Assessment Report

Margaret Creek Watershed
Margaret Creek 6, Fox Lake
Athens County, Ohio

Prepared by: Natural Resources Conservation Service
Columbus, Ohio
September 2009

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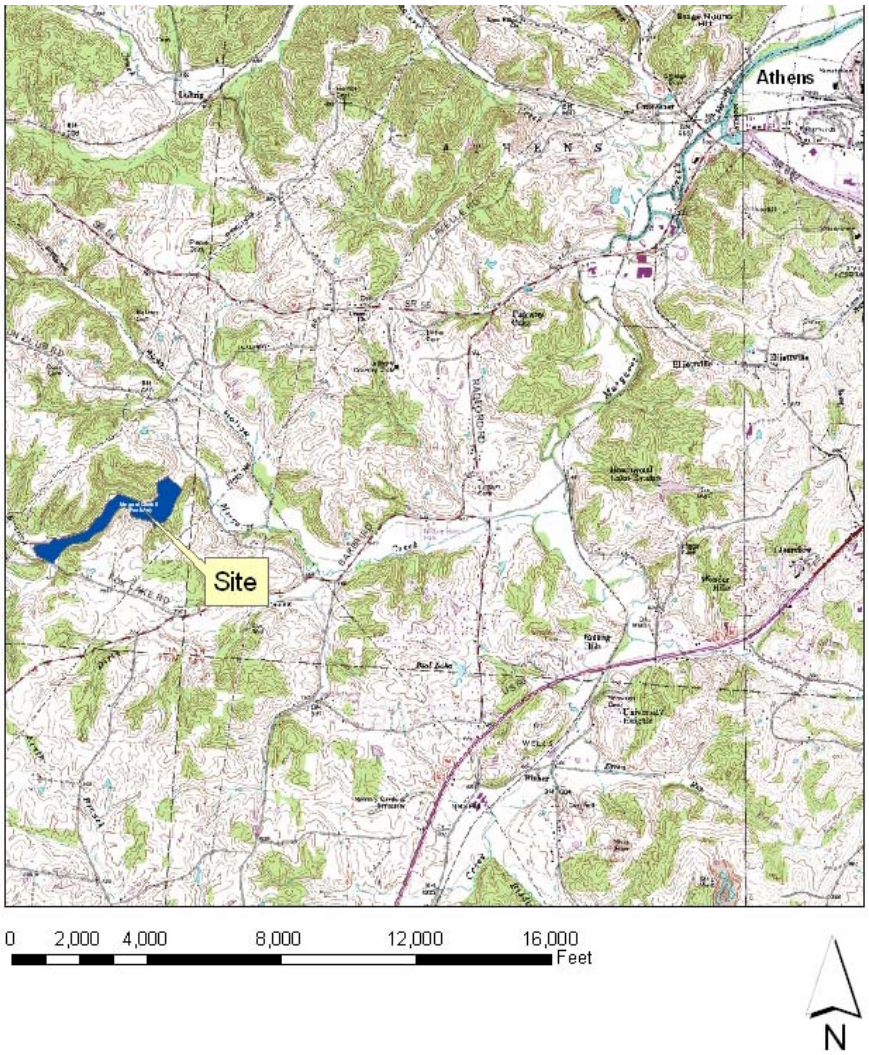
Project Location
Margaret Creek 6 is located approximately 4 miles southwest of Athens, south of the intersection of Township Road 29 and Township Road 27.



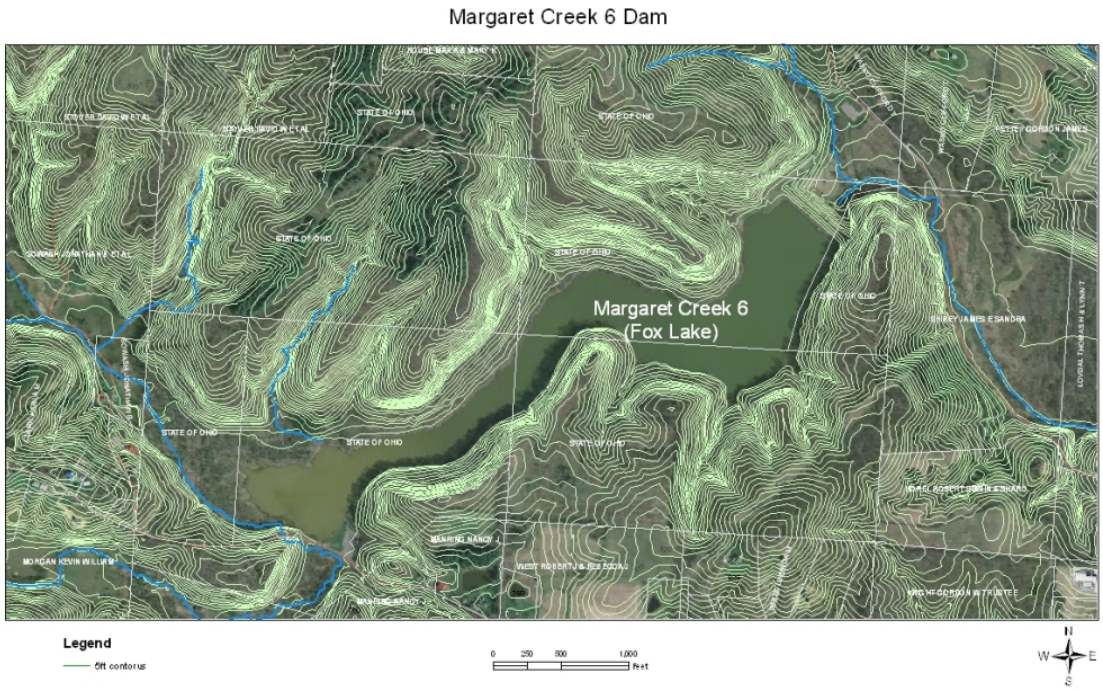
Description of Margaret Creek 6 (Fox Lake)
Fox Lake is Site 6 for the Margaret Creek Conservancy District (MCCD), which is a sub-district of Hocking Conservancy District (HCD). Margaret Creek 6 is a multiple purpose lake that provides flood control and recreation opportunities. MCCD cooperates with ODNR, Division of Fish/Wildlife in operating the lake. Margaret Creek 6 is a compacted earth fill dam that is 46 feet high, 610 feet long, with 3 horizontal to 1 vertical (3 to 1) upstream side slope, and 2.5 to 1 downstream side slope. There is a 10-foot wide wave berm located at the permanent pool elevation on the pool side of the embankment. The drainage area is 2,566 acres (4.0 square miles). A permanent pool of 47.5 surface acres provides 465 acre-feet of storage (160 acre-feet for 100-years of sediment storage and 305 acre-feet for recreation). The principal spillway is a reinforced concrete pipe system, which maintains the normal pool level and regulates the passage of flood flows. It consists of an NRCS standard covered top riser 26 feet high, a 30-inch diameter reinforced concrete pipe, and a stilling basin/plunge pool as an outlet structure. The emergency spillway is 40 feet wide and is designed to safely pass 6.75 inches of rainfall occurring in a 6-hour period. The dam was also designed to pass 13.0 inches of rain occurring in a 6-hour period without overtopping the dam. A 12-inch diameter lake drain allows the lake to be lowered for maintenance. The NID reference for Margaret Creek 6 is OH00706.

