HAWKINSVILLE DAM
FINAL STUDY

HAWKINSVILLE DAM PROJECT

Prepared for:

Hudson River-Black River Regulating District
Albany, New York

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

The Hawkinsville dam was constructed in 1915 by Brant Excelsior Company to generate power for operating machinery in its excelsior mill. Ownership of the dam was transferred to the state of New York after the mill closed in 1966. The Hudson River-Black River Regulating District (Regulating District) operates and maintains the dam, which is located on the Black River in Oneida County, New York, approximately 315 feet upstream of the Hawkinsville Road (County Road 61/Woodgate Drive) bridge. The non-overflow, concrete dam includes a concrete spillway, abandoned concrete intake structure, and two abandoned wooden sluice gates. The dam, which has no usable storage capacity, is approximately 60 feet long and 18 feet high. The spillway is 300 feet long and 12 feet high and has a crest elevation of approximately 1044.1 feet. Figure 1-1 is a location plan of the dam and surrounding area.

The Hawkinsville dam was registered with the New York State Department of Environmental Conservation (NYSDEC) Office of Dam Safety as a Class B – Intermediate Hazard. In 2007, the Dam Safety Section of NYSDEC's Division of Water notified the Regulating District of certain deficiencies at the Hawkinsville dam. A spillway design flood (SDF) study based on the limited topographic data available at the time indicated that the dam's spillway capacity is insufficient to pass the flow of 21,450 cubic feet per second (cfs) required to meet current safety standards for a Class B dam (Kleinschmidt, 2007). In October 2010, the Regulating District's Board hired a consultant to evaluate the potential benefits and cost of remediating or removing the dam. The consultant completed a preliminary assessment of the physical and hydraulic condition of the project and proposed concepts for increasing the discharge capacity of the facility or removing the dam (Milone & MacBroom, 2012).

Scale: AS SHOWN	HRBRRD ALBANY, NY	FIGURE
Project No: 650011.01	HAWKINSVILLE DAM FINAL STUDY	
Filename: see margin	HAWKINSVILLE DAM LOCATION PLAN VIEW	
Drawn By: MPH		1-1
Date Drawn: 05-30-2014	Kleinschmidt 141 Main St., PO Box 650 Pittsfield, Maine 04967 Telephone: (207) 487-3328 Fax: (207) 487-3124 www.KleinschmidtUSA.com	

Path: G:_Client_Data\HRBRRD\Hawkinsville_dam_MXD\Figure 1-1 - Dam Location Plan View.mxd

Source: ESRI

In 2012, the Regulating District's Board engaged Kleinschmidt to (1) complete a final dam remediation study, (2) complete a final dam removal study, and (3) provide final design and construction monitoring services for the alternative approved by the Regulating District Board. In order to evaluate the proposed options for remediating or removing the dam, Kleinschmidt developed an updated hydraulic evaluation of the dam using detailed impoundment bathymetry and topographic data, and field-surveyed cross sections downstream of the dam that were not available for the previous SDF study. The new evaluation indicates that the Hawkinsville Road bridge controls hydrology below the dam such that a breach of the dam during SDF would not cause a significant incremental rise in water level and concludes that the dam qualifies to be reclassified as a Class A dam (Kleinschmidt, 2014). Reclassifying the dam reduced the SDF for the dam from 150 percent of the 100-year flood to 100 percent, which increases the feasibility of remediating the dam.

This report presents the results of the final dam remediation and removal studies including proposed engineering alternatives and opinions of the probable cost to remediate or remove the dam. The following sections describe the engineering alternatives and estimated costs in detail and offer evaluations of the effects, advantages, and disadvantages of each alternative.

2.0 ENGINEERING ALTERNATIVES

2.1 EXISTING CONDITIONS

The Hawkinsville dam is a run-of-river dam consisting of a concrete spillway, abandoned concrete intake structure, and two abandoned wooden sluice gates. The dam's spillway is approximately 300 feet long; the right abutment is 3 feet long, and the combined length of the left abutment and intake structure is 37 feet. The total width of the dam is 340 feet. The dam is founded on ledge. The top of the right abutment is at elevation 1,049.1 feet, and the top of the left abutment and intake is at elevation 1,049.2 feet. The intake structure formerly fed water to a 5.5-foot-diameter metal penstock for use by the excelsior mill. The intake has a metal trash rack oriented perpendicularly to the flow in the river to prevent debris from entering the penstock. The penstock has been severed a few feet downstream of the dam and is no longer connected to any structure. The forebay has been filled, and a non-functioning gate blocks the upstream end of the penstock. Water leaks through the fill material and gate through the remaining penstock to the river downstream.

The elevation of the ground surface adjacent to the right abutment is 1,045.5 feet. The ground surface approximately 20 feet east of the right abutment is rip-rapped with angular stone (D_{50} = 18 inches) to prevent soil erosion when water flows around the abutment. The ground surface stretches east of the dam to Edmonds Road, rising to an elevation of approximately 1,048 feet. When the water level of the Black River exceeds the elevation 1,045.5 feet, water flows over the right embankment and around the right dam abutment.

2.1.1 HYDROLOGY

The headwaters of the Black River are in the western Adirondacks, and the river flows northwest to Lake Ontario. The river near Hawkinsville is part of the upper segment that receives run off from the Adirondacks, which results in a rapid response to rainfall and spring snow melt. The drainage area contributing to the impoundment is 270 square miles (Gomez and Sullivan, 2006). The hydrology of the Black River at Hawkinsville dam was analyzed using the U.S. Geological Survey (USGS) gage near Boonville, NY (USGS #04252500). The period of record represents a slightly larger watershed area of 304 square miles and dates from March 3, 1911, to the present. Flow in the Black River at the Hawkinsville dam typically ranges between 100 cfs and 10,000 cfs (Figure 2-1). Seasonal flows are typical for a northern temperate climate with similar watershed characteristics (Table 2-1).

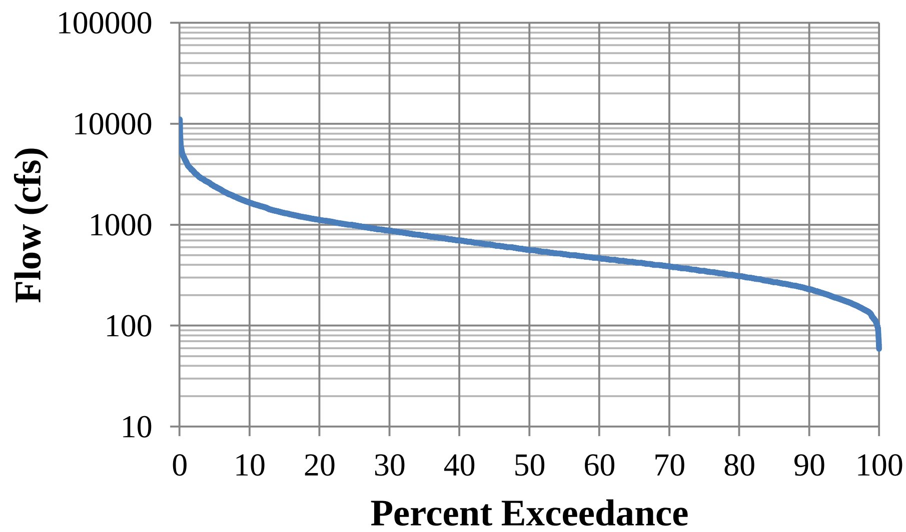


FIGURE 2-1. BLACK RIVER FLOW DURATION CURVE AT USGS GAGE #04252500

TABLE 2-1. SEASONAL AVERAGE AND MEDIAN FLOWS AT USGS GAGE #04252500

SEASON	AVERAGE FLOW (CFS)	MEDIAN FLOW (CFS)
Spring (3/20 to 6/20)	1209	887
Summer (6/21 to 9/22)	434	296
Fall (9/23 to 12/21)	863	697
Winter (12/22 to 3/19)	773	520

Peak flows at the Hawkinsville dam were determined by Milone & MacBroom, Inc. (2012) using the USACE Hydrologic Engineering Center Statistical Software Package (HEC-SSP) by performing a Bulletin 17b analysis for the full period of record through 2011. The flood flows are shown in Table 2-2.

TABLE 2-2. FLOOD FLOWS AT USGS GAGE #04252500

RETURN PERIOD	FLOW (CFS)
2-yr	5,765
10-yr	9,096
50-yr	12,592
100-yr	14,259
500-yr	18,624

2.1.2 DAM STABILITY

As required by NYSDEC's *Guidelines for Design of Dams* (1989), the stability of Hawkinsville dam was determined for overturning and sliding under four load conditions: normal pool, normal pool with a 5,000 pound-per-foot ice load at spillway crest, design flood (100-year), and earthquake conditions at normal pool. The stability analysis was completed using Kleinschmidt's in-house software KA Stable.

The results of the analysis indicate that the dam meets NYSDEC stability guidelines for overturning and sliding under the normal pool, design flood, and earthquake cases (Table 2-3). The dam does not meet stability requirements for overturning during ice load conditions; however, the run-of-river dam is likely to have experienced annual ice load conditions similar to the ice load case during its lifespan and, in Kleinschmidt's opinion, inspection should be sufficient to deem the dam stable under ice load conditions. Appendix A provides details of the stability analysis.

TABLE 2-3. STABILITY ANALYSIS RESULTS

CASE	OVERTURNING SAFETY FACTOR	SLIDING SAFETY FACTOR
Normal Pool	2.0	3.6
Ice Load	0.9	1.5
Design Flood	1.4	2.9
Earthquake	1.7	2.6

NYSDEC regulations specify different SDF values and freeboard requirements based upon the hazard classification and height of the dam, respectively. The Hawkinsville dam is a Class A hazard dam that should have adequate spillway capacity to pass the 100-year-flood. The dam is approximately 10 feet tall and has impoundment storage of 164.15 acre-feet below the water surface elevation at the dam crest; therefore, it is considered a small dam (dam height is less than 40 feet or storage is less than 1,000 acre-feet at normal pond) and requires at least 1 foot of freeboard during the SDF (NYSDEC, 1989). Currently, the capacity of the Hawkinsville dam spillway is insufficient to pass the SDF with adequate freeboard for a small, Class A dam. Two engineering alternatives can resolve this problem: removing the dam and returning the river to its natural condition, or rehabilitating the dam so that its spillway capacity is sufficient to pass the SDF with the required freeboard, in accordance with NYSDEC regulations.

2.2 Removal Alternative

2.2.1 Proposed Approach

Removing the dam will entail removing the entire spillway section and the right abutment. Removal will be accomplished in two phases. The first phase will be to remove a section of the spillway on the river-left, using the intake structure as the access point, to drawdown the impoundment. The drawdown will be performed in increments over a period of days to limit the transport of sediment downstream. The second phase will involve removing the rest of the spillway while diverting flow through the breach in the spillway. Excavators will enter the river from the river-right by isolating the work area with a cofferdam. After removing the sediment behind the dam, excavators equipped with hoe rams will mechanically remove the spillway moving west to east while simultaneously removing the cofferdam. The intake structure, both dam abutments, and the rip-rap on the river-right will be left in place to stabilize the banks.

2.2.2 Conceptual Design

Erosion and sediment control measures, as outlined in the *New York State Standards and Specifications for Erosion and Sediment Control* (NYSDEC, 2005), will be used on the banks and in the river to protect water quality during the removal. A turbidity curtain will be used in the river downstream during both phases of construction to prevent downstream transport of fine materials, including sediment that has accumulated upstream of the dam and debris from the demolition. Silt fences, geotextile fabric, and staked hay bales will be installed as needed along the boundaries of work areas to prevent soil from entering the river (NYSDEC, 2005). All construction will be performed during the seasonal low-flow period beginning in July.

Phase I of the removal will take place entirely on the river-left part of the dam. The contractor will place a mat, or equivalent, on the existing intake to create an access point. The excavator will be equipped with a hoe ram to mechanically breach the spillway. The breach dimensions will be equal to the reach of the excavator. The contractor will breach the spillway approximately 3 feet each day during Phase I to allow the impoundment to drawdown slowly, minimizing disturbance of accumulated sediment upstream of the dam. This process will continue until the breach extends to the channel bottom. The resulting breach dimensions, assuming a 30-foot excavator arm, will lower the water levels to approximately 5 feet and 6 feet below the spillway crest at the average and median summer flows, respectively. The workspace will be demobilized, and all areas of the left bank affected by construction will be graded and seeded to restore the bank as closely as possible to its prior condition.

Phase II will begin on the river-right bank after the impoundment has been lowered. A cofferdam will be installed upstream of the accumulated sediment in the impoundment to isolate the work area from river flow. The cofferdam will extend from the river-right bank and tie into the spillway at the breach in the dam, where the spillway section was removed in Phase I. Pumps will be used to dewater the work areas during construction. Pumped water will be discharged into a settling pond outside of the river channel to allow sediment and other fine materials to settle before the water is discharged to the river. Accumulated sediment will be removed behind the dam by excavators. The sediment is expected to be nontoxic, Class A hazard sediment, which allows it to be loaded directly into trucks for off-site disposal.

After the sediment is removed, the contractor will begin removing the remaining spillway moving west to east. The dam will be removed down to the channel bottom elevation. As the dam is removed, the cofferdam and turbidity curtain will be moved back towards the right bank simultaneously. Phase II will be completed when the entirety of the spillway, right abutment, cofferdam, and turbidity curtain are removed from the river channel. All areas of the right bank affected by construction will be graded and seeded to restore the bank as closely as possible to its prior condition. Appendix B contains conceptual drawings of the proposed dam removal.

2.2.3 Opinion of Probable Cost

Costs were obtained from the RSMeans Online cost database, assuming calendar year 2014 costs, a regional costs location of Utica, NY, and standard union labor (Reed Construction Data, Inc., 2014). The opinion of probable cost for removing the Hawkinsville dam includes direct and indirect costs associated with removing the dam and accumulated sediment. The direct costs include contractor mobilization and demobilization, equipment needed for demolition, labor needed to operate the equipment, materials for the cofferdam, and materials for erosion and sediment control. Construction is assumed to last 2 months. Direct costs also include the excavation and off-site disposal of sediments and off-site disposal of demolition waste. The disposal site is assumed to be the Oneida-Herkimer Solid Waste Authority, approximately 8 miles away from the dam. A cost estimate for sediment disposal and concrete disposal was obtained from Oneida-Herkimer Solid Waste Authority. The cost for reinforced concrete disposal is approximately 25 percent of the total cost of the removal, so other disposal methods should be investigated. The cost opinion assumes the cost of general contractor conditions and mobilization and demobilization to be 10 percent and 15 percent, respectively, of the total cost of equipment, labor, and materials. Additionally, cost analysis includes a contingency equal to 20 percent of all direct and indirect costs. The indirect costs include permitting, engineering final design, preparation of bid documents, and construction monitoring. All indirect costs were assigned lump sum values based upon experience and engineering judgment. The estimated probable cost for removing the Hawkinsville dam is $893,000. Appendix C contains a detailed breakdown of the estimated costs for dam removal.

2.3 REMEDIATION ALTERNATIVE

2.3.1 PROPOSED APPROACH

The objective of the remediation alternative is to bring the dam into compliance with NYSDEC regulations. The dam will be remediated to pass the SDF with 1 foot of freeboard, install a low-level outlet, and maintain the stability of the structure. The plan includes extending the spillway an additional 20 feet, installing a 4-foot by 4-foot vertical lift gate, raising both abutments to an elevation of 1,050 feet, and tying both abutments into existing grade. During the development of this report, the previous plan to install a rubber dam was determined to be infeasible for two reasons: (1) lowering the spillway crest will not create the necessary conveyance of flood flows because of the submergence effect of the tailwater at the dam; and (2) removing concrete mass from the spillway will render the dam unstable.

The dam will be remediated in two phases. Phase I will include installing a cofferdam around the existing intake structure, demolishing the intake structure, and constructing the new spillway section and new low-level outlet. Phase II will include constructing a berm extending from the right abutment of the dam to the existing parking area off of Edmonds Road, raising the right abutment, and extending the existing concrete cut-off wall.

2.3.2 CONCEPTUAL DESIGN

Erosion and sediment control measures will be incorporated to protect water quality throughout the demolition and remediation phases. A turbidity curtain will be placed in the Black River downstream of the construction to prevent downstream transport of fine materials, such as any sediment that has accumulated upstream of the dam. Silt fences, geotextile fabric, and staked hay bales will be installed outside of the river along the boundaries of work areas to prevent soil from entering the river (NYSDEC, 2005). All construction will be performed during the Black River's seasonal low-flow period beginning in July.

Phase I will take place entirely on the west side of the dam. A cofferdam will be installed immediately upstream and downstream of the intake structure to block flow to the area. A pump will be used to dewater the working area during construction. Pumped water will be discharged into a settling pool outside of the river channel to allow sediment and other fine materials to settle before the water discharges to the river. Flows will be routed over the spillway during construction.

An excavator equipped with a hoe ram will be used to mechanically remove the intake structure down to bedrock. A portion of the left abutment extending into the left river embankment will be left intact to tie into the proposed vertical lift gate structure. A 1-foot concrete cap will be added to the upstream left abutment wall and cut-off wall to bring the top of the abutment to elevation 1,050 feet. After the intake structure is removed, the surface of the exposed bedrock will be prepared for construction of a 20-foot extension of the ogee spillway. The new spillway will match the existing spillway in dimensions and alignment and will tie into the remaining portion of the left abutment.

The vertical lift gate will be a single-stem, face-mounted, aluminum gate with a handwheel actuator. The gate opening will be 4 feet wide by 4 feet tall, at invert elevation of 1,035.0 feet. The manual vertical lift gate is designed to exceed the required discharge of 90 percent of the storage below the spillway crest within 14 days, assuming no inflow into the reservoir (NYSDEC, 1989). The gate opening will be located in the upstream wall of the left abutment. Flow through the gate opening will pass through the left abutment cut-off wall and discharge immediately downstream of the new spillway. Upon completion of construction of the vertical lift gate and its supporting structure, the cofferdams located immediately upstream and downstream will be removed. The workspace will be demobilized, and all areas of the left bank affected by construction will be graded and seeded to restore the bank as closely as possible to its prior condition.

Phase II will take place on the east side of the dam by constructing an earthen berm extending east from the right abutment to the parking area off of Edmonds Road. The berm will have a top elevation of 1,050 feet, a minimum top width of 3 feet, and 3:1 upstream and downstream side slopes. The core of the earthen berm will be composed of high clay-content soil compacted with a roller to a minimum of 90 percent of standard proctor density. The core will be overlain with filter fabric, rip-rap, and top soil for stabilization. The upstream and downstream face of the berm will be seeded for erosion protection from run-off.

The right abutment will be raised by 1 foot with a concrete cap, similar to the left abutment, to match the berm elevation. The right abutment currently has a cut-off wall extending east into the rip-rapped bank. The bank will be stripped of rip-rap, and the cut-off wall will be raised to elevation 1,050 feet and extended into the center of the proposed berm for a total length of 10 feet. The purpose of the cut-off wall is to lengthen the seepage flow path through the berm at the abutment. Once construction of the berm and abutment modification have been completed, all areas affected by construction will be graded and seeded to restore the site as closely as possible to prior conditions. Appendix B contains conceptual drawings of the proposed dam remediation.

2.3.3 OPINION OF PROBABLE COST

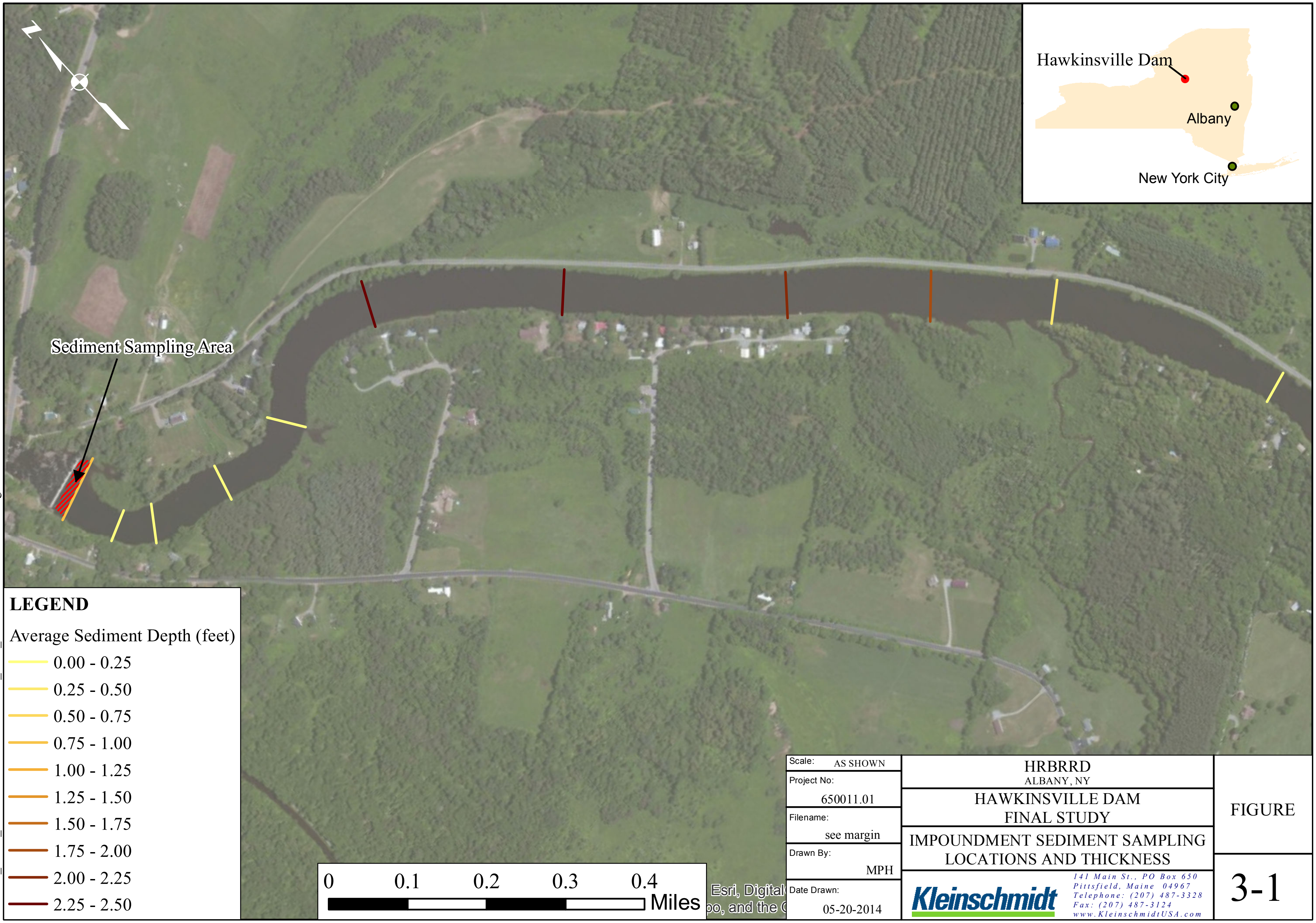
Costs were obtained from the RSMeans Online cost database assuming calendar year 2014 costs, a regional costs location of Utica, NY, and standard union labor (Reed Construction Data, Inc., 2014). The opinion of probable cost for rehabilitating the Hawkinsville dam includes direct and indirect costs associated with the rehabilitation. The direct costs include contractor mobilization and demobilization; equipment needed for demolition; labor needed to operate the equipment; materials for the cofferdams; erosion and sediment control management; concrete and rebar for reinforcing the spillway, left abutment, right abutment, and cut-off wall; aluminum vertical lift gate and controls; berm material; and rip-rap slope protection.

The cost opinion assumes general contractor conditions and mobilization and demobilization costs of 10 percent and 15 percent, respectively, of the total cost of equipment, labor, and materials. The cost analysis includes a contingency equal to 20 percent of all direct and indirect costs to rehabilitate the dam. The indirect costs include the rehabilitation permitting, property acquisition, and other non-construction costs. The cost analysis assumes that all construction occurring within the river will be finished in 2 months. Based upon these assumptions, the estimated probable cost for rehabilitating the Hawkinsville dam is approximately $694,000. In addition to the construction costs needed to remediate the dam, the dam remediation alternative will require an annual operations and maintenance cost of several thousand dollars to maintain and operate the new lift gate at the dam. This cost is not reflected in the opinion of cost stated here because operations and maintenance will be an annual cost incurred each year for the life cycle of the dam. Appendix C contains a detailed breakdown of the estimated costs for dam remediation.

3.0 NATURAL RESOURCE EFFECTS

3.1 BANK STABILITY AND EROSION

Building a dam dramatically affects the physical characteristics of a river, including raising water levels, decreasing water velocities, and altering sediment dynamics. The changes in water levels are discussed further in Section 5.0. Currently, the Hawkinsville dam slows the water velocity in the impoundment, decreasing the chance for active erosion of the riverbed and the riverbanks. The effects on sediment dynamics are characteristic of most dams. As the velocity of the river slows near the upstream influence of the impoundment, the bedload (i.e., the material that moves by rolling and tumbling on the river bottom) is deposited, as indicated by the depths of sand, gravel, and cobble in the middle portions of the impoundment (Figure 3-1). Near the dam, the smaller sediment (i.e., suspended load, the material that moves in the water column) accumulates along with some bedload; however, the sediment near the Hawkinsville dam is still predominately sand and gravel, suggesting that the quantity of suspended load in the Black River is minor for this stretch of the river. Downstream from the dam, the river receives only suspended sediment load, creating a sediment starved section of stream. This affects the habitat diversity and natural physical characteristics of the Black River.



Path: G:_Client_Data\HRBRRD\Hawkinsville_dam_MXD\Sediment Location Figure.mxd

Source: ESRI, MMI

A reconnaissance-level investigation of the impoundment showed no significant active, natural erosion of the riverbanks. The system is relatively stable for such a high-gradient river. That said, because the dam is run-of-river, high flows still result in some erosion of the riverbanks. Because the impoundment is very linear and narrow, wind-induced waves and similar erosive forces are negligible.

3.1.1 REMOVAL

Sometimes removing a dam can dramatically affect bank stability and erosion by altering the flow regime in the river. Removing the low-head Hawkinsville dam will result in relatively small changes in water surface elevation; therefore, the risk of bank instability and erosion are minimal. Two locations, however, have some risk of instability after removal (Figure 3-2). The mechanisms for bank instability are the same for both areas. At bends in rivers, the outer bend carries most of the flow, and the inner bend conveys less. This results in a greater potential for scour on the outer bend and accumulation of sediment on the inner bend. Typically, a pool will form on the outer bend, and a point bar will form on the inner bend.

At Area of Concern (AOC) 1 (Figure 3-2), the Black River takes a sharp turn to the west. The slope on the east bank is steep (nearly 1:1), and mature trees anchor the riverbank. If the dam is removed, the water levels will be approximately 4 feet lower, and the water velocities will increase 1 foot per second during a channel-forming flow (i.e., the 2-year reoccurrence interval). Although these changes are small, the new hydraulics could erode the slope, potentially increasing the chance for bank instability. At AOC 2 (Figure 3-2), the river takes a mild bend to the west. The bank slope and anchoring are similar to those at AOC 1. At AOC 2, the water levels will be approximately 5 to 6 feet lower and the water velocities will increase 4.5 feet per second during a channel-forming flow. These changes are more significant and pose a greater risk for bank instability. To help mitigate the risk, the left abutment of the dam will remain in place to deflect erosive flows away from the bank. In both cases, the bank should be monitored after the dam is removed. Potential engineering solutions to improve bank stability include bio-stabilization or rip-rap of the bank slope, if necessary.

FIGURE 3-2. AREAS OF CONCERN FOR BANK INSTABILITY AFTER THE HAWKINSVILLE DAM IS REMOVED

3.1.2 REMEDIATION

The remediation of the Hawkinsville dam will result in no changes in bank stability compared to existing conditions. Erosion near the right abutment will improve after the completion of the augmented earthen embankment.

3.2 WATER AND SEDIMENT QUALITY

The NYSDEC has classified the portion of the Black River near the Hawkinsville dam as a Class C Trout stream (NYSDEC, 2014a). According to the classification system, a Class C quality waterbody is best fit for fishing and is also suitable for primary and secondary contact (swimming and boating). The "Trout" designation indicates that the river is known to provide trout habitat (NYSDEC, 2008). Four streams drain into the Black River in the Hawkinsville impoundment: East Kent Creek (Class C Trout), Cold Brook (Class C Trout), and two unnamed tributaries (both Class C). The impoundment has no documented water quality issues.

Sediment in the impoundment is expected to be clean. The sediment in the impoundment is composed of combinations of sand, silt, gravel, and cobble (Milone & MacBroom, 2012). Some organic sediment is present, but much less than inorganic sediment, which has less capacity to retain contaminants. The organic sediment is typically found along the margins of the impoundment, suggesting that its occurrence is a result of shoreline erosion instead of upstream transport. No documented upstream sources of contaminated sediment are contributing to the Hawkinsville dam impoundment. Previous estimates of sediment volume indicate 52,000 cubic yards of sediment in the impoundment (Milone & MacBroom, 2012). The impoundment has two main deposits of sediment: (1) a deposit directly behind the dam that has accumulated to within a foot or two of the spillway crest, and (2) a deposit spanning the middle portion of the impoundment. Most of the accumulated sediment is less than 2 feet deep (Figure 3-1).

3.2.1 REMOVAL

Removing the dam will require a sediment management plan. The proposed sediment management plan involves removing 610 cubic yards of sediment located directly upstream of the dam. If that sediment is left in place, removing the spillway would cause a rapid influx of sediment to the downstream reaches of the river, potentially causing accretion of sediment on aquatic habitat. Although the accretion would be temporary, it may have deleterious effects on benthic aquatic species. The remaining sediment will be left to redistribute naturally over time as bedload. Removing the dam will increase flow velocities, and thus bed shear, throughout the impoundment and redistribute the accumulated sediments in the downstream direction. Removing the dam during the low-flow season will prevent a sudden downstream flux of sediments from the middle impoundment, because larger sediment particles will not be readily mobilized. No long-term effects on water and sediment quality due to sediment transport are expected after removal because the sediment is expected to be clean.

To confirm the assumption that the sediment is clean, sediment samples will be collected directly upstream of the dam in the area where sediment removal is proposed. The NYSDEC Technical and Operational Guidance Series 5.1.9 (TOGS) provides several methods for determining the number of sediment samples needed for adequate spatial characterization of contamination. The anticipated area that will require dredging extends from the surveyed transect closest to the upstream face of the dam to the spillway across the width of the river. The calculated volume that will require dredging is the average of the sediment depth over this area. Using these dimensions, the TOGS methods recommend collecting four samples. Appropriate sampling procedures will be followed to protect the quality of samples and prevent contamination (NYSDEC, 2004).

A certified testing firm will analyze the samples for the contaminants selected by NYSDEC in the TOGS: polychlorinated biphenyls (PCBs), chlordane, DDT and its metabolites, mercury, dioxin, cadmium, and mirex (NYSDEC, 2004). The watershed contributing to the Black River upstream of the dam is dominated by forest with minimal development; therefore, other contaminants, such as those associated with manufacturing or other industries, are unlikely to be present.

During construction, dredging activities will be monitored as required by the permit. The dredging areas will be inspected routinely to ensure adherence to all permit conditions. Water quality also will be monitored during dredging to prevent negative effects on the Black River outside of the work areas and mixing zone. Sediment samples will be collected well before construction begins to provide time to adjust monitoring strategies if the laboratory analysis indicates measureable contamination. Sediments are anticipated to be of Class A quality, however, and only total suspended solids (TSS) and turbidity are likely to be monitored at locations specified in the permit. All water quality samples collected during construction will be tested by a laboratory approved by the New York State Department of Health and reported to NYSDEC as soon as possible. Any exceedance of the standard for TSS will be corrected, and the cause and corrective action will be reported to the NYSDEC (2004).

Best management practices will be used to limit the downstream transport of sediment. A turbidity curtain will be used downstream of the dam during both phases of construction. The curtain will limit long-term turbidity and will be adjusted as needed during construction. Phase II calls for the use of cofferdams, which will be dewatered to prevent increased turbidity in the river. Water pumped from dewatering areas will be discharged into sediment settling ponds before being allowed to reenter the main river channel.

The area near the dam that is available for riparian disposal of sediments is limited; therefore, dredged material will be disposed of at an off-site location. Excavators will be used to load dredged sediments into trucks that will remove the sediments from the site. Water will be allowed to drain from the trucks back into the coffered working areas before the trucks leave the site. Because the sediments are expected to be Class A quality, sediment effluent will require no treatment other than settling to reduce TSS and turbidity.

3.2.2 REMEDIATION

Remediating the dam will not require removing sediment upstream of the dam. Remediating the dam as proposed will have no permanent effect on water and sediment quality because the dam will remain in place. Construction will include all appropriate sediment and erosion control measures as specified in the NYSDEC's erosion and sediment control standards (NYSDEC, 2005).

3.3 FISHERIES AND WILDLIFE

A variety of wildlife native to New York is found in and around the Hawkinsville dam impoundment. Common mammals include white-tailed deer (*Odocoileus virginianus*), red squirrel (*Sciurus vulgaris*), raccoon (*Procyon lotor*), and porcupine (*Erethizon dorsatum*). Common birds include red-winged blackbird (*Agelaius phoeniceus*), black-capped chickadee (*Parus atricapillus*) and ruffed grouse (*Bonasa umbellus)*. Green frogs (*Rana clamitans*), spring peepers (*Pseudacris crucifer*), and wood frogs (*Lithobates sylvatica*) are also common in this area. Table 3-1 lists all wildlife observed in the vicinity of the dam impoundment during field visits (May 5 through 7, 2014).

The NYSDEC has classified this section of the Black River as a Class C Trout stream and regulates it as a cold water fishery. Much of the information regarding the fish species community in the Black River comes from an extensive survey conducted in 1931 (Greely, 1932). Fishing catches in this section of the Black River include brook trout (*Salvelinus fontinalis)*, brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*), smallmouth bass (*Micropterus dolomieu*), and chain pickerel (*Esox niger*). Although the fish community is maintained mostly through naturally reproducing stocks, trout species are stocked in this reach of the Black River (NYSDEC, 2014b).

