USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service
Harrisburg, Pennsylvania

In Cooperation With:
Bradford County Commissioners
Bradford County Conservation District
Village of Wellsburg
Town of Ashland
Chemung County Legislature
Chemung County Soil and Water Conservation District

BENTLEY CREEK
Final Watershed Project Plan – Environmental Assessment

Bradford County, Pennsylvania
Chemung County, New York

August 2012

Bentley Creek
Final Watershed Project Plan-Environmental Assessment
Pennsylvania and New York

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Bentley Creek
Final Watershed Project Plan-Environmental Assessment
Pennsylvania and New York

Prepared by:
United States Department of Agriculture,
Natural Resources Conservation Service

Project Location:
Bradford County, Pennsylvania
Chemung County, New York

In Cooperation With:
Bradford County Commissioners
Bradford County Conservation District
Village of Wellsburg
Town of Ashland
Chemung County Legislature
Chemung County Soil and Water Conservation District

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Comments on draft were received through:
27 February 2012

ABSTRACT

The Bentley Creek Watershed Plan-Environmental Assessment describes a plan for reducing flood damages and sedimentation. The plan was developed under the authority of Public Law 83-566, Watershed Protection and Flood Prevention Act, as amended (16 U.S.C.1001-1008,1010,1012). The project is located in Bradford County, Pennsylvania and Chemung County, New York.

The purpose of the project is to reduce flood damages to homes and other occupied non-residential buildings, reduce flood damage, if practical, to roads, bridges and utilities and reduce sediment loads and stream gravel loads to further reduce flood damage and improve stream quality.

The need for the project results from recurring excessive flooding of up to 400 buildings and numerous roads, bridges and utilities. The flooding causes average annual flood damages to buildings of nearly $770,000. Excessive streambank erosion, especially in tributary streams, creates large sediment loads and gravel deposits throughout the basin which contribute to flooding and damage aquatic habitat. Stream instability results in episodic losses of land areas into the stream system.

Alternative plans developed are No Action and two alternatives with varying combinations of structural and nonstructural measures. A wide range of structural and nonstructural measures were examined.

The Preferred Alternative consists of advanced flood warning system, tributary stabilization, two dikes and voluntary nonstructural measures including house acquisition and removal, house “floodproofing”, mobile home elevation and house basement utility elevation. The Preferred Alternative is the National Economic Development Plan which is the plan that reasonably maximizes net national economic development benefits consistent with protecting the Nation’s environment. Economic benefits will exceed costs. Total project costs are estimated at $5.6 million. Local Sponsors will incur about 3% (about $180,000) of the total costs, primarily to acquire needed real property rights.

There are no significant adverse environmental impacts from this project. One house to be removed is eligible for the National Register of Historic Places. A mitigation plan for the house will be developed in consultation with the New York State Historic Preservation Office. This document is intended to fulfill requirements of the National Historic Preservation Act of 1966, the Endangered Species Act of 1973 and the National Environmental Policy Act (NEPA) of 1969, as amended.

BENTLEY CREEK WATERSHED AGREEMENT

between the

BRADFORD COUNTY COMMISSIONERS
BRADFORD COUNTY CONSERVATION DISTRICT
VILLAGE OF WELLSBURG
TOWN OF ASHLAND
CHEMUNG COUNTY LEGISLATURE
CHEMUNG COUNTY SOIL AND WATER CONSERVATION DISTRICT
(Referred to herein as Sponsors)

and the

NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE
(Referred to herein as NRCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for the Bentley Creek Watershed, Commonwealth of Pennsylvania and State of New York, under the authority of the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. 1001-1008,1010,1012); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act (Public Law 83-566), as amended, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsors and NRCS a Watershed Project Plan and Environmental Assessment for works of improvement for the Bentley Creek Watershed, hereinafter referred to as the Watershed Project Plan-Environmental Assessment (Plan-EA), which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the Sponsors hereby agree on this Plan-EA and that the works of improvement for this project may be installed if NRCS funding is available and approved for this project. When installed with NRCS provided funding, the project will be operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this Plan-EA, including the following:

1. **Term**. The term of this agreement is for the installation period and evaluated life of the project (100 years). It does not commit NRCS to providing financial and/or technical assistance during the installation period, the evaluated life of the project, and beyond the end of the evaluated life without NRCS approved and available funding for this project.

2. **Costs**. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties will be the actual costs incurred in the installation of works of improvement.

3. **Real Property.** The Sponsors will acquire with other than Public Law 83-566 funds, such real property as will be needed in connection with the works of improvement. The amounts and percentages of real property acquisition costs to be borne by the Sponsors and NRCS are as shown in the Real Property Acquisition Cost table below.

   The Sponsors agree that all land acquired or improved with Public Law 83-566 financial or credit assistance under this agreement will not be sold or otherwise disposed of for the evaluated life of the project (100 years), except to a public agency which will continue to maintain and operate the development in accordance with the Operations and Maintenance Agreement.

Real Property Acquisition Costs

Works of Improvement (Real Property Acquisition Costs)	PA Sponsors	NY Sponsors	NRCS[1]	Estimated Real Property Acquisition Costs
Flood Warning System	50%	50%	0%	$0
Tributary Stabilization	50%	50%	0%	$25,000
Wellsburg Dike (dike footprint and induced flooding)	0%	100%	0%	$105,000
Wellsburg Dike (nonstructural house acquisition)	0%	$1000/ acquisition (~$5,000)	All, except $1000/ acquisition	$195,000
Centerville Dike	100%	0%	0%	$5,000
Nonstructural House Acquisition (Pennsylvania)	$1000/ acquisition (~$5,000)	0%	All, except $1000/ acquisition	$480,000

[1]In the event NRCS funding is approved and available for this project NRCS's Real Property Acquisition Costs will occur at these rates

4. **Uniform Relocation Assistance and Real Property Acquisition Policies Act.** The Sponsors hereby agree that they will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et seq. as further implemented through regulations in 49 CFR Part 24 and 7 CFR Part 21) when acquiring real property interests for this federally assisted project. If the Sponsors are legally unable to comply with the real property acquisition requirements, it agrees that, before any Federal financial assistance is furnished; it will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance.

In the event NRCS funding is approved and available for this project, the cost of relocation payments in conjunction with displacements under the Uniform Act may be shared by the Sponsors and NRCS as follows:

Relocation Payments

Works of Improvement (Relocation Payments)	Sponsors [1]	NRCS	Estimated Relocation Payments [2,3]
Wellsburg Dike	3%	97%	$16,000

[1] New York Sponsors only

[2] Estimated relocation payment costs include replacement in kind, and payments necessary to meet decent, safe, and sanitary provisions.

[3] Investigation of the other portions of the project area indicates that no other displacements will be involved for works of improvement (other than the Wellsburg Dike) under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost shared in accordance with the percentages shown.

5. **Voluntary Nonstructural Measures.** In the event NRCS funding is approved and available for this project, the Sponsors agree that nonstructural measures, including house acquisition, house floodproofing, mobile home elevation, mobile home park elevation, protection of basement utilities, but not to include houses acquired due to dike induced flooding, will be administered and implemented as a voluntary program. Consequently, compliance with the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 USC 4601 et. seq., as further implemented through regulations in 49 CFR Part 24 and 7 CFR Part 21) is not required for the voluntary nonstructural measures. The Sponsors will obtain, prior to the acquisition of any real property, a signed statement from the seller, as owner of the property, declaring that sale of the real property in question is a voluntary transaction.

6. **Water and Mineral Rights.** The Sponsors will acquire or provide assurance that landowners or resource users have acquired such water, mineral and other natural resources rights pursuant to state law as may be needed in the installation and operation of the works of improvement.

7. **Permits.** The Sponsors will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

8. **Construction Costs.** In the event NRCS funding is approved and available for this project, the percentages of construction costs to be paid by the Sponsors and by NRCS are as follows:

Works of Improvement (Construction Costs)	**PA Sponsors**	**NY Sponsors**	**NRCS**	**Estimated Construction Costs**
Flood Warning System	0%	0%	100%	$35,000
Tributary Stabilization	0%	0%	100%	$650,000
Wellsburg Dike (PA-681)	0%	0%	100%	$1,755,000
Centerville Dike (PA-680)	0%	0%	100%	$605,000
Nonstructural	0%	0%	100%	$785,000
Total	**0%**	**0%**	**100%**	**$3,830,000**

9. **Engineering Costs.** In the event NRCS funding is approved and available for this project, the percentages of engineering costs to be paid by the Sponsors and by NRCS are as follows:

Works of Improvement (Engineering Costs)	**PA Sponsors**	**NY Sponsors**	**NRCS**	**Estimated Engineering Costs**
Flood Warning System	0%	0%	100%	$5,000
Tributary Stabilization	0%	0%	100%	$100,000
Wellsburg Dike (PA-681)	0%	0%	100%	$265,000
Centerville Dike (PA-680)	0%	0%	100%	$90,000
Nonstructural	0%	0%	100%	$65,000
Total	**0%**	**0%**	**100%**	**$525,000**

10. **Project Administration Costs.** In the event NRCS funding is approved and available for this project, the Sponsors and NRCS will each bear the cost of Project Administration that each incurs, estimated to be $14,000 NY Sponsors; $20,000 PA Sponsors; and $385,000 NRCS.

11. **Floodplain Management.** Before construction of any project for flood damage reduction, the Sponsors will ensure local municipal participation in and compliance with applicable Federal floodplain management and flood insurance programs. Implementation may only proceed in communities that meet this requirement.

12. **State Classified High Hazard Dams.** Prior to implementation, the Sponsors shall ensure that all state classified high hazard dams, including Miller Pond, Lake Ondawa, Ridgebury Lake, and other upstream hazards identified by state or local authorities as having a substantial risk of failure, meet all applicable safety standards or demonstrate that a failure will not adversely effect the performance of the planned works of improvement.

13. **Emergency Action Plan.** Prior to construction, the Sponsors shall prepare an Emergency Action Plan (EAP) for each Class I, high hazard, dike or similar structure where failure may cause loss of life and as required by state and local regulations. The EAP shall meet the minimum content specified in Part 500.52 of the NRCS National Operation and Maintenance Manual, and meet applicable State agency safety requirements. In the event approved and available NRCS funds will be used for the project, NRCS and appropriate state agency will determine that an adequate EAP is prepared prior to the execution of fund obligating documents for construction of the structure. EAPs shall be reviewed and updated by the Sponsors annually and as required by state or local law.

14. **Operation and Maintenance.** The Sponsors will be responsible for the operation, maintenance and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an Operation and Maintenance (O&M) Agreement. An O&M Agreement will be entered into before Federal funds are obligated and will continue for the project evaluated life (100 years). Although the Sponsors' responsibility to the Federal Government for O&M ends when the O&M Agreement expires upon completion of the evaluated life of measures covered by the agreement, the Sponsors acknowledge that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.

15. **Land Treatment.** The Sponsors will encourage landowners and operators to operate and maintain needed land treatment conservation measures for the protection and improvement of the watershed.

16. **NRCS Assistance.** This agreement is not a fund-obligating document. Financial and technical assistance to be furnished by NRCS in carrying out the Watershed Project Plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

17. **Additional Agreements.** In the event approved NRCS funds become available for this project, a separate agreement will be entered into between NRCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

18. **Amendments.** This Watershed Project Plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the Sponsors have failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS shall promptly notify the Sponsors in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by NRCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the Sponsors having specific responsibilities for the measure involved.

19. **Prohibitions.** No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

20. **Nondiscrimination Provisions.** The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex (including gender identity and expression), marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write to: USDA, Assistant Secretary for Civil Rights, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, S.W., Stop 9410, Washington, DC 20250-9410. Or call toll-free at (866) 632-9992 (English) or (800) 877-8339 (TDD) or (866) 377-8642 (English Federal-relay) or (800) 845-6136 (Spanish Federal-relay). USDA is an equal opportunity provider and employer.

By signing this agreement the recipient assures the U.S. Department of Agriculture that the program or activities provided for under this agreement will be conducted in compliance with all applicable Federal civil rights laws, rules, regulations, and policies.

21. Certification Regarding Drug-Free Workplace Requirements (7 CFR part 3021). By signing this watershed agreement, the Sponsors are providing the Certification set out below. If it is later determined that the Sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. Section 812) and as further defined by regulation (21 CFR Sections 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification:

A. The Sponsors certifies they will continue to provide a drug-free workplace by:

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(2) Establishing an ongoing drug-free awareness program to inform employees about --

(a) The danger of drug abuse in the workplace;

(b) The grantee's policy of maintaining a drug-free workplace;

(c) Any available drug counseling, rehabilitation, and employee assistance programs; and

(d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will --

(a) Abide by the terms of the statement; and

(b) Notify the employer in writing of his or her conviction --- for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(5) Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph (4) (b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employee who is so convicted--

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency; and

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).

B. The Sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.

C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

22. Certification Regarding Lobbying (7 CFR 3018) (applicable if this agreement exceeds $100,000).

(1) The Sponsors certify to the best of its knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the Sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

3. The Sponsors shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

(2) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

23. Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions (7 CFR 3017).

(1) The Sponsors certify to the best of their knowledge and belief, that they and their principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the primary Sponsor is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

24. Clean Air and Water Certification (applicable if this agreement exceeds $100,000, or a facility to be used has been subject of a conviction under the Clean Air Act (42 U.S.C. Section 7413(c)) or the Federal Water Pollution Control Act (33 U.S.C. Section 1319(c)) and is listed by EPA, or is not otherwise exempt.)

A. The project sponsoring organizations signatory to this agreement certify as follows:

(1) Any facility to be utilized in the performance of this proposed agreement is (____), is not (____) listed on the Environmental Protection Agency List of Violating Facilities.

(2) To promptly notify the NRCS-State administrative officer prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

(3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project sponsoring organization(s) signatory to this agreement agrees as follows:

(1) To comply with all the requirements of section 114 of the Clean Air Act as amended (42 U.S.C. Section 7414) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, issued there under before the signing of this agreement by NRCS.

(2) That no portion of the work required by this agreement will be performed in facilities listed on the EPA List of Violating Facilities on the date when this agreement was signed by NRCS unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use their best efforts to comply with clean air standards and clean water standards at the facilities in which the agreement is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt subagreement.

C. The terms used in this clause have the following meanings:

(1) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq.).

(2) The term "Water Act" means Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et seq.).

(3) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110 of the Air Act (42 U.S.C. Section 7414) or an approved implementation procedure under section 112 of the Air Act (42 U.S.C. Section 7412).

(4) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standards, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. Section 1342), or by a local government to assure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. Section 1317).

(5) The term "facility" means any building, plan, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by a sponsor, to be utilized in the performance of an agreement or subagreement. Where a location or site of operations contains or includes more than one building, plan, installation, or structure, the entire location shall be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

25. Assurances and Compliance. As a condition of the grant or cooperative agreement, the sponsor assures and certifies that it is in compliance with and will comply in the course of the agreement with all applicable laws, regulations, Executive orders and other generally applicable requirements, including those set out below which are hereby incorporated in this agreement by reference, and such other statutory provisions as a specifically set forth herein.
State, Local, and Indian Tribal Governments: OMB Circular Nos. A-87, A-102, A-129, and A-133; and 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: OMB Circular Nos. A-110, A-122, A-129, and A-133; and 7 CFR Parts 3015, 3017, 3018, 3019, 3021 and 3052.

26. Examination of Records. The sponsors shall give the NRCS or the Comptroller General, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to this agreement, and retain all records related to this agreement for a period of three years after completion of the terms of this agreement in accordance with the applicable OMB Circular.

SIGNATURE SHEET
BENTLEY CREEK WATERSHED AGREEMENT

The signing of this Bentley Creek Watershed Agreement by an authorized representative of the Sponsors indicates that the Sponsors have reviewed this Agreement and the Bentley Creek Watershed Project Plan-Environmental Assessment and concur with the intent and contents of each.

BRADFORD COUNTY COMMISSIONERS

The signing of this plan was authorized by a resolution of the governing body of the Bradford County Commissioners adopted at a meeting held on 12-15-11 [Date].

By: _____
Title: Chairman

Date: 8-9-12

Address: 301 Main St.
Towanda PA 18848

BRADFORD COUNTY CONSERVATION DISTRICT

The signing of this plan was authorized by a resolution of the governing body of the Bradford County Conservation District adopted at a meeting held on 8-6-12 [Date].

By: _____
Title: District Chairman

Date: 8/6/12

Address: 200 Lake Rd. Ste. E
Towanda PA 18848

VILLAGE OF WELLSBURG

The signing of this plan was authorized by a resolution of the governing body of the Village of Wellsburg, New York adopted at a meeting held on 05/14/2012 [Date].

By: _____
Title: Mayor

Date: 08-15-12

Address: 233 Church St. P.O. Box 251
Wellsburg, NY 14894

SIGNATURE SHEET
BENTLEY CREEK WATERSHED AGREEMENT
(continued)

TOWN OF ASHLAND

The signing of this plan was authorized by a resolution of the governing body of the Town of Ashland, New York adopted at a meeting held on 5/9/2012 [Date].

By: _____
Title: Town Supervisor

Date: 8-16-12

Address: 3663 6th Street

Wellsburg, NY 14894

CHEMUNG COUNTY LEGISLATURE

The signing of this plan was authorized by a resolution of the governing body of the Chemung County Legislature adopted at a meeting held on 05/14/2012 [Date].

By: Donna L. Drayer
Title: Chairman

Date: 8-15-2012

Address: P.O. Box 588

Elmira, NY 14902

By: _____
Title: County Executive

Date: 8-15-12

Address: P.O. Box 588

Elmira, NY 14902

CHEMUNG COUNTY SOIL AND WATER CONSERVATION DISTRICT

The signing of this plan was authorized by a resolution of the governing body of the Chemung County Soil and Water Conservation District adopted at a meeting held on 05/08/2012 [Date].

By: Kenneth Bush
Title: District Chairman

Date: 8-14-12

Address: 851 Chemung St.

Horseheads, NY 14845

SIGNATURE SHEET
BENTLEY CREEK WATERSHED AGREEMENT
(continued)

NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

Approved by:

Denise Coleman
State Conservationist

Date: 8/1/13

Watershed Project Plan - Environmental Assessment
Bentley Creek Watershed
Pennsylvania and New York

SUMMARY OF WATERSHED PROJECT PLAN (Office of Management and Budget Fact Sheet)

Project Name: Bentley Creek Watershed

County: Bradford, Chemung **State:** Pennsylvania, New York

Sponsors: Bradford County Commissioners
Bradford County Conservation District
Village of Wellsburg
Town of Ashland
Chemung County Legislature
Chemung County Soil and Water Conservation District

Authorities
The Watershed Project Plan is prepared under the authority of Public Law 83-566, Watershed Protection and Flood Prevention Act, as amended (16 U.S.C.1001-1008,1010,1012). The responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to NRCS.

Description of the Preferred Alternative
The Preferred Alternative consists of implementation of a flood warning system, tributary stabilization, dike in Wellsburg, NY, dike in Centerville, PA and nonstructural measures for flood prone residential buildings in the 100-year flood plain not associated with a dike. Nonstructural measures in areas not associated with dikes will be voluntary and include house acquisition, house "floodproofing", house utility protection, mobile home park elevation and other mobile home elevation. This is the National Economic Development (NED) Plan.

Resource Information
Watershed Size – Land Cover

Land Cover	Acres
Agriculture	14,805
Forest	16,920
Urban	805
Surface Water	335
Miscellaneous	635
Watershed Total	33,500

Land Ownership
99% private / 1% public (state, local)

Farms and Farmland
Number of Farms – 160
Average Farm Size – 200 acres
No. of Minority Producers – 15
No. Limited Resource Farmers – 4

Project Beneficiaries:

	Watershed	Notes
Population	3,100	
Minority	45	
Unemployment	4.3%	Below U.S. Rate
Per Capita Income (1999 dollars)	$ 16,450	76% of U.S. Values
Median Home Values	$ 70,970	58% of State Values
52% of watershed flood damaged residences are mobile homes not included in home values		

[1/] Source: 2000 Census Data

Wetlands – over 200 acres within watershed

Flood Plains (Bentley Creek) – 750 acres

Threatened and Endangered Species
The Pennsylvania Natural Diversity Inventory (PNDI), New York State Department of Environmental Conservation and U.S. Fish and Wildlife Service-New York were queried to determine the project's potential to effect species of special concern, which includes federal and state recognized species. Based on the queries, no conflicts with ecological resources of special concern are known to exist in the area.