During flood events, the dam was designed to store 710 acre-feet of floodwater up to the auxiliary spillway elevation which would be slowly released through the principal spillway. There is 8 feet of elevation between the auxiliary spillway and top of dam. Total storage at top of dam is 2060 acre-feet.

Potential seepage along the pipe system is controlled with six 9’ x 13’ concrete anti-seep collars surrounding the concrete principal spillway pipe. There is a foundation trench drainage system along the downstream toe with 6 inch corrugated metal pipes.

Sponsors of Margaret Creek Watershed
The Sponsors of the Margaret Creek Watershed project include Margaret Creek Conservancy District, the Ohio Department of Natural Resources, the Athens Soil and Water Conservation District, Athens County Commissioners, and the Village of Albany.

Plan View



Brief History and Existing Condition

The original Watershed Work Plan for the Margaret Creek Watershed was developed by the Natural Resources Conservation Service (then Soil Conservation Service in 1966. Margaret Creek 6 is one of five floodwater-retarding structures built within the Margaret Creek watershed from 1967 to 1972 under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress). Margaret Creek 6 was constructed in 1967.

The structure was planned and built with the primary purpose of flood control. It was designed to have a 100 year economic life. It is used for recreation activities including boating and fishing. The structure is in overall good condition. In the fall of 2007 flow from the right foundation drain (looking downstream) increased from a trickle to pencil size. This clear water flow has continued with some fluctuation with pool level. The MCCD continues to closely monitor the flow rate. According to the MCCD the auxiliary spillway has not experienced flow.

Hazard Classification
Margaret Creek 6 was originally planned and designed as a significant hazard structure since it primarily protected agricultural lands. Residential development was not anticipated, and there was no anticipated loss of life in the event of a dam failure.

The ODNR, Division of Water, Dam Safety Engineering, has regulatory responsibility for dam safety in Ohio. Margaret Creek 6 was originally reclassified as a high hazard structure by ODNR in 1983. ODNR Dam Safety reclassified this structure as Class I (high hazard) based on visual observations and potential hazard downstream of the dam. ODNR Dam Safety and NRCS criteria require high hazard structures to safely pass 100% of the Probable Maximum Flood (PMF). A breach analysis was completed by NRCS in 1994 that confirmed high hazard classification. In 2001, ODNR Dam Safety performed hydrologic and hydraulic calculations to estimate the capacity of the dam and the size of the design flood. These calculations indicate the dam can only pass 40% of the design flood (PMF). An Emergency Action Plan (EAP), with breach inundation map, was completed in 2003. A copy of the hazard class documentation, breach analysis summary, and revised breach inundation map are included in Attachment A of this report.

Status of Operation & Maintenance
Margaret Creek Conservancy District has a current Operation and Maintenance (O&M) agreement with NRCS to perform O&M for the structure. The O&M agreement expires on May 13, 2067. The remaining evaluated life of the structure is 58 years. The conservancy district performs the required annual inspections every April or May. NRCS has assisted with these annual inspections.

Past and current ODNR dam safety reports indicate the dam is in good condition and has been well maintained. There are hairline cracks in the riser and concrete cradle that need to be monitored. ODNR Dam Safety has formally inspected the dam in 1974, 1983, 1992, 2001, and 2007. According to these inspection records, the owner must develop “plans and specifications as necessary to increase the discharge/storage capacity to pass the required design flood”. The minimum design flood for Class I dams is 100% of the Probable Maximum Flood

Rehabilitation Needs
Several items need to be addressed in order for Margaret Creek 6 to meet current State Dam Safety and NRCS criteria associated with a high hazard structure. The rehabilitation program requires that the useful life of the structure must be extended beyond the original evaluated life. The evaluated life for Margaret Creek 6 must extend past the year 2067. General rehabilitation work would include:

1. Modify the dam and auxiliary spillway to safely pass or contain the larger runoff from the rainfall required for design of a high hazard structure. This may consist of raising the dam and/or widening the emergency spillway, adding a roller compacted concrete (RCC) chute spillway through the dam, or combinations of these.
2. Ensure that appurtenant structures (riser tower, internal drains, etc.) meet current NRCS and State Dam Safety criteria.

3. Ensure that the sediment pool has a minimum sediment storage capacity that matches the rehabilitated evaluation life period.

Eligibility for Dam Rehabilitation Program
Margaret Creek 6 is eligible for NRCS assistance authorized under the Rehabilitation provisions of the Small Watershed Program. Funding for rehabilitation is based upon a priority ranking system, which considers the potential for dam failure and the potential consequences of dam failure. High hazard structures are given a higher ranking for funding than low hazard structures. A completed Evaluation of Potential Rehabilitation Projects spreadsheet is included in Attachment B of this report.

The Sponsors of the potential rehabilitation project should be aware that additional landrights might be required for construction. The Sponsors are responsible for paying this cost but this cost can be included in the total project cost of the rehabilitation project.