TABLE 3-1. LIST OF WILDLIFE OBSERVED DURING FIELD SURVEYS, MAY 5-7

COMMON NAME	SCIENTIFIC NAME
Birds	
red-winged blackbird	*Agelaius phoeniceus*
ruffed grouse	*Bonasa umbellus*
Canada goose	*Branta canadensis*
broad-winged hawk	*Buteo platypterus*
northern flicker	*Colaptes auratus*
blue jay	*Cyanocitta cristata*
yellow-rumped warbler	*Dendroica coronata*
black-throated green warbler	*Dendroica virens*
pileated woodpecker	*Dryocopus pileatus*
dark-eyed junco	*Junco hyemalis*
belted kingfisher	*Megaceryle alcyon*
eastern turkey	*Meleagris gallopavo*
song sparrow	*Melospiza melodia*
black-capped chickadee	*Parus atricapillus*
hairy woodpecker	*Picoides villosus*
common grackle	*Quiscalus quiscula*
kinglet	*Regulus* sp.
eastern phoebe	*Sayornis phoebe*
woodcock (timberdoodle)	*Scolopax minor*
red-breasted nuthatch	*Sitta canadensis*
white-breasted nuthatch	*Sitta carolinensis*
yellow bellied sapsucker	*Sphyrapicus varius*
American goldfinch	*Spinus tristis*
American robin	*Turdus migratorius*
solitary vireo (blue-headed vireo	*Vireo solitarius*
mourning dove	*Zenaida macroura*
white-throated sparrow	*Zonotrichia albicollis*
Mammals	
beaver	*Castor canadensis*
porcupine	*Erethizon dorsatum*
northern hare	*Lepus americanus*
white-tailed deer	*Odocoileus virginianus*
raccoon	*Procyon lotor*
red squirrel	*Sciurus vulgaris*
eastern chipmunk	*Tamias striatus*
Amphibians	
spring peeper	*Pseudacris crucifer*
green frog	*Rana clamitans*
leopard frog	*Lithobates pipiens*

COMMON NAME	SCIENTIFIC NAME
wood frog	*Lithobates sylvatica*
Insects	
water strider	*Gerridae*
spring azure	*Celastrina ladon*

3.3.1 REMOVAL

Removing the dam will restore more natural geomorphic conditions and reestablish in-stream habitat for fish and wildlife by increasing dissolved oxygen concentrations, lowering temperatures, generating sediment movement, and restoring riffle-pool sequences. Removing the dam also will ensure free passage of migrating fish and wildlife.

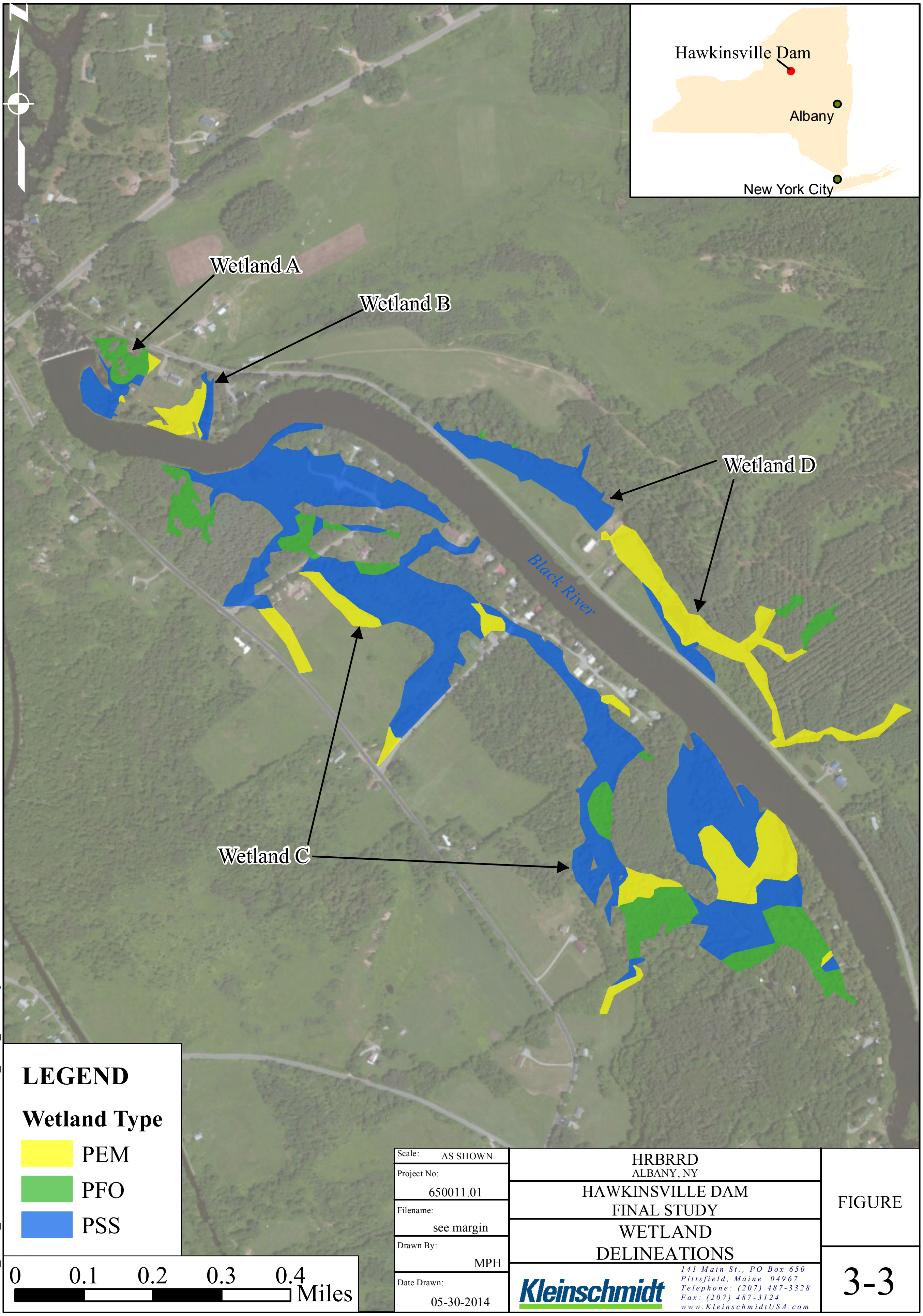
These affects will result in increased habitat diversity that will benefit native species. For example, chain pickerel stocked upstream of the Hawkinsville impoundment in Lake Kayuta many years ago dropped down into the impoundment. The sluggish water and submerged aquatic vegetation created by the Hawkinsville impoundment is the preferred habitat of the chain pickerel and allowed this non-native species to flourish there. Pickerel is an apex predator, and its presence probably affected native trout populations, which the NYSDEC subsequently has had to stock. Once the dam is removed, the trout fishery in the area near the dam is likely to rebound as the pickerel migrate to their preferred habitat elsewhere, relieving predation pressure and competition for prey in the vicinity of the Hawkinsville dam.

3.3.2 REMEDIATION

Remediating the dam as proposed will maintain the existing lentic (i.e., slow water) conditions. Continued sedimentation, nutrient loading, thermal pollution, and lower dissolved oxygen levels may degrade the stream habitat for fish and wildlife. The dam will continue to serve as a barrier to fish and wildlife passage.

3.4 WETLANDS

Wetland delineations were completed using the standard delineation methods described in the 1987 U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual* and the Northcentral and Northeast Regional supplement (USACE, 2012). Delineations were completed May 5 through 7, 2014. The survey area extended approximately 1.3 miles upstream from the dam along the impoundment (Figure 3-3). Appendix D presents the USACE Wetland Determination Data Forms. Wetlands associated with the impoundment include saturated to seasonally flooded palustrine deciduous forested (PFO) wetlands, seasonally flooded palustrine deciduous scrub-shrub (PSS) wetlands, and semi-permanently to seasonally flooded palustrine persistent emergent (PEM) wetlands. Figure 3-3 shows the location of mapped wetlands.



Path: G:_Client_Data\HRBRRD\Hawkinsville_dam_MXD\Figure 3-3 - Wetland Delineations.mxd

Scale: AS SHOWN	HRBRRD ALBANY, NY	FIGURE	
Project No: 650011.01	HAWKINSVILLE DAM FINAL STUDY		
Filename: see margin	WETLAND DELINEATIONS		
Drawn By: MPH		3-3	
Date Drawn: 05-30-2014	Kleinschmidt	141 Main St., PO Box 650 Pittsfield, Maine 04967 Telephone: (207) 487-3328 Fax: (207) 487-3124 www.KleinschmidtUSA.com	

Source: ESRI, KLEINSCHMIDT

The dominant wetland type within the survey area is PSS (Figure 3-4). Dominant shrub species include speckled alder (*Alnus incana*), red osier dogwood (*Cornus cericea*), and meadowsweet (*Spiraea alba*). Common herb-layer vegetation includes lake sedge (*Carex lacustris*), false hellebore (*Veratrum viride*), and jewel weed (*Impatiens capensis*).

FIGURE 3-4. REPRESENTATIVE SCRUB SHRUB WETLAND

Emergent and PFO wetlands are less prevalent but occur throughout the survey area (Figures 3-5 and 3-6). Red spruce (*Picea rubens*) and hemlock (*Tsuga canadensis*) are the dominant species in PFO wetlands. Forested wetlands are primarily of the pit-and-mound configuration with drier microsites. In addition, most woody vegetation (i.e., facultative upland species) displayed morphological adaptation to the presence of a high water table (e.g., raised roots). Cattail (*Typha* sp.), lake sedge (*Carex lacustris*), and tussock sedge (*Carex stricta*) are the dominant species in emergent wetlands. The density of invasive/exotic plants is low throughout the survey area. Table 3-2 lists the flora observed in the vicinity of the dam impoundment.

FIGURE 3-5. REPRESENTATIVE EMERGENT WETLAND

FIGURE 3-6. REPRESENTATIVE FORESTED WETLAND

Wildlife habitat is the principal function of most wetlands in the study area; however, based on the presence of residential and agricultural development, nutrient retention may be a key functional component in some wetland systems. The wetlands directly adjacent to the impoundment and to tributary streams provide flood flow retention and some shoreline sediment stabilization.

TABLE 3-2. LIST OF FLORA OBSERVED DURING FIELD SURVEYS, MAY 5-7

COMMON NAME	SCIENTIFIC NAME
Herb	
marsh marigold	*Caltha palustris*
lake sedge	*Carex lacustris*
tussock sedge	*Carex stricta*
willow herb	*Epilobium*sp.
trout lily	*Erythronium americanum*
jewel weed	*Impatiens capensis*
iris	*Iris sp.*
soft rush	*Juncus effusus*
eastern teaberry	*Gaultheria procumbens*
partridgeberry	*Mitchella repens*
sensitive fern	*Onoclea sensibilis*
cinnamon fern	*Osmundastrum cinnamomeum*
bracken fern	*Pteridium aquilinum*
blackberry	*Rubus sp.*
wool grass	*Scirpus cyperinus*
early meadow rue	*Thalictrum dioicum*
red trilium	*Trillium erectum*
cattail	*Typha sp.*
false hellebore	*Veratrum viride*
Shrub	
speckled alder	*Alnus incana*
silky dogwood	*Cornus amomum*
red oiser dogwood	*Cornus cericea*
hawthorn	*Crataegus sp.*
tatarian honeysuckle*	*Lonocera tatarica*
multiflora rose*	*Rosa multiflora*
willow	*Salix sp.*
elderberry	*Sambucus canadense*
meadowsweet	*Spireaea alba*
nannyberry	*Viburnum lentago*
prickly ash	*Zanthoxylum americanum*
Trees	
balsam fir	*Aibes balsamea*
muscle wood	*Carpinus caroliniana*
green ash	*Fraxinus pennsylvanica*
black spruce	*Picea mariana*
red spruce	*Picea rubens*
white pine	*Pinus strobus*
scotch pine	*Pinus sylvestris*
wild black cherry	*Prunus serotina*
eastern hemlock	*Tsuga canadensis*
American elm	*Ulmus americana*

COMMON NAME	SCIENTIFIC NAME
Moss/ Clubmoss	
shining club moss	*Huperzia lucidula*
tree club moss	*Lycopodium deuterodensum*
sphagnum moss	*Sphagnum sp.*

***Invasive or non-native**

3.4.1 REMOVAL

Removing the dam will lower water levels closest to it approximately 8 feet below the current condition. The wetland adjacent to the dam on the north side of the impoundment (Wetland A in Figure 3-3) receives hydrologic input mainly from stormwater runoff from Edmonds Road. The scrub-shrub area of this wetland may experience lower water levels after dam removal; however, the dominant wetland vegetation present in this area (*Alnus incana*, *Cornus amomum*, and *Cornus cericea*) is able to withstand periods of exposure, and no loss of wetland area is expected. Wetland B (Figure 3-3) is a small PSS/PEM wetland associated with a perennial stream. Removing the dam will not affect the PSS area because the stream feeds this portion of the wetland. The area of PEM is directly adjacent to the impoundment; however, this wetland occurs in a residential yard that is mowed regularly. Although hydric soils are present, no hydrophytic plants occur, and the area is not functioning as a wetland. The wetlands farther upstream on both sides of the impoundment (Wetlands C and D in Figure 3-3) receive hydrologic inputs from groundwater at the base of steeply sloping hillsides, or surface water as overland flow off the contributing terrain, or both. Although the water level will be lower during a portion of the year, many of these wetlands are in basins and are likely to retain groundwater at or near the surface during most of the growing season. The lower water levels resulting from dam removal may affect the southernmost wetlands (Wetland D in Figure 3-3), where water levels may be 0.7 to 2.9 feet lower after dam removal. Wetlands in this area may undergo a change of type. For example, emergent wetlands directly bordering the impoundment may be converted to scrub shrub; however, the existing wetlands will retain hydric soils and hydrophytic vegetation, and the expected ecological change is not necessarily negative.

Temporary impacts on Wetland A are expected during dam removal. Installing the cofferdam may disturb the scrub shrub area directly adjacent to the impoundment; however, following construction, the wetland will be graded and seeded to restore the area as closely as possible to its prior condition. Overall, removing the dam will not result in a significant loss of wetland area or function.

3.4.2 REMEDIATION

Water levels in the impoundment will not change as a result of remediating the dam as proposed; therefore, remediation will not result in a significant change in wetland conditions adjacent to the impoundment. Construction activities, however, will require approximately 0.063 acres of permanent fill adjacent to the existing dam. Temporary impacts on wetlands will be similar to those of the removal alternative.

4.0 CULTURAL RESOURCE EFFECTS

4.1 HISTORY OF PROJECT AREA AND EVALUATION OF SIGNIFICANCE

Hawkinsville, a hamlet on the Black River in the town of Boonville, Oneida County, emerged in the early 1820s. By 1825, early settlers had built a sawmill and a grist mill on the west bank of the river and a low-head, wooden dam across the river to generate power for the mills (Harvey, 2013; Marcucci and Lawrence, 2014). The small village that grew up around those mills quickly became a regional manufacturing center that relied on the forest resources of the region for raw materials and the Black River for power and transportation of a variety of products. The economic decline of the village later in the nineteenth century probably was due in part to the arrival in 1855 of the railroad, which bypassed Hawkinsville (Harvey, 2013).

Despite the decline, a new industry arose in Hawkinsville in 1890 with the opening of an excelsior mill on the west bank of the river. In the early twentieth century, production and export of excelsior (a packing and stuffing material made of finely shredded wood) was a growing industry in the state of New York; only two states surpassed New York's production (Milone & MacBroom, 2012). Walter Brant purchased the entire excelsior operation in 1910 and, in 1915, replaced the original wooden dam with the existing concrete dam in the same location (Harvey, 2013). Synthetic materials gradually replaced excelsior as preferred packing and stuffing, and the Brant Excelsior Company closed in 1966. After the company closed, the factory and outbuildings were razed; the concrete dam, associated intake, and penstock remain intact, except that the intake has been filled (Harvey, 2013).

According to Section 106 of the National Historic Preservation Act (NHPA), four broad criteria (36 CFR Part 60.4) are used to evaluate the significance of a resource and determine its eligibility for the National Register of Historic Places (NRHP). Any resource (building, structure, site, object, or district) may be eligible for the NRHP if it:

A. is associated with events that have made a significant contribution to the broad pattern of history;
B. is associated with the lives of persons significant in the past;
C. embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction; and
D. or has yielded, or is likely to yield, information important to history or prehistory.

A resource may be eligible under one or more of these criteria. Criteria A, B, and C are most frequently applied to historic buildings, structures, objects, non-archaeological sites (e.g., battlefields, natural features, designed landscapes, or cemeteries), or districts. The eligibility of archaeological sites is most frequently considered with respect to Criterion D.

The following sections summarize the results and recommendations of a Phase IA literature review and archaeological assessment of the Hawkinsville dam project area (Marcucci and Lawrence, 2014) and a preliminary assessment of the historic significance of the dam (Harvey 2013). The full reports of those studies are presented in Appendices E and F, respectively.

4.1.1 Archaeological Assessment

For the purpose of the Phase IA assessment, the area of potential effect (APE) for the proposed removal or remediation of Hawkinsville dam was defined as encompassing approximately 8.9 acres along a 1.3-mile segment of the Black River upstream from the Hawkinsville dam. The APE includes the dam, 3.8 acres surrounding the dam, and a 5-meter wide corridor (5.1 acres) along the east and west banks of the river. The Phase IA field reconnaissance team identified a partial concrete foundation interpreted to be the remains of the Brant Excelsior Company and submitted documentation to the Office of Parks, Recreation and Historic Preservation (OPRHP) to record one historic archaeological site (Site 06504.000097). The 1-acre historical site encompasses the dam, water intake, and penstock because of their association with the Brant Excelsior Company (Figure 3 in Appendix F).

The Phase 1A researchers concluded that the potential for historic archaeological resources associated with the documented milling operations in the vicinity of Hawkinsville is high in areas at and downstream of Hawkinsville dam on both sides of the river and recommend Phase 1B fieldwork consisting of close-interval shovel testing at the foundation ruins of the Brant Excelsior Company and on the surrounding slope to define the size and character of the site. The researchers concluded that the potential for prehistoric archaeological resources in the APE is low due to a long history of disturbance in areas that might have supported prehistoric habitation and steep topography that is unsuitable for sustained human habitation in surrounding areas.

4.1.2 Historic Assessment

As a result of a literature review and field assessment, the evaluator found the Hawkinsville dam to have no architectural or engineering features of historical significance. Although excelsior manufacturing outlived other industries in Hawkinsville and was characteristic of the local industrial exploitation of forest resources, the Hawkinsville dam retains only fair integrity as a representation of the historical significance of the Brant Excelsior Company due to the removal of the factory and connecting structures. The evaluator recommends that the dam is not eligible for the NRHP and that the proposed remediation or removal of the dam will not constitute an effect under the NHPA or the New York State Historic Preservation Act.

4.2 Potential Effects of Engineering Options

Given the recommendation that the Hawkinsville dam is not eligible for the NRHP and that neither engineering option will constitute an effect according to the relevant legislation, further discussion of the effects of removing or remediating the dam is limited to assessing the potential for disturbing historic archaeological resources that may be present beneath the surface in the project area. Archaeological shovel testing of the areas of earth disturbance will be necessary to permit either the remediation or removal of the dam. For both alternatives, construction access is the same, and there is no discernible difference in the effects of the two alternatives.

5.0 SOCIOECONOMIC EFFECTS

5.1 AESTHETICS

The Hawkinsville dam spans the entire width of the Black River, creating an impoundment that is approximately 6,340 feet long. The dam raises the surface of the river in the impoundment, and the largest increase in water surface occurs closest to the dam. Because the dam backs up flow in the river, the impoundment is slow moving and calm without whitewater sections, unlike the river upstream of the impoundment and downstream of the dam. The dam creates a waterfall that many observers find pleasing. The NYSDEC (2014) has designated a portion of the Black River many miles upstream of the Hawkinsville dam near the Adirondack Park boundary as a Scenic River. The Black River Trail Scenic Byway, a New York designated Scenic Byway, passes through Boonville New York (New York Department of Transportation, 2014).

5.1.1 REMOVAL

The Hawkinsville dam operates as a run-of-river dam; consequently, the impoundment provides little storage, and the inflow to the impoundment equals the flow that discharges over the dam. Removing the dam, therefore, will have no aesthetic effect downstream of the dam. Likewise, no effects on aesthetics will occur to the river upstream of the impoundment.

The most significant aesthetic effects will occur closest to the dam and will decrease in the upstream direction. After the dam is removed, the water surface elevation directly upstream of the dam will be approximately 8 to 8.5 feet lower than it is currently during the entire year. Approximately 1.3 miles upstream of the dam, the water surface elevation in the Black River will decrease less than 1 foot compared to existing conditions during the entire year. The decreased water surface elevations will be accompanied by increased flow velocities throughout the impoundment, which will create an aesthetic similar to reaches downstream and upstream of the impoundment (i.e. a series of riffles, pools, and runs). Table 5-1 shows the change in water surface elevation at the dam, the mid-point of the impoundment, and the upstream extent of the impoundment for the removal and remediation alternatives. The tables in Appendix G compare the approximate water surfaces and flow velocities for existing conditions and without the dam for various river flows. Appendix H shows a rendering of the site after the Hawkinsville dam is removed. The results in the tables show that as the flow in the Black River increases, the difference between the existing water surface elevation and water surface elevation without the dam decreases.

TABLE 5-1. CHANGES IN WATER SURFACE ELEVATIONS IN THE DAM IMPOUNDMENT FOR REMOVAL OR REMEDIATION

DISTANCE UPSTREAM OF DAM (MILES)	REMOVAL (FEET)	REMEDIATION (FEET)
Spring Flow = 887 cubic feet per second		
1.34	-0.70	0.00
0.78	-3.24	-0.21
0.00	-8.04	-0.23
Summer Flow = 296 cubic feet per second		
1.34	-0.46	-0.09
0.78	-4.31	-0.11
0.00	-8.57	-0.11
Fall Flow = 697 cubic feet per second		
1.34	-0.61	-0.14
0.78	-3.49	-0.18
0.00	-8.17	-0.19
Winter Flow = 520 cubic feet per second		
1.34	-0.54	-0.12
1.25	-2.93	-0.15
0.00	-8.32	-0.16
2-Year Return Flow = 5,765 cubic feet per second		
1.34	-0.72	-0.07
0.78	-1.22	-0.12
0.00	-6.58	-0.21
100-Year Return Flow = 14,300 cubic feet per second		
1.34	-0.36	0.04
0.78	-0.57	0.06
0.00	-3.82	0.15

The structure of the plant community along the shoreline will shift in response to the lower water levels resulting from removing the dam. Riverbanks that have not been exposed since the construction of the dam will once again re-vegetate with plant communities similar to those along the existing shoreline. This change typically occurs within only one growing season because many shoreline plants reach maturity quickly.

Removing the dam will not affect the Black River's Scenic River designation because it occurs too far upstream to be affected by any changes at the dam. Similarly, although the Black River Trail Scenic Byway passes through Boonville, it passes several miles from the dam. The removal will have no downstream effects, and no changes will occur in the Black River at the closest location downstream where the Black River Trail approaches the river, east of Talcottville, NY.

5.1.2 Remediation

Remediating the dam as proposed will leave the impoundment in a condition similar to its existing state. The spillway crest elevation will not change; therefore, the water levels in the impoundment will be similar. The water surface elevations will be slightly lower because the proposed dam remediation will increase the width over which flow can discharge. The dam itself will appear more aesthetically pleasing because the right embankment will be repaired, and the dilapidated intake structure will be removed.

Remediating the dam will not affect the Black River's Scenic River designation because it occurs too far upstream to be affected by any changes at the dam. Remediation will not affect aesthetics along the Black River Trail Scenic Byway because the impoundment will remain unchanged.

5.2 Infrastructure

The area surrounding the Hawkinsville dam has relatively little infrastructure since the removal of the mill complex. According to National Land Cover Database, less than 1 percent of the land in the watershed is considered developed, and more than 90 percent is forested. Infrastructure within the potential area of effect includes stormwater outfalls, private residences, private drinking wells, and roads. The stormwater outfalls located in the potential area of effect were designed based upon the existing elevation of the river impoundment. Similarly, the drinking water wells near the impoundment are influenced by the water surface elevation in the impoundment, which interacts with the groundwater table. According to the *Oneida County Soil and Water Conservation District Hazard Mitigation Plan* (2013), the top two mitigation strategies for the Town of Boonville are addressing the flooding issues on Edmonds Road and ensuring the safety of Hawkinsville dam.

5.2.1 Removal

Removing the dam may affect stormwater outfalls and private drinking wells adjacent to the river. Both types of infrastructure function based upon the existing, typical water surface elevation in the impoundment. Discharge from stormwater outfalls that currently falls directly into the river may affect unarmored shoreline after the removal, which may lead to erosion. If erosion occurs, rip-rap armoring will need to be installed to provide adequate stabilization. Removing the dam may slightly lower the ground water table adjacent to the impoundment. Shallow, privately owned drinking wells adjacent to the impoundment may experience a minor loss in yield. A more detailed analysis may be required to determine the significance of this effect; however, the probability of significant groundwater effects is very small.

Removing the dam will reduce the effects of flooding on road infrastructure, particularly along Edmonds Road in Boonville. Water surface elevations in the impoundment after removal will be several feet lower during high flow events, decreasing the likelihood that Edmonds Road and other roads will experience flood damage.

5.2.2 Remediation

Remediating the dam as proposed may affect stormwater outfalls discharging into the impoundment. Remediating the dam will raise the right embankment and, similarly, the water surface in the river during high flow events. Increased water surfaces may submerge stormwater outfalls, backing up flow and creating surcharges in the stormwater pipes.

Remediating the dam may alleviate flooding of infrastructure along Edmonds Road. The right embankment, which connects the right abutment of the dam to the gravel parking lot east of the dam, will be raised to elevation 1,050 feet (Appendix B, Remediation Drawing Sheet 2). This will be 1 foot higher than the 100-year-flood elevation at the dam, and the new embankment will prevent floodwaters from inundating Edmonds Road at low points near the Hawkinsville Road Bridge.

The potential for redeveloping the Hawkinsville dam to generate electricity was studied previously (Trenton Falls Hydroelectric Co., 1995). Trenton Falls Hydroelectric Co. determined that the site hydrology would allow the maximum sized plant (475 kW) to operate at full capacity during only 20 percent of the year, and the facility would not be able to operate during 15 percent of the year. In addition to dam rehabilitation to accommodate a powerhouse, installing hydroelectric development would require constructing a substation and obtaining a permit exemption from the Federal Energy Regulatory Commission (FERC). The estimated cost of the project in 1995 was $2.5 million (Trenton Falls Hydroelectric Co., 1995). Development of hydroelectric generation at the Hawkinsville dam is cost prohibitive and has a long return on investment, making hydroelectric development undesirable.

5.3 RECREATION

The NYSDEC (2014) designated a portion of the Black River upstream of Hawkinsville dam, and 6.6 miles downstream of the North Lake outlet, as a Recreational River. Although the dam impoundment does not have this designation, recreational activities such as fishing and boating are very popular near the Hawkinsville dam. The 13-mile reach of the Black River between Forestport and Denley dam is a popular place for anglers to fish for brook trout, rainbow trout, rock bass, and smallmouth bass and offers numerous access points, including the state-owned boat launch immediately upstream of the Hawkinsville dam. NYSDEC stocks this reach with trout annually, and a naturally reproducing population of brook trout has been reported. Boating in the Hawkinsville impoundment is popular for flatwater vessels during much of the year. During high flows, the Black River provides significant whitewater boating opportunities below the dam with numerous Class 2 to 4 rapids between the Hawkinsville Road and Norton Road bridges.

5.3.1 REMOVAL

Removing the dam will affect the fishing and boating opportunities in the area. The decrease in water levels will diversify the habitat near the dam and is likely to improve trout fishing. Trout are athletic swimmers that are well-suited to exploit the riffle-pool-run habitat that will surface after the dam is removed. The method of fishing probably will change after dam removal because low flows during the summer will not be conducive to float trips, which will limit fishing access to wading. During the spring and fall months, float trips will remain a popular fishing activity in the river, as will wading.

Bathymetric data in the impoundment indicate steep gradients at the beginning of the impoundment and where the dam is located; these are likely to result in whitewater boating opportunities after the dam is removed. New rapids will improve the already significant whitewater kayaking and canoeing in the area; however, for flatwater paddlers, boating opportunities will be relegated to small pool habitats and the Denley dam and Forestport reservoirs downstream and upstream from the existing impoundment.

5.3.2 Remediation

Remediating the dam will not affect the existing recreational opportunities near the dam.

5.4 Public Safety

The Hawkinsville dam poses a limited risk for public safety. The dam is open to the public, and no fences surround the property. A short length of chain link fence with appropriate signage prevents access to the intake structure. Given the easy access to the dam structure, visitors risk falling when walking on the dam or when boating if they ignore signage.

Flow over low-head dams, such as Hawkinsville, can produce a turbulent hydraulic phenomenon called rollers downstream of the dam. Rollers create reverse flow that can trap and submerge floating objects, including swimmers, by pulling them back to the base of the dam (Wright et al., 2012). Due to the rock outcroppings at the toe of the Hawkinsville dam, however, rollers will form only during flows high enough to submerge the toe adequately. No reported drownings have occurred at the Hawkinsville dam.[1] As mentioned in previous sections, the dam floods the Edmonds Road during high flow events, which may endanger motorists and nearby residents.

5.4.1 Removal

Removing the dam will eliminate public safety concerns associated with pedestrians or boaters falling over the dam. Removing the dam also will eliminate the threat of rollers because the resulting typical river hydraulics will not produce the phenomenon. Removing the dam will decrease the probability of public safety risks related to flooding.

[1] Robert Foltan, Chief Engineer, Hudson River-Black River Regulating District, personal communication, 5/14/14.

5.4.2 REMEDIATION

Remediating the dam as proposed will affect public safety at the dam. The existing fence at the intake structure will be replaced and improved with a new fence to prevent public access. The dam will remain in place; the risk that swimmers or boats may go over the dam will remain. The proposed remediation will create an additional risk of impingement if the low-level gate is open; the operator will have to monitor for this risk. Remediating the dam will improve the right embankment and increase the capacity of the dam to pass high flows. The risk of flooding of Edmonds Road during high flow events will be decreased as a result of improved dam discharge capacity.

6.0 REGULATORY PERMISSIONS

Kleinschmidt met with NYSDEC personnel on December 2, 2013, to determine the requirements necessary for dam removal or remediation. All permits require a Joint Application for Permit submitted to the NYSDEC Regional Permit Administrator in the regional offices serving the dam. During the pre-application meeting, NYSDEC specified that a sampling plan must be developed in accordance with the *Technical and Operation Guidance Series (TOGS) 5.1.9: In-Water and Riparian Management of Sediment and Dredged Material* (NYSDEC, 2004) in order to qualify for the permit required to remove in-stream sediment.

6.1 LOCAL

6.1.1 REMOVAL

A Local Floodplain Development permit may be required for dam removal. The local floodplain administrator will review the application to determine whether the proposed removal will result in physical damage of local property, such as stream bank erosion and increased flood velocities.

6.1.2 REMEDIATION

The remediation option may also require a Local Floodplain Development permit.

6.2 STATE

6.2.1 REMOVAL

Under the NYSDEC's Use and Protection of Waters Law, requirements of 6 NYCRR Part 608, apply to the dam removal. Specifically, Part 608.2(a) is required because removing the dam will change a protected stream and disturb the stream bank. A Dam Safety permit, also issued under 6NYCRR Part 608, will be required to remove the dam. The NYSDEC will also require a Freshwater Wetland permit under the 6 NYCRR Part 633 rules. Under these rules, the NYSDEC regulates freshwater wetlands that are 12.4 acres and larger and are within 100 feet of the regulated area. State Environmental Quality Review Act (SEQRA) requirements of NYCRR Part 617 must be completed on all projects requiring state permits. Under SEQRA, an action is reviewed by agencies to determine whether there are significant adverse impacts on the environment as a result of the action. Type I actions will require preparation of an Environmental Impact Statement (EIS), whereas a Type II action does not require preparation of an EIS. Dam removal is an unlisted action that may require submission of an Environmental Assessment Form (EAF). If the review agency deems the action will result in a significant adverse impact on the environment (Type 1), an EIS will need to be prepared. In addition to the NYSDEC permits, a permit may be required under the Wild, Scenic and Recreational Rivers Act to address changes in land or uses in the channel and area within 1/2 mile of the river.

6.2.2 REMEDIATION

Remediating the dam will require a permit under the 6 NYCRR Part 608.5 of the Use and Protection of Waters Law in order to place permanent fill in an adjacent wetland. A Freshwater Wetland permit may not be necessary because the permanent fill will be placed in a wetland of less than 12.4 acres. Under SEQRA, the remediation option may be deemed a Type II action as a, in kind, replacement, rehabilitation or reconstruction action (617.5(c)(2)). Therefore, preparation of an EAF or EIS is unlikely. The remediation option may also require a review of the effect of construction under the Wild, Scenic and Recreational Rivers Act.

6.3 FEDERAL

6.3.1 REMOVAL

A Joint Application for Permit submitted to the NYSDEC is required to obtain all necessary federal permits. Dam removal will require a Clean Water Act (CWA) Section 404 Dredge and Fill Permit from the U.S. Army Corps of Engineers (USACE) in order to dredge the accumulated sediment behind the dam and for effects on the wetlands east of the dam. Along with USACE permit, a National Environmental Policy Act (NEPA) Review probably will be necessary to examine the environmental effect of removing the dam (Lindloff and Wildman, 2006). Boonville and the Hawkinsville dam are in USACE Region 6 of New York, and the USACE Buffalo District will administer permits (NYSDEC, no date).

The Black River at the Hawkinsville dam is regulated as Zone A of the Federal Emergency Management Agency's (FEMA) Flood Insurance Program; therefore, it does not have a 100-year-flood elevation provided by FEMA, but the construction must not increase damages that would result due to a flood (FEMA, 1995).

6.3.2 REMEDIATION

Remediating the dam as proposed will require a CWA Section 404 Dredge and Fill Permit from the USACE because the modified right embankment will fill existing wetland area east of the dam. Along with USACE permit, a National Environmental Policy Act (NEPA) Review probably will be necessary to examine the environmental impact of dam removal (Lindloff and Wildman, 2006).

The Black River at the Hawkinsville dam is regulated as Zone A of the FEMA Flood Insurance Program; therefore, it does not have a 100-year-flood elevation provided by FEMA, but the construction must not increase damages that would result due to a flood (FEMA, 1995). The 100-year-flood elevation will increase as a result of remediation (Table 5-1), but the modified right embankment will reduce the risk of damage due to flooding. Consultation with FEMA will be required to obtain approval of the proposed remediation if it is selected as the preferred alternative.

7.0 SUMMARY

Both removal and remediation are feasible options that will ensure that the Hawkinsville dam complies with NYSDEC regulations. Removing the dam will return the impoundment to a state resembling the Black River downstream of the dam. Remediating the dam will replace the historical intake structure with a longer spillway and a low-level gate, and will improve the earthen embankment to the right of the dam. Conditions in the impoundment will remain nearly the same as the existing conditions. The alternatives, however, have different implications for various resources near the dam. Table 7-1 is a decision matrix comparing the engineering alternatives.

TABLE 7-1. COMPARISON OF ENGINEERING ALTERNATIVES FOR THE HAWKINSVILLE DAM

ENGINEERING ALTERNATIVE	PROS	CONS
REMOVAL	▪ Complies with NYSDEC regulations ▪ Restored fish passage ▪ Improved and diversified wildlife habitat ▪ Restored river geomorphology ▪ Lower elevations in current impoundment during flood flows ▪ Reduced likelihood of Edmonds Road flooding ▪ Improved fishing and whitewater boating recreation near dam ▪ No public safety concerns	▪ Increased sediment management requirements ▪ Bank stability concerns ▪ Decreased water levels near dam ▪ Potential effects on local infrastructure (i.e., stormwater outfalls and private drinking wells) ▪ More regulatory permissions ▪ Higher construction costs
REMEDIATION	▪ Complies with NYSDEC regulations ▪ No sediment and water quality effects ▪ More aesthetically pleasing dam structure ▪ Reduced likelihood of flooding of Edmonds Road ▪ Fewer regulatory permissions ▪ Lower construction costs	▪ Fish passage remains impeded ▪ Slightly higher elevations in impoundment during flood flows ▪ Potential effects on local infrastructure (i.e., stormwater outfalls) ▪ Public safety concerns remain ▪ Additional life cycle costs ▪ Long-term operation and maintenance

Removing the dam will produce greater effects on natural resources. Water levels will not change significantly after dam removal along most of the impoundment, but bank stability may be affected in two areas. Removing the dam will result in the redistribution of sediments downstream; however, water and sediment quality will not be affected because the sediment is expected to be clean. Removal will restore more natural geomorphic conditions and reestablish fish passage between the upstream and downstream of the dam. Removal may also result in a change in type of some wetlands (i.e., PEM converts to PSS), but no loss of wetland area or functions and services is expected. By comparison, remediating the dam will result in no change in bank stability, water and sediment quality, impediments to fish passage, and wetland type.

