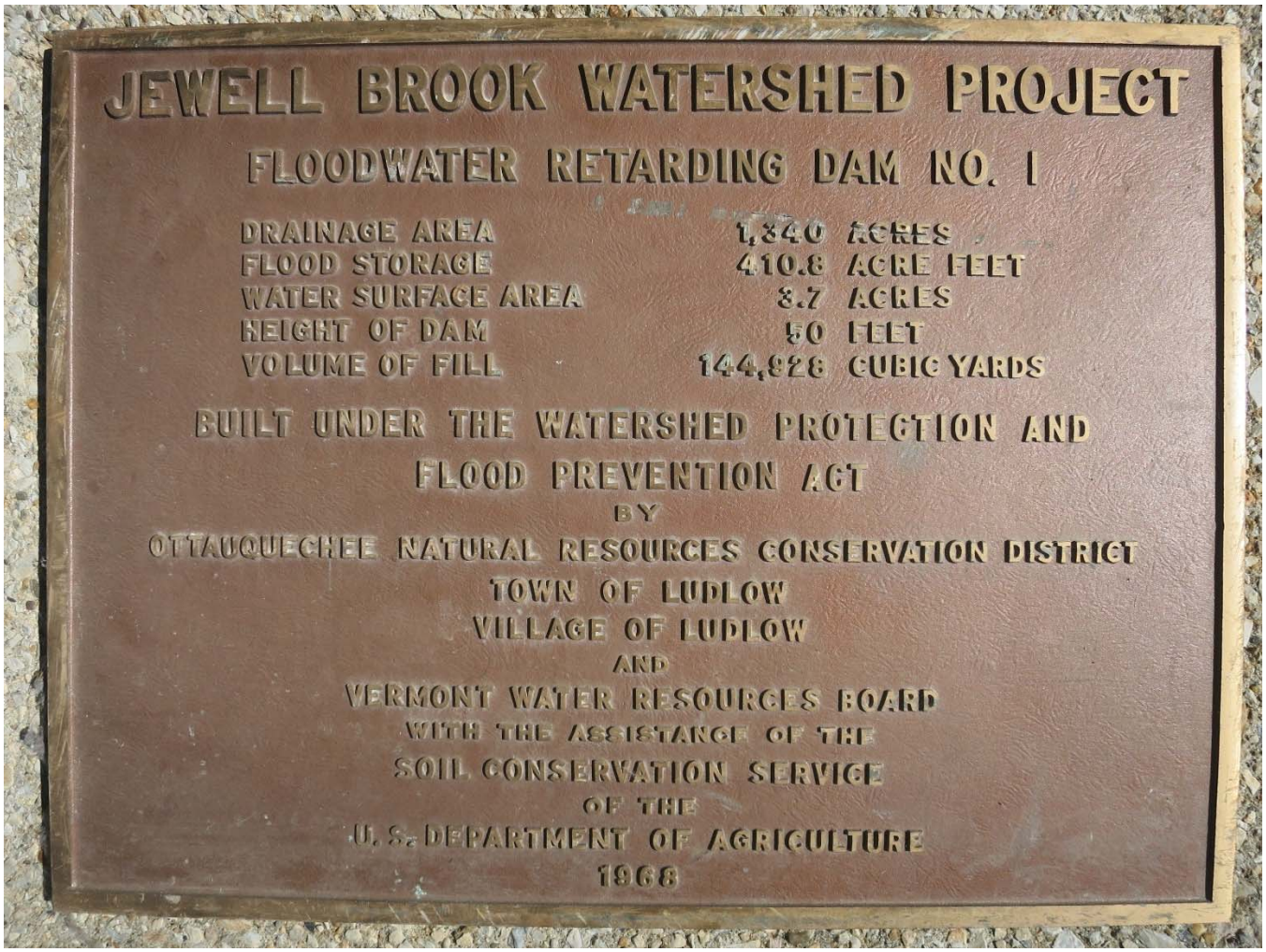
* Formerly known as the Historic Sites and Structures Survey