The rehabilitation provisions of the PL 106-472 can provide 65% of the total rehabilitation cost, but shall not exceed 100% of the actual construction costs incurred in the rehabilitation. Total rehabilitation cost for the project shall include all costs associated with all components of the project, including acquisition of land, easements, rights-of-way, project administration, non-Federal technical assistance (TA), non-structural measures, contracting, and construction. The cost of TA provided by NRCS shall not be considered part of the total cost of the rehabilitation project. If the Sponsors provide or otherwise obtain TA for planning, design, and/or construction, the TA cost is included in the computation of total cost of the rehabilitation project. The Sponsor is responsible for the cost of all water, mineral, and other resource rights and all federal, state, and local permits, which are not considered part of the total cost of the rehabilitation project. The Sponsors' 35% can be in the form of cash, in-kind services, the value of land rights in addition to those acquired for the current project, or any combination of these items.

Potential for Addressing Other Resource Needs
If rehabilitation is pursued, the Sponsors will have the opportunity to investigate the addition of other purposes to the site. There are no known additional resource needs at this time.

Potential Scope of the Rehabilitation Project
The following are potential rehabilitation alternatives that exist for the site.

1. Rehabilitate the structure to meet current State Dam Safety and NRCS criteria for a high hazard structure. The structure must be able to safely pass the PMF. These options briefly outlined below:
    - Alternative 1 - Widen the spillway from 40 feet to 330 feet without modification to the dam. Approximately 375,000 CY of excavation would be required. A splitter dike would be required in the spillway to divide the flow. The cost estimate range is $3,500,000 to $4,000,000.

- Alternative 2 - Raise the top of dam 3 feet and widen the spillway from 40 feet to 150 feet. Approximately 150,000 CY of excavation and 15,000 CY of earthfill would be required. It is assumed that the excavated material could be used to raise the dam. The cost estimate range is $2,000,000 to $2,500,000.
- Alternative 3 – Similar to Alt 2 above except excavation and earthfill quantities would be balanced. The top of dam would be raised 7.4 feet and the spillway widened from 40 feet to 65 feet. Approximately 40,000 CY of excavation and earthfill would be required. The auxiliary spillway would need to be armored to be stabile during high flow. The 30 inch pipe would need to be extended approximately 40 feet and the plunge pool would be replaced with an impact basin. The cost estimate is $1,250,000 to $1,750,000.
- Alternative 4 - Construct a 200-foot wide roller compacted concrete (RCC) chute spillway through the dam to increase spillway capacity. Dam and existing auxiliary spillway would remain as they are currently. Cost estimate is $1,000,000 to 1,250,000.
- Another alternative considered included raising the dam 8.7 feet without widening the spillway. The existing 40-ft wide spillway would however need to be armored to remain stable. The 30 inch pipe would need to be extended almost 50 feet and the plunge pool would be replaced with an impact basin. No cost estimate was calculated for this option.

2. Remove the downstream hazards and enact zoning restrictions within the breach inundation zone to prevent future development. This option is not considered viable due to the extent of development and the low likelihood of additional local zoning being enacted that would restrict future development.

3. Remove or breach the structure to eliminate the capacity of the structure to retain floodwater. This would eliminate the potential for a breach of the structure during a storm event. Since the O&M agreement with NRCS has not expired, this option may require the sponsor to reimburse the federal government for any remaining benefits that the structure may provide over the remainder of the lifespan of the O&M agreement. This option is not considered viable due to the local reliance on the flood control benefits provided by the structure.

Rehabilitation Process

The Sponsors submitted an application for federal dam rehabilitation assistance on March 16, 2007. The application included all of the required items.

If the project is selected for planning, the site will go through the conventional watershed planning process with consideration and evaluation of all potential alternatives and their impacts (economically, environmentally, socially, etc.). During the planning process, there will be opportunities for public participation and comment.

The estimated time frames for the activities are:

- Planning: 1 year minimum
- Design: 1 year
- Implementation: 1 year

Breach Analysis
NRCS conducted a breach analysis and evaluated the hazard classification for Margaret Creek 6. The dam is located in Section 1, Waterloo Township, Athens County, Ohio, on the West Branch Margaret Creek, approximately 2.3 miles upstream of the confluence with Margaret Creek. The analysis continued downstream approximately 2.7 miles to the Hocking River in the City of Athens.

To evaluate the hazard classification, NRCS performed a sunny day breach analysis with the water level at the crest elevation of the auxiliary spillway. First, the minimum peak discharge for a breach of this dam was calculated based on the criteria in NRCS *Technical Release 60, Earth Dams and Reservoirs*. The minimum peak discharge was then used to calculate the breach hydrograph using criteria in NRCS *Technical Release 66, Simplified Dam breach Routing Procedure*. Flood discharges expected downstream were determined by routing the breach hydrograph through valley cross sections downstream of the dam, using NRCS WinTR-20 Program. The peak discharges downstream were input into HEC-RAS (USACE) to determine water elevations. . The breach evaluation extended downstream to the point where the "sunny day" breach flood depth equals the 100-year flood depth without a breach.