Cultural Resources
Phase 1 Cultural Resources Surveys were conducted of the project area. The Pennsylvania (PA) and New York State (NYS) State Historic Preservation Offices and the Seneca Nation of Indians were consulted regarding findings. One house to be impacted by the project is eligible for the National Register of Historic Places. This house will need to be removed from the flood plain to implement the Wellsburg Dike. Mitigation of the house will be coordinated with the NYS State Historic Preservation Office. The NYS SHPO has requested additional investigation of the planned path of the Wellsburg Dike diversion outlet. Although this area was investigated during the Phase I survey, a more extensive investigation will be conducted at the time of project design to confirm that unmarked graves are not located in the planned construction area and to avoid any adverse impacts. Otherwise, the Phase I surveys located no prehistoric cultural material, no other cultural features and no archaeological sites.

Problem Identification
There are about 400 buildings and numerous roads and bridges subject to flood damages. Repeated flooding results in private costs, public expenditures and threats to public safety. Flood damages to buildings alone are in excess of $770,000 annually. In addition to flood damage, streambank erosion and excessive stream sediment and gravel loads are causing damages. Streambank erosion causes the loss of large areas of property, threatens homes, businesses and public facilities, degrades riparian and aquatic habitat and transports large quantities of sediment and gravel. Sediment contains nutrients which are detrimental to downstream aquatic habitats, including the Chesapeake Bay. Sediment and gravel deposits reduce bridge and stream capacity, aggravate flooding, and are costly to remove.

Alternative Plans Considered
1. No Action (future without project action) – The conditions in the watershed are not expected to change much in the next 20-25 years. There has been some new development, but the watershed is expected to remain largely rural. There are local efforts underway in both States to try to better manage stormwater runoff from any development that does occur. Flood damages are expected to remain much as they are today. Actions to reduce streambank erosion, stabilize and rehabilitate streams, and reduce sediment and gravel loads will continue; but progress is expected to be slow with few sources of adequate funding available.

2. Dikes Plus Nonstructural (Preferred Alternative). Flood warning system, tributary stabilization, Wellsburg and Centerville Dikes and nonstructural measures for residences not protected by dikes. This is the National Economic Development Plan.

3. Stream Rehabilitation plus Nonstructural. Same as alternative 2, except the Wellsburg Dike is replaced with stream rehabilitation and the Centerville Dike is replaced with voluntary nonstructural measures.

Project Purpose
Flood damage reduction, including land stabilization of tributaries.

Principal Project Measures
- Flood warning system, including rain and stream gages, repeater station and reverse 911 type system
- Tributary stabilization, about 19,000 feet in 4 tributaries
- Wellsburg Dike (PA-681), about 4200 feet long with 2 road closure structures, stormwater basin, stream reconstruction and hillside diversion, 5-6 house acquisitions
- Centerville Dike (PA-680), about 2400 feet long with 1 road closure structure, stormwater basin and hillside diversion
- Voluntary nonstructural, including house acquisition, house "floodproofing", house utility protection, and mobile home elevation.

Economic Evaluation [1/]

Project Costs:

	PL-83-566 Funds [2/]	Other Funds [3/]	Total
Flood Warning System	$ 42,000	$ 3,000	$ 45,000
Tributary Stabilization	810,000	28,000	838,000
Wellsburg Dike (PA-681)	2,403,000	122,000	2,525,000
Centerville Dike (PA-680)	750,000	6,000	756,000
Voluntary Nonstructural	1,415,000`	21,000	1,436,000
Totals	**$5,420,000**	**$180,000**	**$5,600,000**

Average Annual Costs [4/] [5/]: $275,000

Project Benefits (average annual):

	Agricultural (including rural communities)
Flood/Sediment Damage Reduction	$570,000
Average Annual Benefits:	**$570,000**

Net Economic Benefit: $295,000
Benefit Cost Ratio: 2.1 : 1.0

[1/] Price Base 2011
[2/] Includes $525,000 engineering and $385,000 project administration
[3/] Includes $34,000 project administration
[4/] Price Base 2011, amortized over 100 years at a Discount Rate of 4.0%
[5/] Includes annual operation and maintenance

Non-Monetary Benefits

- Substantial flood damage reduction to an estimated 200 buildings, including 170 residences
- Substantial reduction in threat to life from flooding
- Sediment loads reduced 50% (over 1700 tons per year)
- 19,000 feet of critically eroding tributary stream stabilized
- Moderate improvements in aquatic and riparian habitat along stabilized tributaries

Environmental Values Lost or Changed

Resource	**Effect**
Public Safety	Substantially improved
Flood Damages	Substantially reduced
Water Quality	Improved stream water quality due to reduced sediment loads
Land Use	Conversion of ~19 acres of mixed meadow, lawn & 1 acre of woodland to grassed dike components; conversion of ~ 5 acres of residential use to flood plain/riparian functions.
Soil	19,000 feet of land stabilized along tributaries
Aquatic Life	Moderate habitat improvement in areas stabilized. Little or no change in aquatic game species.
Wildlife	Moderate improvement to riparian habitat in areas stabilized.
Social Issues	Improved economic conditions due to reduced flood hazard; 5-6 homes displaced by dikes; access to and view of creek reduced in dike areas: reduced number and severity of raw exposed streambanks; reduced flood impacts on aesthetics
Cultural Resources	1 home (with outbuildings) that is eligible for the National Register of Historic places will be removed from flood plain
Flood Plain Management	100-year flood hazard eliminated for about 200 buildings; about 10 floodprone houses will be removed
Important Farmland	No effect
Threatened/Endangered Species	No Effect
Wetlands	No Effect
Air Quality	Minor amounts of air pollution during construction
Compensatory Mitigation:	1 building to be removed is eligible for the National Register of Historic Places & will be mitigated in consultation with the New York State Historic Preservation Office
Major conclusions:	Dikes Plus Nonstructural alternative is the National Economic Development plan and is the preferred alternative
Areas of controversy:	None known
Issues to be resolved:	Mitigation of 1 building eligible for the National Register of Historic Places; additional cultural resources survey of dike diversion outlet

INTRODUCTION

The Bentley Creek Watershed Project Plan and Environmental Assessment (Plan-EA) have been combined into a single document. The document identifies the watershed resource problems, describes plan formulation, discloses the expected impacts, and provides a basis for authorizing federal assistance. The purpose of the project is flood damage reduction and tributary stream stabilization to reduce the threat to life and property from floods, enhance stream riparian and aquatic habitat and reduce costs associated with flooding and sedimentation.

The Sponsoring Local Organizations are:

Bradford County Commissioners
Bradford County Conservation District
Village of Wellsburg
Town of Ashland
Chemung County Legislature
Chemung County Soil and Water Conservation District

The Sponsor's objectives are to:

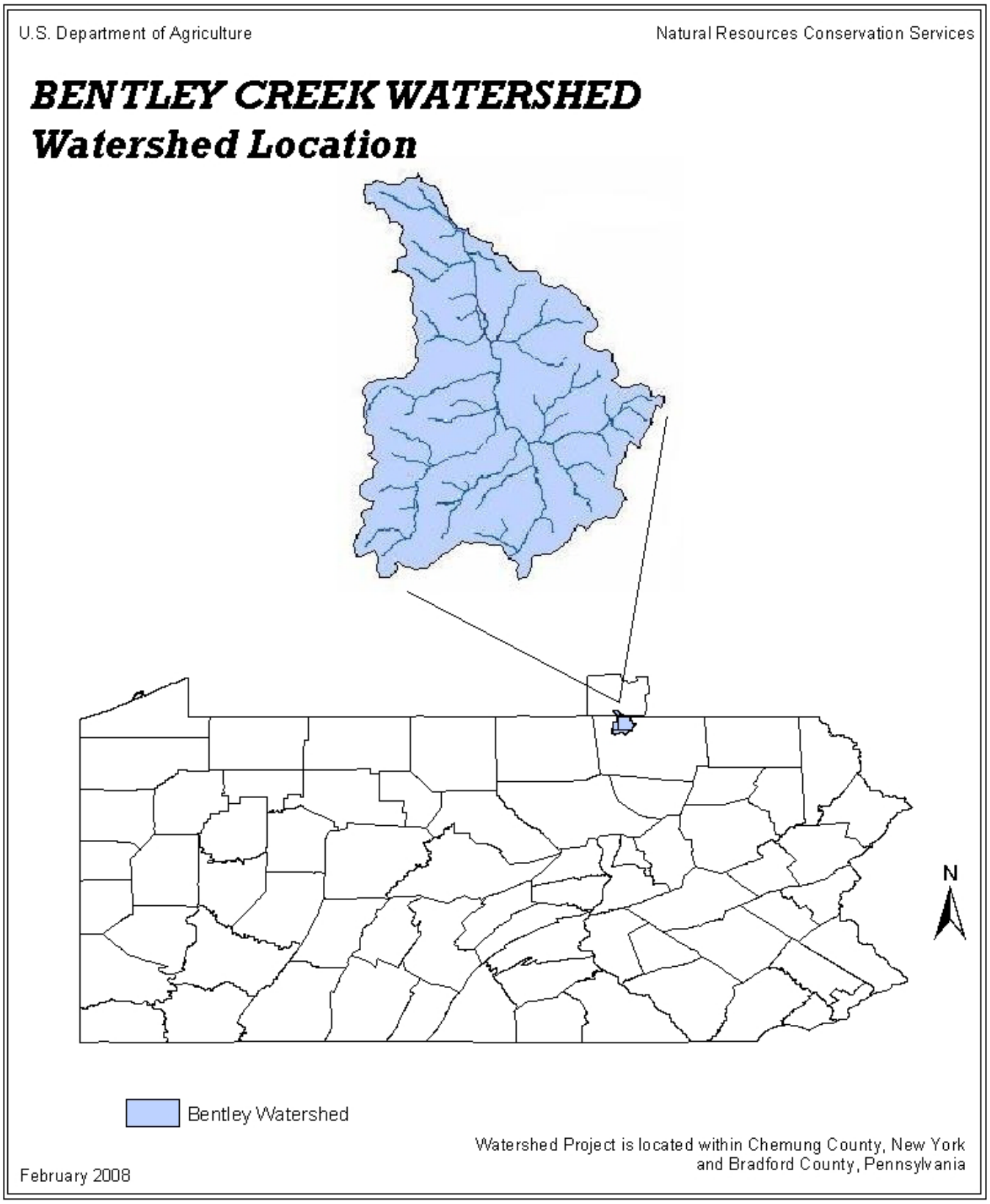
- Substantially reduce flood damages to residential, commercial and public buildings which receive up through the 100-year flood
- Reduce flood damage, if practical, to roads, bridges and utilities
- Substantially reduce sediment loads and stream gravel loads to reduce flood damage and improve stream quality

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS) provided the primary assistance to the local Sponsors in the development of this plan. Many other federal, state and local agencies and organizations also assisted by providing information and comment.

The information presented was obtained from a variety of agencies, organizations, published reports and analytical procedures. The procedures are summarized in the Investigations and Analyses Report included as an appendix to this documents.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16-USC-1001-1008) and in accordance with Section 102-(2)(c) of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, as amended (42-USC-4321 et seq.). Responsibility for compliance with NEPA rests with NRCS.

Figure 1 - Location Map – Bentley Creek Watershed



PROJECT SETTING

Location

The Bentley Creek Watershed is located in the north central part of the Susquehanna River Basin in the glaciated Allegheny Plateau region (see Figure 1). The watershed is situated in the northwestern section of Bradford County, Pennsylvania and the south central section of Chemung County, New York. Approximately 94 percent of the watershed is in Bradford County. The Bentley Creek Watershed lies within Pennsylvania State Water Plan Sub-basin 4B and within Federal Geographic Data Committee Hydrologic Unit 02050105-06, and is more specifically defined by the following three 12-digit Hydrologic Units: 02050105-06-01, 02050105-06-02 and 02050105-06-03.

Land Use

Bentley Creek and tributaries drain an area of 52.4 square miles or 33,500 acres. The watershed is largely rural. Land use is distributed as 44.2 percent agricultural land (cropland, hayland, and pastureland), 50.5 percent forest lands, 2.4 percent developed land (residential, commercial, and transportation), 1.0 percent surface water, with the remaining 1.9 percent being miscellaneous land uses.

The primary agricultural land use is for the production of feed for dairy cows. Corn, feed grains, and hay are the principle crops. There are other less intensive livestock operations such as veal, sheep and beef cattle. Primary forestry uses are timber production, recreation, wildlife, and maple syrup production.

Primary developed land is in the form of strip development immediately adjacent to Bentley Creek along Pennsylvania SR 4013 (Berwick Turnpike) and Route 367 in New York. This development consists of single family homes; several small and medium sized commercial operations, and mobile home parks. The village of Bentley Creek is located near the geographic center of the watershed. The village of Centerville (sometimes known as Ridgebury) is located about two miles north (downstream) from the village of Bentley Creek. The largest populated area in the watershed is Wellsburg, New York, which is located at the confluence of Bentley Creek and the Chemung River. The remaining developed land in the watershed consists primarily of scattered homes and farmsteads.

Bentley Creek is the major water body in the watershed. In addition, there are seven or so small lakes or large ponds within the watershed.

Climate

In Bradford and Chemung Counties, the winters are cold with an average temperature of 28 degrees F and average daily minimum temperatures of 18 degrees F. The summers are moderately warm with average temperature being 69 degrees F and the daily maximum temperature of 82 degrees F.

The total average annual precipitation is 34 inches with 19 inches or 55 per cent occurring in April through September. The average annual snowfall is 48 inches. Thunderstorms occur on about 30 days each year, primarily in the summer.

Geology

The bedrock geology in the watershed is almost entirely composed of units from the Lock Haven formation of the Upper Devonian age. Younger units from the Catskill formation of the Upper Devonian age overlie a very small area at the top of the watershed to the south. The Lock Haven consists of interbedded light olive gray, very fine grained, fossiliferous sandstone, light-gray siltstone, gray silty shale, and some conglomerate beds occur near the top of the formation. The sandstone and siltstone are thin to medium bedded and the shale is thin to very thick bedded. The Catskill consists of shale, siltstone, sandstone and conglomerate. Structurally, all beds lie nearly horizontal.

The watershed has undergone at least three continental glaciations. The Wisconsin Glaciation is the last ice advance that has left a significant record of its presence. As the Wisconsin Glaciation and probably

others advanced over the area they ground down the hilltops and filled the valleys, flattening the area. Besides scouring the landscape, the Wisconsin Glaciation deposited large amounts of glacial till on the uplands and side slopes and glacial outwash and lacustrine deposits in the river valleys. These glacial materials, which were derived from the bedrock of the area, became the parent material of many of the soils of the area.

The glacial till is readily apparent when examining the profiles of the streams within the Bentley Creek Watershed. Glacial till material can be easily eroded from the stream banks and bed in areas of high stream velocity, which are subsequently deposited in areas of lower stream velocity.

Soils

The soils in the Bentley Creek watershed predominantly consist of the Volusia-Mardin-Lordstown Associations, which are deep and moderately deep, gently sloping to moderately steep, somewhat poorly drained to well drained soils.

Volusia Soils are deep and somewhat poorly drained. They have a fragipan and a seasonal high water table. Mardin soils are deep and moderately well drained. They have a fragipan and a seasonal high water table. Lordstown soils are moderately deep and well drained.

Minor soils include Oquaga, Arnot, Wellsboro, Morris and deep Dystrochrepts on uplands; Chippewa and Medisaprists in lowlands and swamps; Wyoming, Chenango, and Rexford on terraces; and Holly, Pope and Udifluvents on flood plains.

Moderate depth to bedrock, seasonal high water table, slow and very slow permeability, and the very stony surface limit non-farm uses of the soils.

Water Resources

Bentley Creek has it source near Big Pond (Lake Ondawa) located at the 1860 foot elevation. Its mouth is located at the Chemung River in New York State at the 860 foot elevation. Its course is almost due north. Bentley Creek's length is 12.8 miles. Meander ratio is 1.08. Relief ratio is 78.1. Channel slope is 59.4 feet per mile or 1.1 percent. Drainage pattern is classified as dendritic. Channel pattern is regular. The average annual runoff is approximately 18 inches.

Bentley Creek is primarily formed by the following tributaries (Project Map - Appendix F); Trout Creek-3.4 square mile drainage area; Fall Creek-11 square mile drainage area; Miller Run-3.2 square mile drainage area; Buck Creek-10.2 square mile drainage area; Justice Run-4.25 square mile drainage area; Terwiliger Creek-4.5 square mile drainage area; and Three Falls Glen-1.9 square mile drainage area.

The watershed contains numerous small ponds. The three main impoundments (all manmade) include Miller Pond, Lake Ondawa, and Ridgebury Lake (Project Map - Appendix F). Miller Pond has a drainage area of 2.6 square miles, a surface area of 10 acres and a maximum storage of 684 acre-feet. Lake Ondawa has a drainage area of 1 square mile, a surface area of 25 acres and a maximum storage of 215 acre-feet. Ridgebury Lake has a drainage area of 2.2 square miles, a surface area of 58 acres and a maximum storage of 1230 acre-feet. Miller Pond was originally constructed for hydropower (mechanical), but is no longer used as such. Identified uses of Lake Ondawa and Ridgebury Lake are recreation, fishing, and aesthetics. There are an estimated 200 acres of wetland within the watershed.

The Pennsylvania Department of Environmental Protection, in its Chapter 93 - Water Quality Standards, lists Bentley Creek's protected use as Warm Water Fishes. This designation is in addition to other protected uses such as water supply and recreation. There are no recorded public water intakes. However, the main stem Bentley Creek has many private shallow groundwater intakes that are largely influenced by the surface waters of the creek. There are no permitted discharges (point source) in the watershed. Non-point influences are land use runoff and on-lot septic systems. New York State Department of Environmental Conservation classifies Bentley Creek and the tributaries in New York as Surface Water Class C. The New York sections are therefore not considered to be protected water bodies.

Forestland

Forested tracts account for 50.5 percent in the watershed. Forestland is diverse, consisting of mixed oaks, oak-pine, cherry-ash-poplar, oak-hickory, beech-birch-maple, white pine, hemlock, and northern hardwoods. Sites are generally moderate to high quality with 96 percent of the site indexes ranging between 60 and 80. Nearly 80 percent of the forested areas are in large, contiguous tracts greater than 80 acres. The rest are in small isolated woodlots less than 25 acres. Most of the forestland acres in the watershed are in private ownership. Of these, about 17,000 acres are non-industrial private forestlands, and about 1,400 acres are in State Game Lands, campgrounds, and golf course ownership. Ownership patterns are expected to remain stable; however, forested tracts are currently being subdivided for residential use (U.S. Forest Service, 1997).

Socioeconomic Profile

The economic base for the Bentley Creek Watershed area consists of several small to medium businesses and agriculture. Much of the employment market is to the northwest in the area of Elmira, New York and other communities outside of the watershed.

There are approximately 3100 people in the watershed, with about 98.5% white and the remainder consisting of black, Hispanic, Asian and other ethnic groups. An estimated 8.5 percent of the population have a bachelor's degree or higher compared to the national average of 24.4 percent. The percentage of high school graduates is about 77.7 percent compared to 80.4 percent nationally.

Based on the criteria developed by NRCS for the Watershed Protection and Flood Prevention Program, this area essentially qualifies as an economically and socially disadvantaged community. The qualifying criteria include project housing values less than 75 percent of the state values and per capita income less than 75 percent of the national values, as follows:

Criteria for disadvantaged communities:	**Watershed**	**States**	**Percent**
1. Property Values - Median House Values (2000)	$71,000	$122,700	**58%**
2. Per Capita Income (1999)	**Watershed**	**United States**	**Percent**
	$16,500	$21,600	**76%**
3. Unemployment (2000)	**Watershed**	**United States**	
	4.3%	5.8%	

Source of data: U.S. Census Bureau - American Fact Finder

WATERSHED PROBLEMS AND OPPORTUNITIES

Watershed Problems

Three primary natural resource related problems have been identified for the Bentley Creek Watershed:

Flood Damage
Streambank Erosion
Sediment Damage

Flood Damage

Bentley Creek has a long history of flooding. In 1965, the USDA-Soil Conservation Service (now USDA-Natural Resources Conservation Service) in a Preliminary Investigation Report for the Watershed Protection and Flood Prevention Program (USDA-SCS, 1965) identified five significant floods that occurred in the watershed since 1915. At that time the last major flood occurred in 1947. Since that 1965 report, significant floods have caused private property and infrastructure damage in 1972 (Hurricane Agnes), 1975 (Hurricane Eloise), 1984, June 1994, August 1994, January 1996 and September 2011. See Photos 1-3.