23. View south-southwest from the top of the earthen dam, October 2019.

24. View southwest showing the earthen dam and a portion of the reservoir, August 2022.

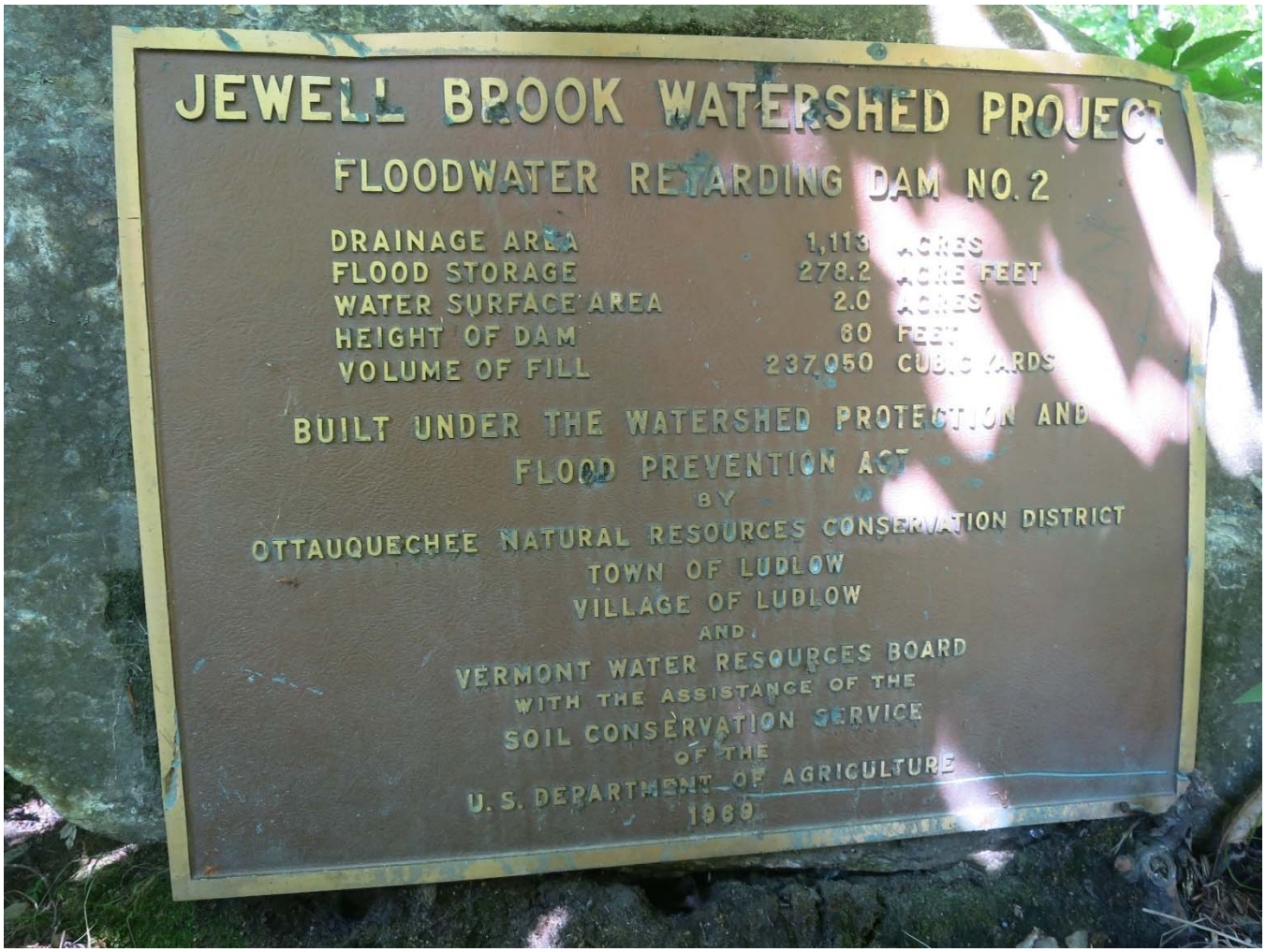
* Formerly known as the Historic Sites and Structures Survey