Both engineering alternatives will also affect cultural and socioeconomic resources. The dam is not eligible for the NRHP, and neither alternative will affect historic resources. Both alternatives will require further archaeological investigation to determine whether there are archaeological resources at the site. Aesthetically, dam removal will have the greatest effects close to the dam, and the impoundment will resemble the river downstream of the dam after removal. Remediation will have no discernible effect on the impoundment, and remediation will improve the appearance of the dam. Dam removal may adversely affect local infrastructure, such as stormwater outfalls and private drinking wells, but it will also reduce flooding of Edmonds Road. Remediation may also adversely affect stormwater outfalls but will reduce flooding of Edmonds Road. Removing the dam will improve recreation opportunities near the dam and eliminate all public safety concerns associated with the dam; remediation will perpetuate the existing recreational opportunities and public safety issues.

Both alternatives will require similar regulatory permissions from local, state, and federal regulating bodies, but dam removal will require additional federal permitting to dredge the sediment upstream of the dam.

8.0 REFERENCES

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APPENDIX A

DAM STABILITY ANALYSIS

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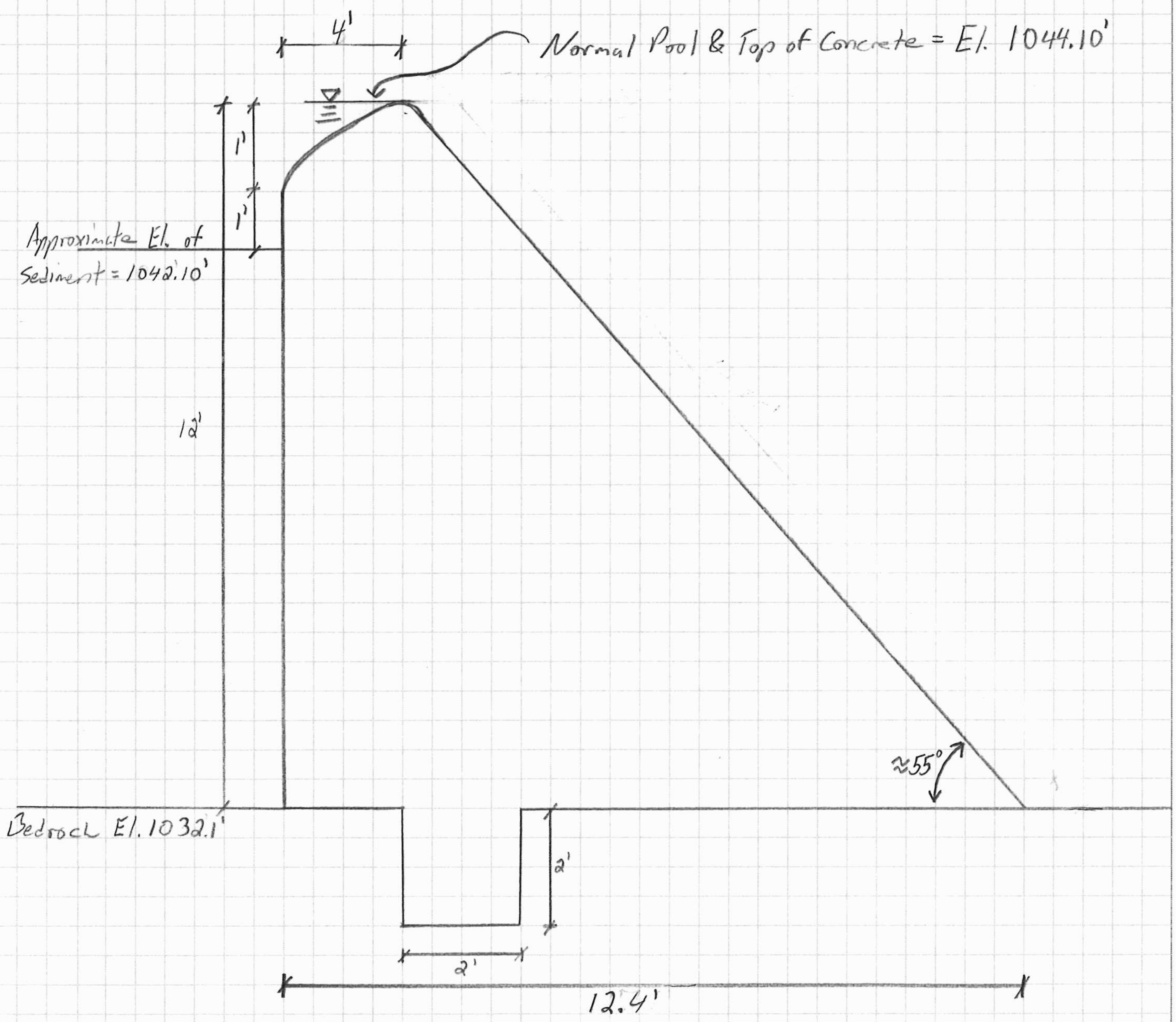
Project No.: 0650-011

Project: Harkinsville Final Study & Design

By: NMC Date: 04/15/14

Subject: Spillway Stability Analysis

Checked: JLD Date: 04/21/14



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By: NMC Date: 04/15/14

Subject: Spillway Stability Analysis

Checked: JLD Date: 04/21/14

References:
1) June 21st, 1915 Dam Inspection Report, New York Conservation Commission
2) May 2nd, 1995 Initial Consultation Document Hawkinsville Dam Hydroelectric Power Plant
3) April, 2006 Hydrologic and Hydraulic Study, Gomez and Sullivan Engineers.
4) March 12th, 2012 Assessment of the Hawkinsville Dam on the Black River, Milone & MacBroom, Inc.
5) ACI 318-11 "Building Code Requirements for Structural Concrete"
6) November, 2013 Site Survey Data, Shumaker Consulting Engineers

Assumptions: Elevations ⇒
- Bedrock El. = 1032.1'
- Sediment El. = 1042.1' (U/S)
- Top of Spillway El. = 1044.1'
- Load Case 1 Water El. = 1044.1'
- Load Case 2 Water El. = 1044.1
- Load Case 3 Water El. = 1049.0'
- Load Case 4 Water El. = 1044.1'

Densities ⇒ $\gamma_{concrete} = 150$ pcf (Assumed)

$\gamma_{water} = 62.4$ pcf

$\gamma_{soil} = 120$ pcf (Assumed) (Saturated)

Spillway Dimensions ⇒ Base Width = 12.4'

Height = 12'

Key Width = 2'

Key Height = 2'

Ogee Type Spillway w/ 4' Wide x 1' Tall Entry Curve to Ogee. 11' High Vertical Upstream Face to Bedrock. Downstream Ogee Face at 55° Off the Horizontal.

Concrete on Rock Friction Factor ⇒ $F_s = 1.0$ (Assumed) (Favorable Dip + Strike)

Friction Angle for Sediment ⇒ $\phi = 35°$ (Assumed)

"At Rest" Soil Pressure ⇒ $K_0 = 1 - \sin(\phi)$

$\gamma_{soil(sat)} - \gamma_{water} = \gamma_{soil(Dry)}$ $K_0 = 0.426$

$120 - 62.4 = \underline{57.6\text{pcf}}$ $K_0 \cdot \gamma_{soil(Dry)}$

$0.426 \cdot 57.6 = \underline{24.54\text{ pcf}}$

Cohesion: 0 psi (Assumed)

Dam Founded on Bedrock

Check Shear Key Capacity against sliding. Shear key dimensions determined from Ref 1.

Shear Strength ⇒ Concrete (Per ACI 318-11, Equation 22-9)

$V_c = \frac{4}{3} \cdot \lambda \sqrt{f'_c} \cdot b_w \cdot h$

$\lambda = 1.0$ (Normal Concrete)

$f'_c = 2{,}000$ psi (Assumed)

$b_w = 12$ in.

$h = 24$ in

$V_c = \frac{4}{3} \cdot 1 \cdot \sqrt{2{,}000} \cdot 12 \cdot 24 = 17{,}173$ lbs, or 17.17 kips

$\phi = 0.6$

$\phi \cdot V_c = 10.3$ kips ⇒ Added to sliding resistance of dam.

Load Cases: per New York State DEC Guidelines for Design of Dams, January, 1989.

Load Case 1 ⇒ Normal Pool Conditions

Load Case 2 ⇒ Normal Pond w/ Ice Conditions = 5,000 lbs/ft @ N.P.

Load Case 3 ⇒ Flood Loading = 150% of 100 yr Flood (T.W. Conservatively Ignored)

Load Case 4 ⇒ Normal Pool plus Earthquake Conditions.

Earthquake Intensity, $P_I = \alpha \cdot W_{Block}$ ⇒ $\alpha = 0.11$ (USGS Seismic Hazards) See attached, $W_{Block} = 100.4\ ft^2 \cdot 150\ pcf$ (Area of Structure)

$W_{Block} = 15{,}060$ lb/ft

$P_I = 0.11 \cdot 15{,}060 = 1{,}657$ lb/ft

Earthquake Intensity Resultant, R_I = Vertical height to center of gravity of structure

Ref 8 (See below)

pg. 300 $R_I = \frac{A_i d_i}{A_T}$

$R_I = \frac{(12.4 \times 12/2) \times 4 + (4 \times 11)(5.5) + (4 \times 1/2)(11.33) + (2 \times 2)(-1)}{74.4 + 44 + 2 + 4}$

$R_I = \frac{558.26}{124.4} = 4.49 \text{ ft}$

Additional Water Pressure due to Earthquake

$P_{WP} = \frac{2}{3} \cdot C_e \cdot \alpha \cdot h_2^2 \Rightarrow C_e$ = Pressure Coefficient = 52, h_2 = height of dam

↑ pg. 332 (Ref 8)

$P_{WP} = \frac{2}{3} \cdot 52 \cdot 0.11 \cdot 12^2 = 549.12 \text{ lb/ft}$

Water Pressure Resultant

$R_{WP} = \frac{2}{5} \cdot h_2 = \frac{2}{5} \cdot 12 = 4.8 \text{ ft}$

Reference 7, "Guidelines for Design of Dams", NY DEC, January 1985, Revised January 1989.
Ref 7 has been added to the end of the calculation package.
Reference 8, "Hydroelectric Handbook", William Creager & Joel Justin, 1950, Second Edition.

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY

HAWKINSVILLE DAM REMOVAL

EXISTING SITE PLAN

No.	Revision	Date	Drawn	Checked
-	-	-	-	-

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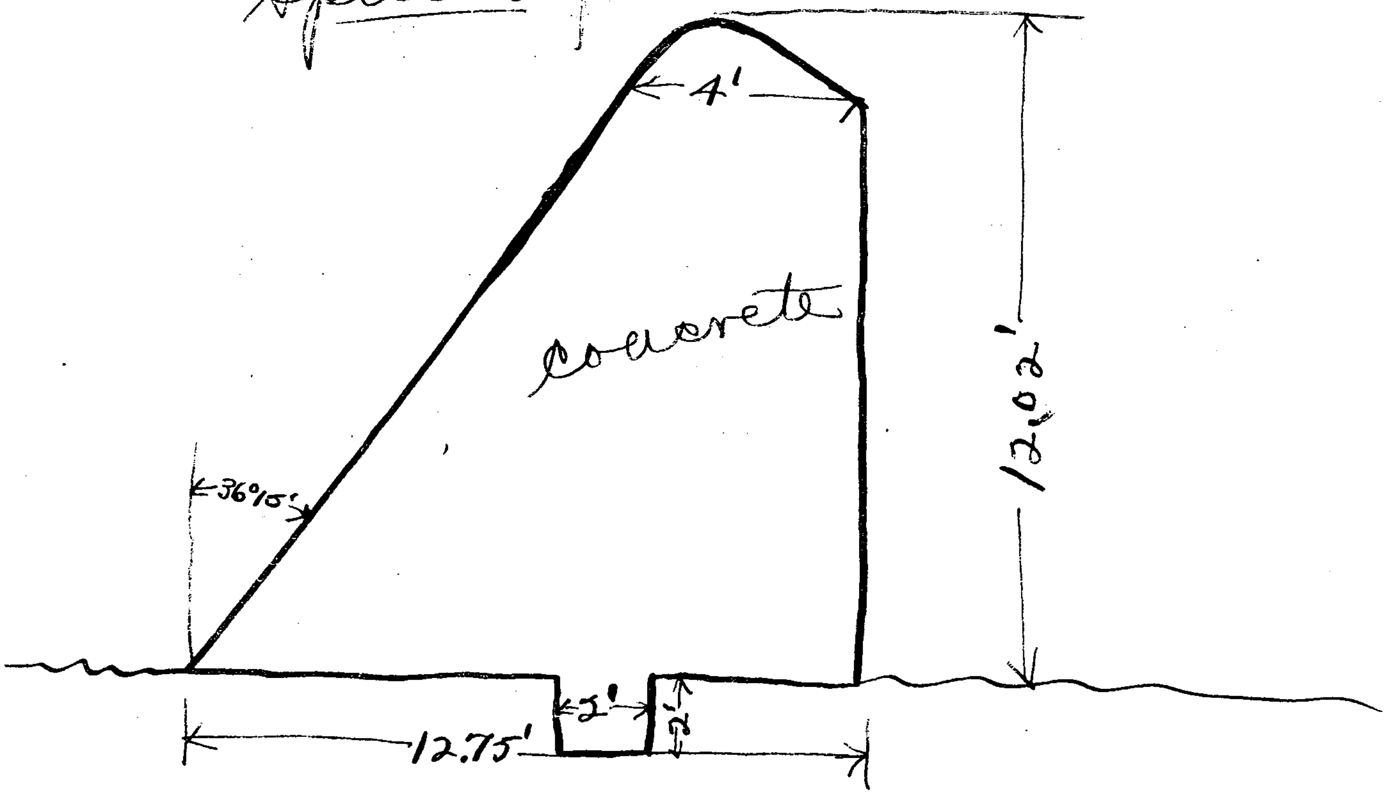
Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	BAL	650-011	04-02-14	1

Reference 1

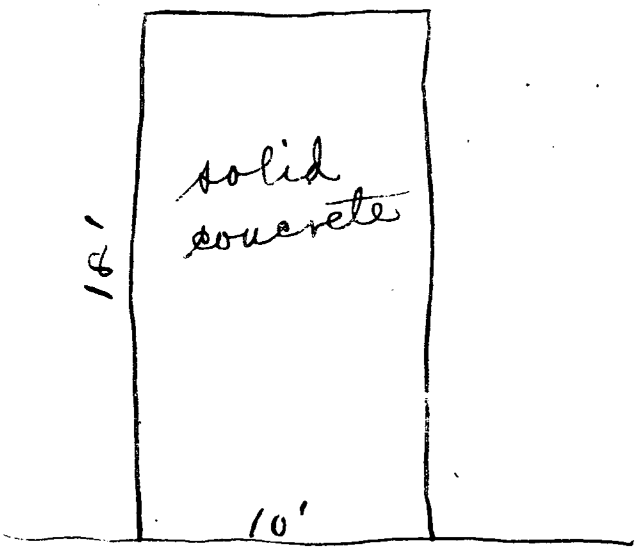
(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)

Spillway

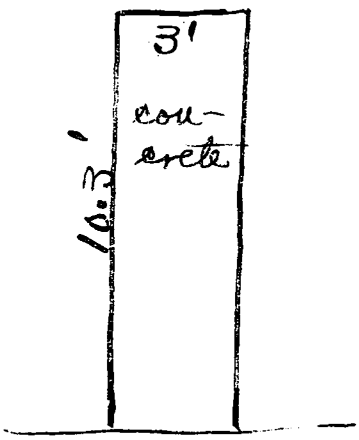


(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)

Abutment wall at left bank



Wing wall at right bank



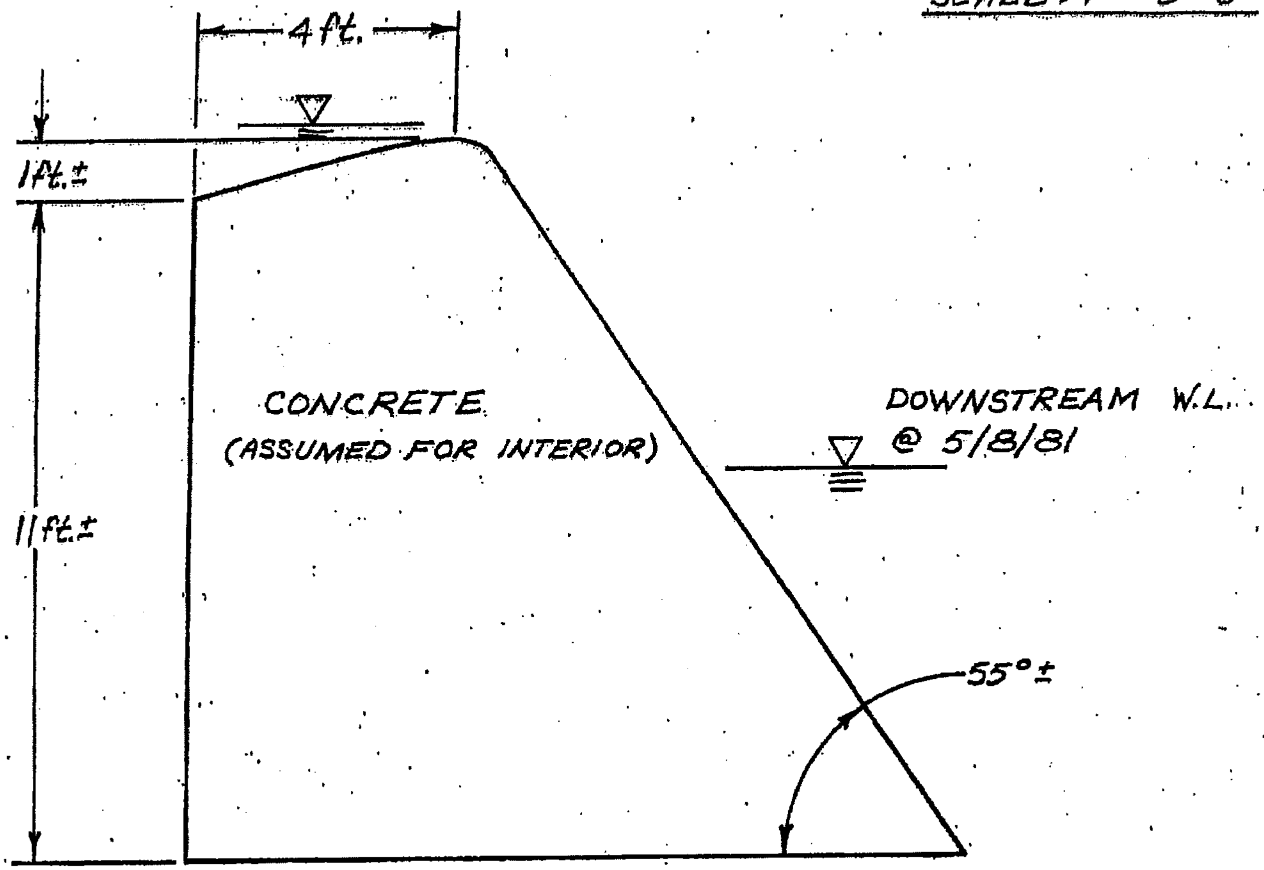
Reference 2

PROJECT NAME HAWKINSVILLE DAM, TOWN OF BOONVILLE DATE 6/11/81

SUBJECT DAM SECTION - BASED ON FIELD MEASUREMENTS PROJECT NO.

DRAWN BY D.F.M.

SCALE: 1" = 3'-0"

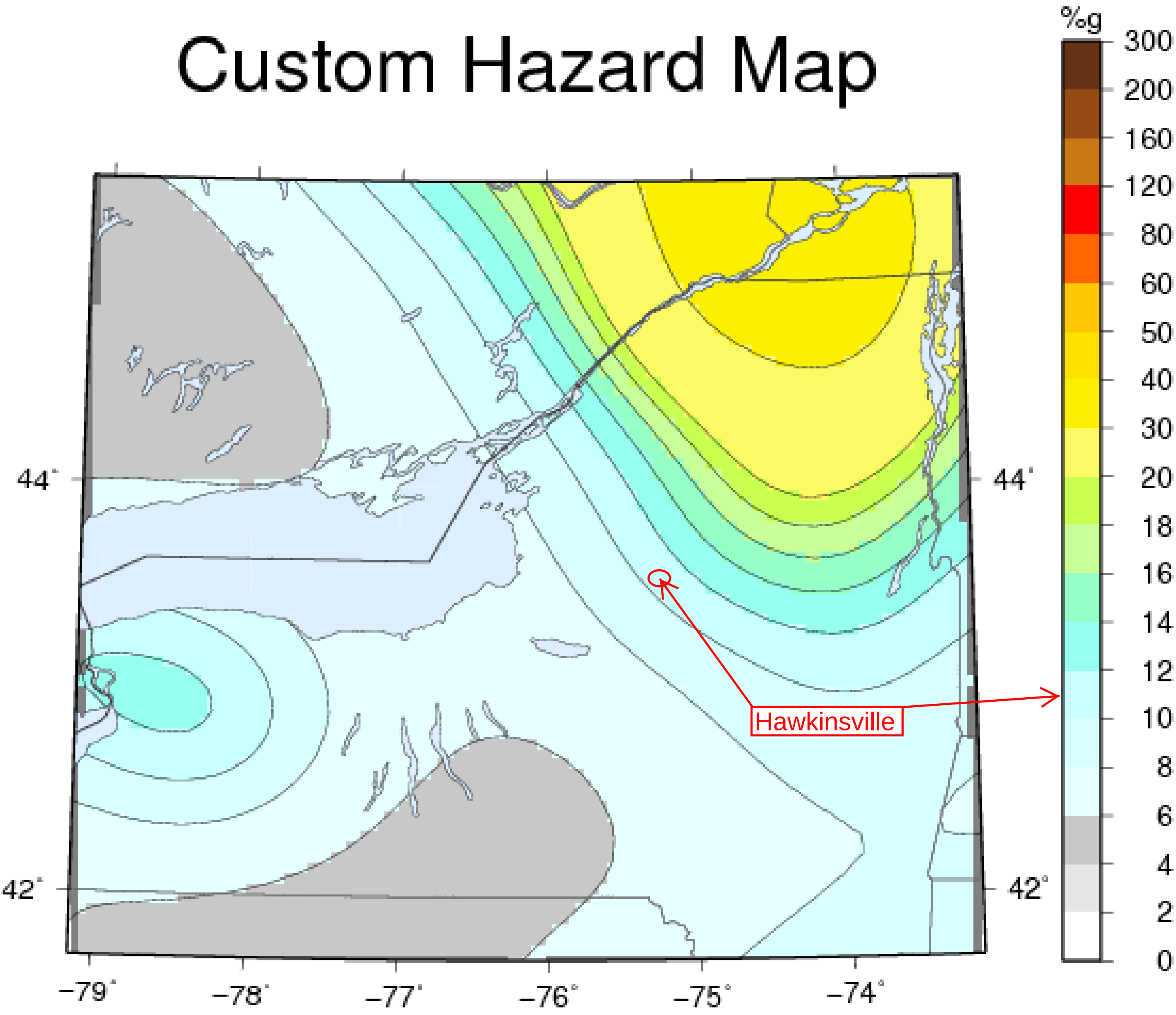


NOTE: DAM SECTION SHOWN IS BASED UPON FIELD MEASUREMENTS AT THE TIME OF A FIELD INSPECTION, 5/8/81. HEIGHT OF DAM APPEARS TO VARY, AS INFLUENCED BY ELEVATION OF FOUNDATION ROCK. SECTION SHOWN REPRESENTS MAXIMUM HEIGHT. ENTIRE DAM FUNCTIONS AS A SPILLWAY.

Figure From New York District Corps of Engineers. *Phase 1 Inspection Report, National Dam Safety Program.* Hawkinsville Dam, New York. August 1981.

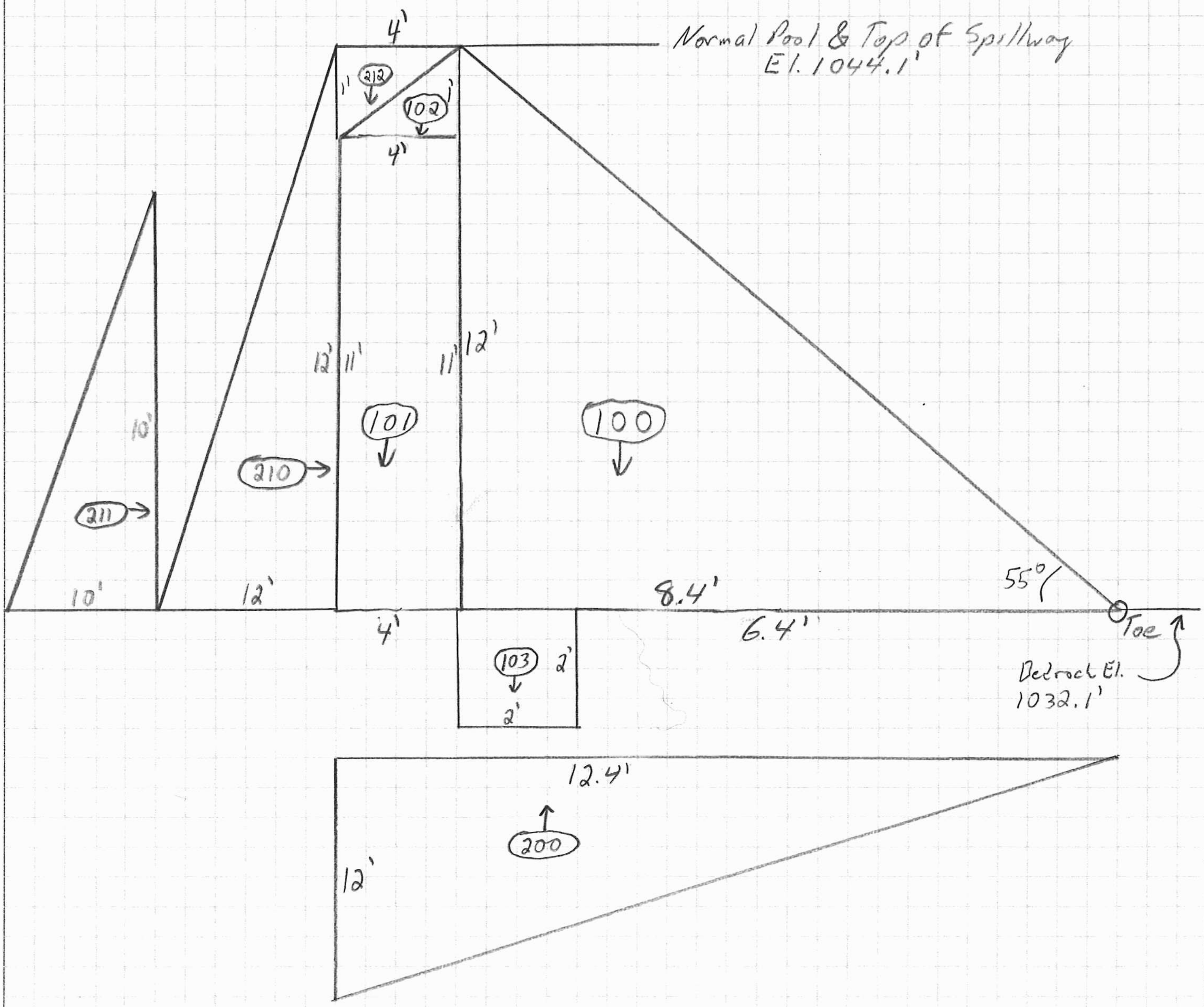
Figure 2b

Custom Hazard Map



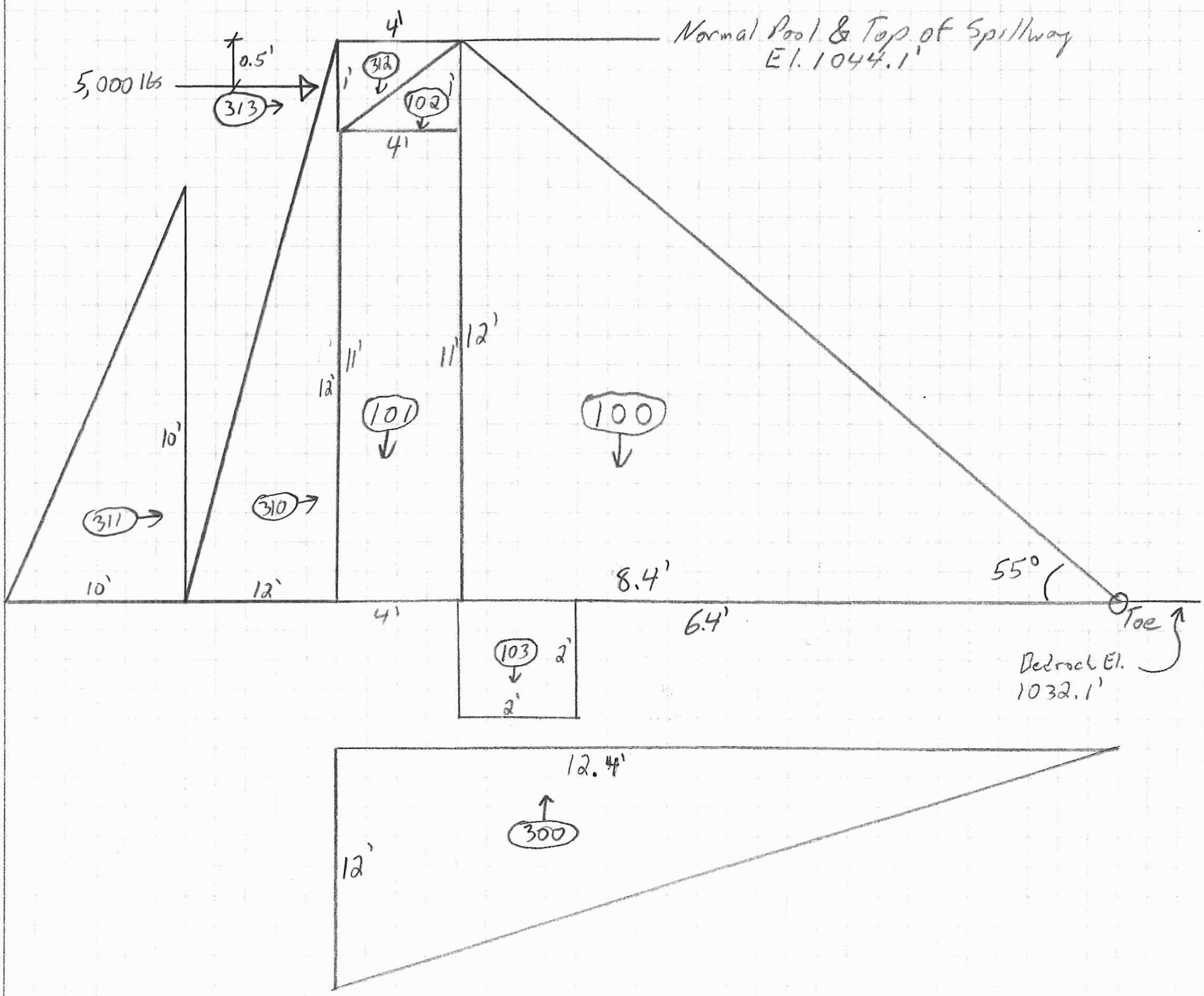
Peak Ground Acceleration

Load Case 1 : Normal Pool Conditions

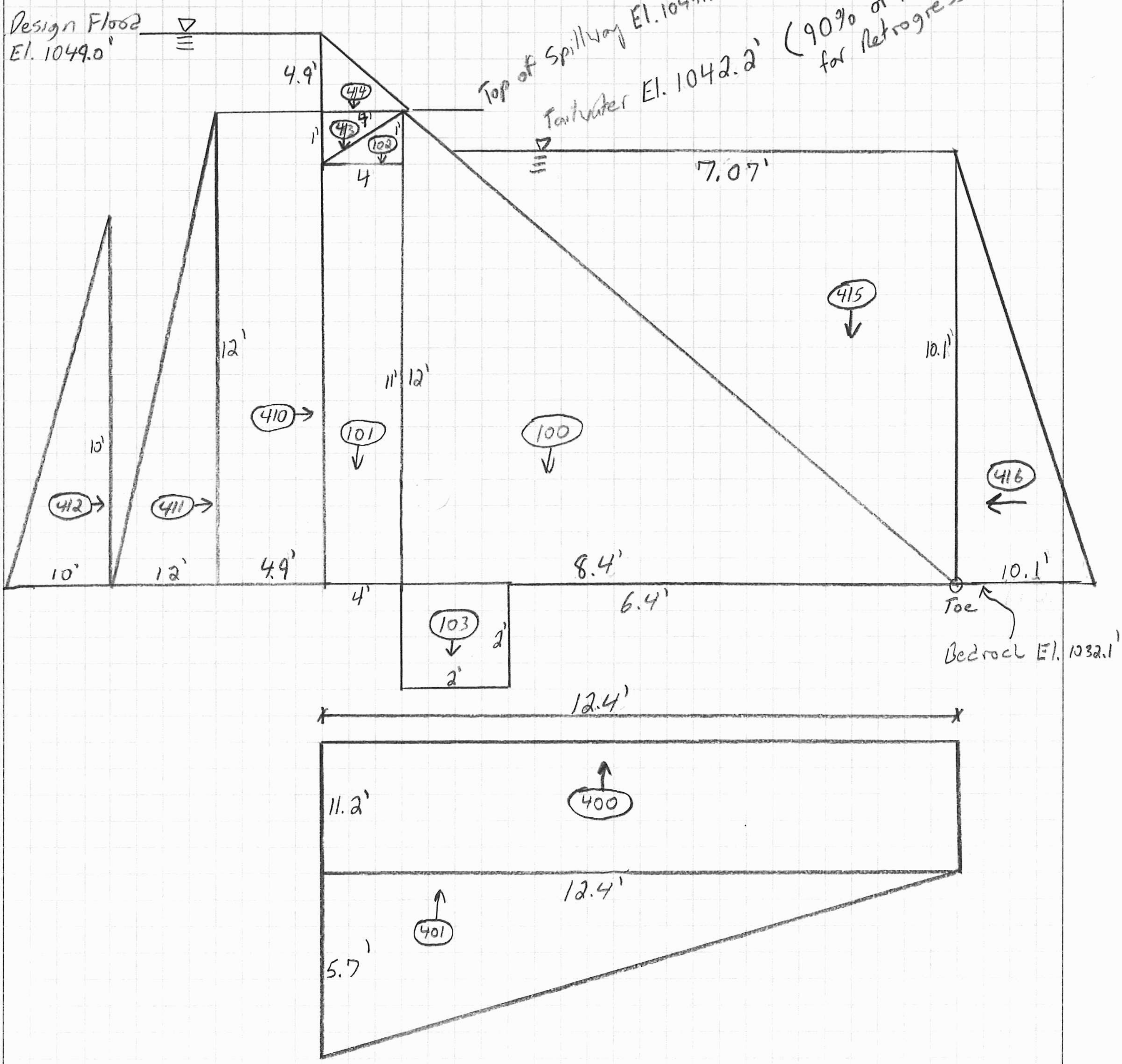


Load Case 2: Ice Loading Conditions

- Assumed 1 ft thick Ice Sheet
- Ignored advantage of sloped concrete



Load Case 3: Spillway Design Flood Conditions



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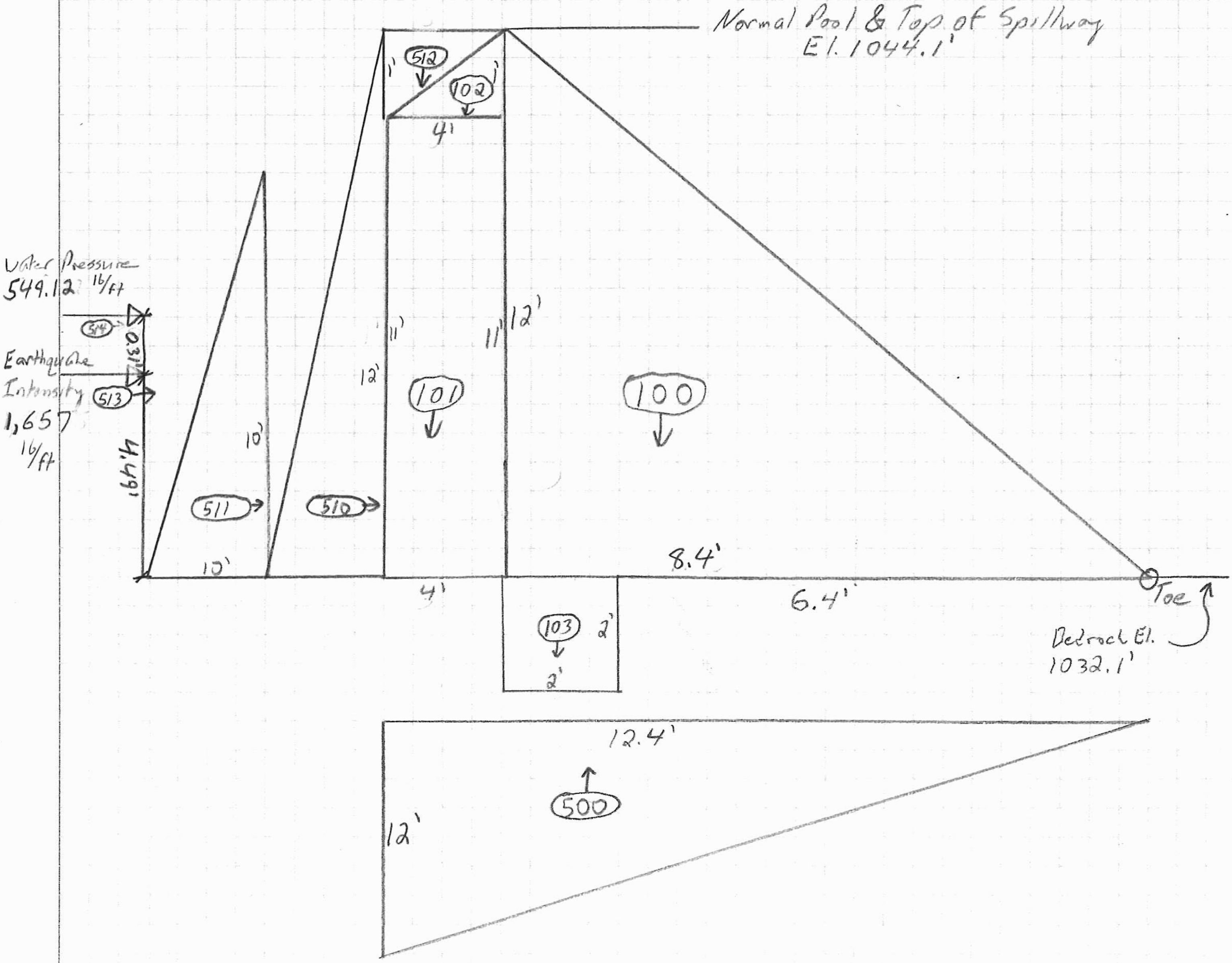
Project:	Hawkinsville Final Study & Design	Project No.:	0650-011
		By: NMC	Date: 04/15/14
Subject:	Spillway Stability Analysis	Checked: JLD	Date: 04/21/14