Wellsburg, NY has experienced multiple flooding events. This town is situated near the confluence of Bentley Creek into the Chemung River. Bentley Creek flows in this area are subject to high tail water influence from the river which can back water over the creek banks and into town.

The best documented are the floods of 1972 and January 19, 1996. The flood of 1972 is recognized as being the flood of record for this watershed and is classified as a 100-year frequency storm. The January 19, 1996 flood, according to local residents, approached or exceeded the 1972 event. The Corps of Engineers has estimated the flood of January 19, 1996 in PA to be a 75-year flood frequency event. This event resulted from rainfall onto snow covered ground which then melted producing significant runoff. Until recently, there have been no stream gages or stream monitoring locations in the Bentley Creek Watershed.

Photo 1. – Flooding in Wellsburg, NY, June 1972

Photo 2. – Flooding in Wellsburg, NY, September 2011

Photo 3. – Flooding along Bentley Creek, Ridgebury Township, PA

Private property, public utilities and roads have been damaged due to floodwaters. The average annual flood damage to approximately 400 buildings (including 295 homes and 40 commercial-public buildings)

throughout the watershed is estimated at $770,000. This is anticipated to remain unchanged in the future with the limited land development forecasted and the expectation that proper stormwater management activities will be pursued to minimize and control any increase in storm runoff.

The flooding frequency has been aggravated by the partial reduction to complete elimination of channel capacity in some locations due to the deposition of water deposited stream "gravel" and by large (greater than 14 inch diameter) trees washed from the streambank.

A review of the existing conditions flood elevations based on the predictive hydrology and hydraulics analysis shows that flood damage (basement and/or first floor) for homes and commercial-public buildings occurs for the following flood frequencies:

Flood Frequency (years)	No. of Flood Damaged Homes and Commercial Public Buildings	Maximum Flood Depth (feet) Homes / Commercial Public
10 year	150	5.0 / 3.1
25 year	200	6.0 / 6.1
100-year	335	7.0 / 6.6

A review of the existing conditions flood elevations shows that first floor damage occurs for the following flood frequencies:

Flood Frequency (years)	1st Floor Damage
10 year	40 Homes / 25 Commercial Public
25 year	70 Homes / 30 Commercial Public
100 year	150 Homes / 35 Commercial Public

Tributary flood damages were also evaluated, especially for Justice Run, Buck Creek and Trout/Fall Creeks. Flood damage in the tributaries was determined to be insufficient to warrant further evaluation.

Streambank Erosion

The erosion of the streambanks and scouring of the flood plain adjacent to Bentley Creek and in some key tributaries is identified as a major concern to residents and the local and state government. Streambank erosion is resulting in the loss of large areas of property, such as lawns and agricultural land, and has the potential to threaten homes and businesses located near the stream channel. The severe erosion also degrades riparian and aquatic habitat.

In the 1965 Preliminary Investigation Report, streambank erosion was recognized as existing, but being relatively minor. To quote from that report, "A small amount of land on the flood plain is lost each year due to channel erosion". This relatively minor level of bank erosion is confirmed by 1959 and 1960 aerial photography. Although there is evidence in the 1959/1960 aerial photography of manmade manipulation of the steam channel and banks in a few locations and along Bentley Creek, the streambank appears stable with woody riparian vegetation adjacent to the streambank.

The flood of 1972, Hurricane Agnes, is identified as the destabilizing event for the streambanks. This information was obtained from discussions with residents and local, state and federal government officials familiar with the watershed. In flood evaluation documents gathered by the Soil Conservation Service in August 1972, reference is made to flood damaged buildings and infrastructure and "tremendous deposition-bedload movement".

As a result of the 1972 flood, extensive flood recovery efforts were undertaken by all levels of government (local, state, and federal) as well as by private individuals. These efforts were primarily focused at removing floatable debris deposited in channels and to removing the "gravel" eroded from the streambanks and deposited in various sections of the stream channel. The efforts were performed by bulldozers and loaders pushing the gravel out of and onto the top of streambanks. There were no attempts to perform this work in accordance with accepted engineering techniques. The effort resulted in unstable streambanks, extensive

sections of the stream channel in poor hydrologic condition and a stream vulnerable to accelerated erosion.

Since 1972, but not including the Hurricane Agnes storm restoration work, in excess of $1 million has been spent in the Bentley Creek Watershed for stabilizing accelerated eroding streambanks. In spite of these efforts, 78 percent of the main stem of Bentley Creek has unstable streambanks based on a 1997 reconnaissance survey. The local Sponsors and others are continuing efforts to address this problem along Bentley Creek. In addition, a tributary reconnaissance study has identified an immediate need to stabilize critically eroding streambanks in four tributaries that are aggravating main stem bank instability.

Sediment Damages

Accelerated streambank erosion is causing heavy loading of sediments and "gravel" into surface water (see Photo 4). Some of this sediment impacts downstream areas, including the Chesapeake Bay. These sediments are also transporting nutrients which are identified as a major cause of degradation of the Chesapeake Bay aquatic environment. Sediments are damaging or destroying aquatic habitat, reducing bridge and channel capacity, aggravating flooding in Bentley Creek, and are contributing to sediment removal costs locally and downstream. The Pennsylvania Fish and Boat Commission (PFBC, 2000) observed that the fisheries of the watershed is among the poorest they ever surveyed. One of the major contributors to impaired quality is poor instream habitat, largely the result of excessive and shifting sediments.

Photo 4. – Gravel Deposits, Bentley Creek

A case study of the impact of sediment downstream of the watershed can be seen in the content of a paper presented to the 1995 Spring Meeting of the American Geophysical Union, Geochemical Society, and Mineralogical Society of America by Lloyd A. Reed of the U.S. Geological Survey. Mr. Reed observed that sediments from the soils typical of the Bentley Creek Watershed remain in suspension at much longer time periods than anticipated. In fact, as much as 25% of the sediment from the watershed may remain in suspension until captured by one of the downstream dams on the Susquehanna River or by the Chesapeake Bay. Much of the nutrient load coming out of Bentley Creek is associated with these fine sediments and contributes to eutrophication of the Bay. The cost of removal of this sediment from behind the dams on the Susquehanna River is conservatively estimated at 12 dollars per ton. Consequently, the cost of removing sediment downstream of the watershed confluence with the Chemung River and impacts to the Bay are likely to be high, but were not quantified as part of this plan.

Quantifying sediment yields and transport in flashy, gravel-cobble streams such as Bentley Creek is extremely difficult (Schmidt, L.J. and Potyondy, J. P., 2004) because they are influenced by numerous factors, e.g. localized variations in tractive power, sporadic sediment input from side channels and local bank erosion, turbulent velocity fluctuations and other sediment imbalances over short spatial and temporal scales. Subsequently, estimates of costs to maintain or rehabilitate such streams can, at best, be rather subjective. However, in this watershed, there was some recorded history of cleanout events from which to document existing conditions, as well as base planning for future alternatives.

Although most of the land in the watershed is currently wooded or grassed, heavy timbering and cropping in the early part of the last century initiated severe gullying in several of the major tributaries. The glaciated character of these upland tributaries has subsequently been contributing large amounts of gravel and cobbles to Bentley Creek in sporadic doses as the gully banks erode; i.e., when the nearly vertical banks are undercut sufficiently, the entire bank falls (see Photo 5). These episodic slugs of coarse sediment cause short-term deposits as the excessive bedloads "pause" until the next threshold event moves them. However, smaller runoff events cause localized overbank flooding where these deposits exist and reduce the channel capacity. Several "natural stream design" structures that the U.S. Fish and Wildlife Service installed on Bentley Creek in the recent decade have either washed out or been buried due, in part, to the excessive bedload. Bedload that does eventually move through the entire length of Bentley Creek is subsequently deposited at its confluence with the much larger Chemung River. Unfortunately, this aggrading reach is within the Village of Wellsburg. The sediment load raises flood levels in Wellsburg, requiring periodic cleanout. Cleanout of this aggrading reach over recent decades averages about $20,000 per year. Of course, these cleanouts occur primarily after major events which simultaneously aggrade the reach and produce overbank discharges.

Photo 5. – Tributary Erosion, Bentley Creek Watershed

Since the land uses in the watershed already provide a fairly good cover, it is not expected that runoff can be reduced in the future. Therefore, the unstable banks of tributaries will continue to produce more sediment than Bentley Creek can move through to the Chemung. Although the majority of the sediment comes from the eroding banks of the tributaries, as they incise further upstream, this load can be expected to increase, from both degrading beds and additionally exposed banks.

The Bradford County Conservation District has performed an extensive assessment of the stability of all 2nd, 3rd, and 4th order tributaries in the watershed, and found that 13.6% of those streambanks were eroding. The conservation district, at a cost of over $350,000, has implemented projects to stabilize about 3,800 feet of eroded streambanks in 3 of the 4 tributaries identified as the largest contributors of bedload material.
Based on monitored stream sites, this was estimated to have prevented 200-300 tons of sediment from entering the system in the first two years after their installation. Approximately 21,800 feet of eroding streambanks are estimated to remain, with plans in place to address an additional 3,000 feet.

Based on the tributary assessment, the Conservation District found that the majority of the bedload material is coming from Cowell Hill Creek, Justice Run, Terwiliger Creek, and Wesleyan Church Creek. Stabilization of these four tributaries could reduce the total watershed sediment yield (i.e., from tributaries) by 80%.

Watershed Opportunities

The following is a general list of opportunities that can be realized with project action to address the identified problems related to flooding, unstable streambanks and sedimentation.

- Substantially reduce flood and sediment damages
- Substantially reduce threats to life and property from flooding and sedimentation
- Reduce sediment loads
- Stabilize land along streams
- Improve aquatic and riparian habitat

Quantification of these opportunities is provided later in the report under **Effects of Alternatives**.

SCOPE OF ENVIRONMENTAL ASSESSMENT

A scoping process was used to identify issues of economic, environmental, cultural, and social concerns in the watershed. Watershed concerns of Sponsors, agencies, organizations and local citizens were expressed at planning and public meetings. Factors that would affect soil, water, air, plant, and animal resources were identified by multidisciplinary teams composed of engineers, biologists, economists, resource conservationists, water quality specialists, and others. The following table shows the concerns, degree of concern and degree of importance to decision making.

Table A. Identified Concerns

Economic, Environmental, Cultural and Social Concerns	Degree of Concern	Importance to Decision Making	Comment
Public Safety	High	High	Primary concern of Sponsors
Floodwater Damages	High	High	Primary concern of Sponsors
Streambank Erosion	High	High	Primary concern of Sponsors
Sedimentation	High	High	Primary concern of Sponsors
Flood Plain Urbanization/Use	Medium	Medium	Minor new development expected
Land Use Changes	Medium	Medium	Minor change expected
Important Farmland	Medium	Low	Little new agriculture expected
Soil Resources	Medium	Medium	Large land losses during flood events
Riparian Areas	Medium	Medium	Unstable land along many streams
Forest Resources	Low	Low	Minimal effect for all alternatives
Aquatic Life Resources	High	Medium	Unstable streams provide little habitat
Wildlife Resources	Low	Low	Minimal effect for all alternatives
Threatened/Endangered Species	High	Low	None identified in project areas
Wetlands	Medium	Low	Minimal effect for all alternatives
Water Quality	Medium	Low	Minimal effect for all alternatives
Cultural Resources	High	Medium	Historic building to be removed & mitigated
Visual/Aesthetic Resources	Medium	Medium	Could be affected by some alternatives
Social Issues	Medium	Medium	Compare differences between alternatives
Civil Rights/Environmental Justice	Medium	Medium	No differences between alternatives
Public Utilities/Services	High	Medium	Loss of services during floods

FORMULATION AND COMPARISON OF ALTERNATIVES

Formulation Process

The Bentley Creek Watershed Project is formulated to address the identified watershed problems and opportunities with full consideration of the effects of various alternative solutions on other watershed resource concerns. Formulation was developed around the following guidelines

- Address the identified watershed problems and meet the Sponsors objectives to the maximum extent practicable
- Develop cost effective solutions
- Maximize positive effects and minimize negative effects for all Identified Concerns which have a high or medium Importance to Decision Making (see SCOPE OF ENVIRONMENTAL ASSESSMENT).

The action alternatives must for the most part be formulated in consideration of the following four general criteria as outlined in Economic and Environmental Principles and Guidelines for Water and Related Land Resource Problems (P&G) (U.S. Water Resources Council, 1983):

- Completeness – alternatives should address the purpose and need and the Sponsors' objectives for meeting the purpose and need.
- Effectiveness – alternatives should reasonably alleviate identified watershed problems and help to achieve watershed opportunities.
- Efficiency – alternatives should be cost-effective and if possible provide positive net economic benefits while protecting the environment.
- Acceptability – alternatives should not have insurmountable adverse effects on the human environment that cannot be reasonably mitigated and should also have the *potential* to: a) be supported by the public; b) receive needed financial assistance or otherwise be able to be affordable to the Sponsors; c) comply with and receive all needed permits required by local, state and federal agencies.

In addition, formulation of alternative plans followed procedures outlined in the NRCS-National Watershed Manual; NRCS-National Planning Procedures Handbook, and other NRCS watershed planning policy.

The process involved considerable input from meetings of the public, agencies, organizations, project Sponsors and interdisciplinary team. Many ideas were put forth to address the watershed problems. The following ideas were evaluated individually and in various combinations:

> Flood warning system, tributary stabilization, dikes, stream rehabilitation, bridge/culvert modification, flood bypass channel, flood control dams, flood plain property acquisition, individual property acquisition, building elevation, building floodproofing, protection of floodprone building utilities, and comparing flood damage reduction for all buildings (including sheds, barns and outbuildings) versus focusing primarily on homes, businesses and public buildings.

Alternatives Eliminated from Detailed Study

Dikes - 5 locations (see Appendix D)
Dikes were evaluated in 7 locations where there are concentrations of flood prone buildings. Five of the dike locations were not developed in detail. Costs were 2 to 3 times the benefits for four of the dikes. One dike was thoroughly evaluated from a cost and layout standpoint because of high benefits relative to costs. However, the primary beneficiary, a local business, determined that it was unacceptable to the operation of the business and was very adamant that it no longer be considered. The local Sponsors determined that this dike should be eliminated from further study. No other cost effective alternative was identified for non-residential buildings in that area of the flood plain. The dike locations not developed in detail are the New

York mobile home park, residential area 1,200-3,300 feet south of the State line, commercial area about one mile south of the State line and adjacent mobile home park, residential area just south of Centerville, and an area in the village of Bentley Creek.

Stream rehabilitation in most locations

Stream rehabilitation was evaluated for all flood prone areas as a means to increase stream stability, restore aquatic habitat and increase flood plain capacity. The effectiveness of this technique for flood damage remediation in most of Bentley Creek is highly variable, very costly, high in maintenance costs and very unpredictable. However, it was determined that this alternative may be more predictable and cost-effective in Wellsburg due to the following factors: 1) it is feasible to control some major upstream sediment sources; 2) the downstream bridges and Chemung River backwater result in localized sediment deposition which creates an ongoing cost for gravel/sediment removal; 3) rehabilitation has the potential to provide large benefits for reducing flood and sediment damages. Due to the extreme instability of Bentley Creek and ongoing attempts to stabilize the creek, it was determined that stream rehabilitation for the purpose of flood damage reduction, including aquatic habitat restoration, is not a reasonable alternative, except in the area of Wellsburg.

Bridge/culvert modification and a flood bypass channel (see Appendix D)

Bridge/culvert modification and a flood bypass channel were evaluated in Wellsburg. These measures would provide only localized benefits, would have high costs relative to benefits, and would need to be combined with other alternatives to be effective. The cost to modify the state highway bridge to provide for improved flood flow characteristics would be in excess of the flood damage reduction benefits provided. Only the northern portion of Wellsburg would benefit requiring additional measures to address the Sponsor's objectives for the southern portion of the community and the rest of the watershed. Alone or in combination with other measures, it was determined that this alternative is not cost effective.

Flood control dams (see Appendix D)

Five potential dam locations were evaluated. The sites were located on Bentley Creek (above Middletown), Fall Creek, Miller Run, Buck Creek, and Terwiliger Run. The sites are well upstream of the damage areas and/or control too little of the watershed to be effective relative to implementation costs. The dams were evaluated individually and in various combinations. If all five were implemented, they would control about 38 percent of the watershed and reduce flood damages to buildings by about 30 percent. Estimated costs to implement the dams vary from $1.5 to $4.5 million each and were determined to provide inadequate benefits relative to costs.

Flood plain acquisition

Complete flood plain acquisition, would involve purchasing and removing all structures in the 100-year flood plain. It would not be cost effective along Bentley Creek and would result in the near elimination of the major communities located in the watershed, including about 2/3 of the Village of Wellsburg. Implementation costs alone for this alternative are in excess of $20 million, which is more than the total potential flood damage reduction benefits. Socioeconomic impacts to the communities would be dramatic and unacceptable. Total acquisition was also evaluated in two areas where dikes were cost-effective. Acquisition in the dike areas was not cost effective relative to flood damage reduction benefits. Total acquisition was evaluated for two mobile home parks. Acquiring the mobile home parks and relocating all residents into safe and sanitary housing was not cost effective relative to benefits and would cost 2 to 3 times the cost of elevating the mobile homes.

Building elevation

Building elevation is extremely costly due to the complications of dealing with old foundations, relocating utilities and utility connections, constructing new access into the elevated structure, temporary housing for the occupants, building the elevated support structure and restoring the building for occupancy. It can be cost effective is areas with high real estate values since the cost to elevate may be more cost effective than acquisition. However, based on the real estate values in the project area, the cost to elevate buildings exceeds the flood damage reduction benefits achieved. It would cost considerably less to acquire the same property and restore the sites to flood plain use.

Dry “floodproofing” buildings with basements

Dry “floodproofing” of buildings with basements cannot be effectively achieved, especially in areas such as Bentley Creek where soils are permeable. Some of the problems that make these measures impractical for most buildings with basements include, the need for pumps maintained and operated by the homeowner to prevent excessive hydrostatic pressure on basement walls and the need for auxiliary power if electricity fails during a flood, difficulties in handling water inside the floodproofing walls/seals, difficulties sealing off garage walls, uncertainties of using homeowner installed stop logs and similar devices and the inability to assure the features will function properly during flood events. This approach was determined to be ineffective and cost prohibitive unless the building was on a slab or over a crawl space where water entry would not damage the structure.

Nonstructural measures for non-residential buildings

Non-residential buildings were evaluated for potential nonstructural flood damage reduction treatments. The most cost-effective treatment for each building was determined. Treatments included individual flood walls or dikes, dry “floodproofing”, acquisition and protection of basement utilities. Although some individual buildings may be able to be treated cost effectively, no cost-effective nonstructural treatment plan could be developed for non-residential buildings evaluated as a group.

Nonstructural measures in Wellsburg

Combinations of nonstructural measures were evaluated in two areas where dikes were found to be cost-effective. In Wellsburg, the nonstructural measures would cost two times as much as the dike to implement and would provide fewer benefits. Benefits would be less because of continued flooding of buildings that are impractical to treat and continued flooding of roads and utilities.

Combination of measures for Wellsburg

Various combinations of potentially cost effective measures were evaluated in Wellsburg, including dike plus stream rehabilitation and stream rehabilitation plus nonstructural measures. The dike plus stream rehabilitation cost 1.5 times the cost of either alone and provides about the same level of benefits as the dike. There were no other substantial benefits associated with the combination. The stream rehabilitation plus nonstructural measures cost almost 3 times the dike and provide fewer benefits. Therefore these combinations were eliminated from more detailed study.