25. View west-northwest, showing the concrete outlet pipe, August 2022.



26. Plaque formerly mounted at Site 1, presently stored at the Town & Village of Ludlow Water Treatment Facility.

* Formerly known as the Historic Sites and Structures Survey



27. Plaque for Site 2, mounted to a boulder at the base of the earthen dam. The plaques for Sites 3 and 5 are presently unlocated.

HARTGEN
archeological associates inc

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November 10, 2022

PO Box 81
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Jeffrey Tucker
DuBois & King, Inc.
28 North Main Street
Randolph, Vermont 05060
p. 802.728.3376
e. jtucker@dubois-king.com

Subject: Jewell Brook Site #2 Archeological Resource Assessment Addendum
HAA #5521-11

Dear Jeff,

This letter documents a site visit to Jewell Brook Flood Control Site #2 to examine a section of the Area of Potential Effects (APE) that was not included in the original Archeological Resource Assessment (ARA) report completed in October 2020. The site visit was completed on November 9, 2022, under cool and clear conditions.

The added area is located on the east side of the APE and north of the access road to the dam and Grant Brook (Maps 1 and 2). Although most of the area is sloped and not archeologically sensitive, there are two sections of it that are fairly level.

At the west end, the level area is in the southwest corner of the added APE and extends approximately 75 feet (23 m) east to west and 70 feet (21 m) north to south (Photo 1). A soil core in the area encountered stratigraphy of an A horizon of dark brown silty loam to 15 centimeters (6 in) underlain by a C horizon of dark yellowish brown silty loam with a gradual division between them with no B horizon visible. The core ended at 60 centimeters (24 in) with an obstruction of stone. This core indicates the area has not been disturbed by the landscape modification associated with the dam.

The east end of the added APE extends to the east edge of the landform before it drops down to a level area along the brook. A second level area is at the east edge of the landform, bound on the south by a steeply sloped hill, on the north and west by gradual sloped areas and on the east by a pronounced drop to the brook (Photo 2). This area measures approximately 50 feet (15 m) east to west by 100 feet (30 m) north to south. Several soil cores were placed in this area.

The first core encountered an A horizon of 20 centimeters (8 in) of dark brown silty loam over 10 centimeters (4 in) of gray sand that may be spodosol (E horizon) or soil leached of all but the sand. An obstruction of stone was encountered at 30 centimeters (12 in). A second core in this area encountered a similar A horizon of dark brown silty loam to 20 centimeters (8 in) over a very dark brown clayey silt to 30 centimeters (12 in) with a stone obstruction. Additional cores attempted in the area encountered a variety of conditions including hitting cobbles within a few centimeters of the surface. Throughout this area the soil was saturated despite there being little recent rain, suggesting the adjacent hill may be draining ground water into the soil of this adjacent level area.

Based on these observations the following conclusions can be drawn. The western area appears to be well drained with an east/southeast facing aspect and a high hill to the south shading the area much of the time. The area is quite removed from the brook to the southeast.

The eastern area overlooks the brook. However, the area is characterized by rocky soils that, judging by the current conditions, are likely often saturated throughout the year.