Load Case 4: Earthquake Load Conditions



New York State

DEC

Division of Water

Guidelines for Design of Dams

January 1985
Revised January 1989

New York State Department of Environmental Conservation

George E. Pataki, *Governor*   John P. Cahill, *Commissioner*

c. Brush obscures the surface limiting visual inspection, provides a haven for burrowing animals and retards growth for grass vegetation.

Stumps of cut trees should be removed so grass vegetation can be established and the surface mowed. Stumps should be removed either by pulling or with machines that grind them down. All woody material should be removed to about 6 inches below the ground surface. The cavity should be filled with well compacted soil and grass vegetation established.

9.4.2 Grass Vegetation

Grass vegetation is an effective and inexpensive way to prevent erosion of embankment surfaces. It also enhances the appearance of the dam and provides a surface that can be easily inspected.

10.0 STRUCTURAL STABILITY CRITERIA FOR GRAVITY DAMS

10.1 Application

These guidelines are to be used for the structural stability analysis of concrete and/or masonry sections which form the spillway or non-overflow section of gravity dams.

These guidelines are based on the "Gravity Method of Stress and Stability Analysis" as indicated in Reference 13.

If the gravity dam has keyed or grouted transverse contraction joints, then the "Trial-Load Twist Method of Analysis" (Reference 13) may be used for the stability analysis.

Elastic techniques, such as the finite element method, my be used to investigate areas of maximum stress in the gravity dam or the foundation. However, the finite element method will only be permitted as a supplement to the Gravity Method. The Gravity Method will be required for the investigation of sliding and overturning of the structure.

10.2 Non-Gravity Dams

For non-gravity structures such as arch dams, the designer is required to present calculations based on appropriate elastic techniques as approved by the Dam Safety Section.

10.3 Loads

Loads to be considered in stability analyses are those due to: external water pressure, internal water pressure (pore pressure or uplift) in the dam and foundation, silt pressure, ice pressure, earthquake, weight of the structure.

10.4 Uplift

Hydrostatic uplift pressure from reservoir water and tailwater act on the dam. The distribution of pressure through a section of the dam is assumed to vary linearly from full hydrostatic head at the upstream face of the dam to tailwater pressure at the downstream face or zero if there is no tailwater. Reduction in the uplift pressures might be allowed in the following instances:

10.4.1 When foundation drains are in place. The efficiency of the drains will have to be verified through piezometer readings.

10.4.2 When a detailed flow net analysis has been performed and indicates that a reduction in uplift pressures is appropriate. Any reduction of pressure of more than 20% must be verified by borings and piezometer readings.

10.4.3 When a sufficient number of borings have been progressed and piezometer readings support the fact that actual uplift pressures are less than the theoretical uplift pressures.

10.5 Loading Conditions

Loading Conditions to be analyzed.

Case 1 - Normal loading condition; water surface at normal reservoir level.

Case 2 - Normal loading condition; water surface at normal reservoir level plus an ice load of 5,000 pounds per linear foot, where ice load is applicable. Dams located in more northerly climates, may require a greater ice load.

Case 3 - Design loading condition; water surface at spillway design flood level.

Case 3A- Maximum hydrostatic loading condition; maximum differential head between headwater and tailwater levels as determined by storms smaller in magnitude than the spillway design flood. This loading condition will only be considered when the is submerged under Case 3 loading condition.

Case 4 - Seismic loading condition; water surface at normal reservoir level plus a seismic coefficient applicable to the location.

10.6 Stability Analysis for New Dams

10.6.1 Field Investigation

Subsurface investigations should be conducted for new dams. Borings should be made along the axis of the dam to determine the depth to bedrock as well as the character of the rock and soils under the dam. The number and depth of holes required should be determined by the design engineer based on the complexity of geological conditions. The depth of holes should be at least equal to the height of the dam. Soil samples and rock cores should be collected to permit laboratory testing. The values of cohesion and internal friction of the foundation material should be determined by laboratory testing.

On proposed sites where the foundation bedrock is exposed, the requirements for borings may be waived in some cases. An engineering geologist's professional opinion of the rock quality and the acceptability of the design assumptions will be required in those cases.

10.6.2 Overturning

The resultant force from an overturning analysis should be in the middle third of the base for all loading conditions, except for the seismic analysis (Case 4), where the resultant shall fall within the limits of the base.

10.6.3 Cracking

The resultant force falling outside the middle third of the base and its resulting tension cracks will not be accepted in the design of new dams, except for the seismic loading condition (Case 4).

10.6.4 Sliding

Sliding safety factors may be computed using the Shear-Friction method of analysis when shear values are based on either the results of laboratory testing or an engineering geologist's professional opinion. When the Shear-Friction method is used, the structure should have a minimum safety factor of 2.0 for all loading conditions except for Case 4 (seismic loading) where the minimum acceptable sliding safety factor shall be 1.5.

Designs which are not based on laboratory testing or an engineering geologist's professional opinion must be analyzed using the Friction Factor of Safety. This analysis assumes that the value of shear or cohesion is zero. The minimum safety factor using this method should be 1.5 for all loading conditions except Case 4 where the minimum safety factor shall be 1.25.

10.7 Stability Analysis for Existing Dams

10.7.1 Field Investigations

Subsurface investigations should normally be conducted as part of a detailed structural stability investigation for an existing dam and should provide information regarding the materials of the dam and its foundation. The number and depth of holes required should be determined by the engineer based on the complexity of the composition of the dam and foundation. Samples should be collected and tested to determine the material properties. The program should also measure the uplift pressures at several locations along the base of the dam.

In cases where no subsurface investigations are conducted conservative assumptions regarding material properties and uplift pressures will be required.

10.7.2 Overturning

The resultant force from an overturning analysis should be in the middle third of the base for normal loading conditions (Case 1) and within the middle half of the base for the ice loading condition (Case 2) and the spillway design flood loading condition (Case 3). For the seismic loading condition (Case 4), the resultant force should fall within the limits of the base.

10.7.3 Cracking

If the overturning analysis indicates that the resultant force is outside the middle third, then tension exists at the heel of the dam which may result in the cracking of the concrete. For existing dams cracking will be permitted for all loading conditions except the normal loading condition (Case 1). If the criteria specified above in Overturning for the location of the resultant force are not satisfied, further study and/or remedial work will be required. The Bureau of Reclamation's Cracked Section Method of analysis is acceptable for investigating the stability of the dam for the above mentioned loading conditions. When the Cracked Section Method of analysis is used, the criteria for the minimum sliding factor of safety will have to be satisfied.

10.7.4 Sliding

Sliding safety factors may be computed using the Shear-Friction method of analysis when shear values are based on the results of laboratory testing of samples from subsurface investigations. When the Shear-Friction method is used, the structure should have a minimum safety factor of 2. 0 for Case 1 and Case 2; a value of 1.5 for Case 3 and a value of 1.25 for Case 4.

If no subsurface explorations are performed, the sliding safety factors must be computed using the Friction Factor of Safety. The minimum safety factor using this method should be 1.5 for Case 1; a value of 1.25 for Case 2 and Case 3; and a value of 1.0 for Case 4.

11.0 EXISTING DAMS: REHABILITATION AND MODIFICATION

Additional data should be submitted for dam rehabilitations or dam modifications, including a report by a professional engineer describing the performance and maintenance history of the existing dam. In addition, all data regarding construction, such as existing subsurface explorations, construction materials used for the dam, and plans and specifications should be submitted. If this information is not available, the engineer should inspect and evaluate the structure as to its condition, performance, maintenance history and other information regarding foundation soils and existing conditions.

The engineer should also assess the safety and adequacy of the existing structure against those criteria for spillway capacity and structural stability, indicated in the appropriate sections of these guidelines.

File Name:	Hawkinsville KA Stable.dam	Kleinschmidt Associates	
Job Name:	Hawkinsville Dam Stability Analysis	KAStable 1.06	
Job Number:	0650-011	Date:	4/15/14
Comments:		By:	NMC
		Reviewed by:	JLD
		Date:	04/21/14

-- STABILITY ANALYSIS SUMMARY TABLE --

LOAD CASE V KIPS	H KIPS	H/V	SLIDE SF	M+ FT-K	M- FT-K	M+/M-	M FT-K	R FT	BASE TOE PSI	PRESS. HEEL PSI	TENS. ZONE FT
FILE NAME: Hawkinsville KA Stable.dam											
GRAVITY											
15.06	0.00	-0.000	Inf	118.34	0.00	-Inf	118.34	7.86	1.67	15.20	0.00
Normal Loading Conditions (WSEL 1044.1 ft)											
10.54	-5.72	0.543	3.640	119.72	-60.44	1.981	59.28	5.62	7.55	4.26	0.00
Ice Load Conditions (WSEL 1044.1 ft)											
5.90	-10.72	1.817	N/A	119.72	-137.13	0.873	-17.41	-2.95	N/A	N/A	N/A
Design Flood Load Conditions (WSEL 1049 ft)											
7.58	-6.21	0.819	2.880	142.45	-101.25	1.407	41.20	5.44	5.81	2.68	0.00
Earthquake Load Conditions (WSEL 1044.1 ft)											
10.54	-7.93	0.752	2.630	119.72	-70.52	1.698	49.20	4.67	10.28	1.52	0.00

File Name: Hawkinsville KA Stable.dam
Job Name: Hawkinsville Dam Stability Analysis
Job Number: 0650-011
Comments:

Kleinschmidt Associates
KAStable 1.06
Date: 4/15/14
By: NMC
Reviewed by: JLD
Date: 04/21/14

SECTION DATA - GRAVITY

ID NO.	BASE (FT)	ALTITUDE (FT)	DEPTH (FT)	UNIT WT. (PCF)	SHP	DIR	DISTANCE (FT)	FORCE (KIPS)	MOMENT (FT-KIPS)	ARM (FT)
100	8.40	12.00	1.00	150.0	2	V	0.00	7.56	42.34	5.60
101	4.00	11.00	1.00	150.0	0	V	8.40	6.60	68.64	10.40
102	4.00	1.00	1.00	150.0	1	V	8.40	0.30	2.92	9.73
103	2.00	2.00	1.00	150.0	0	V	6.40	0.60	4.44	7.40

SUM OF SECTIONAL FORCES

	CASE	VERTICAL FORCE (KIPS)	HORIZONTAL FORCE (KIPS)	POSITIVE MOMENT (FT-K)	NEGATIVE MOMENT (FT-K)
SUBTOTAL	GRAVITY	15.06	0.00	118.34	0.00
TOTAL	GRAVITY	15.06	0.00	118.34	0.00

LOAD CASE CONSTANTS - GRAVITY

STABILITY CASE CONSTANTS

Friction Factor, FF:	1.00	
Shear Friction Value, CV:	0.00	PSI

DIMENSIONAL CASE CONSTANTS

Width, W1:	1.00	FT
Width, W2:	0.00	FT
Length, L1:	12.40	FT
Length, L2:	0.00	FT
Length, L3:	0.00	FT
Slope of Base, (Angle):	0.00	Degrees
Underdrain, (Y Yes, N No):	N	
Dist. Toe to Drain, DT:	0.00	FT
Method, (1 = FERC, 2 = ACoE):	N/A	
Height of Drainage Gallery, H4:	0.00	

FINAL RESULTS OF STABILITY ANALYSIS - GRAVITY

V=	15.06	KIPS
H=	0.00	KIPS
H/V=	-0.000	
SLIDING S.F.=	Inf	
M+=	118.34	FT-K
M-=	0.00	FT-K
SUM.M=	118.34	FT-K
M+/M-=	-Inf	
R=	7.86	FT from Toe
Tension Zone=	0.00	FT
Toe Pressure=	1.67	PSI
Heel Pressure=	15.20	PSI

File Name:	Hawkinsville KA Stable.dam		Kleinschmidt Associates
Job Name:	Hawkinsville Dam Stability Analysis		KAStable 1.06
Job Number:	0650-011		Date: 4/15/14
Comments:			By: NMC
			Reviewed by: JLD
			Date: 04/21/14

SECTION DATA - Normal Loading Conditions (WSEL 1044.1 ft)

ID NO.	BASE (FT)	ALTITUDE (FT)	DEPTH (FT)	UNIT WT. (PCF)	SHP	DIR	DISTANCE (FT)	FORCE (KIPS)	MOMENT (FT-KIPS)	ARM (FT)
200	12.40	12.00	1.00	-62.4	2	V	0.00	-4.64	-38.38	8.27
210	12.00	12.00	1.00	-62.4	1	H	0.00	-4.49	-17.97	4.00
211	10.00	10.00	1.00	-24.5	1	H	0.00	-1.23	-4.09	3.33
212	4.00	1.00	1.00	62.4	2	V	8.40	0.12	1.38	11.07

SUM OF SECTIONAL FORCES

	CASE	VERTICAL FORCE (KIPS)	HORIZONTAL FORCE (KIPS)	POSITIVE MOMENT (FT-K)	NEGATIVE MOMENT (FT-K)
SUBTOTAL	GRAVITY	15.06	0.00	118.34	0.00
	Normal Loading Conditions (WSEL 1044.1 ft)	-4.52	-5.72	1.38	-60.44
TOTAL	Normal Loading Conditions (WSEL 1044.1 ft)	10.54	-5.72	119.72	-60.44

LOAD CASE CONSTANTS - Normal Loading Conditions (WSEL 1044.1 ft)

STABILITY CASE CONSTANTS

Friction Factor, FF:	1.00	
Shear Friction Value, CV:	0.00	PSI

DIMENSIONAL CASE CONSTANTS

Width, W1:	1.00	FT
Width, W2:	0.00	FT
Length, L1:	12.40	FT
Length, L2:	0.00	FT
Length, L3:	0.00	FT
Slope of Base, (Angle):	0.00	Degrees
Underdrain, (Y Yes, N No):	N	
Dist. Toe to Drain, DT:	0.00	FT
Method, (1 = FERC, 2 = ACoE):	N/A	
Height of Drainage Gallery, H4:	0.00	

LOAD CASE CONSTANTS

Drain Efficiency, DE:	0.00	%
Headpond:	12.00	
Tailwater:	0.00	
Length, L4:	0.00	FT
Length, L5:	0.00	FT
Additional Sliding Resistance(s):	10.30	KIPS

FINAL RESULTS OF STABILITY ANALYSIS - Normal Loading Conditions (WSEL 1044.1 ft)

V=	10.54	KIPS
H=	-5.72	KIPS
H/V=	0.543	
SLIDING S.F.=	3.640	
M+=	119.72	FT-K
M-=	-60.44	FT-K
SUM.M=	59.28	FT-K
M+/M-=	1.981	
R=	5.62	FT from Toe
Tension Zone=	0.00	FT
Toe Pressure=	7.55	PSI
Heel Pressure=	4.26	PSI

File Name:	Hawkinsville KA Stable.dam	Kleinschmidt Associates	
Job Name:	Hawkinsville Dam Stability Analysis	KAStable 1.06	
Job Number:	0650-011	Date:	4/15/14
Comments:		By:	NMC
		Reviewed by:	JLD
		Date:	04/21/14

SECTION DATA - Ice Load Conditions (WSEL 1044.1 ft)

ID NO.	BASE (FT)	ALTITUDE (FT)	DEPTH (FT)	UNIT WT. (PCF)	SHP	DIR	DISTANCE (FT)	FORCE (KIPS)	MOMENT (FT-KIPS)	ARM (FT)
300	12.40	12.00	1.00	-62.4	0	V	0.00	-9.29	-57.57	6.20
310	12.00	12.00	1.00	-62.4	1	H	0.00	-4.49	-17.97	4.00
311	10.00	10.00	1.00	-24.5	1	H	0.00	-1.23	-4.09	3.33
312	4.00	1.00	1.00	62.4	2	V	8.40	0.12	1.38	11.07
313	1.00	1.00	1.00	-5000.0	0	H	11.00	-5.00	-57.50	11.50

SUM OF SECTIONAL FORCES

	CASE	VERTICAL FORCE (KIPS)	HORIZONTAL FORCE (KIPS)	POSITIVE MOMENT (FT-K)	NEGATIVE MOMENT (FT-K)
SUBTOTAL	GRAVITY	15.06	0.00	118.34	0.00
	Ice Load Conditions (WSEL 1044.1 ft)	N/A	N/A	N/A	N/A
TOTAL	Ice Load Conditions (WSEL 1044.1 ft)	N/A	N/A	N/A	N/A

LOAD CASE CONSTANTS - Ice Load Conditions (WSEL 1044.1 ft)

STABILITY CASE CONSTANTS		
Friction Factor, FF:	1.00	
Shear Friction Value, CV:	0.00	PSI
DIMENSIONAL CASE CONSTANTS		
Width, W1:	1.00	FT
Width, W2:	0.00	FT
Length, L1:	12.40	FT
Length, L2:	0.00	FT
Length, L3:	0.00	FT
Slope of Base, (Angle):	0.00	Degrees
Underdrain, (Y Yes, N No):	N	
Dist. Toe to Drain, DT:	0.00	FT
Method, (1 = FERC, 2 = ACoE):	N/A	
Height of Drainage Gallery, H4:	0.00	
LOAD CASE CONSTANTS		
Drain Efficiency, DE:	0.00	%
Headpond:	12.00	
Tailwater:	0.00	
Length, L4:	0.00	FT
Length, L5:	0.00	FT
Additional Sliding Resistance(s):	10.30	KIPS

FINAL RESULTS OF STABILITY ANALYSIS - Ice Load Conditions (WSEL 1044.1 ft)

V=	5.90	KIPS
H=	-10.72	KIPS
H/V=	1.817	
SLIDING S.F.=	N/A	
M+=	119.72	FT-K
M-=	-137.13	FT-K
SUM.M=	-17.41	FT-K
M+/M-=	0.873	
R=	-2.95	FT from Toe
Tension Zone=	N/A	FT
Toe Pressure=	N/A	PSI
Heel Pressure=	N/A	PSI

DAM IS UNSTABLE!!!

File Name:	Hawkinsville KA Stable.dam	Kleinschmidt Associates	
Job Name:	Hawkinsville Dam Stability Analysis	KAStable 1.06	
Job Number:	0650-011	Date:	4/15/14
Comments:		By:	NMC
		Reviewed by:	JLD
		Date:	04/21/14

SECTION DATA - Design Flood Load Conditions (WSEL 1049 ft)

ID NO.	BASE (FT)	ALTITUDE (FT)	DEPTH (FT)	UNIT WT. (PCF)	SHP	DIR	DISTANCE (FT)	FORCE (KIPS)	MOMENT (FT-KIPS)	ARM (FT)
400	12.40	10.10	1.00	-62.4	0	V	0.00	-7.81	-48.45	6.20
401	12.40	6.80	1.00	-62.4	2	V	0.00	-2.63	-21.75	8.27
410	4.90	12.00	1.00	-62.4	0	H	0.00	-3.67	-8.99	2.45
411	12.00	12.00	1.00	-62.4	1	H	0.00	-4.49	-17.97	4.00
412	10.00	10.00	1.00	-24.5	1	H	0.00	-1.23	-4.09	3.33
413	4.00	1.00	1.00	62.4	2	V	8.40	0.12	1.38	11.07
414	4.00	4.90	1.00	62.4	2	V	8.40	0.61	6.77	11.07
415	7.07	10.10	1.00	62.4	1	V	0.00	2.23	5.25	2.36
416	10.10	10.10	1.00	62.4	1	H	0.00	3.18	10.72	3.37

SUM OF SECTIONAL FORCES

	CASE	VERTICAL FORCE (KIPS)	HORIZONTAL FORCE (KIPS)	POSITIVE MOMENT (FT-K)	NEGATIVE MOMENT (FT-K)
SUBTOTAL	GRAVITY	15.06	0.00	118.34	0.00
	Design Flood Load Conditions (WSEL 1049 ft)	-7.48	-6.21	24.11	-101.25
TOTAL	Design Flood Load Conditions (WSEL 1049 ft)	7.58	-6.21	142.45	-101.25

LOAD CASE CONSTANTS - Design Flood Load Conditions (WSEL 1049 ft)

STABILITY CASE CONSTANTS		
Friction Factor, FF:	1.00	
Shear Friction Value, CV:	0.00	PSI
DIMENSIONAL CASE CONSTANTS		
Width, W1:	1.00	FT
Width, W2:	0.00	FT
Length, L1:	12.40	FT
Length, L2:	0.00	FT
Length, L3:	0.00	FT
Slope of Base, (Angle):	0.00	Degrees
Underdrain, (Y Yes, N No):	N	
Dist. Toe to Drain, DT:	0.00	FT
Method, (1 = FERC, 2 = ACoE):	N/A	
Height of Drainage Gallery, H4:	0.00	
LOAD CASE CONSTANTS		
Drain Efficiency, DE:	0.00	%
Headpond:	16.90	
Tailwater:	10.10	
Length, L4:	0.00	FT
Length, L5:	0.00	FT
Additional Sliding Resistance(s):	10.30	KIPS

FINAL RESULTS OF STABILITY ANALYSIS - Design Flood Load Conditions (WSEL 1049 ft)

V=	7.58	KIPS
H=	-6.21	KIPS
H/V=	0.819	
SLIDING S.F.=	2.880	
M+=	142.45	FT-K
M-=	-101.25	FT-K
SUM.M=	41.20	FT-K
M+/M-=	1.407	
R=	5.44	FT from Toe
Tension Zone=	0.00	FT
Toe Pressure=	5.81	PSI
Heel Pressure=	2.68	PSI

File Name:	Hawkinsville KA Stable.dam	Kleinschmidt Associates	
Job Name:	Hawkinsville Dam Stability Analysis	KAStable 1.06	
Job Number:	0650-011	Date:	4/15/14
Comments:		By:	NMC
		Reviewed by:	JLD
		Date:	04/21/14

SECTION DATA - Earthquake Load Conditions (WSEl 1044.1 ft)

ID NO.	BASE (FT)	ALTITUDE (FT)	DEPTH (FT)	UNIT WT. (PCF)	SHP	DIR	DISTANCE (FT)	FORCE (KIPS)	MOMENT (FT-KIPS)	ARM (FT)
500	12.40	12.00	1.00	-62.4	2	V	0.00	-4.64	-38.38	8.27
510	12.00	12.00	1.00	-62.4	1	H	0.00	-4.49	-17.97	4.00
511	10.00	10.00	1.00	-24.5	1	H	0.00	-1.23	-4.09	3.33
512	4.00	1.00	1.00	62.4	2	V	8.40	0.12	1.38	11.07
513	1.00	1.00	1.00	-1657.0	0	H	3.99	-1.66	-7.44	4.49
514	1.00	1.00	1.00	-549.1	0	H	4.30	-0.55	-2.64	4.80

SUM OF SECTIONAL FORCES

	CASE	VERTICAL FORCE (KIPS)	HORIZONTAL FORCE (KIPS)	POSITIVE MOMENT (FT-K)	NEGATIVE MOMENT (FT-K)
SUBTOTAL	GRAVITY	15.06	0.00	118.34	0.00
	Earthquake Load Conditions (WSEl 1044.1 ft)	-4.52	-7.93	1.38	-70.52
TOTAL	Earthquake Load Conditions (WSEl 1044.1 ft)	10.54	-7.93	119.72	-70.52

LOAD CASE CONSTANTS - Earthquake Load Conditions (WSEl 1044.1 ft)

STABILITY CASE CONSTANTS

Friction Factor, FF:	1.00	
Shear Friction Value, CV:	0.00	PSI

DIMENSIONAL CASE CONSTANTS

Width, W1:	1.00	FT
Width, W2:	0.00	FT
Length, L1:	12.40	FT
Length, L2:	0.00	FT
Length, L3:	0.00	FT
Slope of Base, (Angle):	0.00	Degrees
Underdrain, (Y Yes, N No):	N	
Dist. Toe to Drain, DT:	0.00	FT
Method, (1 = FERC, 2 = ACoE):	N/A	
Height of Drainage Gallery, H4:	0.00	

LOAD CASE CONSTANTS

Drain Efficiency, DE:	0.00	%
Headpond:	12.00	
Tailwater:	0.00	
Length, L4:	0.00	FT
Length, L5:	0.00	FT
Additional Sliding Resistance(s):	10.30	KIPS

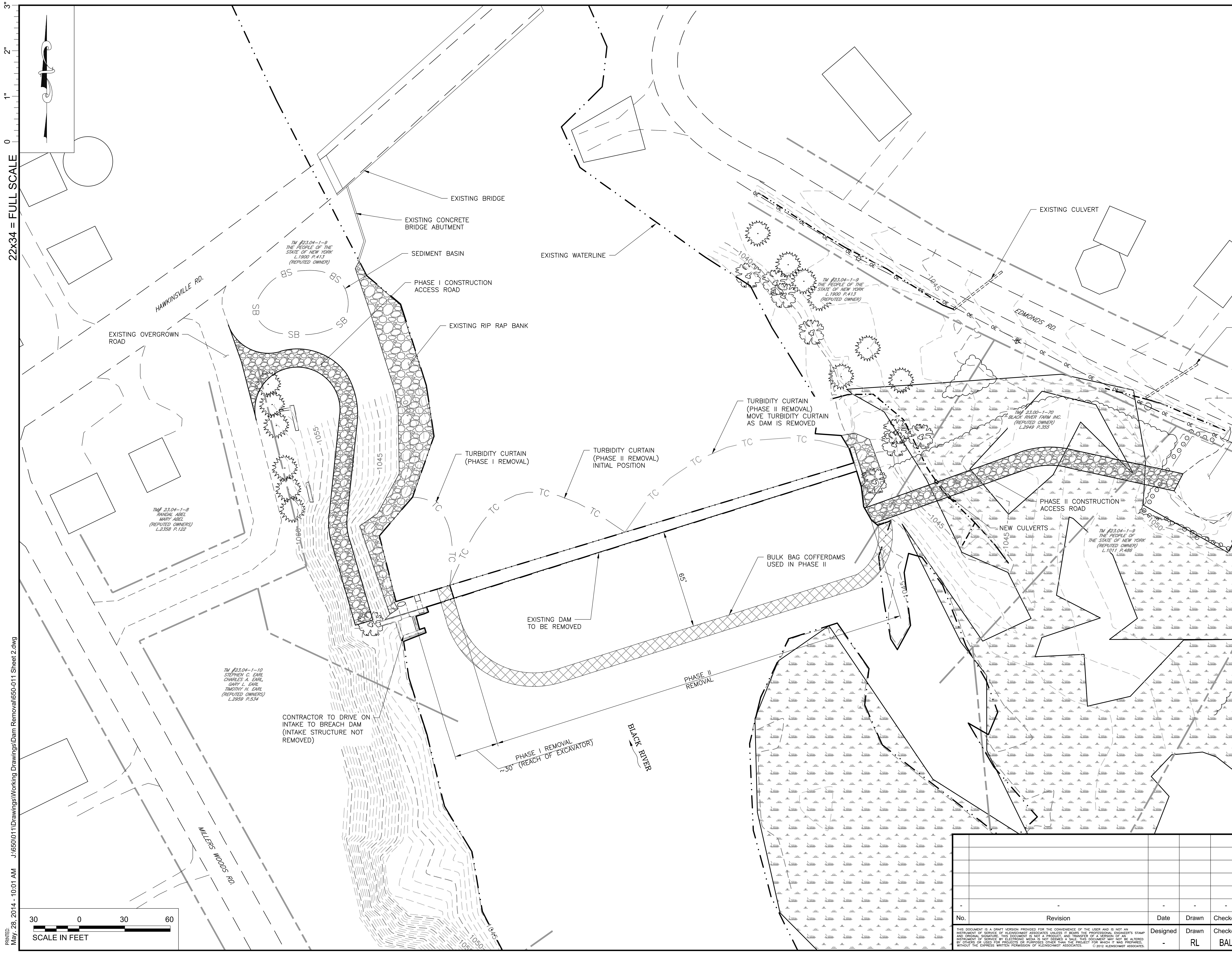
FINAL RESULTS OF STABILITY ANALYSIS - Earthquake Load Conditions (WSEl 1044.1 ft)

V=	10.54	KIPS
H=	-7.93	KIPS
H/V=	0.752	
SLIDING S.F.=	2.630	
M+=	119.72	FT-K
M-=	-70.52	FT-K
SUM.M=	49.20	FT-K
M+/M-=	1.698	
R=	4.67	FT from Toe
Tension Zone=	0.00	FT
Toe Pressure=	10.28	PSI
Heel Pressure=	1.52	PSI

APPENDIX B

CONCEPTUAL DRAWINGS

22x34 = FULL SCALE
EXISTING BRIDGE
EXISTING CONCRETE BRIDGE ABUTMENT
HAWKINSVILLE RD.
BLACK RIVER
EXISTING WATERLINE
BLP 10
BM 1
EXISTING CULVERT
EDMONDS RD.
TM #23.04-1-9 THE PEOPLE OF THE STATE OF NEW YORK L.1900 P.413 (REPUTED OWNER)
EXISTING RIP RAP BANK
EXISTING OVERGROWN ROAD
EXISTING CONCRETE REMAINS
CONSTRUCTION MOBILIZATION/STAGING AREA IN EXISTING PARKING LOT
EXISTING STONE PILES
EXISTING BOULDERS
TM# 23.00-1-70 BLACK RIVER FARM INC. (REPUTED OWNER) L.2949 P.355
EXISTING DAM ABUTMENT
TM# 23.04-1-8 RANDAL ABEL MARY ABEL (REPUTED OWNERS) L.2358 P.122
EXISTING 66"ø OUTLET PIPE
EXISTING DAM
EXISTING SLUICEWAY
EXISTING TRASHRACK
EXISTING OUTLET STRUCTURE
TM #23.04-1-9 THE PEOPLE OF THE STATE OF NEW YORK (REPUTED OWNER) L.1011 P.486
TM# 23.00-1-35 CARL R. KOWALESKI JENNIFER L. KOWALESKI (REPUTED OWNERS) L.2878 P.497
TM #23.04-1-10 STEPHEN C. EARL CHARLES A. EARL GARY L. EARL TIMOTHY H. EARL (REPUTED OWNERS) L.2959 P.534
MILLERS WOODS RD.
1040
1045
1050
1055
1060
30 0 30 60
SCALE IN FEET
PRINTED May 28, 2014 - 7:58 AM J:\650\011\Drawings\Working Drawings\Dam Removal\650-011 Sheet 1.dwg
PRELIMINARY NOT FOR CONSTRUCTION
HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY
HAWKINSVILLE DAM REMOVAL
EXISTING SITE PLAN
Kleinschmidt
141 Main Street P.O. Box 650
Pittsfield, Maine 04967
Telephone: (207) 487-3328
Fax: (207) 487-3124
www.KleinschmidtUSA.com
No. Revision Date Drawn Checked
Designed - Drawn RL Checked BAL
Project No. 650-011
Date Revised 04-02-14
Drawing No. 1