Summary of Alternatives Not Evaluated in Detail

The following alternatives were not developed in detail since they were too costly relative to the benefits provided, or other alternatives were much more cost–effective or the effectiveness was limited to a small area or in one case the alternative was completely unacceptable locally:

- Dikes -5 locations
- Stream rehabilitation other than in Wellsburg
- Bridge/culvert modification and flood bypass channel in Wellsburg
- Five flood control dams and combinations of these dams
- Complete flood plain property acquisition, including acquisition in two areas where a dike is cost effective and acquisition of two mobile home parks.
- Building elevation
- Dry “floodproofing” of buildings with basements
- Nonstructural measures for non-residential buildings
- Nonstructural measures in Wellsburg
- Combinations of measures for Wellsburg

Description of Alternatives

No Action
This alternative represents the future condition of the watershed without some type of project action to address the identified natural resource problems. Future conditions are expected to remain much as they exist presently. Development is not expected to increase substantially and any development that does occur will be required to implement improved stormwater management measures and conform to local flood plain ordinances. There are local efforts underway in both states to establish better stormwater management of future developments. As a result, the vulnerability to flood damages is not expected to change significantly. Streambank erosion should continue to decline somewhat due to ongoing stream rehabilitation efforts, but large sediment sources emanating from tributaries is unlikely to be adequately addressed with projected funding availability.

Dikes plus Nonstructural (National Economic Development alternative)
This alternative includes the following components:

- Watershed-wide flood warning system, including rain and stream gages, repeater station and reverse 911 type system
- Tributary stabilization of about 19,000 feet in Cowell Hill tributary, Terwiliger Creek, Justice Run and Wesleyan Church tributary
- Wellsburg Dike (PA-681), about 4200 feet long with 2 road closure structures, stormwater basin, stream reconstruction and hillside diversion, 5-6 house acquisitions
- Centerville Dike (PA-680), about 2400 feet long with 1 road closure structure, stormwater basin and hillside diversion
- Outside of dikes, voluntary nonstructural measures, including acquisition of homes (with basements) that receive first floor flooding, dry "floodproofing" of homes (without basements) that receive first floor flooding, basement utility protection for homes with basement-only flooding, elevation for mobile homes.

  ESTIMATED TOTAL COSTS: $5,600,000 (PL 83-566 - $5,420,000; Other - $180,000)

  Average Annual Equivalent: $280,000 (including $45,000 for Operation and Maintenance)

Stream Rehabilitation plus Nonstructural
This alternative is the same as Alternative 1, except for the following differences:

- Substitute 4500 feet of stream rehabilitation for the Wellsburg Dike and dike components.
- Substitute voluntary residential nonstructural measures for the Centerville area dike

  ESTIMATED TOTAL COSTS: $5,270,000 (Federal - $5,210,000; Local - $60,000)

  Average Annual Equivalent: $255,000 (including $32,000 for Operation and Maintenance)

Effects of Alternatives

This section describes anticipated effects on resource concerns identified by the project Sponsors and by the public during public meetings. Effects of alternative plans of action on resource concerns of national importance and other important considerations are also included. Since the No Action Alternative represents projected future conditions in the watershed and no noteworthy changes are anticipated relative to existing conditions, it can be inferred that No Action results in conditions equivalent to the existing watershed conditions, unless noted otherwise. When analyzing effects, temporary, direct, indirect and cumulative effects are all considered and presented.

Public Safety / Hazard Potential

No Action [Future without Project] – Flooding will be an ongoing threat to public safety since most of the watershed population lives in or adjacent to the flood plain. Flood depths and velocities will continue to impact hundreds of residents and dozens of commercial-public buildings, dislodge mobile homes, damage roads, utilities and bridges and generally threaten life and property. An estimated 400 buildings, including 335 residential, commercial and public buildings, will be at risk from the 100-year flood event.

Dikes plus Nonstructural – Flood damages and risk to life and property will be substantially reduced. Residences and commercial-public buildings located behind two dikes will be afforded protection against flood damage from Bentley Creek flows through the 100-yr frequency storm (or 1% chance event), with added freeboard protection. In addition, the Wellsburg Dike in combination with the railroad embankment will prohibit Chemung River flows from entering Wellsburg up to the 100-yr flood with no freeboard. Those residences being treated by nonstructural means that remain in the flood plain will show minimal effect from the 100-year flood. All occupants of the flood plain will be alerted in advance, through use of a flood warning system, and be advised to evacuate thereby reducing the threat of loss of life. Nearly 200 residential, commercial and public buildings along with additional structures will be substantially protected from the 100-year flood. About 135 residences and commercial-public buildings and their occupants will remain at the current level of flood risk. The dike at Wellsburg is planned to terminate at the railroad embankment near the Chemung River. The dike will contain the Bentley Creek 100-year flood plus freeboard to this point. Flood stages of the Chemung River are considered to control flow elevations downstream of this point. The railroad embankment height was found to be slightly above the 100-year Chemung River flood stage in the Wellsburg vicinity but with no freeboard being allocated. Therefore the Bentley Creek dike at Wellsburg is planned to protect the village from 100-year Bentley Creek flows plus design freeboard whereas the railroad embankment does not provide Wellsburg with design freeboard protection above the Chemung River 100-year flows.

Stream Rehabilitation plus Nonstructural – Flood damages and risk to life and property will be substantially reduced. However, without a dike in Wellsburg this area will be more susceptible to 100-year flooding than the “Dikes plus Nonstructural” alternative. The benefit of stream rehabilitation will be primarily in Wellsburg. Flood frequency and stage upstream will continue as it currently exists. Those residences being treated by nonstructural means that stay within the flood plain will show minimal effect from the 100-year flood. All occupants of the flood plain will be alerted in advance, through use of a flood warning system, and be advised to evacuate thereby reducing the threat of loss of life. About 115 residential, commercial and public buildings and additional structures will be substantially protected from the 100-year flood and another 60 buildings in Wellsburg will show reduced flood risk. About 160 residences and commercial-public buildings and their occupants will remain at the current level of flood risk.

Floodwater Damages

No Action [Future without Project] – Flood damages will continue with little change. Damage to buildings, costs of emergency response, lost business and wages, clean-up costs and costs to repair roads, bridges and utilities will continue. The estimated average annual damage to buildings alone will be $770,000.

Dikes plus Nonstructural – Flood damages will be substantially reduced. All categories of flood damage will be nearly eliminated behind the two dikes. Participating residential buildings outside of the diked areas will have little or no flood damages. Emergency response costs will be reduced. Total estimated average annual flood damages to buildings will be reduced to about $210,000.

Stream Rehabilitation plus Nonstructural – Flood damages will be substantially reduced. All categories of flood damage will be substantially reduced in Wellsburg, but not eliminated. Participating residential buildings elsewhere will have little or no flood damages. Emergency response costs will be reduced. Total estimated average annual flood damages to buildings will be reduced to about $285,000.

Streambank Erosion

No Action [Future without Project] – Streambank erosion will continue to be severe. Slight reductions will likely be achieved through ongoing efforts to stabilize the highest priority tributaries. Over 75 percent of the main stem of Bentley Creek will continue to have unstable streambanks. About 3,000 feet of tributary streambanks will be stabilized.

Dikes plus Nonstructural – Streambank erosion will be reduced moderately along Bentley Creek and substantially in the critically eroding high priority tributaries. Less than 75 percent of the main stem of Bentley Creek will continue to have unstable streambanks. An additional 19,000 feet of tributary streambanks will be stabilized.

Stream Rehabilitation plus Nonstructural – Streambank erosion will be reduced moderately along Bentley Creek and substantially in the critically eroding high priority tributaries and in the 4500 foot stream rehabilitation in Wellsburg. Less than 75 percent of the main stem of Bentley Creek will continue to have unstable streambanks. An additional 19,000 feet of tributary streambanks will be stabilized.

Sedimentation

No Action [Future without Project] – Sediments will continue to damage or destroy aquatic habitat, reduce bridge and channel capacity, aggravate flooding in Bentley Creek, and contribute to sediment removal costs locally and downstream. The sediments will transport nutrients which are identified as a major cause of degradation of the Chesapeake Bay aquatic environment. Bedload that does eventually move through the entire length of Bentley Creek will be deposited at its confluence with the Chemung River within the Village of Wellsburg. Cleanout of this aggrading stream reach will average $20,000 per year.

Dikes plus Nonstructural – Sediments will be reduced an estimated 50 percent in the main stem of Bentley Creek and 80 percent in the critically eroding tributaries, resulting in moderate improvement in aquatic habitat, improved bridge and channel capacity, somewhat reduced flood damages along Bentley Creek, and reduced sediment removal costs locally and downstream, and reduced sediment and nutrient loads to the Chesapeake Bay. Sediment cleanout costs in Wellsburg will be reduced to about $10,000 per year.

Stream Rehabilitation plus Nonstructural – Same as Dikes plus Nonstructural Alternative, except Wellsburg sediment cleanout costs will be reduced an additional $2,000 per year since more of the sediment will move through the system in the rehabilitated stream.

Flood Plain Urbanization / Use

No Action [Future without Project] – Little new development is expected over the next 20-25 years. Development that does occur will be regulated by local flood plain ordinances. Enforcement and improvement of these ordinances will ensure that new development will be at low risk of flood damage.

Dikes plus Nonstructural – May encourage new development in the diked areas, but little room for expansion exists. About 5 acres will be restored to flood plain function as a result of house acquisitions.

Stream Rehabilitation plus Nonstructural – About 12 acres will be restored to flood plain function as a result of stream rehabilitation and house acquisitions.

Land Use Changes

No Action [Future without Project] – Little new development and few changes in current land use is expected over the next 20-25 years.

Dikes plus Nonstructural – About 19 acres of mixed meadow/lawn/trees and one acre of forest will be converted to dike and components. About 5 acres will be restored to flood plain use as a result of house acquisitions for the dike and nonstructural measures.

Stream Rehabilitation plus Nonstructural – About 7 acres of mixed meadow/trees will be converted to vegetated streambank as part of stream rehabilitation. About 6 acres will be restored to flood plain use as a result of voluntary house acquisitions.

Important Farmland

No Action [Future without Project] - All important farmland is located outside of the identified problem areas within the flood plain. Little change is expected in the watershed in terms of agricultural activities or land development. Important farmland will not change appreciably.

Dikes plus Nonstructural – No effect

Stream Rehabilitation plus Nonstructural – No effect

Soil Resources

No Action [Future without Project] – Soil resources will remain relatively healthy in the watershed. Most soil has good to excellent cover year round and sheet and rill erosion rates are generally low. There are exceptions in some cropped fields without adequate soil conservation, but the majority of agricultural producers are following good conservation practices and this is expected to continue. The largest threat to soil resources is a result of the highly unstable streambanks throughout the watershed. During even moderate flood events, large areas of land are lost into the stream system as streambanks fail. Some improvement is expected as an additional 3000 feet of critically eroding streambanks are stabilized.

Dikes plus Nonstructural – An additional 19,000 feet of the most critically eroding streambanks will be stabilized resulting in substantially reduced land loss in the tributaries and reduced threats to downstream land areas.

Stream Rehabilitation plus Nonstructural – Same as Dikes plus Nonstructural Alternative plus an additional 4500 feet of stream will be stabilized and rehabilitated in Wellsburg.

Riparian Areas

No Action [Future without Project] – There are over 33 miles of stream and tributaries in the watershed that run through cultivated land, pasture and urbanized areas. These areas lack adequate forested riparian buffers. No substantial change is expected except for about 3000 feet of tributary stabilization which will substantially improve riparian habitat in the treated area.

Dikes plus Nonstructural – Flood flows in the areas of the dikes will not have access to the original flood plain. No trees or shrubs will be permitted to grow on the dike embankments which are about 4200 feet long in Wellsburg and 2400 feet long in Centerville. Stabilization of an additional 19,000 feet of tributary streams will substantially enhance riparian habitat in those areas. During construction and establishment there will be a temporary decline.

Stream Rehabilitation plus Nonstructural – Rehabilitation of 4500 feet of stream in Wellsburg and stabilization of an additional 19,000 feet of tributary streams will substantially enhance riparian habitat in those areas.

Forest Resources

No Action [Future without Project] – Little change expected, due to minimal land development or agricultural pressure to convert to other land uses. About one-half of the watershed is forested.

Dikes plus Nonstructural – About one acre of forest will be converted to meadow land cover as a result of hillside diversion component of the dikes.

Stream Rehabilitation plus Nonstructural – Some trees along the stream adjacent to residential areas will be removed.

Aquatic Life Resources

No Action [Future without Project] – Surveys by the Pennsylvania Fish and Boat Commission (2000) and Pennsylvania Cooperative Fish and Wildlife Unit (1998) found a somewhat low diversity of fish species in the watershed. The species consisted of 10 cyprinids, 2 sucker species, 3 sunfish species, brown bullhead, madtom, fantail darter, perch and sculpin. Four or five species of cyprinids, white sucker and mottled sculpin are fairly common and to a lesser extent fantail darter and pumpkinseed sunfish. The fish community is typical of an assemblage found in transitional streams. It was concluded that poor instream habitat along with warm summer temperatures and low summer flows limit the potential for watershed streams to support significant game fish populations. Water quality is generally good. Habitat degradation is due to the excessive streambank erosion, excessive sedimentation, poor riparian habitat in many areas, unstable and shifting bedload and extremes in flow regime. These conditions will only improve slightly as a result of ongoing rehabilitation efforts.

Dikes plus Nonstructural – Moderate habitat improvement in some areas as a result of stabilization of critically eroding tributaries which have poor riparian habitat and are contributing large unstable sediment loads. A previously modified tributary in Wellsburg will be restored to near its original outlet. However, due to the extreme nature of the existing degradation, little to no change in aquatic game species is expected, although other aquatic life is expected to improve moderately.

Stream Rehabilitation plus Nonstructural – Moderate habitat improvement in some areas as a result of stabilization of critically eroding tributaries which have poor riparian habitat and are contributing large unstable sediment loads. In addition, about 4500 feet of Bentley Creek in Wellsburg will be rehabilitated. However, due to the extreme nature of the existing degradation, little to no change in aquatic game species is expected, although other aquatic life is expected to improve moderately.

Wildlife Resources

No Action [Future without Project] – Wildlife resources are typical and include white tail deer, black bear, fox, coyote, turkey, raccoon, squirrel, and other associated species. Waterfowl use and nesting is limited. An active heron rookery exists in the ridge area, beyond the riparian zone. Active streambank erosion and disconnected riparian forest areas disrupts a significant portion of the riparian areas and many potential nesting areas. Little change is expected.

Dikes plus Nonstructural – Moderate improvement of riparian habitat along critically eroding tributaries being stabilized, resulting in less habitat fragmentation. Temporary impacts to meadow/lawn species and woodland species in the areas impacted by dike system construction. Few to no permanent wildlife impacts are expected from dike implementation.

Stream Rehabilitation plus Nonstructural – Moderate improvement of riparian habitat along critically eroding tributaries being stabilized, resulting in less habitat fragmentation. No temporary dike

impacts, since none are included with this alternative. Habitat is currently of low value in the area of the Wellsburg stream rehabilitation, so little wildlife habitat improvement is expected in this reach.

Threatened / Endangered Species

No Action [Future without Project] –The New York State Department of Environmental Conservation was contacted along with the U.S. Fish and Wildlife Service to determine the status of species in New York. The Pennsylvania Natural Diversity Inventory (PNDI) was accessed to determine the status of all federal and state species at risk. The Pennsylvania Department of Conservation and Natural Resources-Bureau of Forestry, Pennsylvania Game Commission, Pennsylvania Fish and Boat Commission, Pennsylvania Biological Survey and U.S. Fish and Wildlife Service all participate in the PNDI system. Two New York endangered plants and one Pennsylvania plant of concern were identified as having a historic presence. A botanical field survey of the New York area was conducted by Cornell University, Cooperative Extension, Chemung County in June 2007. The survey found no evidence of the plants of concern. The Pennsylvania Department of Conservation and Natural Resources found no impact is likely and no further coordination is needed based on the location and types of measures being considered.

Dikes plus Nonstructural – No effect

Stream Rehabilitation plus Nonstructural – No effect

Wetlands

No Action [Future without Project] – The majority of the wetlands in the watershed occur in conjunction with the creeks and drainage ways. Additional wetlands occur in many upland areas. Due to the presence of fragipans in the upland soils, there exists a perched water table that creates numerous smaller wetlands that are included in non-hydric soil mapping units. Along the stream corridors, the primary wetland types include palustrine, open water, intermittently exposed permanent, excavated wetlands; and riverine, upper perennial wetlands. In the upland areas, the primary wetland types include palustrine, emergent, narrow-leaved, persistent wetlands; as well as palustrine scrub/shrub and palustrine forested and many lacustrine open water wetlands. Few changes are expected in the amount or type of wetland.

Dikes plus Nonstructural – No effect, wetland in the vicinity of the Centerville Dike will be avoided.

Stream Rehabilitation plus Nonstructural – No effect

Water Quality

No Action [Future without Project] – Surface waters will continue to be slightly degraded from excessive sediment, iron and aluminum. Generally water quality is good. Ground water quality and quantity remains good and is maintained by enforced stormwater ordinances and other pollution prevention laws.

Dikes plus Nonstructural – There will be a slight improvement in stream water quality and downstream water quality due to a substantial reduction in sedimentation, reduced nutrient loads and improved riparian condition. A short term increase in sedimentation will occur during construction of tributary stabilization measures and possibly some dike components. However, the amount will be minimized by the use of approved erosion and sediment control practices.

Stream Rehabilitation plus Nonstructural – Same as Dikes plus Nonstructural alternative, except additional long term surface water quality improvements will occur in the stream rehabilitation reach in Wellsburg.

Cultural Resources

No Action [Future without Project] – Phase 1 Cultural Resources Surveys were conducted of the project area. The New York State and Pennsylvania State Historic Preservation Offices and the Seneca Nation of Indians were consulted regarding findings. One house in the project area is eligible for the National Register (NR) of Historic Places. This building and associated outbuildings will continue to be subject to flood damage with no protective measures planned. Otherwise, the Phase I surveys located no prehistoric cultural material, no other cultural features and no archaeological sites.

Dikes plus Nonstructural –One property with a house and outbuildings is NR eligible. This alternative will require the house to be removed from the flood plain due to induced flooding from the planned Wellsburg Dike. A mitigation plan will be coordinated with the New York State (NYS) Office of Parks, Recreation and Historic Preservation (NYS Historic Preservation Office). In addition, further investigation is required of the Wellsburg Dike diversion outlet during project design to ensure no adverse impacts to unmarked graves, if any.

Stream Rehabilitation plus Nonstructural – No effect

Visual / Aesthetic Resources

No Action [Future without Project] – Little change from existing watershed setting. Raw stream banks will continue to be exposed and damages related to flooding will continue to impact the visual and aesthetic qualities of the area.

Dikes plus Nonstructural – Tributary stabilization will substantially reduce the amount of raw stream banks. Substantially reduced flood damages will improve the overall aesthetic character of the area, especially immediately following flood events. Dikes will reduce visibility of Bentley Creek along two dikes totaling about 6600 feet and lines of sight near the ends that tie into high ground in four locations. However the Centerville Dike is a low dike and the Wellsburg Dike is a moderate height dike with similar elevation to areas of existing pushed-up gravel on the existing stream banks. Elevated mobile homes and houses with flood protection measures may be less attractive to some observers. Therefore the overall visual impacts will be slight to moderate.

Stream Rehabilitation plus Nonstructural – Tributary stabilization will substantially reduce the amount of raw stream banks. Substantially reduced flood damages will improve the overall aesthetic character of the area, especially immediately following flood events. Stream rehabilitation should improve the visual quality of about 4500 feet of Bentley Creek and reduce the number of temporary visual impacts from stream clean-outs. Elevated mobile homes and houses with flood protection measures may be less attractive to some observers. Overall, slight to moderate impacts.

Social Issues

No Action [Future without Project] – Little change from existing watershed conditions relative to the local economy, unemployment, income, and housing vales. Flooding will continue to periodically disrupt community life, causing lost wages, repair and clean-up costs, closed businesses and demand for emergency services.