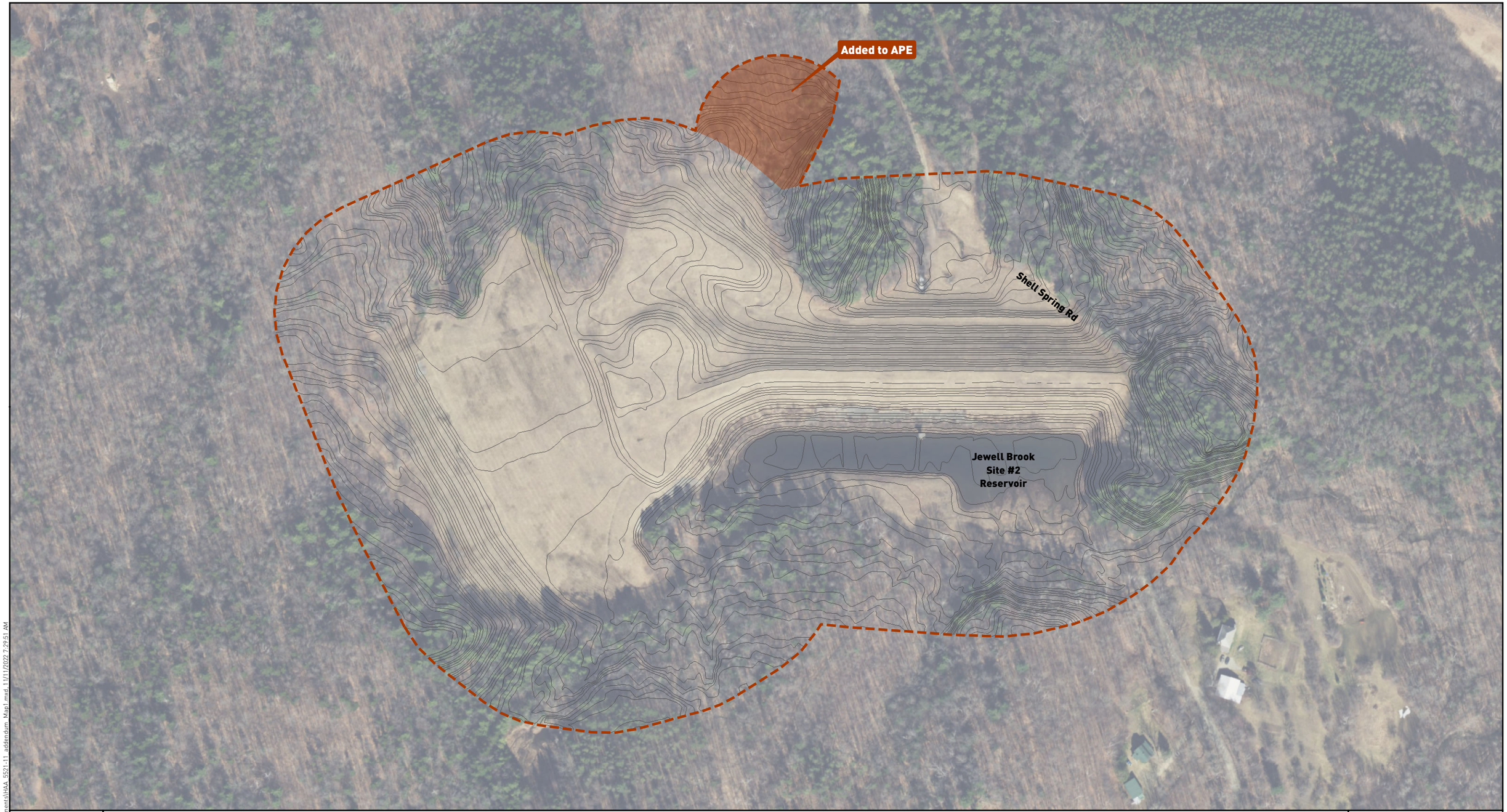
These conditions indicate neither area is ideal for precontact settlement. Exploitation of this locale would likely focus on floral and faunal resources associated with or attracted to the brook. The added APE has no southern exposure and limited east and west exposure. The western area is removed from the brook while the eastern area overlooks the brook but is often saturated with water from the hill to the south. Due to these considerations, the added APE is considered to have low archeological potential. No further archeological review is recommended.