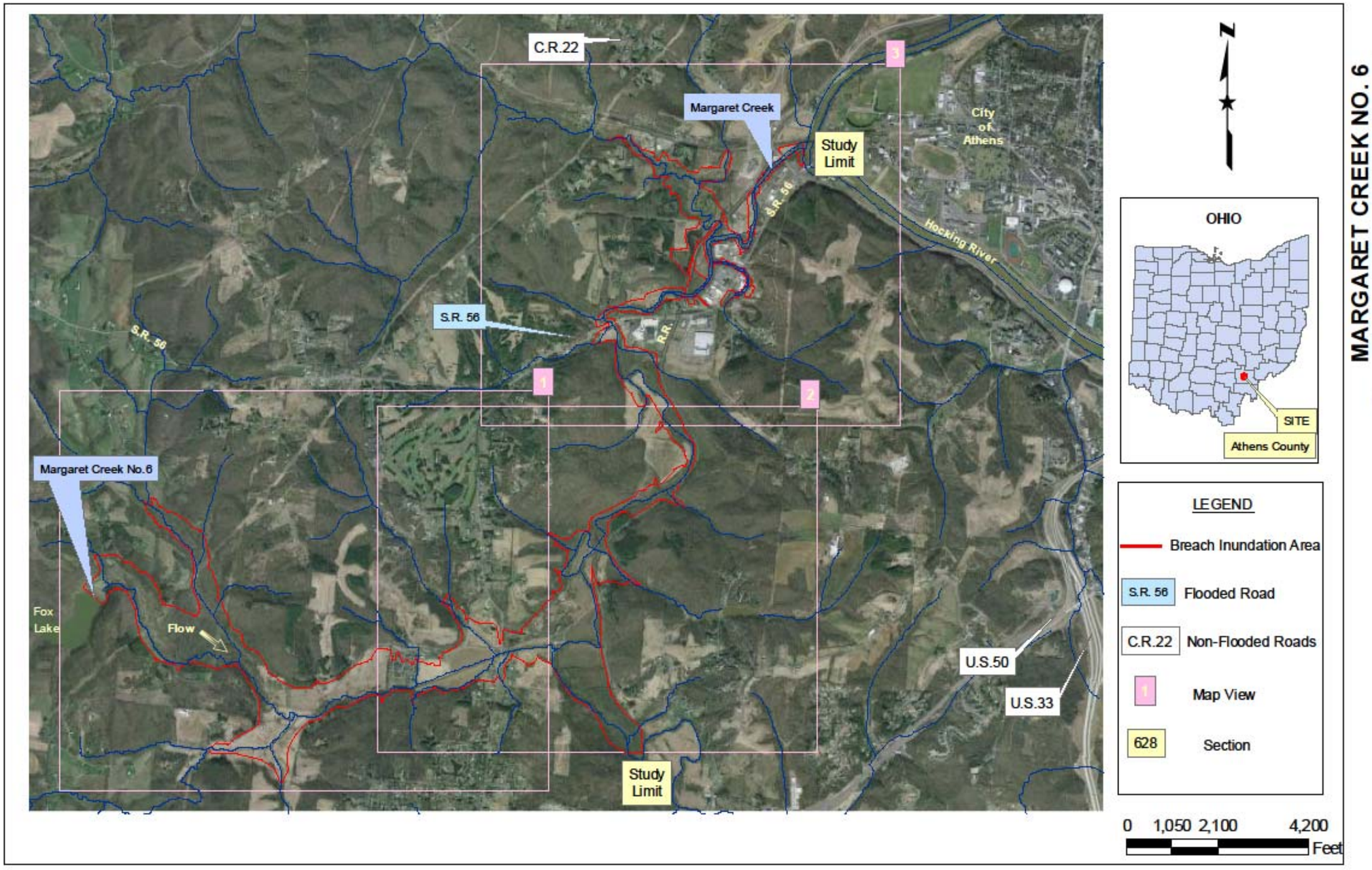
The results of the breach analysis are shown on the dam breach inundation maps (attached). Based on the latest available ortho imagery (2007), there are 5 bridges, 10 unclassified structures (homes, businesses, outbuildings), and 40+ house trailers within the breach inundation area. There is the potential for loss of life in the event of a dam failure.

Based on this analysis, the NRCS has confirmed the classification of Margaret Creek 6 as a high hazard dam.

Scott J. Jerrome
Planning Engineer

Michael J. Monnin, P.E.
State Conservation Engineer

Attachment A

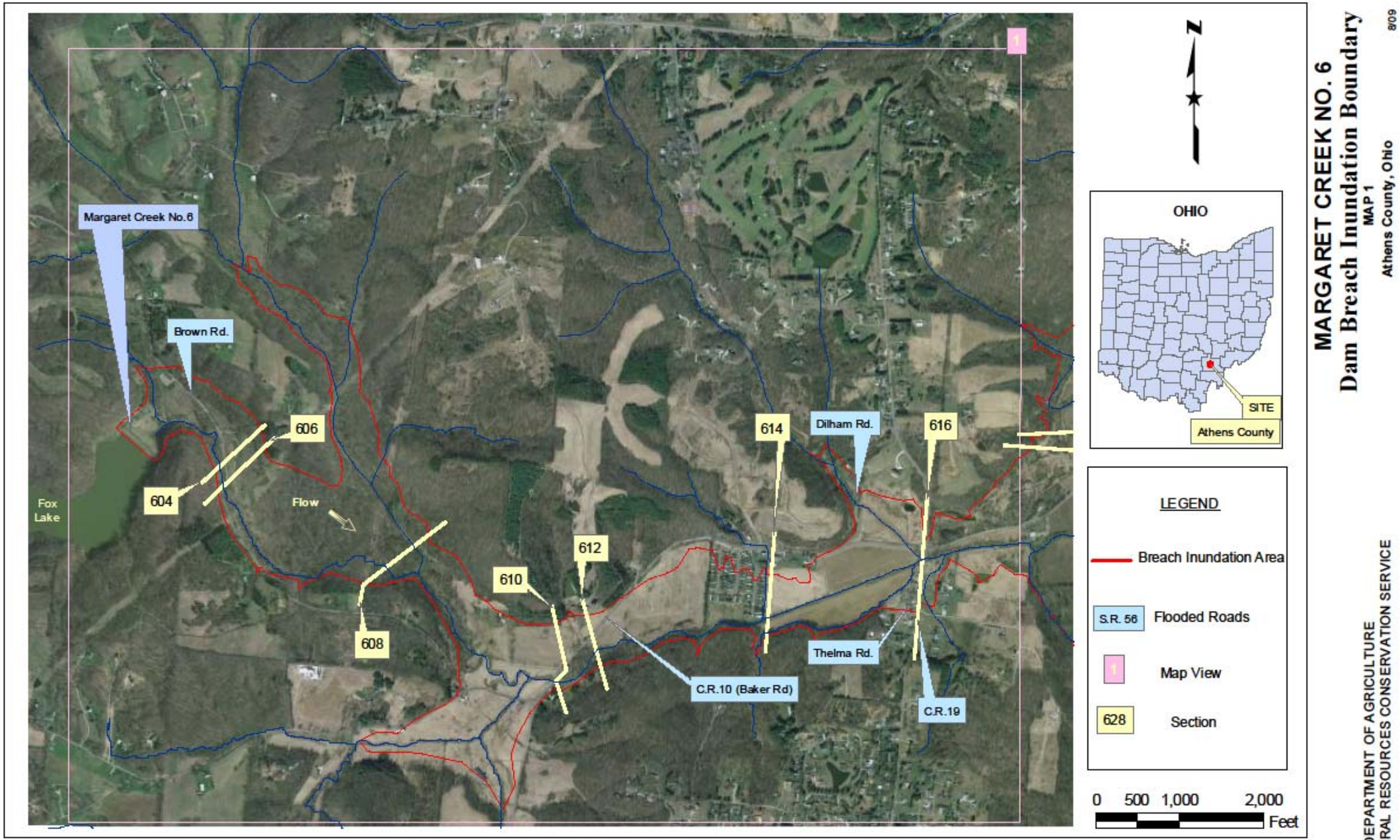


MARGARET CREEK NO. 6
Dam Breach Inundation Boundary
INDEX SHEET - (3) MAPS
Athens County, Ohio
8/09

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Note: The Breach Inundation Area is the area expected to flood if Margaret Creek Dam No. 6 on Fox Lake failured suddenly when the water elevation is at the auxilary spillway crest. Limits of flooding may vary from actual locations on the ground due to photographic displacement.