Dikes plus Nonstructural – Improved economic conditions due to reduced flood hazard. Nearly 200 buildings will have little to no impact from the 100-year flood. Access to and view of creek reduced in areas with dikes. Five or six household displaced by dikes and six additional households may voluntarily abandon the flood plain. Those participating in mobile home elevation and possibly some of the other nonstructural measures will have short term disruptions in living conditions.

Stream Rehabilitation plus Nonstructural – Improved economic conditions due to reduced flood hazard. About 115 buildings will have little to no impact from the 100-year flood and 60 more with reduced flooding. Another 11 households may voluntarily abandon the flood plain. Those participating in mobile home elevation and possibly some of the other nonstructural measures will have short term disruptions in living conditions.

Civil Rights / Environmental Justice

No Action [Future without Project] – No change from existing conditions

Dikes plus Nonstructural – All people in the targeted area, including economically disadvantaged groups, minorities, women and persons with disabilities will be eligible to participate in the program. There will be no disproportionately high or adverse human health or environmental impacts to these groups or individuals as a result of the project action.

Stream Rehabilitation plus Nonstructural – Same as Dikes plus Nonstructural alternative

Public Utilities / Services

No Action [Future without Project] – Little change from existing watershed conditions. During floods, community services are disrupted, access to emergency equipment is restricted, roads and bridges may become impassible. There are 20 bridges and adjacent roads that flood for frequencies less than the 100-year flood. Stream scour during flood events affects adjacent roads, dislodges gas and electric lines. Telephone service is also disrupted during floods.

Dikes plus Nonstructural –Three road closures during significant floods will disrupt traffic flows, but will allow for roads to open more quickly after a flood. Emergency services will be able to continue somewhat normal services within diked areas with advance preparation and there will be a reduced need for emergency services related to flooding. Construction will result in the temporary disruption of natural gas service to relocate lines at one dike.

Stream Rehabilitation plus Nonstructural – Reduced flood levels in Wellsburg will result in fewer disruptions to community services and shorter duration of adverse conditions. Roads and utilities will be subjected to less flooding in Wellsburg. There will be a reduced need for emergency services related to flooding.

Relationship to Other Plans and Policies

No Action [Future without Project] – Flood Plain and Storm Water ordinances will continue to be the primary mechanism for assuring flood damages do not increase in the future. The Federal Emergency Management Agency (FEMA) has commenced work to update flood plain mapping in the New York portion of the watershed and has initiated some inquiries regarding the Pennsylvania portion. NRCS has offered to share with FEMA the hydrology and hydraulic analyses completed for the watershed. Several high hazard dams in the watershed are regulated by the Pennsylvania Department of Environmental Protection, Bureau of Dam Safety.

Dikes plus Nonstructural – The plan would be compatible with existing plans and policies and will increase the importance of strong Flood Plain and Storm Water ordinances. The plan is also compatible with the Susquehanna River Basin Commission Comprehensive Plan which has flood damage reduction as a primary focus area.

Stream Rehabilitation plus Nonstructural – Same as Dikes plus Nonstructural alternative

Irreversible and Irretrievable Commitment of Resources

No Action [Future without Project] – No appreciable change from existing conditions.

Dikes plus Nonstructural – This alternative requires a small commitment of fossil fuel to construct the various project measures. The dikes will be primarily earthfill, some may be borrowed off-site. Therefore up to 78,000 cubic yards of soil resources from off-site borrow areas will be committed to dike construction. The dike and appurtenances could be removed at a future date, so the commitment of resources in those areas is reversible.

Stream Rehabilitation plus Nonstructural – This alternative may require slightly smaller commitment of fossil fuel to construct compared to the "Dikes plus Nonstructural" alternative. Stream rehabilitation will require cutting back stream banks along about 4500 feet of the east side of Bentley Creek to accommodate a larger flood flow cross-section. This will require commitment of the soil resource in that area.

Cumulative Effects

No Action [Future without Project] - No appreciable change from existing conditions other than about 3,000 feet of tributary stabilization.

Dikes plus Nonstructural – Cumulative effects will be primarily the result of the planned action. This alternative would greatly improve public safety due to substantially reduced flood damage and sedimentation, improve riparian and aquatic life resources in treated tributaries and the main stem Bentley Creek, improve water quality as a result of reduced sedimentation, reduce access of flood flows into the flood plain at Wellsburg and Centerville, result in the mitigated removal of one flood prone house that is eligible for the National Register of Historic Places, change the visual quality of the area due to substantially fewer "raw" streambanks, substantially reduced visual impacts after floods and a change in the landscape where the two dikes are located, 20 acres of land converted to dike and appurtenances, 5 acres restored to flood plain / riparian functions in the case of house acquisitions, and protection of soil resources along 19,000 feet of tributaries.

Stream Rehabilitation plus Nonstructural – Cumulative effects will be primarily the result of the planned action. This alternative would have similar effects as the "Dikes plus Nonstructural" alternative, except for the following: flood flow access into the flood plain at Wellsburg and Centerville would not be reduced, in Wellsburg flood flows would be reduced in the village and accommodated in a sub flood plain in the rehabilitated stream, no change in the landscape where the two dikes would have been located and enhanced stream characteristics in Wellsburg, 12 acres of land restored to flood plain function as a result of stream rehabilitation and house acquisitions.

Comparison of Alternative Plans

Table B provides a Summary and Comparison of each alternative plan.

Risk and Uncertainty

Uncertainty and variability are inherent in many aspects of water resources planning and may result in effects that are different from those anticipated. Complex natural, social and economic trends may result in flawed projections of future watershed conditions. Sound analytical and modeling procedures are employed to reduce these uncertainties. However, model projections only approximate future watershed conditions based on historical data and any anticipated changes. The project decision makers must be cognizant of this variability and factor it into their selection of the preferred alternative.

Projections of flood damages are rooted in modeling of hydrology, hydraulics and economics. The hydrology model employed, WinTR20 (NRCS, 2004) has been used, calibrated and updated for several decades. It produces dependable results. The Win TR20 model was calibrated in this instance based on results found when using the US Geological Survey hydrologic regression equations for Pennsylvania (Stuckey and Reed, 2000). It must be noted however, that factors used in the model may change over time, particularly land use. In this watershed, the land use changes that have occurred over the last 50 years and projected into the foreseeable future are unlikely to substantially affect model results. Long term

changes in precipitation patterns tend to occur very slowly and are likewise unlikely to substantially alter the results.

The flood water surface elevations were predicted using a well seasoned hydraulic model, HEC-RAS (USACE, 2003). The results of predictive hydrology peak discharge by frequency were combined with the predictive hydraulic model to assign estimated dike elevations required throughout their length. Dike elevations were planned to include three feet of freeboard as a safeguard measure. The factors that may affect the results of this model would be modifications to bridges or stream cross-sections or major changes in the vegetation or obstructions placed in the flood plain. Again, in this watershed, these types of changes are unlikely to be significant.

The economic analysis of flood damages to homes, buildings and roads/bridges are based on the output of the HEC-RAS model and are only as good as that model's projections as well as the results of the hydrologic analysis by WinTR20. Factors that will likely affect the certainty of the flood damage analysis are major changes in the future number of buildings in the flood plain or unscheduled modifications to bridges. Standard estimates were used to determine the value of building content and the subsequent flood damages to the contents. Standard damage factors have proven to be reasonably reliable in past work done by the U.S. Army Corps of Engineers and NRCS.

Sediment transport projections through the Bentley Creek drainage system is based largely on the estimation of historical clean out efforts. Major changes in erosion rates for the four unstable tributaries would directly influence overall sediment transport in this system.

Projections of the effects of alternatives on ecological and cultural resources were based on on-site evaluations, consultation with specialists and existing reports. Projected changes in habitat and wetland types are fairly reliable since the area is not ecologically complex.

Engineering needs and cost estimates are also reliable since they are based on well established design and construction practices. The areas of uncertainty primarily revolve around the final design for the dikes and appurtenant structures (diversions and stormwater holding ponds). The costs associated with the nonstructural measures have obvious degrees of uncertainty. This is due in part to the unknown features related to specifics style of treatment as well as participation rate of the residents. A cost contingency was added to cover these areas of uncertainty and the overall affect on costs is not adequate to change the relative comparison of the costs of the various alternatives.

Implementation of certain phases of the structural measures in this plan does entail some risk. Specifically, this relates to the manual placement of hardware at the water closing gates at various points in the dikes where road crossings occur. This will need to be done prior to when Bentley Creek flood elevations reach the road elevation at the crossing. This will entail a flood forecasting method that ties existing watershed hydrologic and climatic conditions with up to date satellite Doppler radar imagery to identify when dike closure operations should be executed. Methods used to offer trigger flow elevations and time of response to close the gates do pose some risk in that they are often empirical in nature. True watershed response in terms of rate of runoff and its timing related to excessive rainfall will be learned through time and experience operating the flood gates in this setting. This experience, through time, will likely lead to a more site specific feel of when to commence placement of the water closing gates. Gate closure operations will be performed by local public works employees based upon hearing from the county emergency management staff.

Each closing should likely take, perhaps 15 minutes or so, with all of the related hardware to be kept near the gate for ready access. This operation should be routinely practiced on a regular basis to provide experience to all parties involved and to minimize risk of implementation. The warning system leading to when to enact the closing of the gates may likely cause their closing at times when no actual flooding will occur. This will likely cause local residents, businesses and emergency vehicles some hardships, especially if road closures are considerably more frequent than actual flood threats. The attempt should be made to keep the warning system as accurate as possible yet still allow for ample time to close the water gates before flood damage and threat to life occurs.

Overall, the risk and uncertainty associated with the evaluation of alternatives in the Bentley Creek Watershed are low. Decision makers can be reasonably assured that the comparative data presented should be adequate to make a well informed decision on the preferred alternative.

Rationale for Plan Selection

The “Dikes plus Nonstructural” alternative is selected as the Preferred Alternative. It is developed to accommodate the maximum number of resource concerns identified throughout the scoping process of this project since its inception. When compared against the “No Action” and “Stream Rehabilitation plus Nonstructural” alternative, the “Dikes plus Nonstructural” alternative better meets the Sponsors’ objectives reducing the potential for loss of life or injury and property damage resulting from flooding along Bentley Creek. The “Dikes plus Nonstructural” alternative is the National Economic Development plan, which maximizes net economic benefits consistent with protecting the Nation’s environment. The plan’s economic, social and ecological benefits exceed the costs. One National Register of Historic Places eligible house will be removed from the flood plain. The house removal will be mitigated in consultation with the New York State Historic Preservation Office. There are no significant environmental impacts associated with the Preferred Alternative.

Table B. Summary and Comparison of Alternative Plans

	No Action 1/ (Compared to Existing Condition)	**Dikes plus Nonstructural** (Preferred Alternative)	**Stream Rehabilitation plus Nonstructural**
Measures	None	Flood Warning System Tributary Stabilization Wellsburg & Centerville Dikes Voluntary Nonstructural	Flood Warning System Tributary Stabilization Wellsburg Stream Rehabilitation Voluntary Nonstructural
Total Investment PL 83-566 Funds Other Funds	$0 ---------- ----------	$5,600,000 $5,420,000 $180,000	$5,270,000 $5,195,000 $75,000
National Economic Development Account 2/			
Average Annual Benefits Average Annual Costs Net Beneficial	$0 $0 $0	$570,000 $275,000 $295,000	$495,000 $250,000 $245,000
Environmental Quality Account			
Streambank Erosion	3,000 feet stabilized	19,000 additional feet stabilized	19,000 additional feet stabilized
Sedimentation	Substantial sediment loads	50% reduction in main stem 80% reduction in tributaries	50% reduction in main stem 80% reduction in tributaries
Flood Plain	Little change expected	5 acres restored to flood plain function	12 acres restored to flood plain function
Land Use	Little change in existing land use	5 acres residential to flood plain; 19 ac. meadow/lawn/trees and 1 ac. forest to dike & components	12 ac. residential to flood plain
Important Farmland	All located outside of the project area	No effect	No effect
Soil Resources	3,000 ft of trib. stream bank stabilized, but still excessive soil loss due to unstable stream banks	19,000 additional feet of tributary stream banks stabilized. Some excessive soil loss from stream banks continues	19,000 additional feet of tributary stream banks stabilized. 4,500 feet of Bentley Creek stabilized Some excessive soil loss from stream banks continues
Riparian Areas	Inadequate forested buffers on 33 miles of stream	No trees or shrubs permitted on 6,600 feet of dike embankment 3.6 miles (19,000 feet) improved in tributaries (of the 33 impaired miles)	4,500 feet of stream rehab. 3.6 miles (19,000 feet) improved in tributaries (of the 33 impaired miles)
Forest Resources	About ½ watershed forested Little change expected.	One acre converted to meadow cover on diversions	Some trees removed during stream rehabilitation
Aquatic Life Resources	Poor quality due to sediment and poor riparian habitat	Moderate improvement due to tributary stabilization	Moderate improvement due to tributary stabilization 4,500 feet of Bentley Creek rehabilitated

Table B. Summary and Comparison of Alternative Plans (continued)

	No Action 1/ (Compared to Existing Condition)	**Dikes plus Nonstructural** (Preferred Alternative)	**Stream Rehabilitation plus Nonstructural**
Wildlife Resources	Little change expected	Moderate improvement due to improved riparian habitat Temporary disruption during dike construction	Moderate improvement due to improved riparian habitat Temporary disruption during stream rehabilitation
Threatened/Endangered Species	Historical presence of two NY endangered plants and one PA plant of concern	No effect	No effect
Wetlands	Most wetlands associated with streams, some in uplands. Few impacts expected	No effect	No effect
Water Quality	Slightly degraded due to sediment, iron, aluminum Downstream impacted by sediment and nutrients	Slight improvement due to substantial sediment reduction & associated nutrient reductions Temporary impacts during construction	Slight improvement due to substantial sediment reduction & associated nutrient reductions Temporary impacts during construction
Cultural Resources	One National Register (NR) of Historic Places eligible house remains floodprone. No other prehistoric or cultural features affected	One NR eligible house is removed from the floodplain and is mitigated in cooperation with The NYS Historic Preservation Office. Adverse impacts to unmarked graves, if present, are avoided	No effect
Visual / Aesthetic	"Raw" stream banks and substantial visual damages after floods	Substantial improvement to stream banks and substantially reduced visual flood damages Elevated mobile homes may be less attractive. Some visual impacts from dikes. The dikes are low to moderate height and will blend in well in many areas.	Substantial improvement to stream banks and substantially reduced visual flood damages Elevated mobile homes may be less attractive Additional visual improvements in stream rehabilitation area
Public Utilities/Services	Little change – floods disrupt emergency services, roads, bridges & most utilities	3 designed road closures during flood peaks, but less disruption to roads, bridges & utilities in diked areas. Less disruption & need for emergency services. Temporary gas line disruption during construction	Reduced flood levels in Wellsburg with less disruption & need for emergency services, roads, bridges & utilities

Table B. Summary and Comparison of Alternative Plans (continued)

	No Action 1/ (Compared to Existing Condition	**Dikes plus Nonstructural** (Preferred Alternative)	**Stream Rehabilitation plus Nonstructural**
Other Social Effects Account			
Flood Damages (average annual $)	$770,000	$210,000	$285,000
Sediment Damage (average annual $)	$20,000	$10,000	$8,000
Public Safety	335 residential, commercial and public buildings with high flood risk High demand for emergency services during flood No advance flood warning	135 residential, commercial and public buildings with high flood risk Substantially less demand for flood emergency services Improved advance warning	160 residential, commercial and public buildings with high flood risk, 60 with reduced risk Much less demand for flood emergency services Improved advance warning
Social Issues	Little change from existing	Improved economic condition. 5 or 6 households displaced. Nearly 200 buildings with little flood risk	Improved economic condition. No households displaced. 115 buildings with little flood risk, 60 with reduced risk
Civil Rights / Environmental Justice	Little change from existing	All groups eligible and all groups with equal benefit	All groups eligible and all groups with equal benefit

1/ Future without project. Used zero dollar base for No Action alternative to streamline economic comparison of alternatives.
2/ Price Base 2011, amortized over 100 years at a discount rate of 4.0 percent.

CONSULTATION AND PUBLIC INVOLVEMENT

Project Sponsors

Meetings were held between NRCS and the Sponsors throughout the development of the Watershed Project Plan to determine local needs and concerns regarding the project. The meetings were used to acquire data relative to the project area, ascertain the scope of the problem, begin developing alternative approaches, explain program criteria and operating procedures, develop measures to tailor the project to address local concerns and to work out other project details. In summer 2007 a meeting was held with project Sponsors to discuss alternatives reviewed and those alternatives that are potentially viable, including estimated federal and local costs and local responsibilities for land rights, operation and maintenance costs. Sponsor responsibilities for continuing the planning process were also reviewed.

Interdisciplinary Team

An interdisciplinary team was used to acquire data and develop information for the plan and environmental assessment. The team included Sponsor representatives, engineers, environmental specialist, cultural resources coordinator, resource conservationists, economist and others. The team helped gather basic project information, developed the preliminary determinations of the environmental and social effects of the alternatives and provided input for the development of this document. Landowners and other agencies were contacted during plan development to provide needed information.

Public/Agency Participation

Input from the public and other agencies was solicited during development of the plan. A public participation plan was developed by NRCS and the Sponsors to guide the process. The process included efforts to advertise meetings and opportunities for input for all interested parties, including low income and minority residents. The flood damage reduction efforts for the Bentley Creek Watershed via the PL 83-566 program has consumed many years. During this time NRCS personnel have participated in numerous meetings to explain the program and to gain input from Sponsors and the general public. Among those meetings has been a two day Coordinated Resource Management meeting held in the watershed and attended by agency representatives and private residents. When the 1997 Preliminary Investigation Report was completed there was a public meeting in Wellsburg, NY to explain the findings of the report and to gather input. NY-PENN Bentley Creek Watershed Association holds bi-monthly meetings at which NRCS personnel present updates of planning progress. Meeting attendees had input to the discussions concerning the plan development and influenced the direction and content of the plan. This has been ongoing for many years. These meetings are regularly scheduled and are reported on in the association's newsletter. In July 2003 a meeting was held in the watershed with federal and state agencies with interest in the planning activities. The agencies were provided an opportunity to comment on the resource concerns, alternatives and environmental evaluations being conducted. In October 2005, a public meeting was held in Wellsburg at which alternatives for flood damage reduction were presented by NRCS personnel. The public had input into direction and alternatives considered in project planning. In March 2008, two public meetings were held, one in Pennsylvania and one in New York. The public was again provided the opportunity to be updated on findings and to provide comment. Input from these meetings was used by the Sponsors in selecting the Preferred Alternative. In February 2012, a widely advertised public meeting was held in Wellsburg, NY to solicit input on the Draft Watershed Protection Plan-Environmental Assessment (Plan-EA). Comments received at that meeting and through correspondence are summarized at the end of this section and were considered in the development of the Final Plan-EA.

The Chemung County Soil and Water Conservation District communicated extensively with representatives of Norfolk Southern Railroad since 2009. Norfolk Southern has an important railroad segment which passes through Wellsburg, NY and crosses Bentley Creek near the point of the planned Wellsburg Dike. Communications included an on-site meeting, letters, e-mails and phone conversations.

Phase I Cultural Resources Surveys were conducted in the New York and Pennsylvania portions of the project area. Project alternatives were evaluated with regard to potential impacts to cultural resources. Results of these studies were coordinated with the New York State Office of Parks, Recreation and Historic Preservation, Pennsylvania Historical and Museum Commission and Seneca Nation of Indians.