Sincerely,

Thomas R. Jamison, PhD, RPA #16566
Project Manager

Attachments:

Maps
Photographs



100 0 100 200 Feet

30 0 30 60 Meters

Note: Contour interval is 2 feet.

Legend

Area of Potential Effects (APE)

Project Map - Site 2

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

HARTGEN archeological associates inc

Map 1

C:\HAA\projects\5521\GIS\Documents\HAA_5521-11_addendum_Map1.mxd, 11/11/2022 7:29:51 AM

N

25 0 25 50 Feet

6 0 6 12 Meters

Note: Contour interval is 2 feet.

Project Map - Site 2

Vermont Center for Geographic Information, Orthoimagery, 2016-2020

HARTGEN archeological associates inc

Map 2

C:\HAA\projects\5521\GIS\Documents\HAA_5521-11_addendum_Map2.mxd, 11/11/2022 7:33:14 AM

Photo 1. Western level area. View to the east/southeast.

Photo 2. Eastern level area. View to the north/northeast.

VT SHPO and Tribal Consultation Documentation
Jewell Watershed Dam Sites #1, $#2, #3 and #5. Supplemental Watershed Plan and Environmental Assessment

November 2, 2022

DuBois & King inc.

Jeffrey Tucker <jtucker@dubois-king.com>

Follow-up on 9/28/2022 Jewell Brook Watershed Project Meeting

1 message

Clay, Jacob - NRCS, Berlin, VT <jacob.clay@usda.gov> Wed, Sep 28, 2022 at 12:04 PM
To: "Thompson, Bob - NRCS, Colchester, VT" <bob.thompson@usda.gov>, Jeffrey Tucker <jtucker@dubois-king.com>

Good morning Bob and Jeff,

I just wanted to follow-up on this morning's conversation. When Vermont NRCS made a finding of *No Adverse Effect* this determination of effect was based on the preferred alternative where NRCS would rehab all four dams to ensure the flood control system will continue to operate as originally intended (and also meet current Vermont dam safety and NRCS hydraulic criteria) while causing no significant change in the integrity of location, design, setting, materials, or workmanship.

If NRCS decided it was going to decommission one, two, three, or all four of the dams this would result in an *Adverse Effect* as the dams and the built environment were evaluated as eligible for listing in the National Register of Historic Places under Criteria A and C by Walter Wheeler. Removing part or all of this NR Eligible property would be an Adverse Effect as it would be a significant change to some of the aspects listed above and would need to be mitigated. The mitigation measures would need to be agreed to by NRCS and the SHPO and we would likely need to create a MOU outlining our mitigation measures.

If NRCS elects to do no action at all (no rehab and no decommissioning) it would result in a finding of *No Adverse Effect* as there would be no federal action.

If NRCS elected to do some combination of rehab and no action on the four dams this would also result in a determination of *No Adverse Effect*.

From what I understand we are still looking to move forward with the preferred treatment of rehab of the four dams. If the plans change in the future and we want to for example decommission two of the dams and rehab two of them we will need to resume consultation with the SHPO and the 30 day comment period would start anew.

The email submission was sent to the SHPO on September 19, 2022. If NRCS does not receive a response with the 30 day comment period we can assume concurrence an move forward with the dam rehabilitation as currently designed.

Let me know if you need any additional information from me at this time or if I overlooked anything we discussed this morning.

Thank you,

Jake Clay

Archeologist

Natural Resources Conservation Service

617 Comstock Rd, Suite 1

Berlin, VT 05602-8498

(802) 310-2156

From: thpo <thpo@mohican-nsn.gov>
Sent: Thursday, August 11, 2022 10:32 AM
To: Clay, Jacob - NRCS, Berlin, VT <jacob.clay@usda.gov>
Cc: Thompson, Bob - NRCS, Colchester, VT <bob.thompson@usda.gov>; Carrig, Charles - FPAC-NRCS, Little Rock, AR <chuck.carrig@usda.gov>
Subject: RE: Phase 1B Report for the Jewell Brook Dam Rehabilitation Project located in the Town of Ludlow, Windsor County, Vermont.