PRELIMINARY NOT FOR CONSTRUCTION

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY

HAWKINSVILLE DAM REMOVAL

DEMOLITION PLAN

No.	Revision	Date	Drawn	Checked
-	-	-	-	-

Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	BAL	650-011	05/28/14	2

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www.KleinschmidtUSA.com

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY

HAWKINSVILLE DAM
REMOVAL

PROPOSED
FINAL CONDITIONS PLAN

No.	Revision	Date	Drawn	Checked
-	-	-	-	-

Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	BAL	650-011	5-28-14	3

Kleinschmidt
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22X34 = FULL SCALE
EXISTING BRIDGE
EXISTING CONCRETE BRIDGE ABUTMENT
HAWKINSVILLE RD.
BLACK RIVER
EXISTING WATERLINE
EXISTING CULVERT
EDMONDS RD.
BM 1
EXISTING RIP RAP BANK
TM #23.04-1-9 THE PEOPLE OF THE STATE OF NEW YORK L.1900 P.413 (REPUTED OWNER)
EXISTING OVERGROWN ROAD
EXISTING CONCRETE REMAINS
EXISTING STONE PILES
EXISTING BOULDERS
CONSTRUCTION MOBILIZATION/STAGING AREA IN EXISTING PARKING LOT
TM# 23.00-1-70 BLACK RIVER FARM INC. (REPUTED OWNER) L.2948 P.355
TM# 23.04-1-8 RANDAL ABEL MARY ABEL (REPUTED OWNERS) L.2358 P.122
EXISTING DAM ABUTMENT
EXISTING 66"ø OUTLET PIPE
EXISTING DAM
EXISTING SLUICEWAY
EXISTING TRASHRACK
EXISTING OUTLET STRUCTURE
TM #23.04-1-9 THE PEOPLE OF THE STATE OF NEW YORK (REPUTED OWNER) L.1011 P.486
EXISTING WETLAND
TM# 23.00-1-35 CARL R. KOWALESKI JENNIFER L. KOWALESKI (REPUTED OWNERS) L.2878 P.497
TM #23.04-1-10 STEPHEN C. EARL CHARLES A. EARL GARY L. EARL TIMOTHY H. EARL (REPUTED OWNERS) L.2959 P.534
MILLERS WOODS RD.
1040
1045
1050
1055
1060
PRELIMINARY NOT FOR CONSTRUCTION
30 0 30 60
SCALE IN FEET
PRINTED May. 21, 2014 - 3:09 PM J:\650\011\Drawings\Working Drawings\Dam Rehabilitation\650-011 Sheet 2.dwg
HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY
HAWKINSVILLE DAM REMEDIATION
EXISTING SITE PLAN
Kleinschmidt
141 Main Street P.O. Box 650
Pittsfield, Maine 04967
Telephone: (207) 487-3328
Fax: (207) 487-3124
www.KleinschmidtUSA.com
No. Revision Date Drawn Checked
Designed - Drawn RL Checked BAL
Project No. 650-011
Date Revised 04-02-14
Drawing No. 1

22x34 = FULL SCALE

PRELIMINARY NOT FOR CONSTRUCTION

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY

HAWKINSVILLE DAM REMEDIATION

PROPOSED SITE PLAN

No.	Revision	Date	Drawn	Checked
-	-	-	-	-

Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	BAL	650-011	07/29/14	2

Kleinschmidt
141 Main Street P.O. Box 650
Pittsfield, Maine 04967
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Fax: (207) 487-3124
www.KleinschmidtUSA.com

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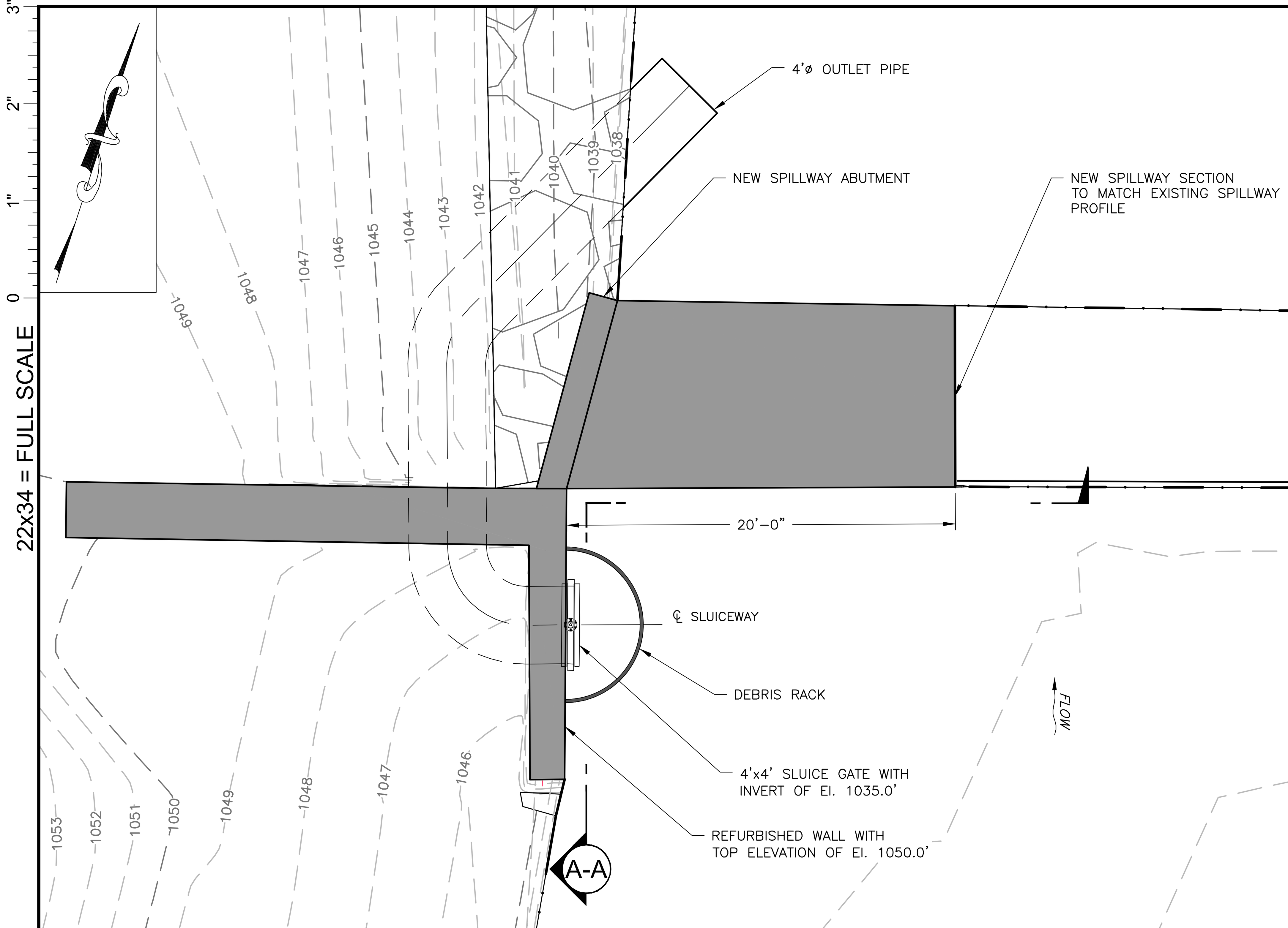

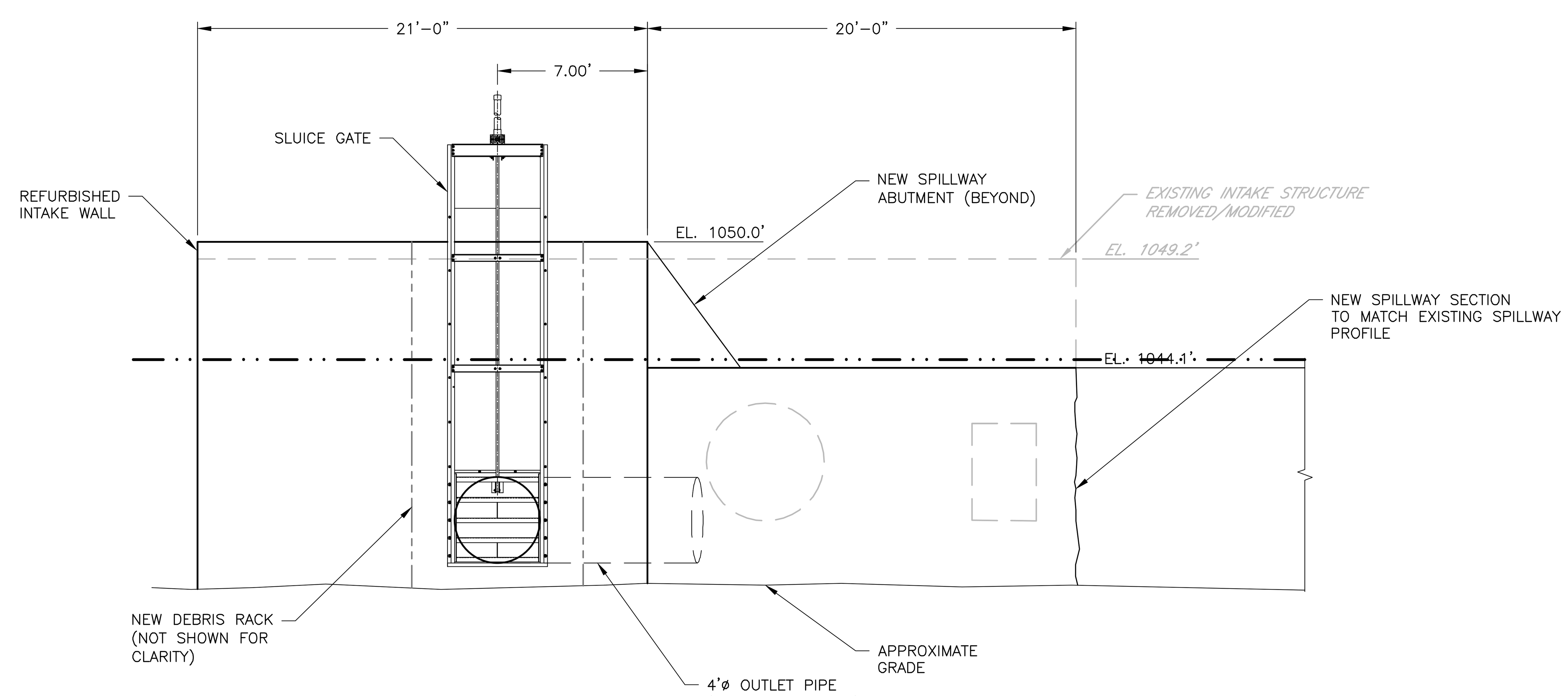

VIEW A-A
1" = 5'-0"

5 0 5 10
SCALE IN FEET

22x34 = FULL SCALE

J:\650\011\Drawings\Working Drawings\Dam Rehabilitation\650-011 Sheet 3.dwg

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PRELIMINARY
NOT FOR
CONSTRUCTION

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY

HAWKINSVILLE DAM
REMEDIATION

PROPOSED OUTLET STRUCTURE
PLAN AND ELEVATION

No.	Revision	Date	Drawn	Checked
-	-	-	-	-

Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	BAL	650-011	05/23/14	3

Kleinschmidt
141 Main Street P.O. Box 650
Pittsfield, Maine 04967
Telephone: (207) 487-3328
Fax: (207) 487-3124
www.KleinschmidtUSA.com

SECTION A
1"= 4'-0"

4 0 4 8
SCALE IN FEET

22x34 = FULL SCALE

J:\650\011\Drawings\Working Drawings\Dam Rehabilitation\650-011 Sheet 4.dwg

PRINTED Aug. 6, 2014 - 1:36 PM

PRELIMINARY
NOT FOR
CONSTRUCTION

No.	Revision	Date	Drawn	Checked
-	-	-	-	-

Designed	Drawn	Checked	Project No.	Date Revised	Drawing No.
-	RL	BAL	650-011	07/29/14	4

HUDSON RIVER - BLACK RIVER REGULATING DISTRICT
ALBANY, NY

HAWKINSVILLE DAM
REMEDIATION

PROPOSED BERM
PLAN AND SECTION

Kleinschmidt
141 Main Street P.O. Box 650
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www.KleinschmidtUSA.com

APPENDIX C

OPINIONS OF PROBABLE COST

Kleinschmidt

Pittsfield, Maine 04967
(207) 487-3328

OPINION OF COST

Project: 0650-011
By: MPH
Date: 5/30/2014

Project: **Hawkinsville Dam Removal Alternative**

Item	Description	Quantity	Unit	Unit Price	Extension	Total
1.0	General Requirements					
	General contractor conditions	10%	%	$547,100	$54,710	
	Mobilization & demobilization	15%	%	$547,100	$82,065	
						$136,800
2.0	Equipment					
	Excavator with bucket	2	MONTH	$9,279	$18,557	
	Excavator with hydraulic hammer attachment	2	MONTH	$13,648	$27,297	
	6" Centrifugal dewatering pump	45	DAY	$1,308	$58,843	
	Dump truck (12 CY, 3 axle, 16 ton, 400 HP)	4	MONTH	$3,292	$13,166	
						$117,900
3.0	Labor					
	Excavator operator (2 operators, 2 months)	640	HR	$48.90	$31,296	
	Dump truck driver (2 drivers, 2 months)	640	HR	$37.55	$24,032	
	Labor crew (4 laborers, 2 months)	1,280	HR	$36.65	$46,912	
	Hauling (12 CY truck, cycle 20 miles)	2,520	LCY	$11.19	$28,199	
	Reinforced concrete disposal (landfill)	3,866	TON	$58.00	$224,228	
	Sediment Disposal (landfill)	825	TON	$25.00	$20,625	
						$375,300
4.0	Materials					
	Bulk sandbags (40" x 40" x 48", 3,000 lbs)	100	EA	$14	$1,400	
	Sand for bulk sandbags	97.5	TONS	$17	$1,699	
						$3,100
5.0	Erosion & Sediment Management Plan					
	Silt fence	500	LF	$0.75	$375	
	Tire cleaner	1	LS	$1,000.00	$1,000	
	Turbidity curtain	200	LF	$90	$18,000	
	Geotextile	500	SY	$1.65	$825	
	Hay bales, Staked	500	LF	$7.23	$3,615	
						$23,900
6.0	Site Preparation					
	Riprap behind intake (18" min. thickness, not grouted)	136.5	SY	$98	$13,366	
	Grade right bank road (rough grade 1,100 - 3,000 SF)	1	EA	$1,094	$1,094	
	Grade left bank and road (rough grade 3,100 - 5,000 SF)	1	EA	$1,639	$1,639	
	Clear and grub trees for access	0.17	AC	$15,402	$2,618	
						$18,800
7.0	Site Restoration					
	Grading (rough grading sites, open, 45.1k-50k SF, grader)	1	EA.	$2,730	$2,730	
	Seeding (mechanical seeding, 215 lb/acre)	1	AC.	$1,252	$1,300	
	Replanting trees (red maple, balled & burlapped, 8-10')	10	EA.	$398	$3,984	
						$8,100
8.0	Permitting	1	LS	$20,000	$20,000	
						$20,000
9.0	Final Design	1	LS	$25,000	$25,000	
						$25,000
9.0	Bid Documents and Construction Monitoring	1	LS	$15,000	$15,000	
						$15,000
						$744,000
			Contingency	20%		$149,000
						$893,000

Kleinschmidt

Pittsfield, Maine 04967
(207) 487-3328

OPINION OF COST

Project: 0650-011
By: NMC & MPH
Date: 5/30/2014

Project: **Hawkinsville Dam Remediation Alternative**

Item	Description	Quantity	Unit	Unit Price	Extension	Total
1.0	General Requirements					
	General contractor conditions	10%	%	$403,200	$40,320	
	Mobilization & demobilization	15%	%	$403,200	$60,480	
						$100,800
2.0	Equipment					
	Excavator with bucket	2	MONTH	$9,279	$18,557	
	Excavator with hydraulic hammer attachment	1	MONTH	$13,648	$13,648	
	6" Centrifugal dewatering pump	60	DAY	$1,308	$78,457	
	Dump truck (12 CY, 3 axle, 16 ton, 400 HP)	2	MONTH	$3,292	$6,583	
						$117,300
3.0	Labor					
	Excavator operator (2 operators, 2 months)	640	HR	$48.90	$31,296	
	Dump truck driver (1 driver, 2 months)	320	HR	$37.55	$12,016	
	Labor crew (4 laborers, 1 month)	640	HR	$36.65	$23,456	
	Labor crew (7 laborers, 1 month)	1,120	HR	$37.99	$42,549	
	Concrete hauling (12 CY truck, cycle 20 miles)	165	LCY	$11.19	$1,849	
	Concrete disposal at landfill	335	TON	$58.00	$19,430	
						$111,200
4.0	Materials					
	Phase 1 downstream cofferdam - sandbags	375	EA	$5	$1,875	
	Phase I upstream cofferdam - timber	1000	SF	$15	$14,870	
	4' X 4' Aluminum slide gate	1	EA	$9,500	$9,500	
	Debris rack	110	SF	$75	$8,290	
	4' Diameter smooth steel pipe	38	LF	$302	$11,463	
	Reinforced concrete	145	CY	$600	$87,000	
	Compacted fill	504	CY	$4	$1,865	
	Geotextile	500	SY	$1.65	$825	
						$135,700
5.0	Erosion & Sediment Management Plan					
	Silt fence	500	LF	$0.75	$375	
	Turbidity curtain	100	LF	$90	$9,000	
	Hay bales, Staked	500	LF	$7.23	$3,615	
						$13,000
6.0	Site Preparation					
	Riprap behind intake (18" min. thickness, not grouted)	136.5	SY	$98	$13,366	
	Grade right bank road (rough grade 5,100 - 8,000 SF)	1	EA	$2,690	$2,690	
	Grade left bank and road (rough grade 1,100 - 3,000 SF)	1	EA	$1,171	$1,171	
	Clear and grub trees for access	0.17	AC	$15,402	$2,618	
						$19,900
7.0	Site Restoration					
	Grading (rough grading sites, open, 45.1k-50k SF, grader)	1	EA.	$2,730	$2,730	
	Seeding (mechanical seeding, 215 lb/acre)	1	AC.	$1,252	$1,300	
	Replanting trees (red maple, balled & burlapped, 8-10')	5	EA.	$398	$1,992	
						$6,100
8.0	Property Acquisition	1	LS	$9,375	$9,375	
						$9,375
9.0	Permitting	1	LS	$15,000	$15,000	
						$15,000
10.0	Final Design	1	LS	$35,000	$35,000	
						$35,000
11.0	Bid Documents and Construction Monitoring	1	LS	$15,000	$15,000	
						$15,000
						$578,000
			Contingency	20%		$116,000
						$694,000

APPENDIX D

U.S. ARMY CORPS OF ENGINEERS WETLAND DATA FORMS

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: ____________ City/County: ____________ Sampling Date: ________

Applicant/Owner: ____________ State: ______ Sampling Point: ________

Investigator(s): ____________ Section, Township, Range: ____________

Landform (hillslope, terrace, etc.): ____________ Local relief (concave, convex, none): ____________ Slope (%): ______

Subregion (LRR or MLRA): ____________ Lat: ____________ Long: ____________ Datum: ________

Soil Map Unit Name: ____________ NWI classification: ____________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ______ No ______ Hydric Soil Present? Yes ______ No ______ Wetland Hydrology Present? Yes ______ No ______	**Is the Sampled Area within a Wetland? Yes ______ No ______** If yes, optional Wetland Site ID: ____________	
Remarks: (Explain alternative procedures here or in a separate report.)		

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Marl Deposits (B15)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): __________

Water Table Present? Yes _____ No _____ Depth (inches): __________

Saturation Present? Yes _____ No _____ Depth (inches): __________
(includes capillary fringe)

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: ___________

Tree Stratum (Plot size: ______________)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	_______ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	_______ = Total Cover		
Herb Stratum (Plot size: ______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	_______ = Total Cover		
Woody Vine Stratum (Plot size: ______________)			
1.			
2.			
3.			
4.			
	_______ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ___________ (A)

Total Number of Dominant Species Across All Strata: ___________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ___________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___________	x 1 = ___________
FACW species	___________	x 2 = ___________
FAC species	___________	x 3 = ___________
FACU species	___________	x 4 = ___________
UPL species	___________	x 5 = ___________
Column Totals:	___________ (A)	___________ (B)

Prevalence Index = B/A = ___________

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: ______________________ City/County: ______________________ Sampling Date: __________

Applicant/Owner: ______________________________ State: ________ Sampling Point: __________

Investigator(s): ______________________ Section, Township, Range: ______________________

Landform (hillslope, terrace, etc.): ______________ Local relief (concave, convex, none): ______________ Slope (%): ______

Subregion (LRR or MLRA): ____________ Lat: ______________ Long: ______________ Datum: __________

Soil Map Unit Name: ______________________________ NWI classification: ______________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ______	**Is the Sampled Area within a Wetland?** **Yes ______ No ______**
Hydric Soil Present?	Yes ______	No ______	
Wetland Hydrology Present?	Yes ______	No ______	If yes, optional Wetland Site ID: ______________

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): __________

Water Table Present? Yes _____ No _____ Depth (inches): __________

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): __________

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: ________

Tree Stratum (Plot size: ________)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	____ = Total Cover		
Herb Stratum (Plot size: ________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ________)			
1.			
2.			
3.			
4.			
	____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ________ (A)

Total Number of Dominant Species Across All Strata: ________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	________	x 1 =	________
FACW species	________	x 2 =	________
FAC species	________	x 3 =	________
FACU species	________	x 4 =	________
UPL species	________	x 5 =	________
Column Totals:	________ (A)		________ (B)

Prevalence Index = B/A = ________

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: ______________________ City/County: ______________ Sampling Date: ________

Applicant/Owner: ______________________________ State: _______ Sampling Point: ________

Investigator(s): ______________________ Section, Township, Range: ______________________

Landform (hillslope, terrace, etc.): ____________ Local relief (concave, convex, none): __________ Slope (%): _____

Subregion (LRR or MLRA): ________ Lat: ____________ Long: ____________ Datum: ______

Soil Map Unit Name: ______________________________ NWI classification: ____________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _______	No _______	**Is the Sampled Area within a Wetland?** **Yes _______ No _______**
Hydric Soil Present?	Yes _______	No _______	
Wetland Hydrology Present?	Yes _______	No _______	If yes, optional Wetland Site ID: ____________________

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)	
___ High Water Table (A2)	___ Aquatic Fauna (B13)	
___ Saturation (A3)	___ Marl Deposits (B15)	
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)	
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)	
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)	
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)	
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)	
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)	
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): ___________

Water Table Present? Yes _____ No _____ Depth (inches): ___________

Saturation Present? Yes _____ No _____ Depth (inches): ___________
(includes capillary fringe)

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: ___________

Tree Stratum (Plot size: _______________)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	_______ = Total Cover		

Sapling/Shrub Stratum (Plot size: _______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	_______ = Total Cover		

Herb Stratum (Plot size: _______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	_______ = Total Cover		

Woody Vine Stratum (Plot size: _______________)			
1.			
2.			
3.			
4.			
	_______ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ___________ (A)

Total Number of Dominant Species Across All Strata: ___________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ___________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___________	x 1 = ___________
FACW species	___________	x 2 = ___________
FAC species	___________	x 3 = ___________
FACU species	___________	x 4 = ___________
UPL species	___________	x 5 = ___________
Column Totals:	___________ (A)	___________ (B)

Prevalence Index = B/A = _____________

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: ____________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) (**LRR R, MLRA 149B**)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Dark Surface (S7) (**LRR K, L**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________________

Depth (inches): ______________________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: ______________________ City/County: ______________ Sampling Date: ______

Applicant/Owner: ______________________________ State: ______ Sampling Point: ______

Investigator(s): ______________________ Section, Township, Range: ______________________

Landform (hillslope, terrace, etc.): ____________ Local relief (concave, convex, none): __________ Slope (%): ____

Subregion (LRR or MLRA): ________ Lat: ____________ Long: ____________ Datum: ______

Soil Map Unit Name: ______________________________ NWI classification: __________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ______ No ______ Hydric Soil Present? Yes ______ No ______ Wetland Hydrology Present? Yes ______ No ______	**Is the Sampled Area within a Wetland? Yes ______ No ______** If yes, optional Wetland Site ID: ______________
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Marl Deposits (B15)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): ________

Water Table Present? Yes _____ No _____ Depth (inches): ________

Saturation Present? Yes _____ No _____ Depth (inches): ________
(includes capillary fringe)

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: ______

Tree Stratum (Plot size: ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	______ = Total Cover		
Sapling/Shrub Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	______ = Total Cover		
Herb Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	______ = Total Cover		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
3.			
4.			
	______ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: ______________________ City/County: ______________________ Sampling Date: ____________

Applicant/Owner: ______________________ State: ________ Sampling Point: ____________

Investigator(s): ______________________ Section, Township, Range: ______________________

Landform (hillslope, terrace, etc.): ______________ Local relief (concave, convex, none): ______________ Slope (%): _______

Subregion (LRR or MLRA): ____________ Lat: ______________ Long: ______________ Datum: __________

Soil Map Unit Name: ______________________ NWI classification: ______________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______	No ______	**Is the Sampled Area within a Wetland? Yes ______ No ______**
Hydric Soil Present?	Yes ______	No ______	
Wetland Hydrology Present?	Yes ______	No ______	If yes, optional Wetland Site ID: ______________________

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)
___ High Water Table (A2)	___ Aquatic Fauna (B13)
___ Saturation (A3)	___ Marl Deposits (B15)
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)
___ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No _____	Depth (inches): ___________
Water Table Present?	Yes _____	No _____	Depth (inches): ___________
Saturation Present? (includes capillary fringe)	Yes _____	No _____	Depth (inches): ___________

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: ___________

Tree Stratum (Plot size: _______________)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	________ = Total Cover		

Sapling/Shrub Stratum (Plot size: _______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	________ = Total Cover		

Herb Stratum (Plot size: _______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	________ = Total Cover		

Woody Vine Stratum (Plot size: _______________)			
1.			
2.			
3.			
4.			
	________ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ___________ (A)

Total Number of Dominant Species Across All Strata: ___________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ___________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___________	x 1 = ___________
FACW species	___________	x 2 = ___________
FAC species	___________	x 3 = ___________
FACU species	___________	x 4 = ___________
UPL species	___________	x 5 = ___________
Column Totals:	___________ (A)	___________ (B)

Prevalence Index = B/A = ____________

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________

Depth (inches): ______________________

Hydric Soil Present? Yes ______ No ______

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: ______________________ City/County: ______________ Sampling Date: ________

Applicant/Owner: ______________________________ State: ______ Sampling Point: ______

Investigator(s): ______________________ Section, Township, Range: ______________________

Landform (hillslope, terrace, etc.): ____________ Local relief (concave, convex, none): __________ Slope (%): ____

Subregion (LRR or MLRA): ________ Lat: ____________ Long: ____________ Datum: ______

Soil Map Unit Name: ______________________________ NWI classification: __________

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes ______ No ______

Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ______ No ______ Hydric Soil Present? Yes ______ No ______ Wetland Hydrology Present? Yes ______ No ______	**Is the Sampled Area within a Wetland? Yes ______ No ______** If yes, optional Wetland Site ID: ______________	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	___ Water-Stained Leaves (B9)
___ High Water Table (A2)	___ Aquatic Fauna (B13)
___ Saturation (A3)	___ Marl Deposits (B15)
___ Water Marks (B1)	___ Hydrogen Sulfide Odor (C1)
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)
___ Algal Mat or Crust (B4)	___ Recent Iron Reduction in Tilled Soils (C6)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)
___ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): ___________

Water Table Present? Yes _____ No _____ Depth (inches): ___________

Saturation Present? Yes _____ No _____ Depth (inches): ___________
(includes capillary fringe)

Wetland Hydrology Present? Yes ______ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: ___________

Tree Stratum (Plot size: ______________)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: ______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	= Total Cover		

Herb Stratum (Plot size: ______________)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	= Total Cover		

Woody Vine Stratum (Plot size: ______________)			
1.			
2.			
3.			
4.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ___________ (A)

Total Number of Dominant Species Across All Strata: ___________ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ___________ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	________	x 1 = ________
FACW species	________	x 2 = ________
FAC species	________	x 3 = ________
FACU species	________	x 4 = ________
UPL species	________	x 5 = ________
Column Totals:	________ (A)	________ (B)

Prevalence Index = B/A = ___________

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ______ **No** ______

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: ___________

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) (**LRR R, MLRA 149B**)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Dark Surface (S7) (**LRR K, L**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______________________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No ______

Remarks:

APPENDIX E

PHASE 1A ARCHAEOLOGICAL ASSESSMENT REPORT

Phase IA Literature Review and Archaeological Sensitivity Assessment of the Hawkinsville Dam Remediation and Removal Final Study and Design Project
Town of Boonville
Oneida County, New York

Prepared for:
Kleinschmidt Associates, PA, PC
141 Main Street
Pittsfield, Maine 04967

Prepared by:
Derrick J. Marcucci, RPA and Dawn Lawrence
Landmark Archaeology, Inc.
6242 Hawes Road
Altamont, New York 12009-4606

Derrick J Marcucci, RPA
Principal Investigator

LA# 310
February 2014

MANAGEMENT SUMMARY

SHPO Project Review Number:

Federal Agencies:
State Agencies: NYSDEC

Phase of Study: Phase IA

Location: Hawkinsville Road between Edmonds Road and Millers Woods Road
Minor Civil Division: Town of Boonville
County: Oneida County

USGS 7.5' Quadrangle Map: Boonville, NY (2000)

Survey Area
Length: 1,898 meters (6,227 ft)
Width: Shoreline 5 meters (16 ft)/Dam 200 meters (656 ft)
Depth: n/a
Size Total Acres Surveyed: 8.90
Total Square Meters Excavated (Phase II and III): n/a
Total Square Feet Excavated (Phase II and III): n/a

Archaeological Survey Overview
Total and Interval of Shovel Tests: n/a
Total and Size of Units: n/a
Width of Plowed Strips: n/a
Surface Survey Transect Interval: n/a

Results of Archaeological Survey
Number and name of prehistoric sites identified: 0
Number and name of historic sites identified: Brant Excelsior Company and Dam (06504.000097)
Sites Recommended for Phase II/Avoidance: 0

Report Author(s): Derrick J Marcucci, RPA and Dawn Lawrence
Landmark Archaeology, Inc.

Date of Report: February 2014

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

This report presents the results of a Phase IA Literature Review and Archaeological Sensitivity Assessment for the Hawkinsville Dam Remediation and Removal Final Study and Design Project (referred to herein as the Hawkinsville Dam Project). The Hawkinsville Dam, a concrete spillway dam constructed in 1915, is located on the Black River in the hamlet of Hawkinsville, town of Boonville, Oneida County, New York (Figure 1). The Hawkinsville Dam has been determined unsafe by the New York State Department of Environmental Conservation (DEC) as a Class "B-Intermediate Hazard". The Hawkinsville Dam Project is the final study to evaluate the benefits and cost of either the dam's removal or rehabilitation. The Phase IA project area, or Area of Potential Effect (APE), was defined as encompassing approximately 8.9 acres along a 1.3 -mile long segment of Black River. The investigation was conducted by Landmark Archaeology, Inc. who was retained as a consultant by Kleinschmidt Associates, PA, PC, of Pittsfield, Maine.

The purpose of the Phase IA investigation is to assess potential for National Register of Historic Places (NRHP) properties to exist within the project area. The study is designed to gather information concerning the cultural, historical, and environmental/physical setting of the project area. Research tasks associated with the Phase IA study consist of a literature review and records search at the Office of Parks, Recreation and Historic Preservation (OPRHP), a review of historic maps of the project area, and a field visit to assess the general character (i.e., land use, geography, obvious disturbances) of the project area.

The following technical report presents the results of the Phase IA study conducted in January, 2014. Derrick Marcucci, RPA, served as Principal Investigator for the project and supervised all aspects of the investigation. Background research data were collected and analyzed by Dawn Lawrence. A field visit was performed by Mr. Marcucci and Evan Butterfield. Mr. Marcucci and Ms. Lawrence are the authors of this report. Graphics were created by Mr. Butterfield. All records associated with the project are on file at Landmark Archaeology, Inc., 6242 Hawes Road, Altamont, New York.

II. PROJECT DESCRIPTION

The Hawkinsville Dam is located on the Black River in the hamlet of Boonville, Oneida County, New York (Figure 2). The dam is approximately 96 meters (315 ft) upstream of Hawkinsville Road (County Road 61). The Hawkinsville Dam consists of a 91-meter (300-ft) long by 3.5-meter (12-ft) high concrete spillway abutted by two concrete training walls and two earthen embankments (Appendix A, Photograph 1). The spillway is oriented roughly east to west. The Black River channel flows in a northwesterly direction at the dam location.

The Hawkinsville Dam has been determined unsafe by the New York State DEC for a Class "B-Intermediate Hazard". A preliminary feasibility assessment was conducted in 2012 to examine the alternates of either repairing or removing the dam (Milone and MacBroom, Inc. 2012). The present (final) assessment is being undertaken to make the final determination of repair or removal of the dam and complete the chosen alternative.

Potential adverse impacts associated with the project include the removal or rehabilitation of the Hawkinsville Dam and effects related to bank erosion due to increase water flow should the dam be removed. In addition, potential impacts would include large machinery access and construction staging areas in vicinity of the existing dam that will be needed to demolish or repair the dam.

For the purpose of the Phase IA archaeological assessment, the APE encompasses an 8.9-acre (terrestrial) area (Figure 3). The APE includes the dam, 3.8 acres surrounding the dam, and a 5-meter wide corridor (5.1 acres) along the right (east) and left (west) Black River banks for a distance 1.3 miles upstream from the Hawkinsville Dam (Figure 3). The APE is bordered to the west by Hawkinsville Road and most of the northern limits of the APE are bounded by an approximate 1.3 mile section of Edmonds Road. Millers Woods Road and the left (southern) banks of the Black River form the southern boundaries.

There are two historic structures within the survey area. The Hawkinsville Dam, constructed in 1915, and the architectural remains of a stone bridge abutment. The stone abutment is located downstream from the dam and it appears to have once supported a bridge that connected Edmonds Road to Hawkinsville Road (Appendix A, Photograph 2).

III. DESCRIPTION OF PROJECT AREA

The project area is located in northern New York in the northern portion of Oneida County (see Figure 1). This part of New York is in the physiographic region known as the Ontario Lowlands (Isachsen et al. 2000). Situated between the Tug Hill Plateau and the Adirondack Mountain physiographic regions, the topography of the area is related to the Ontario Lobe that retreated across the lowlands about 12,000 years ago (Isachsen 2000:191). Flat plains, containing glacial lake sediments that surround drumlins molded from glacial till, characterize this region. Bedrock in the area consists of Queenston shale, Rochester shale, and Lockport dolomitic limestone.