In addition, the following agencies/organizations were contacted directly for comment and review of the Draft Plan-EA:

Athens Township, Pennsylvania
Smithfield Township, Pennsylvania
South Creek Township, Pennsylvania
Springfield Township, Pennsylvania
Bradford County Emergency Management Agency
Chemung County Emergency Management Office
Bradford County Planning Commission
Chemung County Planning Commission
Chemung County Health Department
Appalachian Regional Commission
Endless Mountains Resource Conservation and Development (RC&D) Council
North Central Pennsylvania Regional Planning & Development Commission
Southern Tier Central Regional Planning & Development Board
Susquehanna River Basin Commission
New York State Department of Environmental Conservation
New York State Department of Environmental Conservation, Region 8
New York State Department of Environmental Conservation, Water Division
New York State Department of Transportation
New York State Emergency Management Office
New York State Soil and Water Conservation Committee
Pennsylvania Department of Agriculture
Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry
Pennsylvania Department of Environmental Protection, Bureau of Watershed Management
Pennsylvania Department of Environmental Protection, Bureau of Waterways Engineering, Dam Safety
Pennsylvania Department of Environmental Protection, Office of Policy & Communications
Pennsylvania Department of Environmental Protection, Office of Water Management
Pennsylvania Department of Environmental Protection, River Basin Commission
Pennsylvania Department of Environmental Protection, Northcentral Regional Office
Pennsylvania Department of Environmental Protection, Bureau of Watershed Management, Division of Watershed Protection
Pennsylvania Department of Transportation
Pennsylvania Emergency Management Agency
Pennsylvania Fish & Boat Commission
Pennsylvania Game Commission
Pennsylvania Game Commission, Northcentral Region
State Conservation Commission
Federal Emergency Management Agency
U.S. Army Corps of Engineers, Baltimore District
U.S. Army Corps of Engineers, Buffalo District
U.S. Environmental Protection Agency, Region 2
U.S. Environmental Protection Agency, Region 3
U.S. Fish and Wildlife Service, New York Office
U.S. Fish and Wildlife Service, Pennsylvania Office
U.S. Geological Survey, Pennsylvania District
USDA Farm Service Agency
USDA Forest Service
USDA Rural Development
Governor's Policy Office, Pennsylvania
THE HONORABLE KIRSTEN E. GILLIBRAND, United States Senate, New York
THE HONORABLE CHARLES E. SCHUMER, United States Senate, New York
THE HONORABLE ROBERT P. CASEY, United States Senate, Pennsylvania
THE HONORABLE PATRICK J. TOOMEY, United States Senate, Pennsylvania
THE HONORABLE TOM REED, Congress of the United States, 29th New York
THE HONORABLE TOM MARINO, Congress of the United States, 10th Pennsylvania

THE HONORABLE ANDREW CUOMO, Governor of New York
THE HONORABLE TOM CORBETT, Governor of Pennsylvania
Bentley Creek Watershed Association
Chesapeake Bay Foundation
Pennsylvania Association of Conservation Districts, Inc.
Ducks Unlimited
Sierra Club

Plan Review Comments and Responses

A preliminary draft of the Watershed Project Plan-Environmental Assessment (Plan-EA) was reviewed by the NRCS-National Water Management Center, Little Rock, Arkansas. Technical comments received from the National Water Management Center were addressed in the draft document.

The Draft Plan-EA was made available to interested agencies, organizations and the general public for a 30-day review period. A public meeting was held in Wellsburg, NY during the review period. Comments were addressed in the Final Plan-EA and, as necessary, were coordinated with the party submitting them. Letters of Comment received on the draft Plan-EA are presented in Appendix A.

Following is a summary of questions (**Q**) and comments (**C**) received and the NRCS response (**R**):

Public Meeting-Wellsburg, NY- February 2012

Q: How were dike locations selected?
R: The dike evaluation process is described in this document under “Alternatives Eliminated From Detailed Study”. Areas were initially selected where the most people or businesses would be benefited. The locations had to have benefits that exceeded the cost. Seven sites were originally considered.

Q: Can the final dike alignment be moved further away from homes?
R: There is only some flexibility in the dike alignment. The final design will designate where the dikes will be located because there must be enough flood plain to carry the water properly. If it is too close to the creek, there will be excessive flows and high velocities in the creek. Effort will be made not to put the dike right next to the homes, but the closer the dike is to the creek the higher the dike has to be built due to constriction of the flood plain. Language regarding this consideration has been added to this document under “Measures to Be Installed/Dikes”.

Q: Why are the homes being taken on the creek side opposite of the dike?
R: The houses on the opposite side of the dike will get more frequent and higher flooding once the dike is installed due to a constriction in the flood plain. This is referred to as induced flooding. This information is provided in this document under “Measures to be Installed/Dikes”.

Q: How will emergency vehicles get over the road closures during an emergency?
R: Road closures will be managed by emergency officials using the flood warning system. The closures will only be put in place when needed and will be maintained by the emergency officials. The officials will learn how manage them as they use them more, and will get more efficient about when they put them in. If absolutely needed, the closures could be removed as long as doing so would not compromise dike function during a flood event. A description of the road closures is provided in this document under “Measures to Be Installed/Dikes”.

Q: When the Chemung River backs up will the dike still protect the homes?
R: The Chemung River backwater was used in the planning design of the Wellsburg Dike. The dike, in combination with the railroad embankment will prohibit the 100-year Chemung River flood flows from entering Wellsburg. This effect is described in this document under “Effects of Alternatives/Public Safety/Hazard Potential”.

Q: Has anything been done to try and make it so we don't need the dikes, such as cleaning the creeks and regular maintenance?
R: Numerous alternatives were evaluated that did not involve dikes. Many of these are described in this document under "Alternatives Eliminated From Detailed Study". One alternative was evaluated in detail that did not include dikes. This alternative included stream rehabilitation in Wellsburg and nonstructural measures in the rest of the floodplain. This alternative was not selected since it was less effective in addressing the flooding problems, had lower net economic benefits, and did not adequately meet the Sponsor's objectives. The alternative was described in this document under "Description of Alternatives", "Effects of Alternatives" and "Comparison of Alternatives".

Q: Will this plan include flood prevention measures for the tributaries?
R: Tributary flood prevention was evaluated, but was determined to be insufficient to warrant further evaluation as noted in this document under "Watershed Problems and Opportunities/Watershed Problems".

Q: Will the flood warning system be managed?
R: The local Emergency Management Office will manage the flood warning system 24 hours per day. The maintenance costs of this system are covered by the sponsors but the up-front costs are covered by project funds. The flood warning system is primarily described in this document under "Measures to Be Installed", "Costs" and "Operation and Maintenance".

Q: Ridgebury Township does not have a stormwater management plan at this time, should this be in place before the project is implemented?
R: Assurance of proper stormwater management is required to ensure that future flood flows do not increase. The importance of this is highlighted in this document under "Measures to Be Installed/General" and "Installation and Financing/Responsibilities".

Q: Will Ridgebury Township not being a sponsor prevent this plan from being implemented?
R: No, only the official Sponsors and regulatory agencies have a say in project implementation. The project Sponsors for the Pennsylvania portion of the watershed are listed in the document under "Introduction".

Q: Is there any funding to stabilize Bentley Creek?
R: There is no funding planned to stabilize Bentley Creek. Only the tributaries flowing into Bentley Creek were targeted for stabilization. Bentley Creek is a very unstable system and previous efforts to stabilize the stream have mainly failed. More information on the issue is presented in this document under "Watershed Problems and Opportunities/Streambank Erosion and Sediment Damages.

Q: Who is paying for the gravel removal work being done in Bentley Creek in Wellsburg area?
R: The Town of Ashland and the Village of Wellsburg.

Q: Is it possible to estimate a time of completion for the project?
R: Other than the American Recovery and Reinvestment Act of 2009 (stimulus act), funding for Watershed Operations under the PL 83-566 program has been very low or zero for many years. Due to these funding issues, no schedule for completion was presented in this document. However, if funding were to become available immediately, the dikes could be designed in roughly a year and then built in another year or so. The flood warning system and tributary stabilization work could be completed concurrent with the dike design. Other planned work could be implemented over a 2-3 year period. However, these timelines only illustrate what could be accomplished with complete and early funding which is highly unlikely in the current fiscal climate.

Pennsylvania Department of Environmental Protection, Northcentral Regional Office
(see Letter of Comment in Appendix A for additional details)

C: A Pennsylvania Chapter 105 water obstruction and encroachment permit will be needed.
R: Noted in "Permits and Compliance" section of this document.

C: Increased velocities through the diked areas may increase erosion downstream.
R: Velocity impacts on downstream areas will be evaluated during dike design and protective measures will be implemented as part of the dike installation. Language has been added to this document under "Measures to Be Installed/Dikes".

Pennsylvania Fish & Boat Commission
(see Letter of Comment in Appendix A for additional details)

C: A Pennsylvania Natural Diversity Index (PNDI) screening form will be need to be submitted with Pennsylvania Chapter 105 water obstruction and encroachment permit.
R: A PNDI screening was completed during project planning. An updated PNDI screening will be completed during permitting as noted in this document under "Permits and Compliance".

Pennsylvania Game Commission
(see Letter of Comment in Appendix A for additional details)

C: Portions of State Game Lands #123 are located within the Bentley Creek Watershed. Approvals may be needed for any project activities that impact the State Game Lands.
R: At this time no work is planned that will impact State Game Lands. However, language has been added to this document under "Permits and Compliance" to address this should plans change in the future.

Pennsylvania Department of Transportation
(see Letter of Comment in Appendix A for additional details)

C: A Highway Occupancy Permit will be required for the Centerville Dike
R: Language has been added to this document under "Permits and Compliance".

C: PennDOT would not maintain the road closure structure for the Centerville Dike. Other PennDOT District 3 municipalities have agreements with the county to maintain and operate road closures.
R: Language has been added to this document under "Operation and Maintenance".

New York State Department of Environmental Conservation, Bureau of Flood Protection and Dam Safety
(see Letter of Comment in Appendix A for additional details)

C: An inundation area from a breach of a dike can exceed what occurred prior to the dikes being placed.
R: NRCS agrees that the initial surge of a breach may have a higher velocity and height near the point of breach. However, the breach inundation zone would not change to any notable extent. Language has been added to this document under "Measures to Be Installed/Dikes" and "Appendix B-Flood Plain Maps".

C: NYS-DEC recommends basing the dike design on 500-year flood elevations.
R: The planned dike is classified as an NRCS Class I dike. The minimum standard for NRCS Class I earthen dikes requires the use of the 100-year flood elevation plus freeboard and consideration of the flood of record and wave height. A minimum of three feet of freeboard will be added. In all locations the freeboard will contain the 500-year flood with additional freeboard above that. A statement noting the NYS-DEC recommendation was added to this document under "Measures to Be Installed/Dikes".

C: A Letter of Map Revision (LOMR) to the Federal Emergency Management Agency (FEMA) must be part of the dike design since the dike will cause a change to the FEMA Special Flood Hazard Area and Floodway. The LOMR process includes a notice to all affected property owners and concurrence from the chief elected official of each impacted municipality. The regulatory references were provided in the letter of comment.
R: Language has been added to this document under "Permits and Compliance" and "Installation and Financing/Responsibilities".

C: Will any buildings eligible for voluntary buyout have a higher Base Flood Elevation as a result of the project? If so, these properties must be acquired in accordance with LOMR requirements.
R: No. None of the voluntary buyouts are affected by the dikes. Several houses in Wellsburg will have dike induced flooding that is higher than the current Base Flood Elevation. These houses will be acquired and removed as noted in this document under "Measures To Be Installed/Dikes".

Q: Mobile homes that would need to be elevated higher than 8 feet based on the 100-year flood elevation plus freeboard will not be elevated but will be offered a buyout. Why was 8 feet used?
R: Due to the relatively low values of mobile homes, it was determined that few mobile homeowners would be economically able to accept an acquisition at fair market value. The project includes mobile home elevation as a project measure to encourage maximum participation. However, it was determined that elevations higher than about one story (8 feet) become impracticable for the homeowner and for engineering design.

C: Dry floodproofing for residential structures may be done under National Flood Insurance Program (NFIP) requirements as long as the cost does not exceed 50% of the market value of the structure. If the cost is more than 50%, then the structure must be elevated instead of floodproofed to meet the NFIP requirements. Also, dry floodproofing of residential structures does not qualify for a decrease in flood insurance rates.
R: Most of the residential structures in the project area, including those targeted for dry floodproofing, are of low value relative to other locations in the two states. Due to the high cost of house elevation, NRCS cannot economically justify elevation of residential structures in the project area. Dry floodproofing takes many forms and is loosely defined for this project. NRCS will ensure that houses treated under these provisions comply with all federal, state and local requirements. Language regarding NFIP requirements has been added to this document under "Measures To Be Installed/Dry Floodproofing".

C: In 2003, NRCS re-evaluated the hydrology and hydraulics related to establishing the predicted 100-year flood elevations along most of the length Bentley Creek and suggests that the municipalities request the Federal Emergency Management Agency (FEMA) update the existing Flood Insurance Rate Maps. This data should be submitted to FEMA as a Letter of Map Revision (LOMR). There is no FEMA fee if the information was developed by a federal agency.
R: NRCS has previously communicated with FEMA regarding the updated analysis. Language has been added to this document under "Permits and Compliance" regarding the need for municipalities to submit a LOMR in regard to the planned dikes. Clarifying language was also added to this document under "Installation and Financing/Flood Plain Ordinances and Flood Insurance" regarding submission of a LOMR for Bentley Creek.

C: New York State Department of Environmental Conservation (NYS-DEC) is required by state law to be a non-federal sponsor of all federally constructed flood control projects in New York.
R: After further dialog between NYS-DEC, NRCS and the Chemung County Soil and Water Conservation District it was determined that formal sponsorship by NYS-DEC may not be required for this project and will not be pursued at the present time. The existing New York sponsors of this project are encouraged to continue to coordinate with NYS-DEC and determine if they should be added as official sponsors in the future. New sponsors may be added through a simple supplement to the Watershed Project Plan. Language has been added to this document under "Permits and Compliance".

New York State Department of Transportation- first letter dated February 27, 2012
(see Letter of Comment in Appendix A for additional details)

C: 1 - The railroad bridge over Bentley Creek in Wellsburg appears to present a serious constriction to flow. The report does not describe the railroad bridge or its effect on raising the backwater in Bentley Creek. NYS-DOT is not aware of any plans for the railroad bridge to be replaced.
R: NRCS studied all Bentley Creek bridges as part of the update of the hydrology and hydraulic analysis of flooding. More detailed analyses were conducted for the railroad and Rt 427 bridges. These additional evaluations included flood elevation effects related to bridge blockages, sediment accumulation, the center bridge piers, wider/additional bridge spans and the addition of culverts to covey more flood flows. Language has been added to this document under "Appendix C-Investigations and Analyses Report/Hydraulics and Hydrology" regarding these studies. Language regarding alternatives that were considered is included in this document under "Alternatives Eliminated from Detailed Study/Bridge/culvert modification and a flood bypass channel".

C: 2 - Regarding water surface elevations at the Rt 427 and Rt 367 highway bridges.
R: See discussion under New York State Department of Transportation- second letter dated March 20, 2012.

C: 3 & 4 – these comments were provided as additional information for NYS-DOT internal review.
R: No response needed as per discussions between NRCS and NYS-DOT.

C: 5 – Additional road closures would be appropriate on the south of Wellsburg on Rt 367 and the west of Wellsburg on Rt 427.
R: As per discussions between NRCS and NYS-DOT, the recommendation is for road blocks, not road closures in these locations. Language regarding the road blocks has been added to this document under "Measures To Be Installed/Dikes".

C: 6 – A Highway Work Permit will be needed from NYS-DOT.
R: Language has been added to this document under "Permits and Compliance".

New York State Department of Transportation- second letter dated March 20, 2012
(see Letter of Comment in Appendix A for additional details)

C: Water surface elevations of Bentley Creek for the 100-year flood with the Wellsburg Dike in place will raise floodwater elevations at the Rt 427 and Rt 367 bridges above existing levels. The Rt 427 bridge will overtop in the 100-year flood by 2 feet. The Rt 367 bridge will overtop by 0.3 feet at the north end. NYS-DOT requests that NRCS include in this document the 6 points highlighted in their March 20, 2012 Letter of Comment regarding the induced flooding at the Wellsburg bridges.
R: Reference to the recommended language has been added to this document under "Measures To Be Installed/Dikes" and "Permits and Compliance".

PREFERRED ALTERNATIVE

Purpose and Summary

The purpose of this Watershed Project Plan is to meet the Sponsors objectives for addressing the watershed problems, including reducing flood damage and sedimentation. The plan will provide authorization to use financial and technical assistance funds, as appropriated by Congress, under the Watershed Protection and Flood Prevention Act (Public Law 83-566). The PL 83-566 purpose is flood prevention. These funds are typically considered for annual appropriation under the Agricultural, Rural Development, Food and Drug Administration and Related Agencies Appropriations Bill, Title II – Conservation Programs, Natural Resources Conservation Service, Watershed and Flood Prevention Operations.

Refer to the Flood Plain Map (Appendix B) and the Project Map (Appendix F) for additional information on project measures and the area to be benefitted.

Measures To Be Installed

General

Structural and nonstructural flood damage reduction measures will be implemented, including an advanced flood warning system. Structural measures include earthen dikes in Wellsburg, New York and Centerville, Pennsylvania. Land stabilization will be addressed by tributary stabilization measures. Voluntary nonstructural measures include house acquisition, house dry “floodproofing, protection of house utilities and mobile home elevation. Additional requirements apply to mobile home parks which are detailed later in this section.

The proper functioning of all structural and nonstructural measures will be dependent on continuation and enhancement of flood plain ordinances, flood insurance and stormwater management. These measures will ensure flood frequency and peaks do not increase over time and ensure that new structures in the flood plain do not incur undue flood risks and flood loss.

The Sponsors will also need to ensure that all state classified high hazard dams, Miller Pond, Lake Ondawa Ridgebury Lake, and other upstream hazards identified by state or local authorities as having a substantial risk of failure, meet all applicable safety standards or demonstrate that a failure will not adversely affect the performance of the planned structural and nonstructural measures.

Detailed information on the project measures follows:

Flood Warning System

The flood warning system should consist of:

a. Rainfall gages equipped with telemetric communication equipment (perhaps 3 or 4 scattered throughout the watershed).
b. Stream flow gages equipped with telemetric communication equipment (perhaps 2 or 3 scattered along the main Bentley Creek).
c. Repeater station for the telemetric communication equipment.
d. Base station and computer (likely to use existing facility)
e. Computer terminals, maps, and weather radios in Emergency Management Agency (EMA) office (already found in existing facility).
f. Dike road closure structure information.
g. Other items as recommended by the existing EMA office.

The flood warning system will be developed in consultation with entities that are knowledgeable in the design of such systems. The system will include a plan and procedures for evacuation and dike road closure structure operations based on various flood frequencies. Provisions for emergency equipment and personnel stationing should be included in the warning system to ensure access to emergency services is efficiently allocated and utilized once road closures are in place. The flood warning system may be

fashioned after the one used along the Chemung River and its tributaries upstream from the confluence of Bentley Creek.

In the Bentley Creek Watershed, rainfall and stream gages, as needed can be located on public or private lands. Easements or other arrangements will be used as needed to ensure continuous access to the gages.

Part of the flood warning system should include dam breach routings and Emergency Action Plans (EAP) on all existing high hazard dams, currently consisting of Miller Pond, Lake Ondawa and Ridgebury Lake; and all planned dikes in the Bentley Creek Watershed, currently comprised of Wellsburg and Centerville Dikes.

Tributary Stabilization

Bentley Creek is plagued with having several of its tributary streams that are considered to be unstable and that introduce a large bedload of sediments into Bentley Creek. These sediments tend to settle at flow constriction points such as bridges. The capacity for flow within the channel is reduced by the settling of sediments causing increased frequency of flooding and higher maintenance costs. Four main tributaries have been identified as the largest contributors of sediment to the Bentley Creek system. The tributaries are Cowell Hill Creek, Terwiliger Creek, Justice Run and Wesleyan Church Creek. About 19,000 feet of these tributaries is to be stabilized using conventional stream rehabilitation practices. These practices include, but are not limited to stream barbs, rock sills, and root wads, which should significantly reduce the current delivery of sediments downstream. The Sponsors will be required to acquire all needed real property rights using their own resources. NRCS will provide a detailed land rights work map during design to ensure that all needed land rights are identified. All real property rights will need to be certified as acquired by the Sponsors before implementation may begin.

Dikes

Structural measures include two dikes as follows (see Figures 2 and 3):

- 4200 foot long earthen dike at Wellsburg, New York (PA-681)
- 2400 foot long earthen dike at Centerville, Pennsylvania (PA-680)

The constructed top of dike and road closure structure elevations will include freeboard (currently a minimum of 3 feet) above the 100-year flood elevation as required at the time of design.