Attachment A

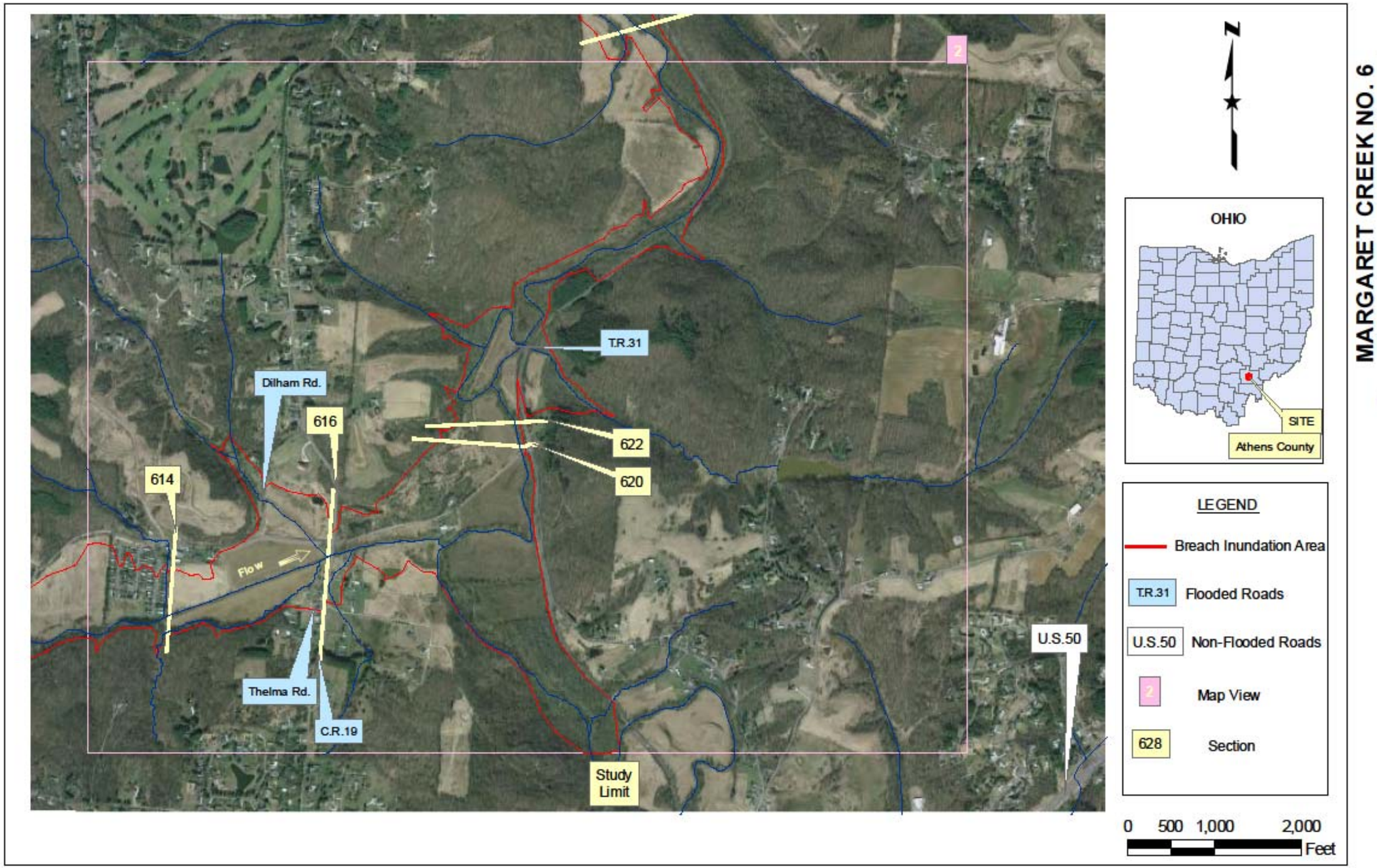


MARGARET CREEK NO. 6
Dam Breach Inundation Boundary
MAP 1
Athens County, Ohio
8/09

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Note: The Breach Inundation Area is the area expected to flood if Margaret Creek Dam No. 6 on Fox Lake failured suddenly when the water elevation is at the auxillary spillway crest. Limits of flooding may vary from actual locations on the ground due to photographic displacement.