The project area encompasses the Hawkinsville Dam and river banks along and approximate 1.3 -mile segment of the upper reaches of the 125-mile long Black River in Oneida County. The Black River drainage comprises an approximate 270 square mile watershed located in the southwestern part of the Adirondacks. The river's source is along the foothills of the Adirondack Mountains east of the project area. The Black River empties into Lake Ontario in the village of Dexter. At the dam location, the river flows in a northwesterly direction in an approximate 90-meter wide channel

The project area includes level to steep terrain with elevations ranging from 1060 to 1030 feet above mean sea level (see Figure 2). The higher elevations are found on the side and backslopes of a high terrace within the hamlet of Hawkinsville (Appendix A, Photograph 3). The lower elevations are found along the river banks that confine Black Creek's channel. Below the dam, the current is swift as the water flows on exposed bedrock. The river's floodplain is more broad (300-400 m) upstream from the Hawkinsville Dam, and it narrows (<100 m) at the rapids just below the dam. Vegetation within the APE consists of wooded areas with scrub brush and areas of manicured lawns.

The northern limits of the project area extend into the hamlet of Hawkinsville. The APE terrain within the hamlet of Hawkinsville is primarily steep sideslopes and disturbed backslopes on the west side of Black River (Appendix A, Photograph 3). East of the Black River within the hamlet, the project area extends across the low-lying floodplain. Exposed bedrock can be seen along the river channel in the floodplain at this location. Edmonds Road, which forms the eastern limit of the APE, follows the eastern (right) banks of the Black River upstream from the Hawkinsville Dam. The road is constructed on fill (Appendix A, Photograph 4).

Four soils are mapped in the project area: Adams loamy sand 3-8% (55B), Adams loamy sand 8-15%, Salmon silt loam, and Fluvaquents-Borosaprists complex (Stein et al. 2008; Figure 4). Adams loamy sands are excessively drained soils formed in glaciofluvial, glaciolacustrine, or deltaic sandy material. Salmon silt loam soils are well drained and located on lake plains, uplands, and terraces above floodplains. Fluvaquents-Borosaprists complex includes alluvial soils formed in material recently deposited on floodplains by streams or rivers. All four soils are mapped in the western limits of the project, where the project area encompasses both floodplain and glacial terrace landforms.

Table 1
Summary Soil Information

Soil Series	**Symbols**	**Slope**	**Drainage Class**	**Parent Material**	**Landscape Position**
Adams loamy sand	55B	3-8%	Excessively drained	Glaciofluvial, glaciolacustrine, or deltaic sandy material	Outwash plains, terraces, kames, eskers, lake plains
Adams loamy sand	55C	8-15%	Excessively drained	Glaciofluvial, glaciolacustrine, or deltaic sandy material	Outwash plains, terraces, kames, eskers, lake plains
Salmon silt loam	36B	2-8%	Well drained	Wind or water deposited silt or fine sand	Lake plains, uplands, terraces above floodplains
Fluvaquents-Borosaprists complex	13	n/a	Very poorly drained	Recently deposited alluvium	Floodplains

SOURCE: Stein et al. (2008)

IV. PHASE IA INVESTIGATIONS

A. RESEARCH OBJECTIVES

The goal of the Phase IA study is to assess potential for the presence of significant archaeological resources within the project area. The study is designed to gather data regarding archaeological potential through archival research and a preliminary field inspection. All pertinent archaeological and historical literature and state records applicable to the project area are reviewed during the Phase IA investigation.

Site assessments are based on NRHP criteria of significance (36CFR60.6, *Federal Register* 1976). The criteria are:

> The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and

a. that are associated with events that have made a significant contribution to the broad patterns of our history; or

b. that are associated with the lives of persons significant in our past; or

c. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant and distinguishable entity whose components may lack individual distinction, or

d. that has yielded, or may be likely to yield, information important in prehistory or history.

Typically, Criterion d is the most applicable criterion for evaluation of archaeological resources.

B. BACKGROUND RESEARCH

Background research was conducted for the purpose of compiling baseline information related to the prehistory, history, geomorphology, environment, and land use history of the project area. These sources provided information regarding NRHP eligible sites in the area and data with which to evaluate the project's archaeological potential.

Background research consisted of consulting official site records at the OPRHP, the New York State Museum (NYSM) site files at the OPRHP, and historic maps at the New York State Library. Historic maps were used to identify land use history and potential for historic resources within the project area. A GIS database search also was conducted at OPRHP to determine the presence of NRHP properties within or near the project area.

C. RESULTS OF PHASE IA INVESTIGATIONS

Background Research

Research conducted at the OPRHP revealed that no NRHP properties or archaeological sites are within, adjacent to, or within one mile of the project area. No previous archaeological investigations have been conducted within one mile of the project area.

Historic maps reviewed for the Phase IA study include the years 1874 (Beers 1874; Figure 5) and 1904 (USGS 1904; Figure 6). The Black River, Hawkinsville Road, Edmonds Road, and Millers Woods Road are depicted on both maps in roughly the same configuration as their modern alignments. The 1874 map shows Mill Street bordering the northwestern limits of the APE, but this road is not illustrated on the 1904 map.

A dam and three map documented structures are depicted in the project area on the 1874 map (Figure 5). The three structures are all located in downstream from the existing Hawkinsville Dam. The structures include a grist mill, a carding mill, both located on the west (left) side of the river, and a chair factory on the east side of the river. In 1904, the chair factory and one of the mills on the west side is no longer depicted. One structure (carding mill?) is shown along the west bank of the river south of the dam on the 1904 map. The dam's location is depicted at, or near, its present location on both the 1874 and 1904 map.

The existing Hawkinsville Dam was constructed in 1915 to harness water power for the Brant Excelsior Company which was located on the west bank of the river immediately south of Hawkinsville Road (American Contractor 1915). The concrete dam replaced the original wooden dam at the same location which was constructed in 1823 to power the milling industries along the riverbank in Hawkinsville (Ryder 1966). In 1910, Walter Brant purchased an excelsior mill that had been in operation since 1890 and renamed it Brant Excelsior Company (Harvey 2013). At the time of its closing in 1966, the Brant Excelsior Company was the last company in New York to manufacture excelsior, a type of packing material made from wood. The company's shredding machine and last bale of excelsior is housed at the Adirondack Museum in Blue Mountain Lake, and it is representative of a once thriving forestry industry in the Adirondack Region. The Brant Excelsior Company complex included the factory and several outbuildings. After closing, the buildings were removed and the land regraded (Harvey 2013). The concrete dam and the associated intake and penstock remain intact.

Field Reconnaissance

A field reconnaissance was conducted January 15, 2014. Much of the project area had one to two inches of snow and the soils and sediments were frozen. Except for the portions of the project area that extends into the hamlet of Hawkinsville and the east banks of the Black River that is comprised of fill along Edmonds Road's western ditch (Appendix A, Photograph 4), much of the area surrounding the APE is undeveloped land. Private vacation and residential properties were noted along the west side of the Black River adjacent to the APE in the southern limits of the survey area.

The Phase IA field reconnaissance identified one historic archaeological site (Site 06504.000097). This site, interpreted to be the remnants of the Brandt Excelsior Company, is represented by a partial concrete foundation. It is located on the high terrace on the river's western bank immediately downstream from the dam (see Appendix A, Photograph 5). The portion of the foundation visible at the time of the Phase IA field visit appeared intact and rectangular in shape. It measured roughly 18 meters (59 ft) long by 4 meters (13 ft) wide (Appendix A, Photograph 6). The existing Hawkinsville Dam including water intake and penstock are associated with the Brant Excelsior Company as these structures were constructed in 1915 to provide power to the factory (Ryder 1966). Based on this association, in addition to foundation ruins, boundaries for Site 06504.000097 encompass the Hawkinsville Dam, water intake and penstock. Based on the Phase IA investigation, Site 06504.000097 is estimated to be one acre in size.

D. ARCHAEOLOGICAL POTENTIAL

Based on the physiographic setting of the project area, land use, topographic features and the results of background research, archaeological potential was considered to be high for historic resources, especially for features related to milling operations that captured the energy of the Black River rapids. While prehistoric sites are undoubtedly present within the Black River Valley in the Hawkinsville locality, the potential for their presence within the survey area is considered low when considering land-use, topographic features and geomorphologic processes. The terrace on which the hamlet of Hawkinsville sits generally has potential for intact (shallow) prehistoric sites. However, the high terrace has been extensively landscaped in historic and modern times. Archaeological potential has been greatly diminished on the terrace through road and house construction as well as utility trenching within the hamlet of Hawkinsville. The part of the terrace that has not been altered, comprised primarily of sideslopes, is too steep for sustained human habitation (see Appendix A, Photograph 3). Additionally, the existing upstream banks of the Black River are steep on the west side and comprised of fill on the east. There is little potential for deeply buried archaeological sites within the project.

Archaeological potential was considered high for historic resources, particularly for those areas at and downstream from the existing Hawkinsville Dam. Historic maps for the years 1874 and 1904 depict a dam and structures on both sides of the river in the portion of the APE in proximity to the existing dam (see Figures 5 and 6). In 1874, these structures include a grist and carding mill on the west side of the river and a chair factory located on the east side. The 1901 map illustrates only one structure on the west bank and no structure on the east bank. The 1901 structure's location corresponds to the foundation recorded by the current study and is interpreted to the remains of the Brandt Excelsior Company. At noted, the Brandt Excelsior Company was in operation from 1910 until 1966. Because the foundation extends above ground and may have prevented subsurface intrusion when the building was demolished and landscaped, there is potential for intact and significant archaeological deposits that relate to the Brandt Excelsior Company or an earlier factory or mill. The field inspection found no surficial evidence of the chair factory, depicted on the 1874 map on the east (right) side of the river nor the grist and carding mill on the west (left) side of the river.

V. SUMMARY AND RECOMMENDATIONS

The Phase IA archaeological study conducted for the proposed Hawkinsville Dam Project in the town of Boonville, Oneida County consisted of a literature review, records check, and a preliminary field assessment. The existing Hawkinsville Dam was constructed in 1915 to provide power to the Brant Excelsior Company. The Hawkinsville Dam has been determined unsafe by the New York State DEC as a Class "B-Intermediate Hazard" and the Hawkinsville Dam Project is the final study to evaluate benefits and cost of the dam's removal or rehabilitation. The Phase IA investigation was conducted by Landmark Archaeology, Inc., for Kleinschmidt Associates, PA, PC, of Strasburg, Pennsylvania. The Phase IA study examined a 8.9-acre APE that included an approximately 3.8 acres surrounding the dam and approximately 1.3 miles (5.8 acres) of river bank upstream from the dam.

Phase IA research determined that the proposed project area has high potential for historic archaeological resources and low potential for prehistoric sites. Historic maps examined for the years 1874 and 1904 show several map documented structures within the APE, all near and downstream from the existing Hawkinsville Dam. Additionally, a dam is depicted at, or near, the location of the existing Hawkinsville Dam on both the 1874 and 1904 maps.

The field reconnaissance documented exposed concrete foundation ruins interpreted to be associated with the Brant Excelsior Company. The foundation is located on a terrace hillslope downstream from the Hawkinsville Dam on the west side of the river. The excelsior factory was in operation at this location in 1910 and closed in 1966. The Brant Excelsior Company building was razed at least 30 years ago based on the size of pine trees that grow in its foundation. The existing Hawkinsville Dam was constructed to power the factory in 1915. The current study recorded the exposed foundation as a historic archaeological site (06504.000097) and documentation was submitted to the OPRHP (Appendix B).

Given the high archaeological potential in the areas at and downstream of the Hawkinsville Dam, a Phase IB archaeological study is recommended for this portion of the APE (Figure 7). Phase IB fieldwork should concentrate on conducting close interval shovel testing within and adjacent to the historic foundation ruins associated with Site 06504.000097 to gather information regarding size and character of the site. Testing should include the entire hillslope surrounding the ruins to refine the site boundaries and to determine if subsurface deposits or features exist that are associated with the grist and carding mill depicted on the 1874 map. Investigations should also extend from the concrete foundation to the west dam abutment to determine if intact subsurface connecting structural features related to water powering the factory are preserved. While no surface evidence exists of the chair factory illustrated on the 1874 map on the east side of Black River, this location should be shovel tested to document the presence or absence of this map documented structure. Shovel testing elsewhere within the APE appears unwarranted.

All Phase IB investigations should comply with the guidelines established in *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* by the New York Archaeological Council (NYAC 1994) and adopted by the OPRHP, and the 2005 revised guidelines issued by the OPRHP.