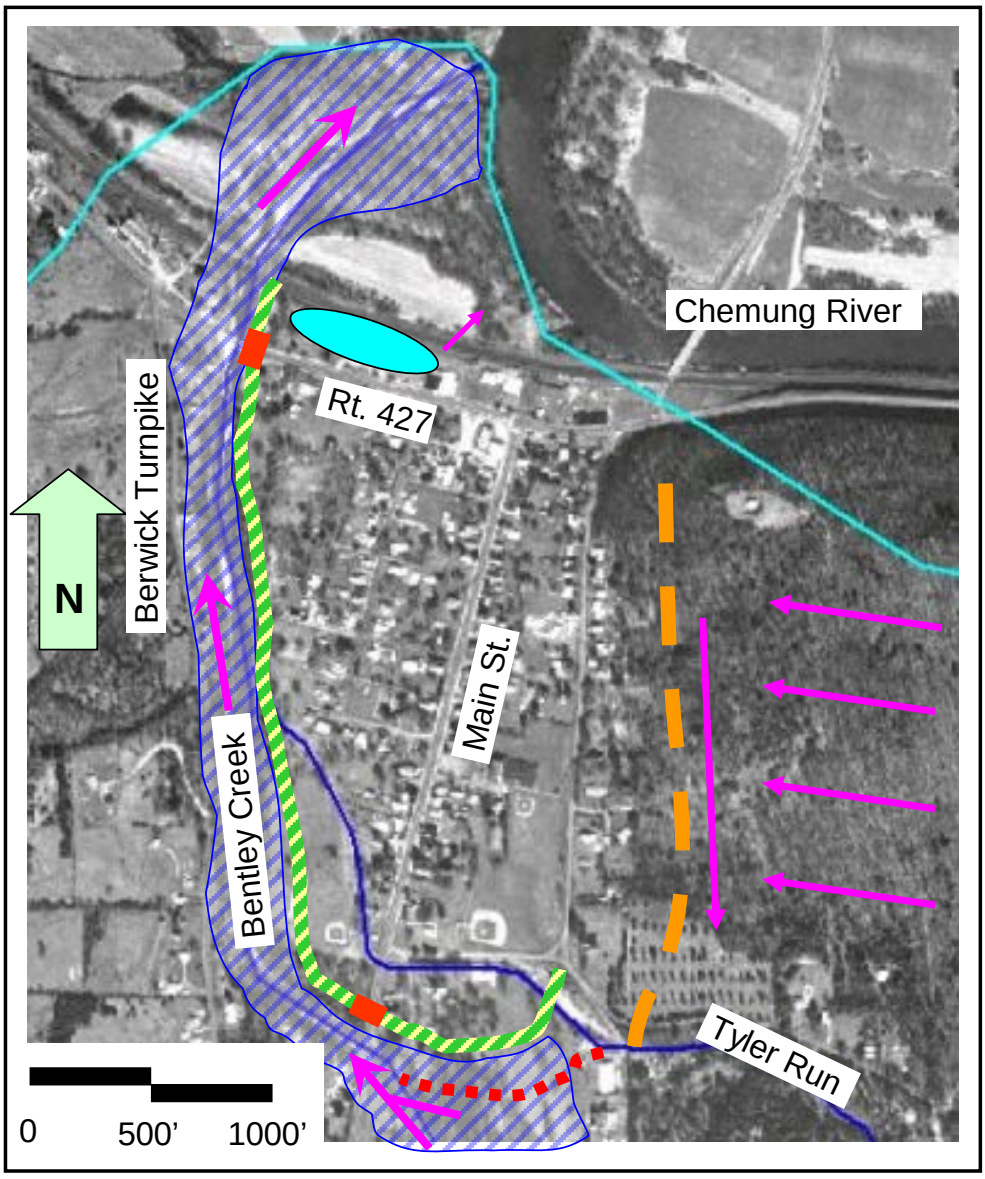
The dikes will be NRCS Class I, high hazard. This classification is based on the potential for loss of life should the dike breach. High hazard structures are designed to the highest safety standards utilizing the latest techniques to ensure the structures will function as designed. The New York State Department of Environmental Conservation recommends using the 500-year flood as a basis for design.

The inundation area resulting from a breach of the dikes will not notably exceed what occurred prior to the dikes being placed. It is possible that a breach failure of the dike would result in a shorter warning time for affected residents to evacuate and the initial surge of a breach may have a higher velocity and height near the point of breach than if the dikes were not there.

The Sponsors will prepare an Emergency Action Plan (EAP) for each dike. The EAP's will meet all NRCS, federal, state and local requirements.

The foundation for the dikes is largely within the coarse alluvial material prevalent in the Bentley Creek flood plain. This will necessitate that a plastic soil type (clay based) be used at the core of the dike and as fill in the cutoff trench to control seepage. This may require importing soil from off-site. The dikes are to be built such that they include the maximum freeboard specified by local, state, or federal laws or standards above the accepted 100-year flood elevation. Table 3a details pertinent features about each dike related to their length, height, top width, volume of fill, and erosion protection means. Select portions of the dikes will require rock rip rap protection along the toe where erodible Bentley Creek flow velocities are anticipated. Vegetative cover will serve where flow velocities are not as severe. Flow velocity impacts on downstream areas will be evaluated during dike design and protective measures will be implemented as part of the dike installation.

Figure 2. Wellsburg Dike (PA-681) with appurtenant structures

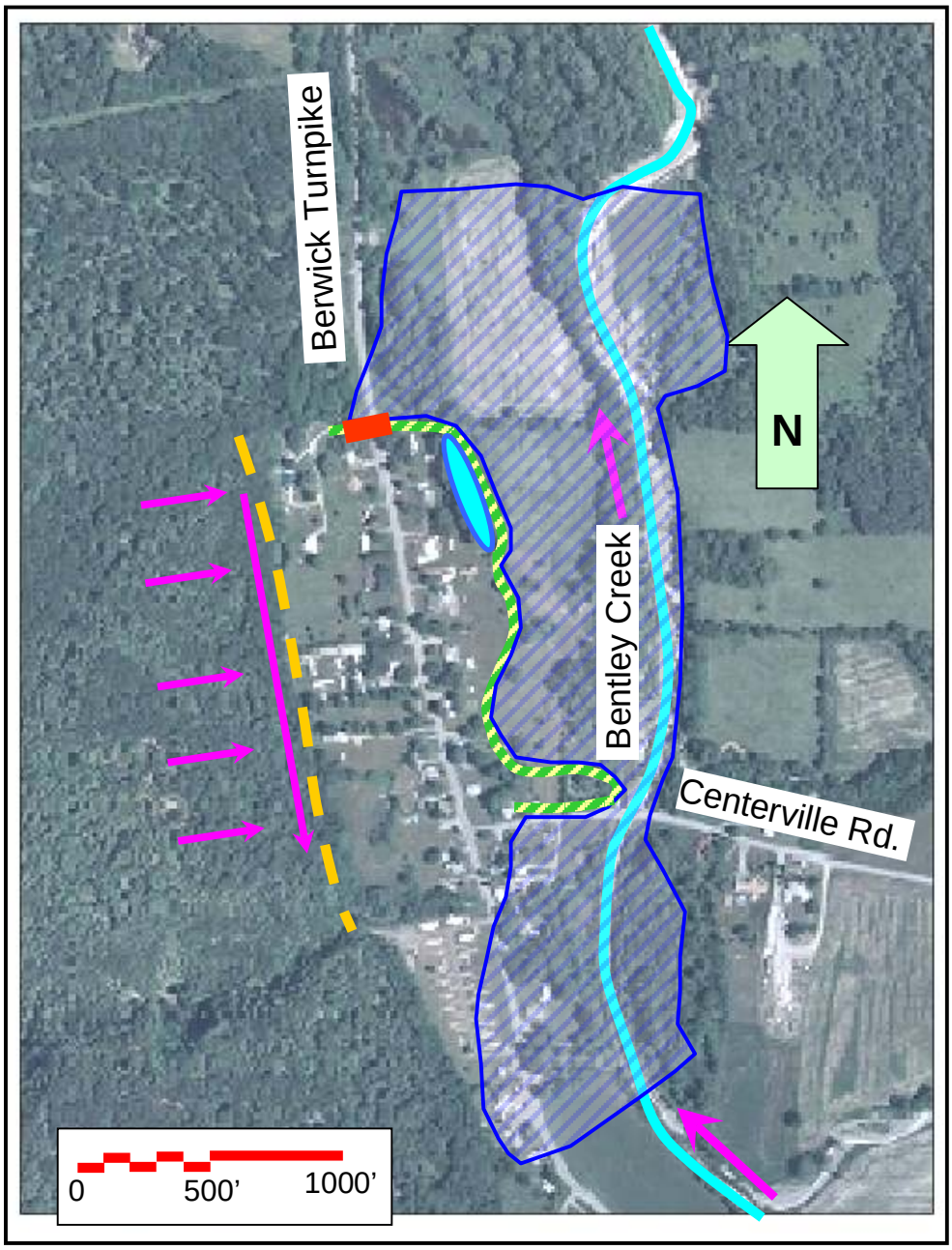


WELLSBURG DIKE

Legend:

- Earthen Dike
- Approximate 100-year flood inundation area
- Reconstructed stream
- Diversion
- Stormwater Basin
- Road Closure Structure
- Flow Direction
- Watershed Boundary

Figure 3. Centerville Dike (PA-680) with appurtenant structures



CENTERVILLE DIKE

Legend:

- Earthen Dike
- Approximate 100-year flood inundation area
- Diversion
- Stormwater Basin
- Road Closure Structure
- Flow Direction

Road closure structures will be required wherever these dikes cross a road. These structures will need to be placed into operation in advance of a flood. Many designs require manual operation. The Bentley Creek Watershed has a fast response to rainfall events and warning times may be short. It will be important that the design of the road closure system be compatible with the typical response time expected. Two closure structures are planned for Wellsburg, one for Centerville. Road closure operations will entail a flood forecasting method that ties existing watershed hydrologic and climatic conditions with up to date satellite Doppler radar imagery to identify when road closure operations should be executed. The road closure system will require training of public works operators, periodic practice drills and maintenance of the gates and appurtenant structures so as to gain the experience needed to operate the gates efficiently and properly. In addition to the road closures, road blocks will be required during flood events in Wellsburg on the west side of the Rt 427 bridge and the south side of the Rt 367 bridge and in Centerville on either side of the Centerville Road bridge and on the Berwick Turnpike.

Upland diversions will be used to minimize water trapped behind the interior of the dike. Of particular note here is the planned diversion above Wellsburg being directed to the south crossing along a road adjacent to a cemetery before entering into Tyler Run (which is to be reconstructed along its historical path). This was deemed to be the most efficient route for the diversion during planning, since the only other viable route requires flows to be diverted to the north, descend down a steep hill, cross under state highway NY Rt. 427 and the railroad, and then empty into the Chemung River. The final route of this diversion will be determined during the design phase.

> Cultural Resource Survey - The cemetery route will require further investigation of the diversion outlet, at the time of design, to avoid adverse impacts to unmarked graves, if any.

Stormwater management ponds will be required to temporarily store trapped water arising from runoff from the land between the upland diversions and the dikes. These stormwater ponds will temporarily store runoff and release it back to Bentley Creek by gravity flow via a flap gate control structure, or other appropriate means, once the excessive creek flows have subsided.

The Wellsburg Dike will require Tyler Run to be re-routed outside of the dike footprint so that water is not trapped behind the dike. The new location for Tyler Run will actually be its historic path based on historic maps of the area.

Houses in the path of the planned footprint of the Wellsburg Dike may need to be acquired. Alteration of the dike alignment or the possible use of a concrete (vertical) wall may alleviate the need for removal. Final dike alignment and a cost comparison between house removal and dike modification will be used to determine the appropriate course of action during design. One home was identified during planning that is in the planned dike alignment. Since this home is within the current 100-year flood plain it would be eligible for Federal acquisition assistance. During final design consideration will be given to locating the dikes as far from homes as practicable, taking into consideration the effect on dike height and flow velocities.

Houses on the west side of Bentley Creek that will be subject to increased flooding because of the dike must be acquired. Five homes were identified during planning that would be impacted. Two of these were not previously subject to 100-year flooding and are therefore the full responsibility of the Sponsors to acquire using their own resources. The other three homes will also need to be acquired by the Sponsors, but these homes are eligible for Federal acquisition assistance since they are part of the planned flood damage reduction measures that were developed in conjunction with the dike.

All homes acquired as part of dike implementation will be eligible for assistance under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646. Acquired homes that do not require special considerations, such as for hazardous wastes or cultural resources, can be left for demolition as part of dike construction.

> Mitigation - One house to be removed from the floodplain in Wellsburg is eligible for the National Register of Historic Places (Birchwood Archaeological Services, 2008). Mitigation will be coordinated with the New York State Office of Parks, Recreation and Historic Preservation (NY State Historic preservation Office).

Other real property rights required for both dikes will include the dike footprints, stormwater basins, hillside diversions, Tyler Run stream reconstruction in Wellsburg and other needs identified during design. In addition, written assurances must be acquired from the railroad in Wellsburg to ensure the continued maintenance and stability of the railroad embankment. The Sponsors will be required to acquire these real property rights using their own resources. NRCS will provide a detailed land rights work map during design to ensure that all needed land rights are identified. All real property rights will need to be certified as acquired by the Sponsors before implementation may begin.

Additionally, New York State Department of Transportation (NYS-DOT) provided a Letter of Comment, dated March 20, 2012 in which they highlight six recommendations regarding the Wellsburg Dike and the Bentley Creek bridges located in Wellsburg. The letter is the last one in "Appendix A-Letters of Comment". The six recommendations will be considered by NRCS during the design phase of the Wellsburg Dike.

Voluntary Nonstructural Measures

Residential buildings located between the planned Wellsburg and Centerville Dikes and upstream of the Centerville Dike to Middletown along the main stem of Bentley Creek (see Project Map, Appendix F) are eligible for nonstructural flood damage reduction measures. Participation by landowners in these areas is voluntary. The participant makes the final decision, with guidance from the Sponsors, on eligible nonstructural measures to be installed.

Residential buildings located in the Bentley Creek 100-year flood plain that meet specific criteria described later in this section are eligible for one of several site specific nonstructural measures. Non-residential buildings (unless part of an acquired residential property) are not eligible for nonstructural assistance. Eligible dwellings are those where floodwater could cause damage based on the final NRCS 100-year flood level, assuming these levels are acceptable to the Federal Emergency Management Agency (FEMA). If not acceptable, the greater of the final NRCS or FEMA 100-year flood elevation will be used to determine eligibility.

The specific method of flood damage reduction will be determined by the criteria discussed under each nonstructural method. Determining which nonstructural method is applicable will require an accurate determination of the buildings lateral location (valley station along Bentley Creek) and first floor elevation. The station for each building will be interpolated based on the stationing of the stream cross-sections immediately upstream and downstream of the building (See Appendix B, Flood Plain Maps). The building's station will be used to estimate the 100-year flood level at the dwelling. The first floor elevation will be determined by an engineering survey.

> **First floor elevation** is defined here as the elevation of the finished surface (carpet, tile, vinyl, etc) of the first floor of a dwelling, not including basements. The basement floor may be defined as the first floor if the basement is finished non-recreational living space that serves as bedrooms, offices, bathrooms or kitchens and represents at least 20% of the combined finished non-recreational living space of the first floor and basement.

The required freeboard (according to local ordinances in compliance with FEMA) at the time of design and installation will be added in setting final elevations for each nonstructural measure. Currently 1.5 feet will be used in Pennsylvania while 2.0 feet of freeboard will be used in New York. Freeboard will be added to the greater of the final NRCS or FEMA 100-year flood elevation for each location, unless the NRCS elevations are adopted for use. Freeboard is to provide protection against wave action and includes other safety factors.

Access for persons with disabilities will be provided as needed on residential properties that participate in the nonstructural program. Access will be provided in accordance with Public Law 90-840 and CFR 1190 in the Code of Federal Regulations entitled, "Minimum Guidelines and Requirements for Accessible Design" and all other applicable Federal, State, and local rules and regulations.

The nonstructural measures to be used will be designed using the most up to date criteria. Examples include Flood Proofing Performance, U.S. Army Corps of Engineers, December 1998, including the revised matrix found on errata page 15 and Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings, FEMA 259, Federal Emergency Management Agency, January 1995.

All nonstructural features which leave the building in the flood plain will require landowner involvement. All such measures will be operated, maintained and replaced by the landowner. Proper operation and maintenance will be assured by placement of an encumbrance on the property in the form of deed covenants or restrictions. This is described in more detail in the Operation and Maintenance section later. The encumbrance must be completed by the Sponsors before construction commences. The Sponsors will recommend and encourage homeowners to maintain or buy flood insurance. During a flood emergency all occupants will be evacuated as directed by the local emergency management officials.

The following nonstructural measures will be used:

Acquisition (Buyout)

Voluntary acquisition will be used for the following:

1. Permanent houses with basements having 100-year flood elevations at the level of the bottom of the first floor joists or greater.
2. Permanent houses that do not have basements having 100-year flood elevations at the level of the bottom of the first floor joists or greater, that cannot be dry "floodproofed" as described later.
3. Mobile homes that, if elevated to the 100-year flood level plus freeboard, would have a final first floor elevation greater than 8 feet above the lowest ground level adjacent to the home and the mobile home cannot cost-effectively be moved on the existing lot to reduce the final height below 8 feet.

Acquisition will consist of:

a. purchasing the house
b. purchasing outbuildings and other structures
c. purchasing land parcel(s) directly associated with the eligible dwelling
d. closing costs
e. disconnecting utilities
f. removing any heating system fuel tanks
g. removal of all non-attached items from the building(s) by the landowner
h. demolishing and removing building(s), foundation(s) and other structures
i. decommissioning wells and septic systems
j. re-grading and re-vegetating the land purchased
k. installing a riparian buffer on areas adjacent to Bentley Creek or its tributaries
l. other reasonable and customary costs associated with acquisition, demolition and decommissioning

The property will be bought at fair market value, based on a certified appraisal by the appraiser retained by the Sponsors. For homes that do not meet current codes for safe and sanitary housing, fair market value will be the greater of the fair market value of the existing property or the fair market value of a comparable local unit that is not in a flood plain and meets current codes for safe and sanitary housing.

The landowner is responsible for removal and proper disposal of all non-attached items within the buildings. These include paints and other household chemicals, scrap lumber, broken furniture, appliances and other unwanted items.

The existing house, outbuildings and other structures will be demolished and removed (the landowner may remove structures such as above ground swimming pools, sheds, etc. if they are not included in the appraisal and before the construction contract is signed). Disposal will be at an authorized landfill. All hazardous materials found on site will be disposed at an authorized hazardous waste facility as required by law and ordinances. Wells will be decommissioned. Septic systems and fuel tanks will be decommissioned and disposed of as required by law.

All interior finished areas in basements will be demolished and removed. Any basement drain(s) that remain will be plugged. Concrete basement floors, concrete poured walls, and concrete block walls can be broken up by jack hammering or other methods and left in place as long as it is

covered with a minimum of two feet of soil or as required by law. The foundations will be back filled to the adjacent ground level and the area re-vegetated with a riparian buffer where appropriate. The Sponsors will become the owners of the property and the land will become a permanent conservation parcel, restricted to flood plain compatible uses.

Dry "Floodproofing"

Dry "floodproofing" has very limited application but will be used for permanent houses that do not have basements having 100-year flood elevations at the level of the bottom of the first floor joists or greater and the final "floodproofing" height, including freeboard, does not exceed about three feet above the lowest ground adjacent to the building. Allowances for minor variations above the three foot height will be determined by engineering design. Houses that meet the flood depth criteria but cannot meet the dry floodproofing criteria will be addressed under Acquisition.

Dry "Floodproofing" will consist of:

a. constructing the "floodproofing" measure, including disconnection / reconnection of utilities
b. surface water diversion, as required
c. installation of sumps and sump pumps
d. installation of backflow valves, as required
e. re-grading and re-vegetating disturbed areas
f. landscaping and aesthetic mitigation features, if applicable
g. provisions, as needed, for persons with disabilities
h. other reasonable and customary costs associated with dry "floodproofing"
i. operation, maintenance, and replacement provisions
j. encouraging flood insurance (note that some dry floodproofing may not qualify for a decrease in flood insurance rates)
k. emergency evacuation plan
l. deed encumbrances

Each dry "floodproofing" measure will be designed by the Sponsor's engineer based on flooding characteristics (flood depth, velocity, scour, flash flooding potential, and ice and debris flow); site characteristics (soil type); and structure characteristics (structure foundation, construction, condition; fences; hedges; outbuildings).