Dear Jake,
Thanks for the Phase 1B Report for the Jewell Brook Dam Rehabilitation Project located in the Town of Ludlow, Windsor County, Vermont. It was good to have the record of your correspondence with Nathan to bring me up to speed on this consultation.
Considering the lack of any Native American archaeological resources recovered during the Phase 1B investigation, the Stockbridge-Munsee Historic Preservation Office has no concerns with this project moving forward with the following stipulations:

- If previously undocumented archaeological resources are encountered, please contact me promptly and follow the Inadvertent Discovery Policy on the Stockbridge-Munsee Community website: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.mohican.com/mt-content/uploads/2020/11/smc-inadvertent-discovery-policy.pdf.
- Please give due attention to the incidental or routine movement of heavy machinery both inside and outside the stated area of potential effects (APE) that may cause unintended or inadvertent impacts to cultural resources.
- Should the proposed work be altered to expand beyond the current scope of work and/or APE, we ask to be notified.

Many Thanks,
Jeff.

Jeffrey C Bendremer Ph.D., RPA
Tribal Historic Preservation Officer
Stockbridge-Munsee Community
Tribal Historic Preservation Extension Office
86 Spring St.
Williamstown, MA 01267
413-884-6029 (o)
406-544-5269 (c)

Jeffrey C Bendremer Ph.D., RPA
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86 Spring St.
Williamstown, MA 01267
413-884-6029 (o)
406-544-5269 (c)

From: Clay, Jacob - NRCS, Berlin, VT <jacob.clay@usda.gov>
Sent: Tuesday, August 9, 2022 8:24 AM
To: thpo <thpo@mohican-nsn.gov>
Cc: Thompson, Bob - NRCS, Colchester, VT <bob.thompson@usda.gov>; Carrig, Charles - FPAC-NRCS, Little Rock, AR <chuck.carrig@usda.gov>
Subject: Phase 1B Report for the Jewell Brook Dam Rehabilitation Project located in the Town of Ludlow, Windsor County, Vermont.

Good morning Jeff,
Please find attached a copy of Hartgen Archeological Associates Inc's Phase 1B Report summarizing their investigation of the Jewell Brook Dam Rehabilitation Project located in the Town of Ludlow, Windsor County, Vermont. Although this project is located outside the typical area of interest of the Stockbridge-Munsee Community, former Tribal Historic Preservation Officer

Nathan Alison had agreed to review this project and provide comments as no other Tribal Nation expressed an interest in this project. Currently we are still awaiting the results of Hartgen's architectural historian's report to determine if the dams and the built environment are eligible for the National Register of Historic Places or not before NRCS makes a formal determination of effect, but I wanted to share the results of the Phase 1B.

In summary the Phase IA conducted by Hartgen identified several archaeologically sensitive areas within the project area, but all but two of these landforms are now planned to be avoided. The Phase IB report summarizes the archeological investigation of archaeologically sensitive area 3 and archeologically sensitive area 6.

The remains of an early 20th century water system were identified and mapped within archeologically sensitive area 3, but Hartgen is recommending no further testing because the mapping and the photography of the features of the water system provide a good account of the systems construction and components within the project area. No precontact Native American or historic period artifacts were identified during the investigation of archeologically sensitive area 6.

Once NRCS receives a copy of the architectural historian's report I will send along a copy of it along with a determination of effect for your comments or concurrence. I also attached a PDF of my previous emails with Nathan Alison regarding this project.

Don't hesitate to contact me if you have any questions or comments at this time.

Thank you,

Jake Clay
Archeologist
Natural Resources Conservation Service
617 Comstock Rd, Suite 1
Berlin, VT 05602-8498
(802) 310-2156