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Figures

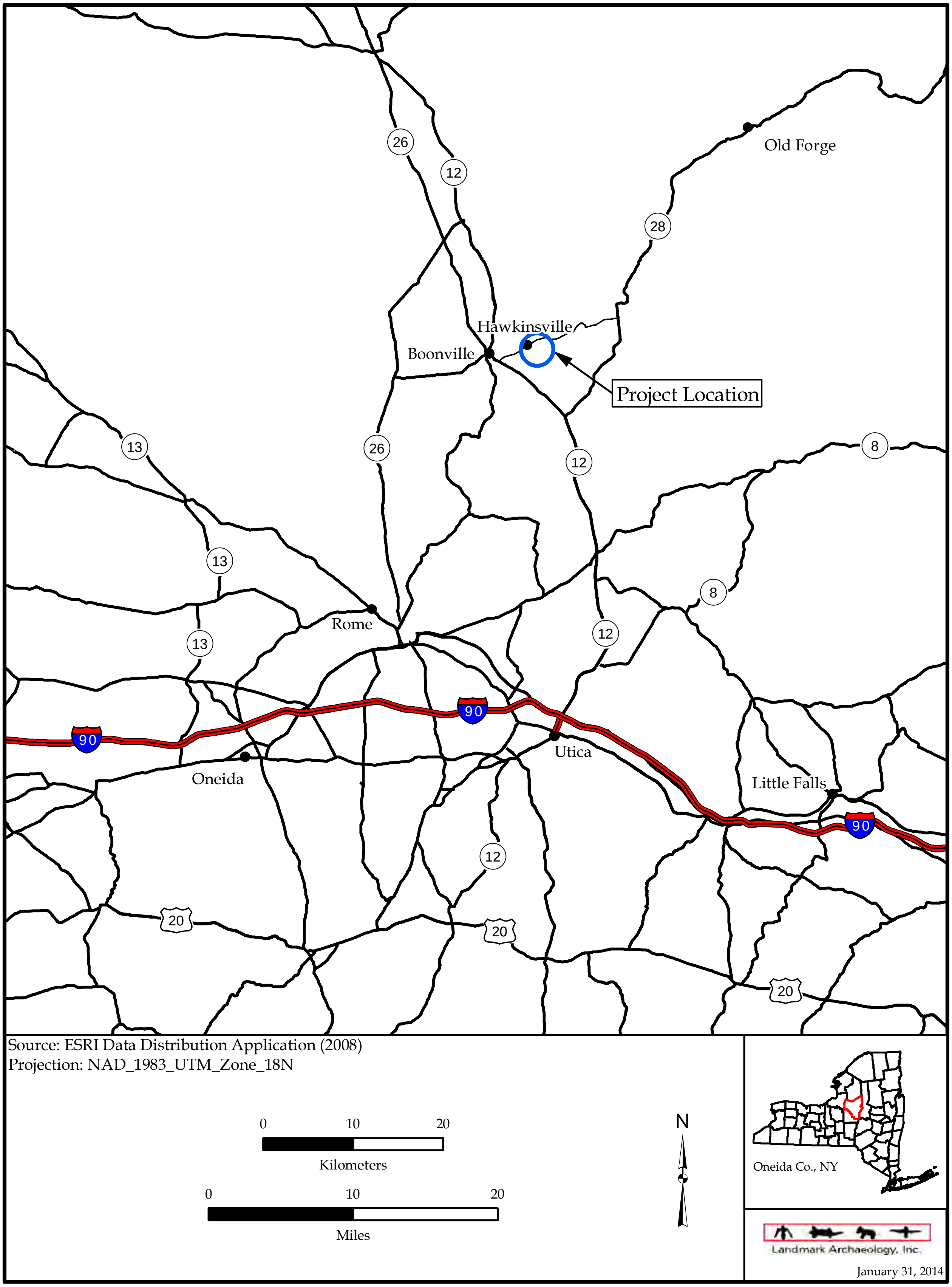


Figure 1: Project Location

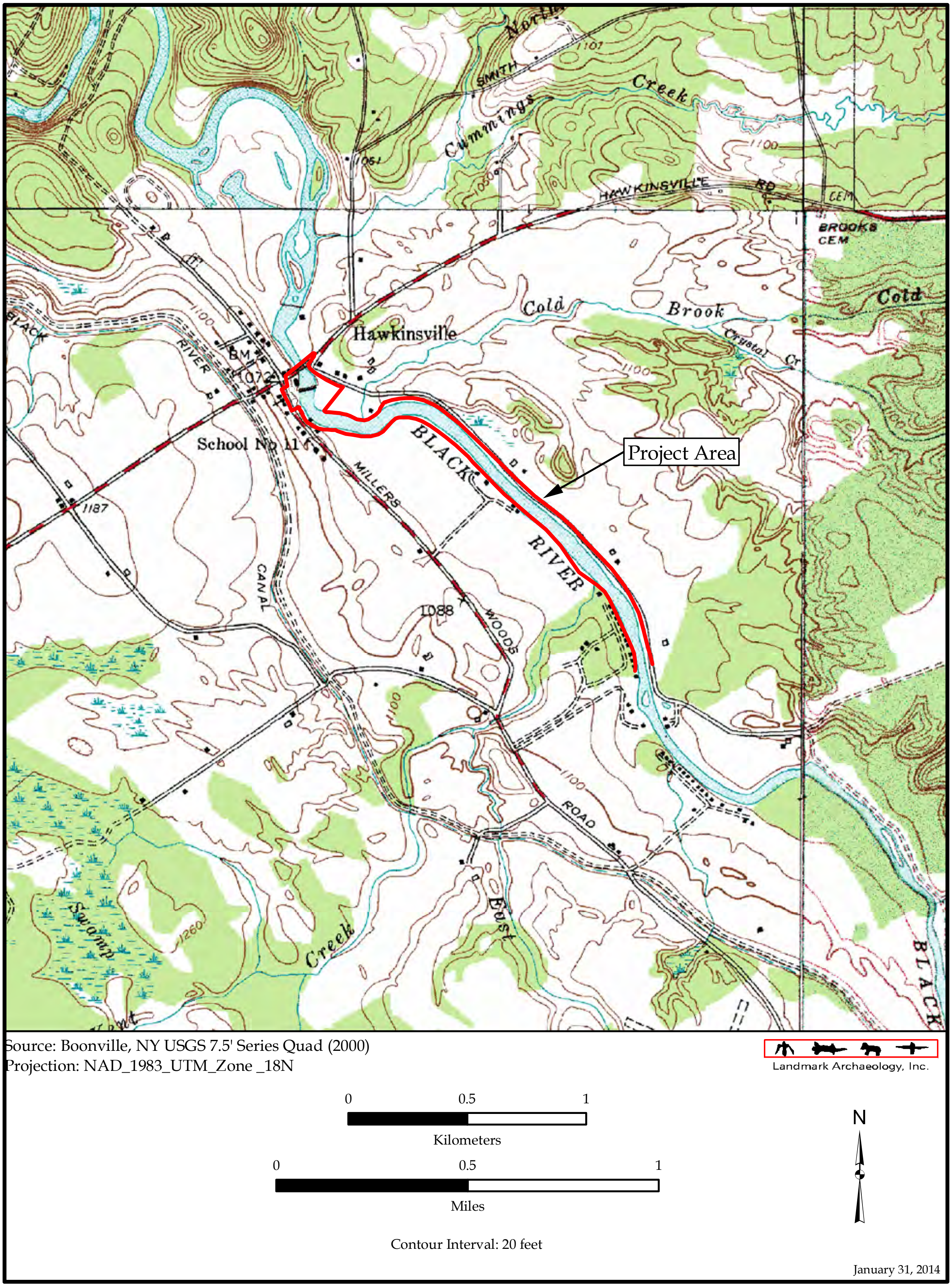


Figure 2: Project Location and Topographic Features

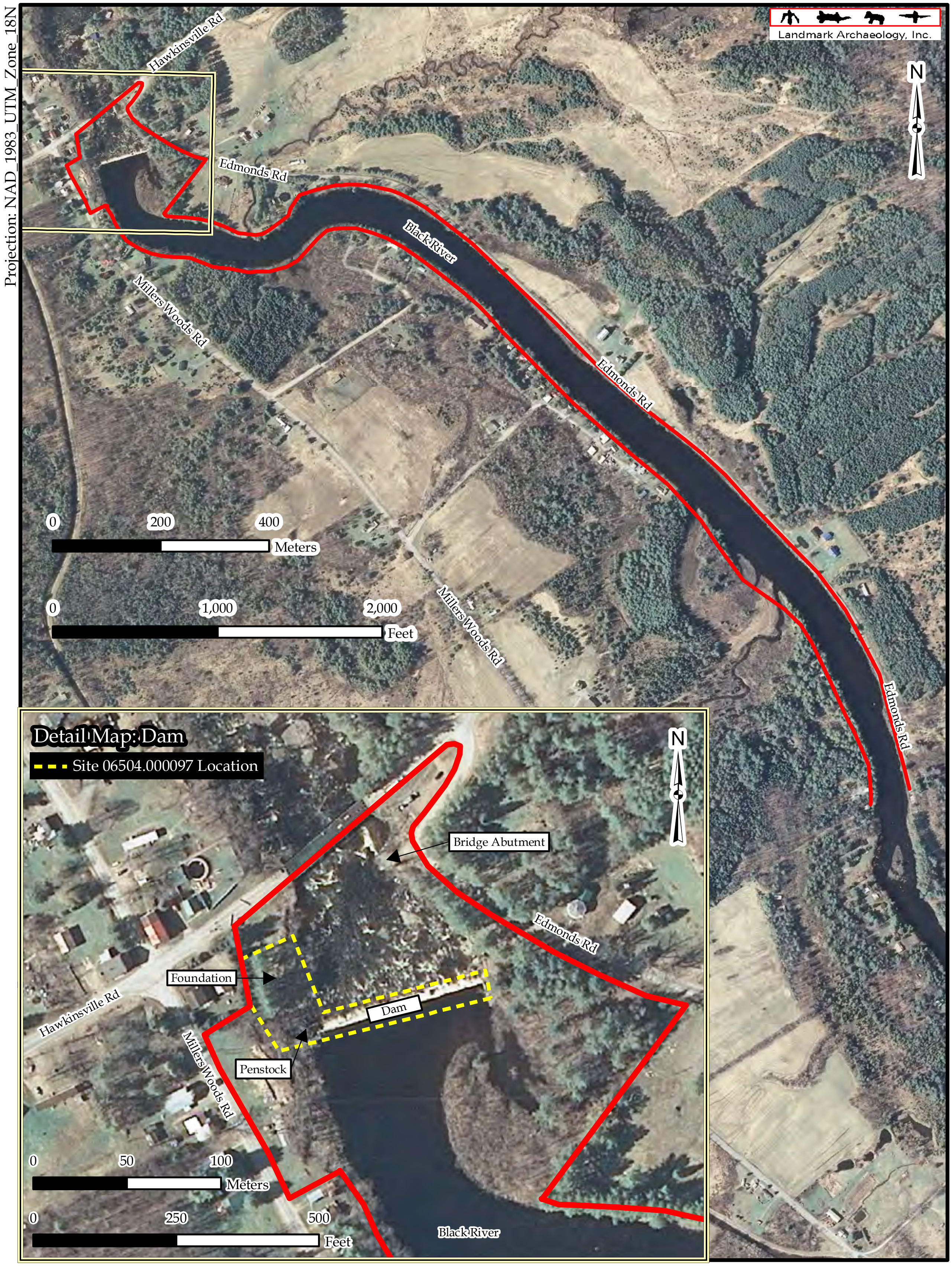


Figure 3: Phase IA Area of Potential Effect and Site 06504.000097 Location

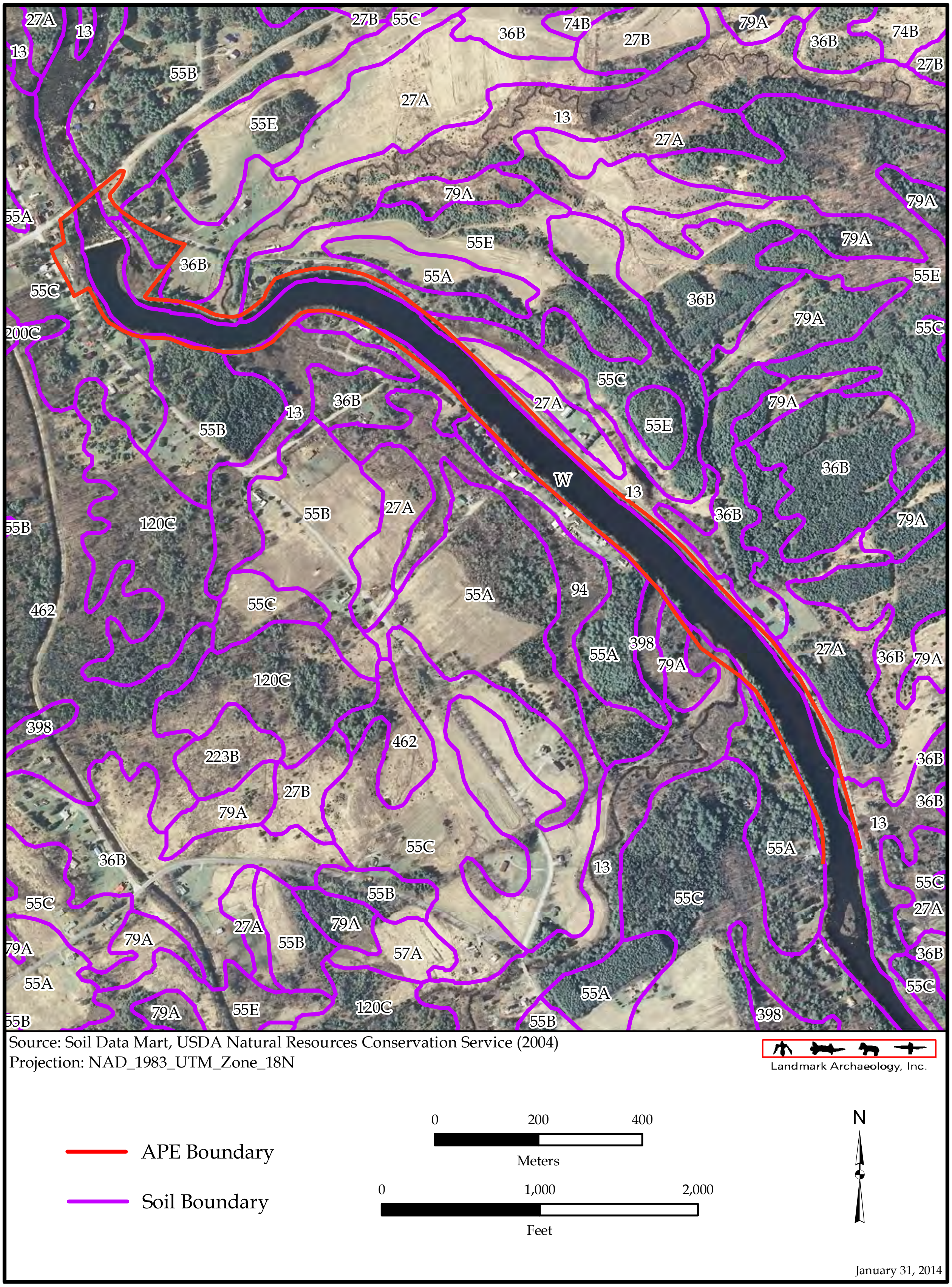


Figure 4: Mapped Soils

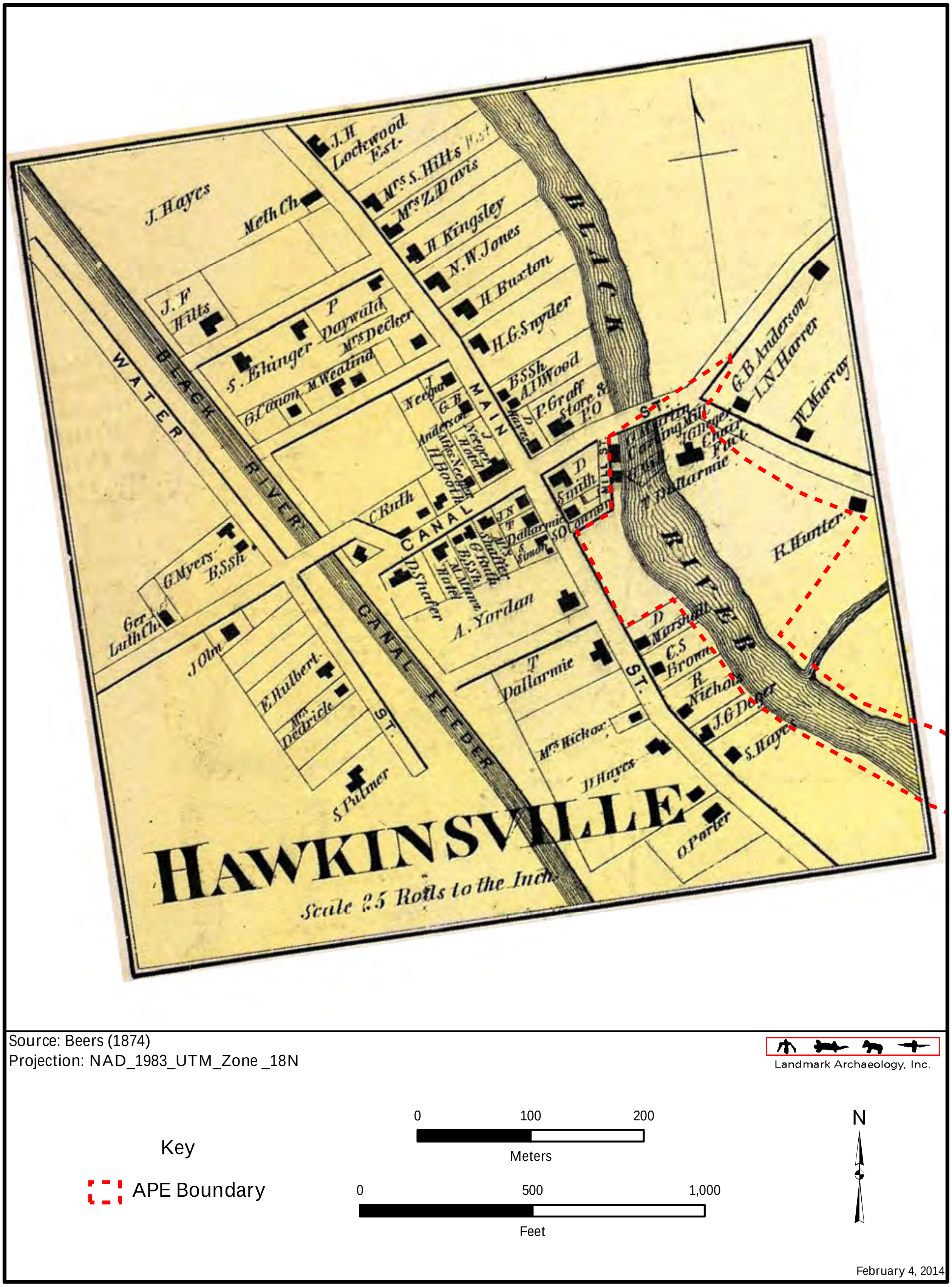


Figure 5: Project Location, 1874

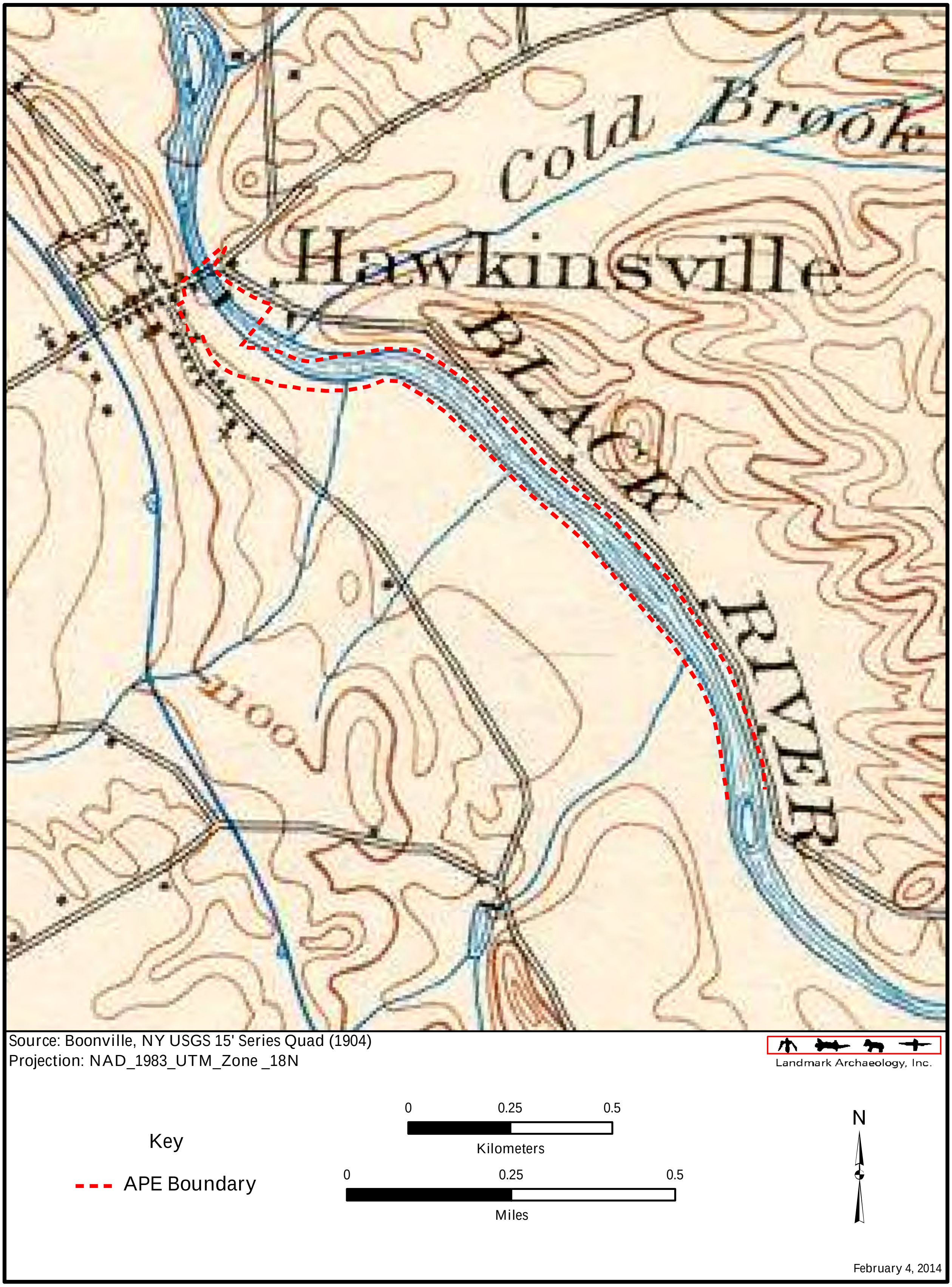


Figure 6: Project Location, 1904

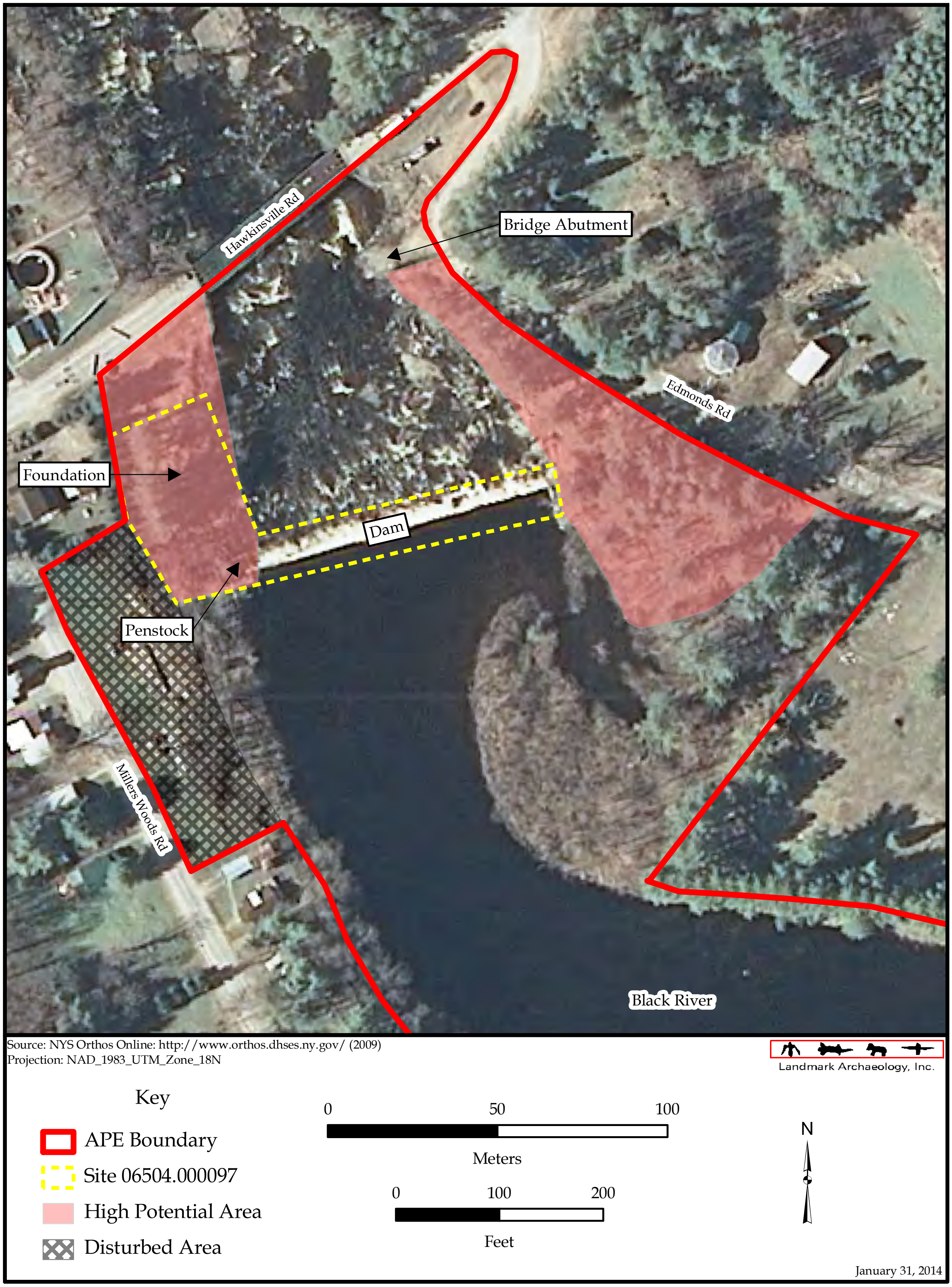
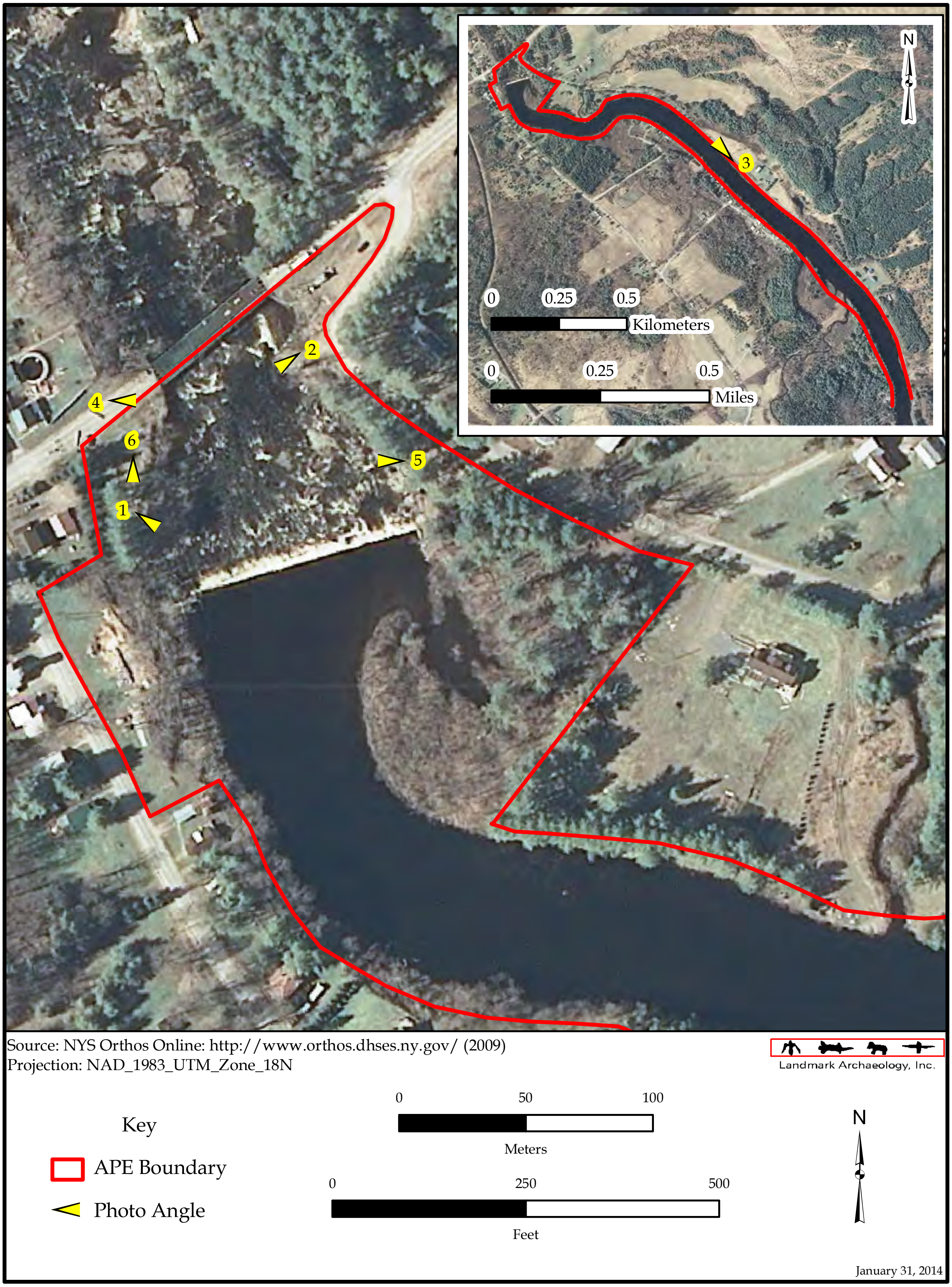


Figure 7: Areas of High Archaeological Potentional

APPENDIX A

Photographs



N
0
0.25
0.5
Kilometers
0
0.25
0.5
Miles
1
2
3
4
5
6
Source: NYS Orthos Online: http://www.orthos.dhses.ny.gov/ (2009)
Projection: NAD_1983_UTM_Zone_18N
Landmark Archaeology, Inc.
Key
APE Boundary
Photo Angle
0
50
100
Meters
0
250
500
Feet
N
January 31, 2014

Photo Key

Photograph 1: Hawkinsville Dam, View to Southeast

Photograph 2: Historic Bridge Abutment, View to East


Photograph 3: Hawkinsville Terrace, View to West


Photograph 4: Edmonds Road, View to Northwest

Photograph 5: Historic Archaeological Site 06504.000097, Vew to West

Photograph 6: Foundation Remnants, Brandt Excelsior Company,
Site 06504.000097, View to South

APPENDIX B

New York State Archaeological Site Inventory Form

NEW YORK STATE HISTORIC ARCHAEOLOGICAL SITE INVENTORY FORM

NYS OFFICE OF PARKS, RECREATION & HISTORIC PRESERVATION
(518) 237-8643

Bernadette Castro
Commissioner

For Office Use Only--Site Identifier 06504.000097

Project Identifier

Your Name Derrick J. Marcucci Date 1/20/2014
Address Landmark Archaeology, Inc. Phone (518) 861-8283
6242 Hawes Rd. Altamont, NY 12009

Organization (if any) : Landmark Archaeology, Inc.

1. SITE IDENTIFIER(S): Brant Excelsior Company Factory and Dam

2. COUNTY Oneida One of the following: CITY
TOWNSHIP: Boonville
INCORPORATED VILLAGE
UNINCORPORATED VILLAGE OR HAMLET

3. PRESENT OWNER: Hudson River-Black River Regulating District
Address Hawkinsville Road between Millers Woods Rd. and Edmonds Rd., Boonville, NY 13309

4. SITE DESCRIPTION (check all appropriate categories):
Superstructure: complete X (dam) partial___ collapsed ___ not evident X (factory)
Foundation: above X below ___ (ground level) not evident ___
___ Structural subdivisions apparent ___Only surface traces visible
___ Buried traces detected
List construction materials (be as specific as possible): Concrete

Grounds
___Under cultivation ___Sustaining erosion ___ Woodland ___Upland
X Never cultivated ___Previously cultivated X Floodplain ___Pastureland
Soil Drainage: excellent X good ___ fair ___ poor
Distance to nearest water from structure (approx.) 15 meters (50 ft) from foundation
Elevation: 1040-1060 ft amsl

5. Site Investigation (append additional sheets, if necessary):
Surface -- date (s) Ph IA January 2014
Site map (submit with form*)
Collection
Subsurface -- date(s) ____________
Testing: shovel ___ coring ___ other ___ unit size ____
no. units ____ (Submit plan of units with form*)

Excavation: unit size ____ no. of units __
(Submit plan of units with form*)
* Submission should be 8 ½" by 11", if feasible

Investigator Derrick J. Marcucci

Manuscript or published report (s) (reference fully):

Derrick J. Marcucci and Dawn Lawrence
2014 *Phase IA Literature Review and Archaeological Assessment of the Hawkinsville Dam Remediation and Removal Final Study and Design Project, Town of Boonville, Oneida County, New York. LA 310.*

Present repository of materials:

6. Site inventory:
a. Date constructed or occupation period: c. early- late 20th century
b. Previous owners, if known: 1890-1910: E.C. West, 1910-1951: Walter Brant, 1951-1969: Julia and Stanley Presta, 1969-Present: Hudson River-Black River Regulating District
c. Modifications, if known
(append additional sheets, if necessary)
Buildings associated with the factory were demolished, no known modifications to the Hawkinsville Dam aside from regular maintenance

7. Site documentation (append additional sheets, if necessary):
a. Historic map references
1) Name Boonville, NY Date 1904 Source: USGS
Present location of original, if known
2) Name_____________Date ____________ Source
Present location of original, if known
b. Representation in existing photography
1) Photo date _____________Where located:
2) Photo date ____________ Where located
c. Primary and secondary source of documentation (reference fully)

American Contractor
1915 Dam at Hawkinsville, NY. *American Contractor*, Vol. 6.
Ryder, Ron
1966 Brant Excelsior Mill Closing Signals End of Era on River. *Boonville Herald and Adirondack Tourist* 11 August: 1. Boonville, NY.

d. Persons with memory of site
1) Name_________________ Address
2) Name _________________ Address

8. List of material remains other than those used in construction (be as specific as possible in identifying object and material):

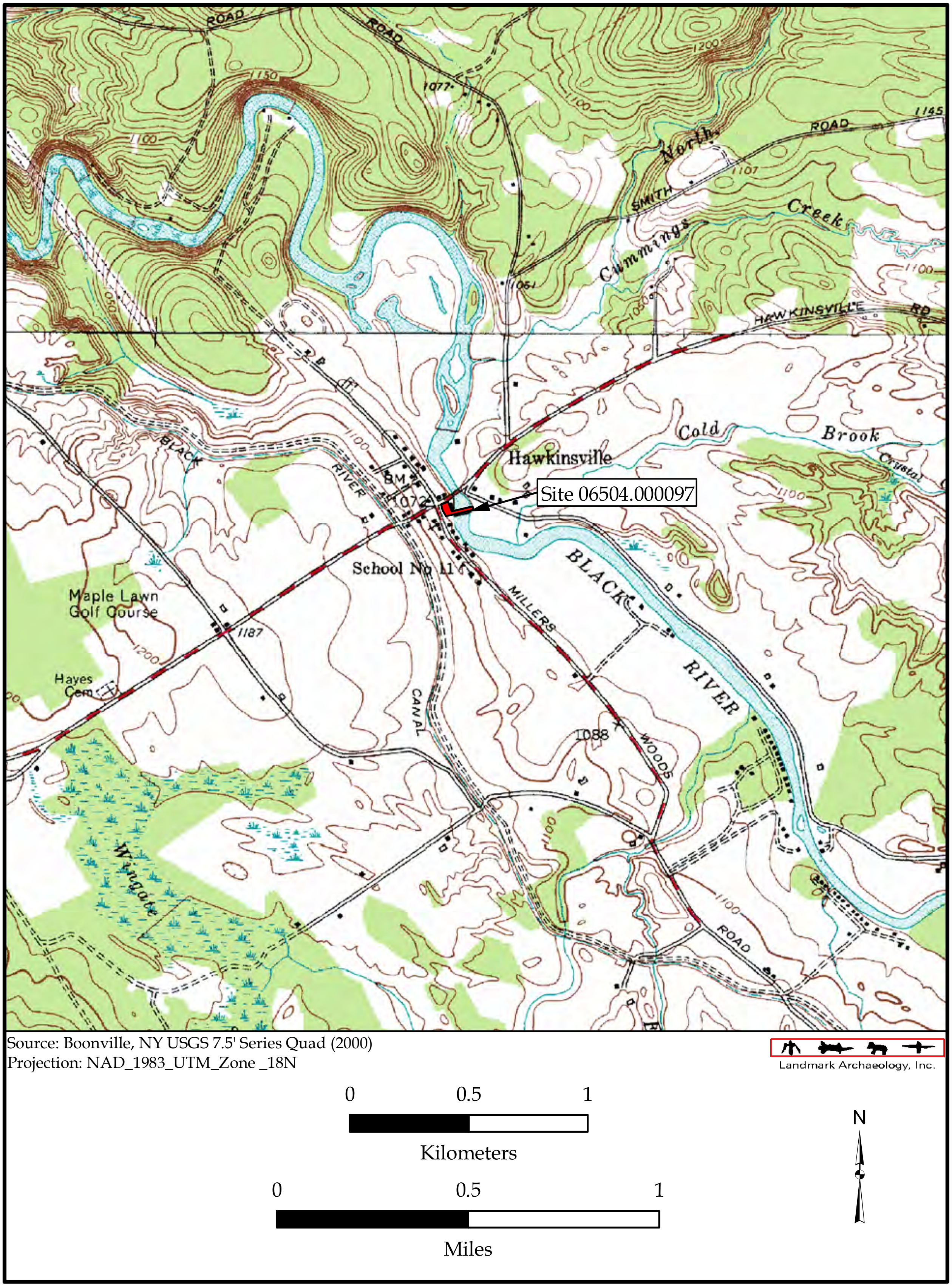
If prehistoric materials are evident, check here and fill out prehistoric site form.

9. Map References: Map or maps showing exact location and extent of site must accompany this form and be identified by source and date. Keep this submission to 8½" x 11", if possible.

USGS 7 1/2 Minute Series Quad. Name: Boonville, NY 2000
For Office Use Only--UTM Coordinates: 477667.6 East
4815645.5 North

10. Photography (optional for environmental impact survey): Please submit a 5"x7" black and white print(s) showing the current state of the site. Provide a label for the print(s) on a separate sheet.

Photos provided in technical report



Site 06504.000097 Location

APPENDIX F

HISTORICAL ASSESSMENT REPORT

HARVEY RESEARCH AND CONSULTING

4948 Limehill Drive • Syracuse, NY 13215 • Tel (315) 492-1454 • bgharvey@me.com

December 5, 2013

Bjorn Lake, Ph.D., P.E.
Engineering Team Leader, Department of Ecological Services
Kleinschmidt Associates
141 Main Street
Pittsfield, ME 04967

Via email

Dear Bjorn:

Under the terms of a Subcontractor Agreement dated October 16, 2013, and in accordance with my proposal which I sent to you on February 25, 2013, I have carried out a preliminary assessment of a dam on the Black River in Hawkinsville, Oneida County, New York. This preliminary assessment consisted of desktop research into the history of Hawkinsville and the Town of Boonville, and a site visit. I conducted the site visit on November 5, 2013, and have carried out the desktop research between November 4 and November 27, 2013, using readily available resources online and in local libraries. I have presented the results of this preliminary research below.

Hawkinsville is a hamlet situated on the Black River in the extreme northern portion of Oneida County near the southwestern edge of the Adirondack Park. It is located in the Town of Boonville, approximately three miles east of the Village of Boonville. Figure 1 shows the location of the hamlet of Hawkinsville.

Historic Overview

The Town of Boonville was first settled in the 1790s. The Oneida Nation ceded much of its land to the State of New York in the Treaty of Fort Stanwix (Schuyler) in 1788, with subsequent treaties and agreements through the early and mid 1790s. This series of concessions by the Oneida Nation opened the northern portions of Oneida County to European settlement. The area was included in the lands of the Holland Land Company, and the new town was named for the Company's agent, Gerrit Boon. The first white settlers in the town were led by Andrew Edmunds, who served as an agent for the

Holland Land Company. Edmunds and his associates arrived in Boonville in 1795. As an early historian of Oneida County noted, "the water power and other natural features of the locality were attractive to settlers" (Wager 1896: 397). Drawing upon the water power of the Black River and its tributaries, Edmunds and the group of men with him built a sawmill in 1795, and a grist mill in 1796. With the new mills, more settlers arrived in 1796 and the Holland Land Company quickly built a store and a tavern in 1796. Lumber, limestone quarrying, and dairying were the principal early industries in what became the Town of Boonville, in addition to agriculture (Jones 1851: 116-118).

Hawkinsville emerged on the west bank of the Black River in the early 1820s. Sterry Hawkins, David Porter, and Moses Johnson built a sawmill on the Black River in 1824, followed a year later by a grist mill. These early settlers built a small village, which quickly became a regional manufacturing center using the power of the Black River and its tributaries, with a carding mill in 1830, followed in subsequent decades by a chair factory and a tannery. It was a booming community through the mid-nineteenth century, gaining a Post Office in 1850 (when the Village was given its present name), with a tavern, store, and hotel. Much of this growth was driven by the completion of the Black River Canal in 1850, which connected the Erie Canal at Rome to the Black River in Carthage; a feeder canal paralleled the Black River through the Village of Hawkinsville. Improvements to the Black River then allowed for easy passage between the Erie Canal and Lake Ontario. This transportation connection made possible the increased development of forest products including lumber, furniture, and tanneries (Jones 1851: 118-120; Wager 1896: 405-406).

In the mid-nineteenth century, Hawkinsville and its manufacturing plants grew largely because of the combined water power and transportation provided by the Black River. The 1874 Oneida County Atlas (Figure 2) shows the village at its heyday, when buildings lined both side of the principal street in the village on the west side of the Black River, between the Black River and the Black River Canal. The principal business in the village by this time was a tannery, which was located slightly downstream of the village on the east side of the Black River. A tributary to the Black River featured a dam with a small mill pond that provided power to the tannery. There is evidence also that a mill was located at the site of the present dam in the 1880s, though no maps showing this mill were found during the current research.

Later in the nineteenth century, however, the village faded in importance. One part of the decline likely was the arrival of the railroad in northern Oneida County in the 1855; the railroad bypassed Hawkinsville and instead connected at Boonville. Railroads in the mid and late nineteenth century had immense power to both make and break communities, building up those where stations were built and leaving those without stations to fend for themselves without ready access to markets. As Wager (1896: 406) noted in regard to Hawkinsville, "The general business of the place has declined in late years."

Although the general business of Hawkinsville was in decline at the end of the nineteenth century, a new industry arrived in 1890. E.C. West, a business man in nearby

Lowville, first began operating an excelsior mill in Hawkinsville, using an existing wooden dam across the Black River (Ryder 1966). Excelsior was a packing material produced from wood slivers, using a technology that was developed in the early and mid-nineteenth century. The process made use of poplar, basswood, and white pine, all of which was available in northern New York. A USGS quadrangle map from 1904 shows the village small but intact, with the wooden dam across the Black River (Figure 3). The map does not show an impoundment in the river, suggesting that it was a very low-head dam.

In 1910, Walter Brant purchased the excelsior mill, with the factory and the wooden dam (Ryder 1966). In March 1915, the State of New York approved the construction of a new dam at the location. W.G. Stone & Son, an engineering firm in Utica, prepared the plans for the dam, which was to be 347 feet long and eight feet high. Reports of the dam's plans noted that it would include 800 cubic yards of concrete, along with 3.5 tons of iron and steel. The contracts were to be let in the spring of 1915 (*American Contractor* 1915).

The dam was designed and permitted for the generation of power, with a concrete intake on the left (west) side of the dam. The intake fed water to a penstock that originally measured 5'-10" in diameter. The Brant Excelsior Company factory was located on the west side of the Black River, immediately downstream of the dam on the south side of Rt. 61. An undated postcard shows the factory as a one and one-half story frame building with a gabled roof, above a raised basement where the ground slopes down to the river (Figure 4). An auxiliary building extended to the north from the main factory building. This building was built in 1929, when the original mill was destroyed by fire. A slightly larger penstock, measuring six feet in diameter, replaced the original penstock in 1959 (Ryder 1966). The factory was closed in 1966. No evidence was found during the present research to indicate that the dam has been replaced or significantly altered.

As other, synthetic packing materials were invented, the number of excelsior plants declined. By 1927, only seven excelsior plants remained in New York, including the Brant Company in Hawkinsville (Hoyle 1927: 143). According to the Adirondack Museum, which includes the Brant Company's excelsior machine in its collection, the Brant Excelsior Company was the last mill in New York State. A 1947 USGS quadrangle map shows the factory building in its relation to the dam (Figure 5).

Results

I carried out a field inspection of the Hawkinsville Dam on November 5, 2013. The concrete dam spans the Black River approximately 250 feet south of the bridge that carried Rt. 61 across the river. The dam remains intact, including the concrete intake structure at the western end of the dam. The intake itself, however, appears to have been filled, though the trash racks remain in place. Figures 6-11 present views of the dam and the intake.

As noted above, the Brant Excelsior factory closed in 1966, and all of the equipment and machinery were removed at that time. The building remained standing for many years, but is now gone and the land where it stood has been re-graded. Only a small portion of the concrete foundation remains to indicate the location of the factory. Figures 12 and 13 present views of the former factory site.

Methods

In order to evaluate the significance of the former Brant Excelsior dam in Hawkinsville, I carried out a historic architectural survey of the resource during my field visit. Following *National Register Bulletin: How to Apply the National Register Criteria for Evaluation* (Savage and Pope 1998), evaluation of any resource requires a twofold process. First, the significance of a resource must be determined. The basis for determining the significance of a resource is an understanding of the historic context. As per 36 CFR Part 60.4, there are four broad evaluative criteria for determining the significance of a resource and its eligibility for the NRHP within its historic context. Any resource (building, structure, site, object, or district) may be eligible for the NRHP if it:

A. is associated with events that have made a significant contribution to the broad pattern of history;

B. is associated with the lives of persons significant in the past;

C. embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, possesses high artistic value, or represents a significant and distinguishable entity whose components may lack individual distinction; or

D. has yielded, or is likely to yield, information important to history or prehistory.

A resource may be eligible under one or more of these criteria. Criteria A, B, and C are most frequently applied to historic buildings, structures, objects, non-archaeological sites (e.g., battlefields, natural features, designed landscapes, or cemeteries), or districts. The eligibility of archaeological sites is most frequently considered with respect to Criterion D. Also, a general guide of 50 years of age is employed to define “historic” in the NRHP evaluation process. However, more recent resources may be considered if they display “exceptional” significance (Sherfy and Luce n.d.).

If this association is demonstrated, the integrity of the resource must be evaluated to ensure that it conveys the significance of its context. After a resource is specifically associated with a significant historic context, one must determine which physical features of the resource are necessary to reflect its significance. This must include a consideration of the aspects of integrity applicable to a resource. Integrity is defined in seven aspects of a resource; one or more may be applicable depending on the nature of the resource under evaluation. These aspects are *location, design, setting, materials, workmanship, feeling, and association* (36 CFR 60.4; Savage and Pope 1998). If a resource does not possess integrity with respect to these aspects, it cannot adequately reflect or represent its associated historically significant context. Therefore, it cannot be eligible for the NRHP. To be considered eligible under Criteria A and B, a resource must retain its essential physical characteristics that were present during the event(s) with which it is associated. Under Criterion C, a resource must retain enough of its physical characteristics to reflect the style, type, etc., or work of the artisan that it represents. Under Criterion D, a resource must be able to generate data that can address specific research questions that are important in reconstructing or interpreting the past.

While in the field, I evaluated the integrity of the former Brant Excelsior dam. For the purpose of this project, four levels of architectural integrity were employed. These include:

Excellent All original construction materials and design remain intact and unchanged.

Good The majority of original construction materials remain intact and unchanged except for renewable elements such as roofing and window panes, and in-kind replacements such as windows, doors, and siding.

Fair A substantial number of original architectural elements have been altered, such as the installation of aluminum, asbestos, or vinyl siding, the substitution of historic doors and windows with non-historic replacements, and the construction of non-historic additions.

Poor Has been radically altered from its original design by non-historic renovations and/or additions.

Recommendations

The flow of water over the dam during the site visit did not allow for a view of the dam itself. However, the preliminary research carried out for this report did not identify any evidence that the former Brant Excelsior Company dam had been altered in any significant way. The only significant alterations concern the intake, which has been filled, and the penstock, which has been removed. It appears, therefore, that the dam has retained its integrity of location, design, setting, materials, and workmanship.

While the dam itself is intact, it is important to note that when the dam was built in 1915, its purpose was to provide water for the existing Brant Excelsior factory, replacing an earlier dam that likely was constructed of timber cribs. The dam itself was, therefore, part of a larger complex that also include the factory, together with the intake and penstock that connected them. With the removal of the factory and the connecting structures, the dam has lost its integrity of feeling and association. While the dam itself appears to be intact, it has retained only fair integrity because of the loss of the associated factory.

I also evaluated the significance of the former Brant Excelsior Company dam, and its potential eligibility for inclusion in the NRHP, under the four criteria identified above. Under Criterion A, the Brant Excelsior factory, with its dam, was an important feature in the history of the Town of Boonville and the northern section of Oneida County in the early and mid twentieth century. It was the one industry that survived in this remote section, and characteristically drew upon the local industrial tradition of forest resources. However, without the entire complex consisting of factory, dam, and connecting structures, the one component that remains is not able to convey the significance of this site in the history of Oneida County and northern New York State.

Under Criterion B, the current research did not indicate any historically significant persons who were associated with the former Brant Excelsior Company dam.

Under Criterion C, the former Brant Excelsior Company dam is of a standard type of low-head gravity dam constructed in the early twentieth century using reinforced concrete. The current research did not indicate any architectural or engineering features of the dam that are historically significant.

Under Criterion D, the site of the former factory has the possibility of yielding information that is significant in history, given the importance of the Brant Excelsior Company to the Town of Boonville and Oneida County. The dam itself, however, is unlikely to yield any information, as it was built according to what was by then a standardized type.

On the basis of this evaluation, therefore, I recommend that the former Brant Excelsior Company dam is not eligible for the NRHP. Any proposed alterations, or its removal, will not constitute an effect under Section 106 of the NHPA or Section 14.09 of the New York State Historic Preservation Act.

If you have any questions or comments, please do not hesitate to let me know.

Yours truly,

Bruce G. Harvey
Principal

References

"Dam at Hawkinsville, NY." *American Contractor*. Vol. 6: March 6, 1915.

Hoyle, Raymond J. "Wood-Using Industries of New York." Technical Publication of NY State College of Forestry at Syracuse University. 1927.

Jones, Pomroy. *Annals and Collections of Oneida County*. Rome, NY: By the Author. 1851.

Ryder, Ron. "Brant Excelsior Mill Closing Signals End of Era on River." *Boonville Herald and Adirondack Tourist* (Boonville, NY). August 11, 1966, p. 1.

Savage, Beth L. and Sarah Dillard Pope. *National Register Bulletin: How to Apply the National Register Criteria for Evaluation*. Washington, DC: US Department of the Interior, Park Service, Interagency Resources Division. 1998.

Sherfy, Marcella and W. Ray Luce. *National Register Bulletin 22: Guidelines for Evaluating and Nominating Properties That Have Achieved Significance in the Last Fifty Years*. Washington, DC: US Department of the Interior, Park Service, Interagency Resources Division. N.d.

Wager, Daniel E., ed. *Our County and Its People: A Descriptive Work on Oneida County, New York*. Boston, MA: The Boston History Company, Publishers. 1896.

Figure 1. Map showing Hawkinsville, NY

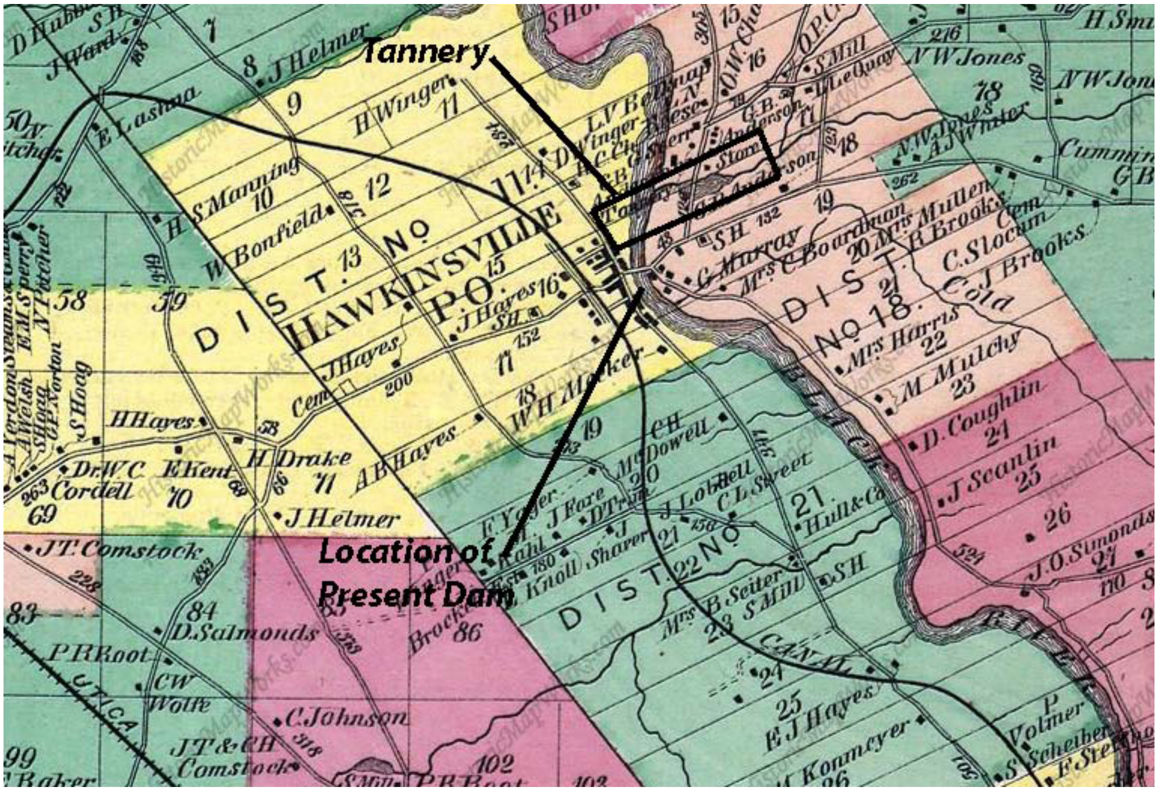


Figure 2. Portion of 1874 Oneida County Atlas, showing Hawkinsville

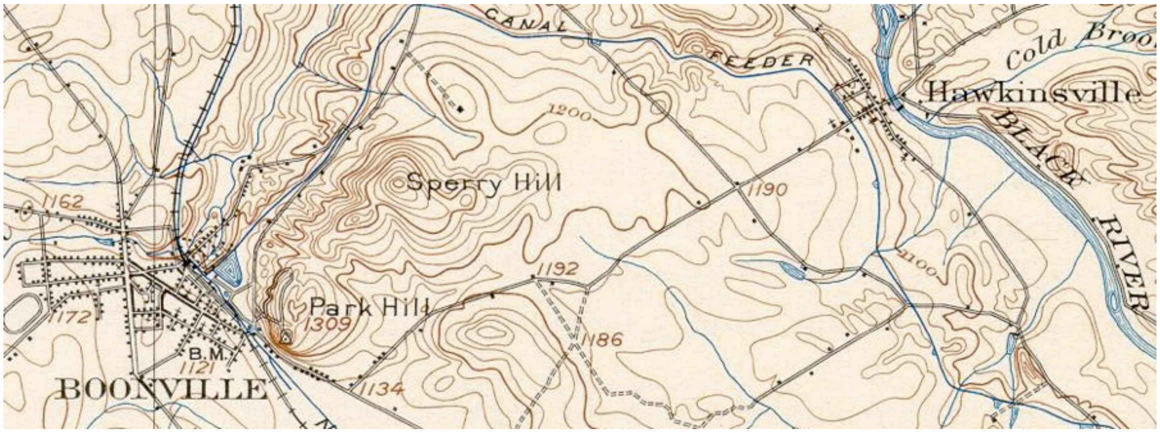


Figure 3. 1904 USGS Boonville quadrangle map, showing Boonville and Hawkinsville.

Figure 4. Undated postcard showing the Brant Excelsior factory, looking SW from east side of the Black River.