Attachment A

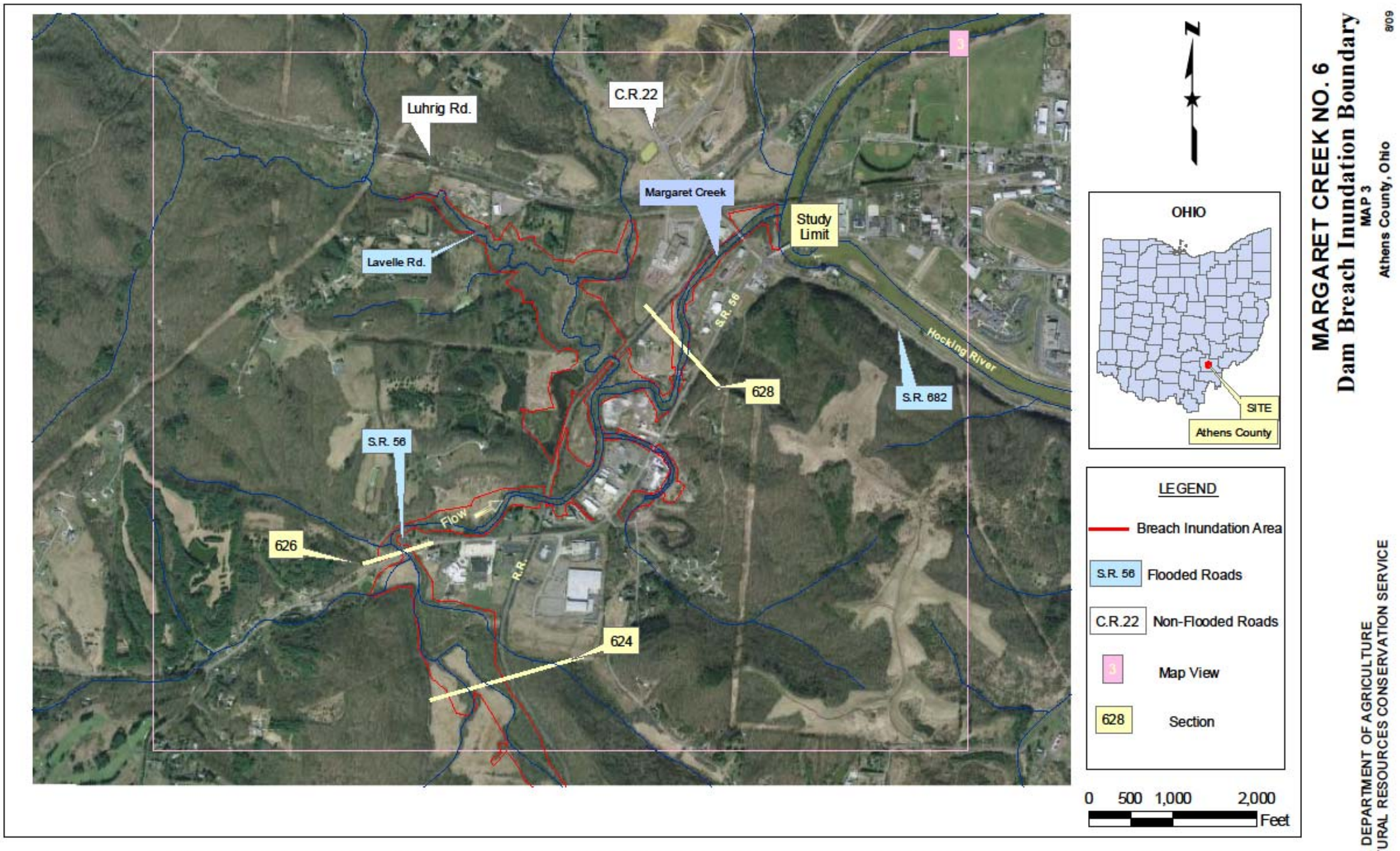


MARGARET CREEK NO. 6
Dam Breach Inundation Boundary
MAP 2
Athens County, Ohio
8/09

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Note: The Breach Inundation Area is the area expected to flood if Margaret Creek Dam No. 6 on Fox Lake failured suddenly when the water elevation is at the auxiliary spillway crest. Limits of flooding may vary from actual locations on the ground due to photographic displacement.

Attachment A



MARGARET CREEK NO. 6
Dam Breach Inundation Boundary
MAP 3
Athens County, Ohio
8/09

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Note: The Breach Inundation Area is the area expected to flood if Margaret Creek Dam No. 6 on Fox Lake failured suddenly when the water elevation is at the auxiliary spillway crest. Limits of flooding may vary from actual locations on the ground due to photographic displacement.

EVALUATION OF POTENTIAL REHABILITATION PROJECTS

STATE	OH	DAM	Margaret Creek Str 6		BY	SJJ	DATE	8/19/09	
YEAR BUILT			1967	DESIGN HAZARD CLASS	M	DRAINAGE AREA		4	mi2
WORK PLAN DATE			1966	CURRENT HAZARD CLASS	H	DAM HEIGHT		42	ft
sht 1 of 5			CONSEQUENCES OF DAM FAILURE					ver 100101	

POTENTIAL DAM FAILURE:			
Total Failure Index		199	A
POTENTIAL LOSS OF LIFE:			
Maximum Population-at-Risk [PAR]	(number)	125	B
Total Risk Index		746	C
POTENTIAL LOSS OF PROPERTY:			
Identify major community affected by breach and rate impact as High (H), Medium (M), Low (L) or None(blank)			
Community Athens	(H,M,L,-)	H	D
Number of homes, businesses, major buildings	(number)	50	E
POTENTIAL LIFELINE DISRUPTION:			
Water supply, identify community disrupted by dam failure, and estimate number/amount			
Municipal sole source Users	(number)	0	F
Supplemental source Users	(number)	0	G
Irrigation water Storage	(Ac-Ft)	0	H
POTENTIAL INFRASTRUCTURE DISRUPTION:			
Transportation system crossings, identify major crossing rendered unusable by dam failure, and estimate number			
Major/Interstate St Rt 56 Roads	(number)	1	I
Secondary/County T.R. 29, C.R. 10, C.R. 19, T.R. 31 Roads	(number)	4	J
POTENTIAL ADVERSE IMPACTS ON THE ENVIRONMENT:			
Describe impacts and rate each as High (H), Medium (M), Low (L), or None (blank)			
Threatened & endangered species	(H,M,L,-)	L	K
Sensitive riparian areas	(H,M,L,-)	L	L
Contaminated reservoir sediment	(H,M,L,-)	L	M
Wetland and wildlife habitat	(H,M,L,-)	L	N
Other	(H,M,L,-)		O
POTENTIAL ADVERSE SOCIAL IMPACTS:			
Describe impacts and rate each as High (H), Medium (M), Low (L) or None(blank)			
Known cultural resources none known	(H,M,L,-)	L	P
Historic preservation issues none known	(H,M,L,-)	L	Q
Socially disadvantaged community none known	(H,M,L,-)	L	R
POTENTIAL ADVERSE ECONOMIC IMPACTS:			
Average annual benefits attributed to this dam, updated workplan value	($)		S
Changes in benefits since workplan; Increase(I), No change(NC), Decrease(D)	(I,NC,D)	I	T
Low income families impacted	(number)		U
INPUT BY STATE DAM SAFETY AGENCY:			
State dam safety order issued for repair, modification, removal issued, Yes(Y), No(N)	(Y,N)	Y	V
State Dam Safety Agency Priority, High(H), Medium(M), Low(L), None(blank)	(H,M,L,-)	H	W
OTHER CONSIDERATIONS:			
Identify any other considerations and rate as High(H), Medium(M), Low(L) or None(blank)			
none known	(H,M,L,-)		X
	(H,M,L,-)		Y