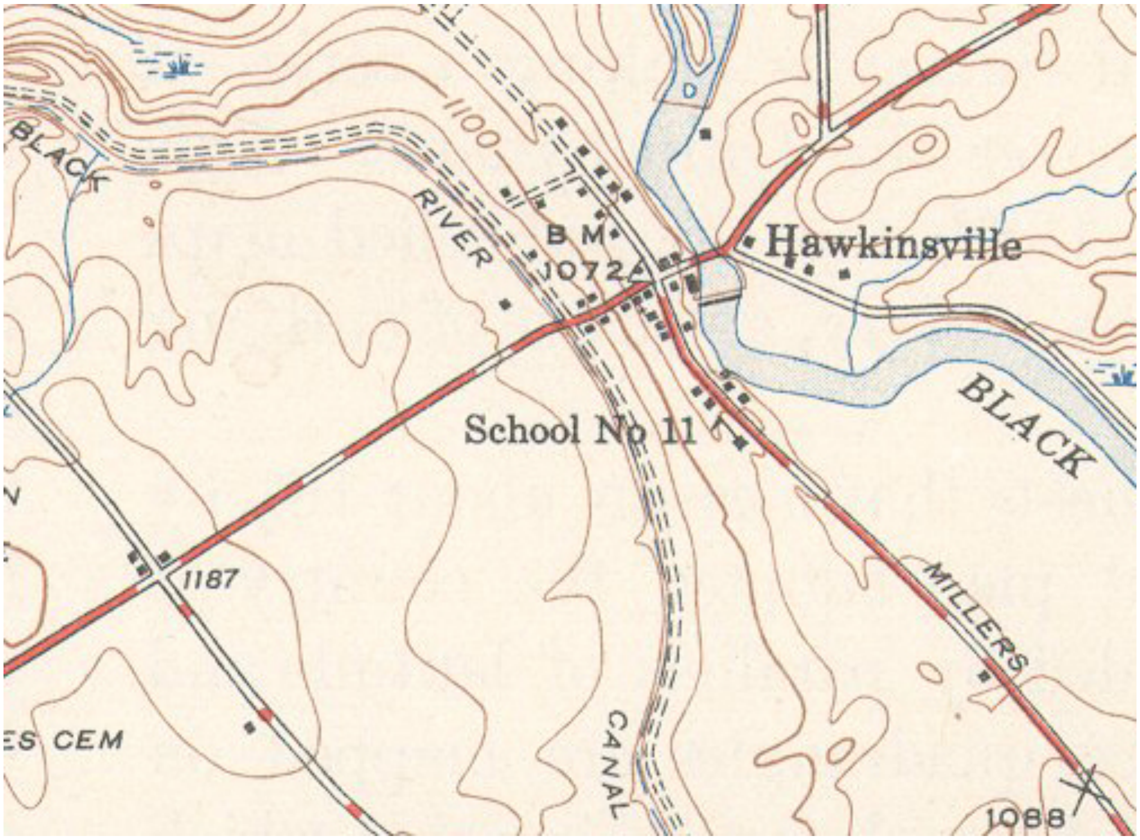


Figure 5. 1947 USGS Boonville quad map, showing Hawkinsville and the present dam.

Figure 6. Crest of dam looking E, 2013.

Figure 7. Dam and intake looking NE, 2013.

Figure 8. Downstream face of dam looking SE, 2013.

Figure 9. Downstream face of dam looking SW, 2013.

Figure 10. Intake detail, 2013.

Figure 11. Downstream face of intake, showing penstock outlet.

Figure 12. Former factory site looking SW, 2013.

Figure 13. Former factory site, foundation detail, 2013.

APPENDIX G

IMPOUNDMENT WATER SURFACE ELEVATION TABLES

Table G-1. Spring Mean Black River Flow at Dam (Flow = 1,209 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,048.12	0.84	1,048.10	-0.02	0.85	1,048.11	-0.01	0.84
32271.13	2.02	1,048.03	0.89	1,048.00	-0.03	0.89	1,048.02	-0.01	0.89
31016.32	1.78	1,047.74	1.47	1,047.70	-0.04	1.48	1,047.72	-0.02	1.48
30274	1.64	1,047.37	2.00	1,047.32	-0.05	2.03	1,047.35	-0.02	2.01
29550.22	1.51	1,046.76	2.18	1,046.65	-0.11	2.27	1,046.72	-0.04	2.21
29022.67	1.41	1,046.23	1.75	1,045.98	-0.25	1.97	1,046.15	-0.08	1.82
28697.79*	1.34	1,045.85	1.90	1,045.00	-0.85	3.25	1,045.66	-0.19	2.10
28184.22	1.25	1,045.71	1.09	1,043.53	-2.18	1.84	1,045.47	-0.24	1.13
27023.5	1.03	1,045.62	0.90	1,043.01	-2.61	1.59	1,045.37	-0.25	0.94
26421.9	0.91	1,045.59	0.75	1,042.83	-2.76	1.47	1,045.34	-0.25	0.79
25717.27	0.78	1,045.56	0.81	1,042.65	-2.91	1.38	1,045.31	-0.25	0.84
24632.32	0.57	1,045.52	0.83	1,042.41	-3.11	1.53	1,045.26	-0.26	0.87
23671.11	0.39	1,045.48	0.89	1,042.12	-3.36	1.79	1,045.21	-0.27	0.93
22929.57	0.25	1,045.45	0.90	1,041.83	-3.62	1.88	1,045.18	-0.27	0.94
22487.31	0.17	1,045.41	1.19	1,041.40	-4.01	3.04	1,045.14	-0.27	1.25
22102.97	0.09	1,045.39	0.91	1,040.42	-4.97	4.10	1,045.11	-0.28	0.96
21932.54	0.06	1,045.38	0.97	1,039.13	-6.25	4.44	1,045.10	-0.28	1.00
21672.38	0.01	1,045.38	0.46	1,038.00	-7.38	3.34	1,045.10	-0.28	0.48
21617.62	0.00	1,045.37	0.47	1,037.56	-7.81	2.50	1,045.10	-0.27	0.45

*Approximate upstream extent of impoundment

Table G-2. Spring Median Black River Flow at Dam (Flow = 887 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,047.55	0.72	1,047.54	-0.01	0.73	1,047.55	0.00	0.73
32271.13	2.02	1,047.47	0.78	1,047.45	-0.02	0.79	1,047.46	-0.01	0.78
31016.32	1.78	1,047.21	1.25	1,047.19	-0.02	1.26	1,047.20	-0.01	1.25
30274	1.64	1,046.90	1.69	1,046.86	-0.04	1.71	1,046.88	-0.02	1.7
29550.22	1.51	1,046.36	1.87	1,046.29	-0.07	1.93	1,046.33	-0.03	1.89
29022.67	1.41	1,045.86	1.54	1,045.69	-0.17	1.70	1,045.80	-0.06	1.6
28697.79*	1.34	1,045.47	1.72	1,044.77	-0.7	2.93	1,045.31	-0.16	1.91
28184.22	1.25	1,045.35	0.86	1,042.89	-2.46	1.67	1,045.15	-0.20	0.9
27023.5	1.03	1,045.29	0.70	1,042.37	-2.92	1.39	1,045.08	-0.21	0.73
26421.9	0.91	1,045.27	0.59	1,042.19	-3.08	1.34	1,045.06	-0.21	0.61
25717.27	0.78	1,045.25	0.62	1,042.01	-3.24	1.18	1,045.04	-0.21	0.65
24632.32	0.57	1,045.23	0.64	1,041.81	-3.42	1.30	1,045.01	-0.22	0.67
23671.11	0.39	1,045.20	0.68	1,041.56	-3.64	1.53	1,044.98	-0.22	0.71
22929.57	0.25	1,045.18	0.69	1,041.32	-3.86	1.58	1,044.96	-0.22	0.72
22487.31	0.17	1,045.16	0.92	1,040.97	-4.19	2.60	1,044.94	-0.22	0.96
22102.97	0.09	1,045.15	0.70	1,040.02	-5.13	3.93	1,044.92	-0.23	0.73
21932.54	0.06	1,045.14	0.73	1,038.78	-6.36	3.82	1,044.91	-0.23	0.76
21672.38	0.01	1,045.14	0.35	1,037.62	-7.52	3.19	1,044.91	-0.23	0.36
21617.62	0.00	1,045.14	0.35	1,037.10	-8.04	2.30	1,044.91	-0.23	0.34

*Approximate upstream extent of impoundment

Table G-3. Summer Mean Black River Flow at Dam (Flow = 434 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,046.52	0.51	1,046.51	-0.01	0.52	1,046.52	0.00	0.51
32271.13	2.02	1,046.45	0.57	1,046.44	-0.01	0.58	1,046.44	-0.01	0.57
31016.32	1.78	1,046.26	0.84	1,046.25	-0.01	0.85	1,046.26	0.00	0.85
30274	1.64	1,046.05	1.15	1,046.03	-0.02	1.15	1,046.04	-0.01	1.15
29550.22	1.51	1,045.66	1.30	1,045.63	-0.03	1.32	1,045.65	-0.01	1.31
29022.67	1.41	1,045.24	1.12	1,045.15	-0.09	1.20	1,045.21	-0.03	1.15
28697.79*	1.34	1,044.89	1.29	1,044.38	-0.51	2.24	1,044.77	-0.12	1.43
28184.22	1.25	1,044.81	0.47	1,041.74	-3.07	1.33	1,044.67	-0.14	0.49
27023.5	1.03	1,044.79	0.38	1,041.20	-3.59	1.05	1,044.65	-0.14	0.39
26421.9	0.91	1,044.79	0.32	1,041.00	-3.79	1.14	1,044.65	-0.14	0.33
25717.27	0.78	1,044.78	0.33	1,040.82	-3.96	0.81	1,044.64	-0.14	0.34
24632.32	0.57	1,044.77	0.34	1,040.69	-4.08	0.87	1,044.63	-0.14	0.35
23671.11	0.39	1,044.76	0.36	1,040.52	-4.24	1.07	1,044.62	-0.14	0.37
22929.57	0.25	1,044.76	0.37	1,040.37	-4.39	1.02	1,044.62	-0.14	0.37
22487.31	0.17	1,044.75	0.49	1,040.16	-4.59	1.80	1,044.61	-0.14	0.50
22102.97	0.09	1,044.75	0.37	1,039.38	-5.37	3.27	1,044.61	-0.14	0.38
21932.54	0.06	1,044.75	0.38	1,038.13	-6.62	2.72	1,044.60	-0.15	0.39
21672.38	0.01	1,044.75	0.18	1,037.06	-7.69	2.56	1,044.60	-0.15	0.18
21617.62	0.00	1,044.75	0.18	1,036.34	-8.41	1.86	1,044.60	-0.15	0.17

*Approximate upstream extent of impoundment

Table G-4. Summer Median Black River Flow at Dam (Flow = 296 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,046.09	0.43	1,046.09	0.00	0.43	1,046.09	0.00	0.43
32271.13	2.02	1,046.03	0.49	1,046.02	-0.01	0.49	1,046.02	-0.01	0.49
31016.32	1.78	1,045.87	0.68	1,045.86	-0.01	0.69	1,045.86	-0.01	0.68
30274	1.64	1,045.69	0.92	1,045.68	-0.01	0.93	1,045.69	0.00	0.92
29550.22	1.51	1,045.37	1.07	1,045.35	-0.02	1.08	1,045.37	0.00	1.07
29022.67	1.41	1,045.00	0.93	1,044.93	-0.07	0.99	1,044.97	-0.03	0.95
28697.79*	1.34	1,044.69	1.06	1,044.23	-0.46	1.95	1,044.60	-0.09	1.17
28184.22	1.25	1,044.63	0.34	1,041.30	-3.33	1.18	1,044.53	-0.10	0.35
27023.5	1.03	1,044.62	0.27	1,040.73	-3.89	0.89	1,044.52	-0.10	0.27
26421.9	0.91	1,044.62	0.22	1,040.51	-4.11	1.09	1,044.52	-0.10	0.23
25717.27	0.78	1,044.62	0.23	1,040.31	-4.31	0.66	1,044.51	-0.11	0.23
24632.32	0.57	1,044.61	0.24	1,040.20	-4.41	0.71	1,044.51	-0.10	0.24
23671.11	0.39	1,044.61	0.25	1,040.07	-4.54	0.88	1,044.50	-0.11	0.26
22929.57	0.25	1,044.61	0.25	1,039.94	-4.67	0.80	1,044.50	-0.11	0.26
22487.31	0.17	1,044.60	0.34	1,039.78	-4.82	1.48	1,044.50	-0.10	0.35
22102.97	0.09	1,044.60	0.26	1,039.06	-5.54	3.05	1,044.49	-0.11	0.26
21932.54	0.06	1,044.60	0.26	1,037.85	-6.75	2.29	1,044.49	-0.11	0.27
21672.38	0.01	1,044.60	0.12	1,036.85	-7.75	2.23	1,044.49	-0.11	0.13
21617.62	0.00	1,044.60	0.13	1,036.03	-8.57	1.71	1,044.49	-0.11	0.12

*Approximate upstream extent of impoundment

Table G-5. Fall Mean Black River Flow at Dam (Flow = 863 cubic feet per second)

Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,047.51	0.71	1,047.49	-0.02	0.72	1,047.50	-0.01	0.72
32271.13	2.02	1,047.42	0.77	1,047.40	-0.02	0.78	1,047.41	-0.01	0.78
31016.32	1.78	1,047.17	1.23	1,047.15	-0.02	1.24	1,047.16	-0.01	1.23
30274	1.64	1,046.86	1.67	1,046.83	-0.03	1.69	1,046.84	-0.02	1.68
29550.22	1.51	1,046.33	1.85	1,046.26	-0.07	1.90	1,046.30	-0.03	1.87
29022.67	1.41	1,045.83	1.52	1,045.66	-0.17	1.68	1,045.77	-0.06	1.58
28697.79*	1.34	1,045.44	1.70	1,044.75	-0.69	2.90	1,045.28	-0.16	1.89
28184.22	1.25	1,045.32	0.84	1,042.84	-2.48	1.65	1,045.13	-0.19	0.88
27023.5	1.03	1,045.26	0.68	1,042.32	-2.94	1.37	1,045.06	-0.20	0.71
26421.9	0.91	1,045.25	0.57	1,042.13	-3.12	1.33	1,045.04	-0.21	0.60
25717.27	0.78	1,045.23	0.61	1,041.96	-3.27	1.16	1,045.02	-0.21	0.63
24632.32	0.57	1,045.20	0.63	1,041.76	-3.44	1.28	1,044.99	-0.21	0.66
23671.11	0.39	1,045.18	0.67	1,041.51	-3.67	1.51	1,044.97	-0.21	0.70
22929.57	0.25	1,045.16	0.68	1,041.27	-3.89	1.56	1,044.95	-0.21	0.70
22487.31	0.17	1,045.14	0.89	1,040.93	-4.21	2.57	1,044.92	-0.22	0.93
22102.97	0.09	1,045.13	0.68	1,039.99	-5.14	3.91	1,044.91	-0.22	0.71
21932.54	0.06	1,045.12	0.71	1,038.75	-6.37	3.76	1,044.90	-0.22	0.74
21672.38	0.01	1,045.12	0.34	1,037.59	-7.53	3.17	1,044.90	-0.22	0.35
21617.62	0.00	1,045.12	0.35	1,037.06	-8.06	2.28	1,044.90	-0.22	0.33

*Approximate upstream extent of impoundment

Table G-6. Fall Median Black River Flow at Dam (Flow = 697 cubic feet per second)

Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,047.17	0.64	1,047.15	-0.02	0.65	1,047.16	-0.01	0.65
32271.13	2.02	1,047.08	0.70	1,047.07	-0.01	0.71	1,047.08	0.00	0.70
31016.32	1.78	1,046.85	1.09	1,046.84	-0.01	1.10	1,046.85	0.00	1.10
30274	1.64	1,046.58	1.49	1,046.55	-0.03	1.50	1,046.57	-0.01	1.49
29550.22	1.51	1,046.10	1.65	1,046.04	-0.06	1.70	1,046.08	-0.02	1.67
29022.67	1.41	1,045.62	1.39	1,045.48	-0.14	1.51	1,045.57	-0.05	1.43
28697.79*	1.34	1,045.23	1.57	1,044.62	-0.61	2.69	1,045.09	-0.14	1.74
28184.22	1.25	1,045.13	0.71	1,042.45	-2.68	1.55	1,044.95	-0.18	0.74
27023.5	1.03	1,045.08	0.57	1,041.93	-3.15	1.27	1,044.91	-0.17	0.59
26421.9	0.91	1,045.07	0.48	1,041.74	-3.33	1.26	1,044.89	-0.18	0.50
25717.27	0.78	1,045.06	0.51	1,041.57	-3.49	1.03	1,044.88	-0.18	0.52
24632.32	0.57	1,045.04	0.52	1,041.40	-3.64	1.14	1,044.86	-0.18	0.54
23671.11	0.39	1,045.03	0.56	1,041.18	-3.85	1.35	1,044.84	-0.19	0.57
22929.57	0.25	1,045.01	0.56	1,040.97	-4.04	1.37	1,044.83	-0.18	0.58
22487.31	0.17	1,045.00	0.74	1,040.67	-4.33	2.30	1,044.81	-0.19	0.77
22102.97	0.09	1,044.99	0.57	1,039.78	-5.21	3.70	1,044.80	-0.19	0.58
21932.54	0.06	1,044.98	0.59	1,038.54	-6.44	3.40	1,044.80	-0.18	0.60
21672.38	0.01	1,044.98	0.28	1,037.39	-7.59	3.01	1,044.80	-0.18	0.29
21617.62	0.00	1,044.98	0.28	1,036.81	-8.17	2.14	1,044.79	-0.19	0.27

*Approximate upstream extent of impoundment

Table G-7. Winter Mean Black River Flow at Dam (Flow = 773 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,047.33	0.68	1,047.31	-0.02	0.68	1,047.32	-0.01	0.68
32271.13	2.02	1,047.24	0.74	1,047.23	-0.01	0.74	1,047.23	-0.01	0.73
31016.32	1.78	1,047.00	1.16	1,046.98	-0.02	1.16	1,046.99	-0.01	1.16
30274	1.64	1,046.71	1.57	1,046.68	-0.03	1.59	1,046.70	-0.01	1.58
29550.22	1.51	1,046.21	1.75	1,046.15	-0.06	1.79	1,046.18	-0.03	1.76
29022.67	1.41	1,045.72	1.46	1,045.57	-0.15	1.59	1,045.66	-0.06	1.51
28697.79*	1.34	1,045.33	1.64	1,044.68	-0.65	2.79	1,045.18	-0.15	1.81
28184.22	1.25	1,045.22	0.77	1,042.63	-2.59	1.60	1,045.03	-0.19	0.80
27023.5	1.03	1,045.17	0.62	1,042.11	-3.06	1.32	1,044.97	-0.20	0.65
26421.9	0.91	1,045.15	0.52	1,041.93	-3.22	1.29	1,044.96	-0.19	0.55
25717.27	0.78	1,045.14	0.55	1,041.76	-3.38	1.09	1,044.94	-0.20	0.57
24632.32	0.57	1,045.12	0.57	1,041.57	-3.55	1.21	1,044.92	-0.20	0.59
23671.11	0.39	1,045.10	0.61	1,041.34	-3.76	1.43	1,044.90	-0.20	0.63
22929.57	0.25	1,045.08	0.61	1,041.11	-3.97	1.46	1,044.88	-0.20	0.64
22487.31	0.17	1,045.06	0.81	1,040.80	-4.26	2.43	1,044.86	-0.20	0.85
22102.97	0.09	1,045.05	0.62	1,039.88	-5.17	3.81	1,044.85	-0.20	0.64
21932.54	0.06	1,045.05	0.65	1,038.64	-6.41	3.57	1,044.84	-0.21	0.67
21672.38	0.01	1,045.05	0.31	1,037.48	-7.57	3.09	1,044.84	-0.21	0.31
21617.62	0.00	1,045.05	0.31	1,036.93	-8.12	2.21	1,044.84	-0.21	0.30

*Approximate upstream extent of impoundment

Table G-8. Winter Median Black River Flow at Dam (Flow = 520 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,046.75	0.56	1,046.74	-0.01	0.56	1,046.75	0.00	0.56
32271.13	2.02	1,046.67	0.62	1,046.66	-0.01	0.63	1,046.67	0.00	0.62
31016.32	1.78	1,046.47	0.93	1,046.46	-0.01	0.94	1,046.47	0.00	0.93
30274	1.64	1,046.23	1.27	1,046.22	-0.01	1.28	1,046.23	0.00	1.27
29550.22	1.51	1,045.82	1.42	1,045.78	-0.04	1.45	1,045.80	-0.02	1.44
29022.67	1.41	1,045.37	1.22	1,045.27	-0.10	1.31	1,045.33	-0.04	1.25
28697.79*	1.34	1,045.00	1.39	1,044.46	-0.54	2.41	1,044.88	-0.12	1.55
28184.22	1.25	1,044.92	0.55	1,041.99	-2.93	1.40	1,044.77	-0.15	0.57
27023.5	1.03	1,044.89	0.44	1,041.46	-3.43	1.13	1,044.74	-0.15	0.46
26421.9	0.91	1,044.88	0.37	1,041.27	-3.61	1.18	1,044.73	-0.15	0.38
25717.27	0.78	1,044.87	0.39	1,041.09	-3.78	0.89	1,044.72	-0.15	0.40
24632.32	0.57	1,044.86	0.40	1,040.95	-3.91	0.97	1,044.71	-0.15	0.41
23671.11	0.39	1,044.85	0.43	1,040.76	-4.09	1.17	1,044.70	-0.15	0.44
22929.57	0.25	1,044.85	0.43	1,040.58	-4.27	1.15	1,044.69	-0.16	0.44
22487.31	0.17	1,044.84	0.57	1,040.34	-4.50	1.97	1,044.68	-0.16	0.59
22102.97	0.09	1,044.83	0.43	1,039.51	-5.32	3.46	1,044.67	-0.16	0.45
21932.54	0.06	1,044.83	0.45	1,038.27	-6.56	2.96	1,044.67	-0.16	0.46
21672.38	0.01	1,044.83	0.21	1,037.17	-7.66	2.73	1,044.67	-0.16	0.22
21617.62	0.00	1,044.83	0.22	1,036.51	-8.32	1.96	1,044.67	-0.16	0.20

*Approximate upstream extent of impoundment

Table G-9. 2-Year Return Period Black River Flow at Dam (Flow = 5,765 cubic feet per second)									
Model River Station	**Distance Upstream of Dam (miles)**	**Existing Conditions**		**Dam Removal**			**Dam Remediation**		
		Impoundment Water Surface Elevation (feet)	**Average Flow Velocity in Channel (feet/second)**	**Impoundment Water Surface Elevation (feet)**	**Difference from Existing Conditions (feet)**	**Average Flow Velocity in Channel (feet/second)**	**Impoundment Water Surface Elevation (feet)**	**Difference from Existing Conditions (feet)**	**Average Flow Velocity in Channel (feet/second)**
33083.67	2.17	1,052.77	1.77	1,052.66	-0.11	1.79	1,052.75	-0.02	1.77
32271.13	2.02	1,052.63	1.73	1,052.52	-0.11	1.76	1,052.62	-0.01	1.74
31016.32	1.78	1,052.06	3.26	1,051.91	-0.15	3.32	1,052.04	-0.02	3.27
30274	1.64	1,051.26	4.51	1,051.05	-0.21	4.64	1,051.23	-0.03	4.52
29550.22	1.51	1,050.23	4.53	1,049.84	-0.39	4.82	1,050.19	-0.04	4.54
29022.67	1.41	1,049.81	2.72	1,049.23	-0.58	3.07	1,049.74	-0.07	2.75
28697.79*	1.34	1,049.55	2.96	1,048.83	-0.72	3.43	1,049.48	-0.07	2.99
28184.22	1.25	1,049.32	2.84	1,048.47	-0.85	3.19	1,049.23	-0.09	2.88
27023.5	1.03	1,048.94	2.58	1,047.90	-1.04	2.97	1,048.83	-0.11	2.60
26421.9	0.91	1,048.81	2.13	1,047.69	-1.12	2.50	1,048.70	-0.11	2.16
25717.27	0.78	1,048.63	2.54	1,047.41	-1.22	2.97	1,048.51	-0.12	2.57
24632.32	0.57	1,048.36	2.62	1,046.94	-1.42	3.20	1,048.23	-0.13	2.67
23671.11	0.39	1,048.06	2.86	1,046.38	-1.68	3.67	1,047.91	-0.15	2.93
22929.57	0.25	1,047.80	3.08	1,045.80	-2.00	4.07	1,047.63	-0.17	3.15
22487.31	0.17	1,047.46	4.17	1,044.78	-2.68	6.43	1,047.27	-0.19	4.27
22102.97	0.09	1,047.26	3.19	1,043.46	-3.80	6.43	1,047.05	-0.21	3.29
21932.54	0.06	1,047.10	3.74	1,041.89	-5.21	8.62	1,046.88	-0.22	3.81
21672.38	0.01	1,047.12	1.79	1,040.90	-6.22	4.89	1,046.90	-0.22	1.84
21617.62	0.00	1,047.10	1.86	1,040.52	-6.58	4.59	1,046.89	-0.21	1.77

*Approximate upstream extent of impoundment

Table G-10. 10-Year Return Period Black River Flow at Dam (Flow = 9,096 cubic feet per second)									
Model River Station	**Distance Upstream of Dam (miles)**	**Existing Conditions**		**Dam Removal**			**Dam Remediation**		
		Impoundment Water Surface Elevation (feet)	**Average Flow Velocity in Channel (feet/second)**	**Impoundment Water Surface Elevation (feet)**	**Difference from Existing Conditions (feet)**	**Average Flow Velocity in Channel (feet/second)**	**Impoundment Water Surface Elevation (feet)**	**Difference from Existing Conditions (feet)**	**Average Flow Velocity in Channel (feet/second)**
33083.67	2.17	1,054.99	2.18	1,054.88	-0.11	2.21	1,054.98	-0.01	2.19
32271.13	2.02	1,054.86	2.08	1,054.73	-0.13	2.10	1,054.84	-0.02	2.08
31016.32	1.78	1,054.16	4.07	1,054.00	-0.16	4.13	1,054.14	-0.02	4.07
30274	1.64	1,053.16	5.66	1,052.95	-0.21	5.77	1,053.15	-0.01	5.64
29550.22	1.51	1,052.06	5.42	1,051.68	-0.38	5.71	1,052.04	-0.02	5.43
29022.67	1.41	1,051.72	3.10	1,051.24	-0.48	3.34	1,051.69	-0.03	3.12
28697.79*	1.34	1,051.49	3.38	1,050.94	-0.55	3.66	1,051.46	-0.03	3.40
28184.22	1.25	1,051.23	3.52	1,050.61	-0.62	3.80	1,051.20	-0.03	3.53
27023.5	1.03	1,050.75	3.21	1,050.01	-0.74	3.50	1,050.72	-0.03	3.22
26421.9	0.91	1,050.59	2.68	1,049.80	-0.79	2.95	1,050.55	-0.04	2.69
25717.27	0.78	1,050.34	3.28	1,049.47	-0.87	3.63	1,050.30	-0.04	3.30
24632.32	0.57	1,049.96	3.38	1,048.93	-1.03	3.84	1,049.92	-0.04	3.40
23671.11	0.39	1,049.55	3.72	1,048.29	-1.26	4.36	1,049.50	-0.05	3.71
22929.57	0.25	1,049.14	4.12	1,047.61	-1.53	4.98	1,049.08	-0.06	4.15
22487.31	0.17	1,048.57	5.69	1,046.38	-2.19	7.68	1,048.49	-0.08	5.76
22102.97	0.09	1,048.23	4.41	1,045.05	-3.18	7.29	1,048.14	-0.09	4.47
21932.54	0.06	1,047.92	5.32	1,043.20	-4.72	10.29	1,047.81	-0.11	5.44
21672.38	0.01	1,047.97	2.59	1,042.65	-5.32	5.24	1,047.86	-0.11	2.63
21617.62	0.00	1,047.93	2.70	1,042.38	-5.55	4.98	1,047.84	-0.09	2.55

*Approximate upstream extent of impoundment

Table G-11. 50-Year Return Period Black River Flow at Dam (Flow = 12,592 cubic feet per second)										
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation			
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,056.93	1,056.93	1,056.82	-0.11	2.54	1,056.93	0.00	2.51
32271.13	2.02	1,056.79	1,056.79	1,056.68	-0.11	2.37	1,056.80	0.01	2.34
31016.32	1.78	1,055.97	1,055.97	1,055.83	-0.14	4.83	1,055.98	0.01	4.77
30274	1.64	1,054.81	1,054.81	1,054.61	-0.20	6.73	1,054.82	0.01	6.59
29550.22	1.51	1,053.65	1,053.65	1,053.33	-0.32	6.46	1,053.66	0.01	6.21
29022.67	1.41	1,053.38	1,053.38	1,053.00	-0.38	3.63	1,053.40	0.02	3.45
28697.79*	1.34	1,053.15	1,053.15	1,052.73	-0.42	4.00	1,053.17	0.02	3.80
28184.22	1.25	1,052.88	1,052.88	1,052.41	-0.47	4.28	1,052.90	0.02	4.06
27023.5	1.03	1,052.35	1,052.35	1,051.78	-0.57	3.96	1,052.37	0.02	3.76
26421.9	0.91	1,052.16	1,052.16	1,051.56	-0.60	3.35	1,052.18	0.02	3.12
25717.27	0.78	1,051.86	1,051.86	1,051.20	-0.66	4.15	1,051.88	0.02	3.89
24632.32	0.57	1,051.41	1,051.41	1,050.63	-0.78	4.31	1,051.43	0.02	3.93
23671.11	0.39	1,050.91	1,050.91	1,049.96	-0.95	4.86	1,050.94	0.03	4.31
22929.57	0.25	1,050.39	1,050.39	1,049.21	-1.18	5.65	1,050.43	0.04	4.94
22487.31	0.17	1,049.58	1,049.58	1,047.79	-1.79	8.76	1,049.63	0.05	6.91
22102.97	0.09	1,049.10	1,049.10	1,046.61	-2.49	7.70	1,049.16	0.06	5.52
21932.54	0.06	1,048.61	1,048.61	1,044.58	-4.03	11.27	1,048.63	0.02	6.93
21672.38	0.01	1,048.71	1,048.71	1,044.45	-4.26	5.42	1,048.74	0.03	3.36
21617.62	0.00	1,048.65	1,048.65	1,044.26	-4.39	5.18	1,048.70	0.05	3.28

*Approximate upstream extent of impoundment

Table G-12. 100-Year Return Period Black River Flow at Dam (Flow = 14,300 cubic feet per second)										
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation			
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,057.77	2.66	1,057.67	-0.10	2.68	1,057.78	0.01	2.66
32271.13	2.02	1,057.63	2.46	1,057.53	-0.10	2.48	1,057.64	0.01	2.46
31016.32	1.78	1,056.75	5.09	1,056.63	-0.12	5.15	1,056.76	0.01	5.09
30274	1.64	1,055.52	7.02	1,055.34	-0.18	7.13	1,055.54	0.02	7.00
29550.22	1.51	1,054.34	6.55	1,054.05	-0.29	6.75	1,054.37	0.03	6.53
29022.67	1.41	1,054.09	3.64	1,053.77	-0.32	3.75	1,054.13	0.04	3.62
28697.79*	1.34	1,053.87	3.95	1,053.51	-0.36	4.14	1,053.91	0.04	3.93
28184.22	1.25	1,053.59	4.31	1,053.19	-0.40	4.49	1,053.63	0.04	4.29
27023.5	1.03	1,053.04	3.94	1,052.55	-0.49	4.17	1,053.08	0.04	3.92
26421.9	0.91	1,052.84	3.32	1,052.32	-0.52	3.50	1,052.89	0.05	3.30
25717.27	0.78	1,052.51	4.15	1,051.94	-0.57	4.38	1,052.57	0.06	4.13
24632.32	0.57	1,052.04	4.18	1,051.37	-0.67	4.50	1,052.10	0.06	4.15
23671.11	0.39	1,051.51	4.58	1,050.69	-0.82	5.05	1,051.58	0.07	4.56
22929.57	0.25	1,050.93	5.35	1,049.92	-1.01	5.92	1,051.02	0.09	5.30
22487.31	0.17	1,050.04	7.42	1,048.48	-1.56	9.07	1,050.17	0.13	7.30
22102.97	0.09	1,049.48	6.06	1,047.29	-2.19	7.89	1,049.62	0.14	5.97
21932.54	0.06	1,048.90	7.49	1,045.27	-3.63	11.59	1,048.99	0.09	7.61
21672.38	0.01	1,049.02	3.68	1,045.29	-3.73	5.49	1,049.13	0.11	3.68
21617.62	0.00	1,048.94	3.87	1,045.12	-3.82	5.28	1,049.00	0.06	3.61

*Approximate upstream extent of impoundment

Table G-13. 500-Year Return Period Black River Flow at Dam (Flow = 18,624 cubic feet per second)									
Model River Station	Distance Upstream of Dam (miles)	Existing Conditions		Dam Removal			Dam Remediation		
		Impoundment Water Surface Elevation (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)	Impoundment Water Surface Elevation (feet)	Difference from Existing Conditions (feet)	Average Flow Velocity in Channel (feet/second)
33083.67	2.17	1,059.70	2.97	1,059.63	-0.07	2.99	1,059.71	0.01	2.97
32271.13	2.02	1,059.56	2.70	1,059.49	-0.07	2.72	1,059.58	0.02	2.69
31016.32	1.78	1,058.56	5.73	1,058.47	-0.09	5.77	1,058.59	0.03	5.72
30274	1.64	1,057.11	8.05	1,056.98	-0.13	8.14	1,057.15	0.04	8.02
29550.22	1.51	1,055.88	7.36	1,055.69	-0.19	7.49	1,055.95	0.07	7.31
29022.67	1.41	1,055.71	4.00	1,055.50	-0.21	4.09	1,055.78	0.07	3.97
28697.79*	1.34	1,055.49	4.27	1,055.26	-0.23	4.39	1,055.57	0.08	4.24
28184.22	1.25	1,055.21	4.74	1,054.96	-0.25	4.84	1,055.29	0.08	4.70
27023.5	1.03	1,054.60	4.42	1,054.30	-0.30	4.54	1,054.70	0.10	4.37
26421.9	0.91	1,054.38	3.75	1,054.06	-0.32	3.87	1,054.48	0.10	3.73
25717.27	0.78	1,054.01	4.68	1,053.66	-0.35	4.84	1,054.12	0.11	4.63
24632.32	0.57	1,053.48	4.69	1,053.07	-0.41	4.89	1,053.61	0.13	4.63
23671.11	0.39	1,052.88	5.21	1,052.39	-0.49	5.42	1,053.04	0.16	5.12
22929.57	0.25	1,052.19	6.22	1,051.57	-0.62	6.62	1,052.38	0.19	6.11
22487.31	0.17	1,051.11	8.46	1,050.15	-0.96	9.54	1,051.37	0.26	8.20
22102.97	0.09	1,050.33	7.33	1,048.99	-1.34	8.32	1,050.67	0.34	7.10
21932.54	0.06	1,049.56	9.02	1,047.00	-2.56	12.26	1,049.77	0.21	9.23
21672.38	0.01	1,049.74	4.48	1,047.32	-2.42	5.66	1,050.02	0.28	4.46
21617.62	0.00	1,049.62	4.72	1,047.18	-2.44	5.50	1,049.96	0.34	4.39

*Approximate upstream extent of impoundment

APPENDIX H

RENDERING OF DAM REMOVAL