EVALUATION OF POTENTIAL REHABILITATION PROJECTS

STATE	OH	DAM	Margaret Creek Str 6	BY	SJJ	DATE	8/20/09
sht 2 of 5			**FAILURE & RISK INDEXES**				ver 102201

Adopted from Bureau of Reclamation "Risk Based Profile System"

see: http://www.usbr.gov/dsis/risk/rbpsdocumentation.pdf

LIFE LOSS:

Population-at-Risk [PAR], see NRCS dams inventory definition (number of people)

Estimate PAR for static loading failure, typically assume water at top of dam	125	A
Estimate PAR for hydrologic loading failure, typically assume water at top of dam	125	B
Estimate PAR for seismic loading failure, typically assume water at ES crest (sunny day failure)	100	C

Fatality Rates [FR] from dam breach

Adopted from BuRec "A Procedure for Estimating Loss of Life Caused by Dam Failure" DSO-99-06

see: http://www.usbr.gov/research/dam_safety/documents/dso-99-06.pdf

Flood Severity/Lethality [DV] is the average depth [D] times velocity [V] across flood plain (ft2/sec)

DV= (breach discharge - bank full discharge) / breach floodplain width

Warning Time [T] between failure warning and flood wave at population (minutes)

Flood Severity Understanding [U] of the warning issuer of the likely flooding magnitude

scenario	breach discharge (cfs)	bankfull discharge (cfs)	breach width (ft)	DV (ft2/sec)	warning time (minutes)	under-standing (N/A or Vague)
Static	54100	120	550	98	60	vague
Hydrologic	54100	120	550	98	60	vague
Seismic	21700	120	500	43	60	vague

For	DV>50	T=0	U=N/A (no warning)	FR=0.15
For	DV>50	T<60	U=vague	FR=0.04
For	DV>50	T>60	U=vague	FR=0.03
For	DV<50	T=0	U=N/A (no warning)	FR=0.01
For	DV<50	T<60	U=vague	FR=0.007
For	DV<50	T>60	U=vague	FR=0.0003

Estimate FR for static loading failure scenario	0.03	D
Estimate FR for hydrologic loading failure scenario	0.03	E
Estimate FR for seismic loading failure scenario	0.007	F

Scenario	Load Factor	Response Factor	Failure Index	Fatality Rate	PAR	Risk Index
Static	1	126	126	0.03	125	473
Hydrologic	*	*	73	0.03	125	274
Seismic	0.00	#DIV/0!	0	0.007	100	0
		TOTAL=	199		TOTAL=	746

Attachment B

EVALUATION OF POTENTIAL REHABILITATION PROJECTS								
STATE	OH	**DAM**	Margaret Creek Str 6	**BY**	SJJ	**DATE**	8/19/09	
sht 3 of 5	**STATIC FAILURE INDEX**						ver 100101	
PRINCIPAL SPILLWAY SYSTEM (60 points max):					(total points)	30		A
Downstream filter or filter zone around conduit (yes=0 or no=10)							10	B
Conduit trench deep (>2d) and narrow (<3d) and steep sideslope (<2:1) (no=0 or yes=10)							0	C
Principal spillway system (inlet, pipe, or outlet) in deteriorated condition (no=0 or yes=10)							0	D
Conduit has seepage cutoff collars or other compaction adverse features (no=0 or yes=10)							10	E
Conduit contains open joints, open cracks, steady seepage (no=0 or yes=10)							0	F
Conduit founded on competent bedrock (yes=0 or no=10)							10	G
Reservoir control gate located at outlet of conduit (no=0 or yes=10)							0	H
RESERVOIR FILLING HISTORY (75 points max):					(total points)	10		I
Reservoir has filled to x% of effective height (earth spillway crest minus original streambed)							91	J
(<50%=75 or 51-75%=50 or 76-90%=25 or 91-95%=10 or 96-100%=5 or >100%=0)							10	K
SEEPAGE AND DEFORMATION (85 points max):					(total points)	80		L
Seepage carrying fines, or seepage increases with reservoir elevation increases, or sinkholes/jugholes exist in embankment (no=0 or yes=80)							80	M
Large amounts of seepage (no=0 or yes=6)								N
Visible and significant slope movement or sloughing (no=0 or yes=6)							0	O
Longitudinal or transverse embankment cracking greater than one foot in depth (no=0 or yes=6)							0	P
Sinkholes/depressions within two times effective height of the dam, either face (no=0 or yes=6)							0	Q
Poor top of dam condition, eroded, trees, rodent holes, settlement (no=0 or yes=6)							0	R
Abnormally wet areas at downstream toe/groin of embankment (no=0 or yes=6)								S
Inadequate slope protection against erosion by rainfall or waves (no=0 or yes=6)							0	T
FOUNDATION GEOLOGY (41 points max):					(total points)			U
Highly fractures rock under core (no=0 or treated=3 or untreated=30)							0	V
Karst terrain and soluble rock (gypsum or limestone) (no=0 or treated=3 or untreated=30)							0	W
Collapsible soils (no=0 or treated=3 or untreated=30)							0	X
Significant stress relief fractures in abutments (no=0 or treated=3 or untreated=30)							0	Y
History of underground mining under embankment area (no=0 or treated=3 or untreated=30)							0	Z
Coarse grained and highly permeable soils (no=0 or yes=3)							0	AA
Presence of weak layers/conditions diminishing embankment stability (no=0 or yes=3)							0	AB
Erodible soils (sandy/silty materials) or weakly cemented rock (no=0 or yes=3)							0	AC
Reservoir area prone to landslides that could cause overtopping (no=0 or yes=3)							0	AD
EMBANKMENT DESIGN AND CONSTRUCTION (24 points max):					(total points)			AE
Filters for core or foundation or incompatibility between zones (no=3 or yes=0)							0	AF
Embankment or foundation drainage system (yes=0 or no=4)							0	AG
Erodible core material (sands, silts, dispersive clays) (no=0 or yes=4)							0	AH
Incomplete or no foundation cutoff of shallow permeable layers (no=0 or yes=4)							0	AI
Poorly placed earthfill, inadequate density (no=0 or yes=4)							0	AJ
Gate features to drain reservoir (yes=0 or no=4)							0	AK
EMBANKMENT MONITORING (15 points max):					(total points)	6		AL
Instruments (except surficial survey points) installed at dam (yes=0 or no=3)							3	AM
Installed instruments routinely read and evaluated (yes=0 or no=3)							3	AN
Visual inspection of dam by engineer less often than yearly (no=0 or yes=3)							0	AO
Good physical/visual access to downstream groin/toe for inspection (yes=0 or no=3)							0	AP
STATIC FAILURE INDEX: A+I+L+U+AE+AL							126	AQ

EVALUATION OF POTENTIAL REHABILITATION PROJECTS									
STATE	OH	DAM	Margaret Creek Str 6		BY	SJJ	DATE	8/20/09	
sht 4 of 5	HYDROLOGIC FAILURE INDEX							ver 100101	
HYDROLOGIC LOADING:									
Total Spillway Capacity (PS&ES) for 6hr storm [Pfb], Work Plan Tbl 3 (rainfall inches)								13	A
Obtained from Work Plan Tbl 3, or dams inventory data, or computer routings									
100 year, 6hr rainfall [P100] (inches)								4.25	B
Probable Maximum Precipitation [PMP] (inches)								27.2	C
if Pfb < P100	=	4.25	enter	40					
if Pfb = P100+0.2(PMP-P100)	=	8.84	enter	25					
if Pfb = P100+0.4(PMP-P100)	=	13.43	enter	15					
if Pfb = P100+0.6(PMP-P100)	=	18.02	enter	7					
if Pfb = P100+0.8(PMP-P100)	=	22.61	enter	3					
if Pfb = PMP	=	27.2	enter	1					
Enter interpolated value								15.9	D
HYDROLOGIC UNCERTAINTY:									
Drainage Area [DA] (square miles)								4	E
DA<10 enter 1.5 ; 10<DA<20 enter 1.4 ; 20<DA<50 enter 1.3 ; DA=>50 enter 1.2								1.5	F
PIPE SPILLWAY PLUGGING:									
Pipe Diameter [D] (inches)								30	G
D<12 enter 1.1; 12<=D<24 enter 1.0; 24<=D enter 0.9								0.9	H
Riser & trash rack type:									
Non-standardized inlet enter 1.1, Open Top riser enter 1.0; Covered or Baffle Top enter 0.9								0.9	I
EARTH SPILLWAY FLOW:									
Earth spillway flow depth [Des] from top of dam to spillway crest (feet)(10' max)								8	J
DAM EROSION RESISTANCE:									
Non-plastic (PI<10) fill enter 2.0 ; Plastic core enter 1.7 ; Overtopping armoring enter 0.8								1.7	K
Vegetal Cover Factor [Cf], see SITES or AH667								0.87	L
http://www.pswcrl.ars.usda.gov/ah667/ah667.htm									
Cf <0.4 enter 1.1; Cf < 0.7 enter 1.0; Cf<1.0 enter 0.9; larger Cf enter 0.8								0.9	M
EARTH SPILLWAY EROSION RESISTANCE:									
Low, can be excavated with hand tools, enter 2.0									
PI>10 and SPT blows<8, PI<10 and SPT blows>8, Kh<0.10, seismic velocity<2000fps									
Moderate, can be excavated with construction equipment, easy ripping, enter 1.2									
PI>10 and SPT blows>8, PI<10 and SPT blows>30, Kh<10, seismic velocity<7000fps									
High, very hard ripping, requires drilling and blasting, enter 0.2									
moderately hard rock, Kh>10, seismic velocity>7000fps								1.2	N
Vegetal Cover Factor [Cf], see SITES or AH667								0.87	O
Cf <0.4 enter 1.1; Cf < 0.7 enter 1.0; Cf<1.0 enter 0.9; larger Cf enter 0.8								0.9	P
HYDROLOGIC FAILURE INDEX:									
dam overtopping breach: (2)(D)(F)(H)(I)(K)(M)								59	Q
earth spillway breach: (D+5J)(F)(H)(I)(N)(P)								73	R
larger of (2)(D)(F)(H)(I)(K)(M) or (D+5J)(F)(H)(I)(N)(P) but less than 300								73	S

EVALUATION OF POTENTIAL REHABILITATION PROJECTS								
STATE	OH	DAM	Margaret Creek Str 6	BY	SJJ	DATE	8/20/09	
sht 5 of 5	SEISMIC FAILURE INDEX						ver 102201	

SEISMIC LOADING:		
Latitude (degrees.decimal)	39.3	A
Longitude (degrees.decimal)	82.19	B
See "http://eqint.cr.usgs.gov/eq/html/lookup.shtml"		
PGA [peak ground acceleration] for 2% chance in 50 years, see NEHRP maps (%g)	5.43	C
if PGA is less than 10% g, enter 0		
if PGA is between 10% g and 19% g, enter 0.15		
if PGA is between 20% g and 39% g, enter 0.30		
if PGA is between 40% g and 59% g, enter 0.65		
if PGA is greater than 60% g, enter 1.0	0	D
FOUNDATION LIQUEFACTION:		
Select only one of the following foundation conditions which best represents the site		
Loose alluvium, lacustrine, loess materials (no=0 or yes=10)	0	E
Bedrock, glacial till, highly clayey materials (no=0 or yes=5)	5	F
EMBANKMENT FREEBOARD FOR FOUNDATION LIQUEFACTION:		
Dam height for seismic event is the height from top of dam to downstream channel bottom (ft)	42	G
Freeboard for seismic event is the depth from top of dam to assumed pool surface (ft)	8	H
Freeboard percent of dam height (%)	19	I
if Freeboard is less than 25% of dam height, enter 10		
if Freeboard is 25% to 50% of dam height, enter 5		
if Freeboard is more than 50% of dam height, enter 1	10	J
EMBANKMENT FREEBOARD FOR EMBANKMENT CRACKING:		
Freeboard is less than or equal to 15 feet (no=0 or yes=1)	1	K
EMBANKMENT CRACKING:		
Embankment contains self-healing filter zones (no=4 or yes=0)	4	L
SEISMIC FAILURE INDEX:		
(D) ((E)(J) + (F)(K+1)(L+1)) but less than 100	0	M

Michael J Mannin

State Conservation Engineer's Signature

concurring with technical content of sheets 2 thru 5