Dry floodproofing for residential structures may be done under National Flood Insurance Program (NFIP) requirements as long as the cost does not exceed 50% of the market value of the structure. If the cost is more than 50%, then the structure must be elevated instead of floodproofed to meet the NFIP requirements. For this project, elevation is not eligible for assistance. Therefore designs may need to be modified to comply with the latest federal, state and local requirements, including if applicable, NFIP requirements. Variances may be possible if planned improvements are not actually part of the house. If reasonable solutions do not exist, then the house will be eligible for voluntary Acquisition.

"Floodproofing" can be constructed adjacent to the house exterior wall or with a small set back as required to accommodate stairs, small porches and similar features that are impractical to exclude. In certain instances these floodproofing materials may only need to be located on two or three sides of the house depending on topography. Attached garages will need to be excluded by interior floodproofing, as only passive treatment systems will be considered. No homeowner installed stoplogs or similar devices will be used. Entrances will be via steps over the floodproofing measure with ramps or other special features provided as required by persons with disabilities. Steps and ramps can be finished similar to the foundation material, floodproofing material or with pressure treated lumber. Each house will be evaluated separately.

To the extent possible all surface water drains (roof drains, etc) will need to outlet outside of the floodproofing measure. In some cases, some minor sources of surface water may not be able to be outletted outside of the measure. This water will be drained to a sump. Temporary water storage in the area at the sump will be adequate to store the accumulated water until after the flood recedes without damage to the building. Sump pump operation during a flood event will not be a requirement. This can be provided for by use of a sunken area, underground gravel bed or tank

that drains to the sump, etc. A sump pump will be provided if gravity drainage cannot be used. Drains which could allow flood water to enter the building will have back flow valves installed. All sources of surface and subsurface water outside the wall will be diverted away from the wall.

Protection of Basement Utilities

This measure will be used for permanent houses with basements having 100-year flood elevations below the first floor joists. Therefore these homes only receive basement flooding from the 100-year flood. The intent of this measure is to elevate utilities that are subject to flooding above the 100-year flood level plus freeboard. This can be accomplished within the existing structure, if practicable, or by constructing an elevated room large enough to safely house and operate utilities that are currently subject to flooding. The new utility room will generally be attached to the existing house with exterior finish that will reasonably blend with the existing structure. Existing basement area will generally need to be filled in.

Protection of basement utilities includes:

a. removal of all non-attached items from the basement by the landowner, if applicable
b. use of motel if required during construction (up to the maximum Federal lodging amount for the locality)
c. removal of finished basement interiors, if applicable
d. cutting openings in the basement walls and doors at ground level, adding approved openings to relieve flood flow pressures and to control access by animals and children, if applicable
e. filling in basement to adjacent ground level, if applicable
f. construction of new utility room, if applicable,
g. elevation of utilities such as heating, cooling, hot water and electrical systems to the 100-year flood level plus freeboard as a minimum, or the elevation of the existing first floor as a maximum
h. interior and exterior modifications to the existing house to accommodate relocated utilities or for attachment of new utility room and entrance to the new utility room, as applicable
i. re-grading and re-vegetating the disturbed area
j. landscaping and aesthetic mitigation features, if applicable
k. provisions, as needed, for persons with disabilities
l. other reasonable and customary costs associated with protecting utilities from flooding
m. operation, maintenance and replacement provisions
n. encouraging flood insurance
o. emergency evacuation plan
p. deed encumbrances

New utility rooms will be designed by the Sponsor's engineer based on flooding characteristics (flood depth, velocity, scour, flash flooding potential, and ice and debris flow); site characteristics (soil type); and structure characteristics (structure foundation, construction, condition; fences; hedges; outbuildings).

New utility rooms can be constructed on high ground or on piers of concrete or reinforced concrete block (piers and reinforced concrete block oriented parallel to flood flow path). Piers do not need to be continuous under the buildings. Extending the existing foundation walls is also acceptable, if the current foundation walls are structurally capable of being extended and costs are commensurate with pier type construction.

Entrances will be via steps, ramps or other special features provided as required by specific needs including consideration for persons with disabilities.

The landowner is responsible for removal and proper disposal of all non-attached items within the basement. These items include paints and other household chemicals, scrap lumber, broken furniture, appliances and other unwanted items.

Basement walls that extend above the existing ground line will have openings cut in them at ground level to allow flood flows to pass through. The openings will have provisions to restrict animals and

children. Grading of the adjacent ground will be required as needed to allow flood flows to enter or leave the basement area without ponding, including filling the existing basement with approved materials to allow for free drainage of flood water. Any basement drain(s) that remain will be plugged. Interior doors in the existing building leading to the original basement will be closed off. Any exterior doors in the basement will be left in place but will be installed with screens at the bottom if the door is located at the lowest point of the basement. The basement can be used to store tools or equipment that can be removed during a flood.

Mobile Home Elevation

This measure applies to all mobile homes with first floor elevations below the 100-year flood plus freeboard requirement for the municipality. Mobile homes that, if elevated to the 100-year flood level plus freeboard, would have a final first floor elevation greater than 8 feet above the lowest ground level adjacent to the home will be addressed under Acquisition. In some cases, it may be more practicable and cost-effective to move the mobile home within the land parcel to reduce the height above the ground. Additional requirements apply to mobile home parks as specified below.

An engineering evaluation, design and cost estimate will be completed by the Sponsor's engineer to 1) determine if the building is structurally sound and if there are no other elevation limitations and 2) complete the new foundation design for the building. If the building is not structurally sound, the elevation option is not available and the mobile home will be addressed under Acquisition. However, elevation would be used if structural integrity can be restored and the mobile home elevated for less cost than if using Acquisition. These cost comparisons will be based on preliminary engineering evaluations not detailed engineering estimates.

Mobile home elevation will consist of:

a. elevating the mobile home, including disconnecting and reconnecting utilities
b. improvements, if required, to meet safe and sanitary code for the structure
c. use of motel during the elevation of the mobile home (up to the maximum Federal lodging amount for the locality)
d. re-grading and re-vegetating the disturbed area
e. landscaping and aesthetic mitigation, if needed
f. provisions, as needed, for persons with disabilities
g. other reasonable and customary costs associated with mobile home elevation
h. operation, maintenance and replacement provisions
i. encouraging flood insurance
j. emergency evacuation plan
k. deed encumbrances

Each foundation will be designed by the Sponsor's engineer based on flooding characteristics (flood depth, velocity, scour, flash flooding potential, and ice and debris flow); site characteristics (soil type); and structure characteristics (structure foundation, construction, condition; fences; hedges; outbuildings).

Entrances will be via steps, ramps or other special features provided as required by specific needs including consideration for persons with disabilities.

Additional Requirements for Mobile Home Parks

Mobile homes clustered in mobile home parks must be addressed as a group. Mobile homes that are not properly elevated and anchored may become dislodged during flood events. Therefore, mobile homes in close proximity to one another pose a threat to other co-located units. Consideration of public safely and protection of the public investment in elevating mobile homes is at risk if all units in the park are not elevated to the required height. Therefore, the owners and residents of mobile home parks must reach agreement, in writing, that all units will participate in the elevation process before any work may proceed. This is still a voluntary provision, but requires agreement within each mobile home park.

Permits and Compliance

Installation of the Preferred Alternative involves the placement of earthen dikes to protect homes, businesses and public buildings. These dikes will impede, retard, change flood flows and cross sections of the floodway. In addition, tributary stabilization measures in Pennsylvania and stream reconstruction in Wellsburg, New York will all require water obstruction and encroachment permits from the Pennsylvania Department of Environmental Protection (PA-DEP, Chapter 105 Permit) and New York State Department of Environmental Conservation (NYS-DEC). An updated Pennsylvania Natural Diversity Index (PNDI) screening will be needed for the Pennsylvania encroachment permit.

A Letter of Map Revision (LOMR) to the Federal Emergency Management Agency (FEMA) must be part of the dike design since the dike will cause a change to the FEMA Special Flood Hazard Area and Floodway. The LOMR process includes a notice to all affected property owners and concurrence from the chief elected official of each impacted municipality as further described in 44 CFR 60.3(d) and 44 CFR 65.12.

The Wellsburg stream reconstruction of Tyler Run will likely require a Clean Water Act, Section 404 nationwide permit from the U.S. Army Corps of Engineers, Buffalo District. If the Section 404 permit is required, then a Clean Water Act, Section 401, Water Quality Certification will be required from the NYS-DEC.

Land disturbance for dike construction in New York will likely require a General Construction Permit for Stormwater Discharges from Construction Activities (GP-02-01), including the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) and filing of a Notice of Intent (NOI) with NYS-DEC.

Construction of the Wellsburg Dike will require a Highway Work Permit from New York State DOT. The Centerville Dike will require a Highway Occupancy Permit from PennDOT District 3-0.

Bentley Creek and tributaries in the New York portion of the watershed are Surface Water Class C. Therefore an Article 15/6NYCRR Part 608 Protection of Waters-Stream Disturbance Permit will not be required; however standard erosion and sediment controls will be required to protect water quality. No regulated New York State freshwater wetlands are located near the project. Therefore an Article 24/6NYCRR Part 633 Freshwater Wetland Permit will not be required.

Removal of one house and associated outbuildings which is eligible for the National Register of Historic Places will require compliance with Section 106 of the National Historic Preservation Act and New York State Historic Preservation Act. Mitigation will be coordinated with the New York State Historic Preservation Office.

Municipal building permits and zoning permits will be required. Applications will be reviewed and permits issued based on standards for new construction. Surveyed plot plans are not required by NRCS, but may be required locally. All contractors must be licensed in the individual municipality. Municipal ordinances will be applicable. All floodproofing and elevations must be in compliance with local zoning and land development ordinances. It is possible that variances from the zoning ordinance may be required, particularly with regard to height and yard setbacks. If needed, variances will be sought by application to the local zoning hearing board. This will be done by the local Sponsors through its consulting engineers/project managers.

State Game Lands #123 are located within the upper portions of the watershed. At this time no work is planned that will impact State Game Lands. However, if plans are modified in a way that State Game Lands could be impacted, approvals will need to be coordinated with the Pennsylvania Game Commission.

New York State law may require the New York State Department of Environmental Conservation to become a non-federal sponsor of this project. The existing New York sponsors of this project are encouraged to continue to coordinate with NYS-DEC and determine if they should be added as official sponsors in the future. New sponsors may be added through a simple supplement to the Watershed Project Plan.

Costs

The costs shown throughout the document are based on standard cost accounting practices required of Federal watershed planning agencies, such as NRCS. The cost accounting guidance is *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (U.S. Water Resources Council, 1983). The basis for cost-sharing between NRCS and the Sponsors is based on the provisions of the Watershed Protection and Flood Prevention Act (PL 83-566). Tables 1, 2 and 4 at the end of this section are standard NRCS tables used to show estimated costs to implement the project.

Table 1 shows estimated costs for installing the project by primary project measures. Cost estimates for voluntary measures have more potential for wide variation depending on the actual rate of participation.

Table 2 shows a detailed breakdown of the costs. Construction costs include costs for building dikes and appurtenances, removing and decommissioning acquired houses and costs for constructing the nonstructural measures. Engineering costs cover design, surveys, investigations, development of land rights work maps, inspection services and similar work. Real Property costs are the costs of acquiring real property such as purchase price, closing costs, surveys and appraisal fees. Relocation costs are those costs incurred to relocate residents that are required to vacate their homes, as in the case of houses with induced flooding from the Wellsburg Dike. Relocation costs include items such as moving expenses, temporary lodging and the like. Project administration costs are the general costs incurred for managing project implementation, administering contracts, processing payments and similar costs.

Table 4 shows total annualized costs and the estimated operation and maintenance costs by the primary evaluation units. For this project two evaluation units were used. The two units are Wellsburg and the rest of the flood plain upstream of Wellsburg.

Additional details on costs eligible for NRCS assistance follow:

Flood warning system: assistance will be provided for needed components of the watershed-wide flood warning system, except that the Sponsors will be responsible for all costs associated with any needed dam breach routing information and Emergency Action Plans needed for each high hazard dam and planned dike in the watershed.

Components eligible for assistance include, but are not limited to: soil moisture, rainfall and stream gages, gage communications equipment; repeater stations; base station and computer; computer terminals; maps; weather radios and engineering services associated with eligible components.

Tributary Stabilization: Assistance will be provided for components of tributary stabilization. Eligible costs will include, but not be limited to: construction of the tributary stabilization measures; purchase of borrow and disposal of spoil (but not the real property rights); re-grading and reseeding; and engineering services associated with eligible components.

Dikes: Assistance will be provided for components of dike implementation, demolition of acquired buildings, and acquisition of some flood prone homes. Eligible costs will include, but not be limited to: construction of the dike and appurtenances; historic building mitigation, demolition and removal of buildings; purchase of borrow and disposal of spoil (but not the real property rights); acquisition costs of currently flooded houses that are outside of the dike; re-grading and reseeding; and engineering services associated with eligible components.

Acquisition: Assistance will be provided for components of property acquisition and the demolition of buildings. Eligible acquisition costs will include, but not be limited to: purchase of buildings, outbuildings and eligible land parcels (to be based on certified appraisals); closing costs such as appraisal fees, land survey fees, map preparation fees, recording fees, transfer taxes, title search fees, title insurance fees, title binder and policy costs; disconnecting utilities; removal of heating system tanks; demolition and disposal of buildings; plugging of basement drains; proper handling and disposal of hazardous wastes that are part of the building structure (i.e. asbestos); decommissioning wells, septic systems, and fuel tanks; re-grading and reseeding; riparian buffer plantings; and engineering services associated with eligible components.

Dry "Floodproofing": Assistance will be provided for the needed components for floodproofing houses. Eligible floodproofing costs will include, but not be limited to: construction of floodproofing measures; disconnection and reconnection of utilities; surface water diversion; installation of sumps and sump pumps; basement drain plugs and backflow devices; re-grading and reseeding; landscaping and aesthetic mitigation, if required; provisions as needed for persons with disabilities; and engineering services associated with eligible components.

Protection of Basement Utilities: Assistance will be provided for the needed components to protect basement utilities. Eligible costs will include, but not be limited to: construction of protection measures, disconnection and reconnection of utilities; removal and disposal of basement interiors; proper handling and disposal of hazardous wastes that are part of the building structure (i.e. asbestos); modification of basements; construction of a utility room; motel, if required (up to the maximum Federal lodging amount for the locality); re-grading and reseeding; landscaping and aesthetic mitigation features, if required; provision as needed for persons with disabilities; and engineering services associated with eligible components.

Mobile Home Elevation: Assistance will be provided for the needed components of mobile home elevation. Eligible costs will include, but not be limited to: elevation of the mobile home to the 100-year flood level plus freeboard; costs to restore structural integrity as specified for the Mobile Home Elevation measure; disconnection and reconnection of utilities; removal and disposal of exiting supports; proper handling and disposal of hazardous wastes that are part of the building structure (i.e. asbestos); motel (up to the maximum Federal lodging amount for the locality); re-grading and reseeding; landscaping and aesthetic mitigation features, if required; provisions as needed for persons with disabilities; and engineering services associated with eligible components.

Installation and Financing

Planned Sequence of Installation
Initial funding will be used to initiate completion of the flood warning system. This system is critical to the proper operation of the dikes and for residents who remain in the flood plain. The Sponsors, using their own resources, should ensure that Emergency Action Plans, including dam breach routings for every significant or high hazard dam have been performed. The breach flow impacts to measures included in the Preferred Alternative should be investigated.

Once a flood warning system is in place, other project measures can be implemented. Tributary stabilization measures need to be in place before construction of the earthen dikes begins. Reducing tributary sources of sediment is critical to the function of the dikes.

Nonstructural measures can be implemented at any point once the flood warning system is functional. Nonstructural measures are independent of the tributary stabilization measures and dikes and may be implemented concurrently. Installation of the nonstructural measures should follow a specified sequence to assure the highest practicable protection of life and the greatest practicable damage reduction, as funds become available.

The Sponsors will develop an objective ranking system with NRCS concurrence to prioritize nonstructural measures. The ranking system should take into consideration depth and severity of flooding, landowner willingness and ability to proceed, and other considerations. In the interest of maximum efficiency, cost control, and times savings, consideration will be given to work within several locations at the same time.

Concurrent with the above steps, the Sponsors should continue to encourage enforcement and improvements to the flood plain ordinances and stormwater management and encourage all the landowners in the flood plain to carry flood insurance.

Responsibilities
NRCS will be responsible for the following:

- Design the tributary stabilization measures for the four targeted tributaries listed in the plan
- Design of the NRCS Class I earthen dikes – drawings and specifications
- Assisting the Sponsors with the technical components of an Emergency Action Plan for each dike

- Executing project, grant or other implementation agreements with specific project Sponsors to obligate funds for various project measures.
- Mitigation for removal of National Register eligible house and consultation with NY State Historic Preservation Office
- Providing contract administration technical assistance for the project measures
- Providing construction management technical assistance (Inspector, Contracting Officer Technical Representative) for the dikes
- Providing financial assistance as appropriations become available under Agricultural Appropriations, Title II-Conservation Programs, Natural Resources Conservation Service, Watershed and Flood Prevention Operations
- Certifying completion of installed dikes

The Sponsors will be responsible for the following features relevant to their location:

- Updating/completing an Emergency Action Plan for all significant or high hazard dams located within the Bentley Creek Watershed.
- Developing a state approved Emergency Action Plan for each dike (Wellsburg and Centerville)
- Ensuring that all townships continue to remain in compliance with federal flood plain management and flood insurance programs
- Submitting a request to the Federal Emergency Management Agency for a Letter of Map Revision (LOMR) as part of the dike design.
- Executing separate project, grant or other implementation agreements with NRCS to obligate funds for various project measures.
- Installation of the flood warning system and tributary stabilization measures with responsibilities to be shared by both states
- Implementation of the nonstructural measures, to include providing program information to all eligible participants
- Securing all needed permits, easements, and rights for installation, operation, and maintenance
- Securing all needed real property rights for the dikes and tributary stabilization measures (using eminent domain if necessary).
- Holding all easements and land acquisitions in perpetuity or for the evaluated life of the project (100 years), as required by the specific project measure.
- Complying with the policies of the Uniform Relocation Assistance Act when relocating displaced persons. This Act does not apply to voluntary participants targeted for nonstructural measures.
- All needed utility and road relocations
- All buried waste found during construction activities, if any, and all associated costs.
- Assuring that proper zoning or other development regulations are in place, as needed
- Assuring upstream hazards are properly addressed before project implementation to ensure implemented measures function as designed.
- Assuring that municipalities implement proper stormwater management ordinances to protect downstream areas from increased flood risks
- Executing Operation and Maintenance (O&M) Agreements for all project measures and take responsibility for O&M of all project measures.
- Obtaining agreements with landowners/operators to Operate and Maintain implemented measures
- Encumbering participant property deeds, as required, to address nonstructural improvements
- Helping to coordinate activities with partner agencies and organizations
- Providing local administrative services necessary for installation of the project

<u>Contracting</u>

The dike projects will be installed by means of a federal contract administered by NRCS, as requested by the Sponsors. Other contracting arrangements will be agreed to between NRCS and the Sponsors before either party commences work activities. A project, grant or other implementation agreement between NRCS and the Sponsors will detail the work activities and financial responsibilities for both parties for other project measures.

Real Property and Relocation

The Sponsors are responsible for all land rights and relocations that are needed to implement the project. During implementation, NRCS will provide the Sponsors with land rights work maps showing what needs to be acquired and the type of land rights required. Properties needed to implement planned measures (other than voluntary nonstructural measures) may require the use of eminent domain. Persons displaced for non-voluntary measures are eligible for relocation assistance.

Structures, such as dikes and appurtenances, generally require fee simple title or term easements (for the evaluated life of the project which is 100-years). Areas of changed flows generally require a flowage easement. Construction generally requires a term easement for the construction period. The Sponsors will be required to certify that the needed land rights are acquired before implementation can begin. Some of the known land rights needs follow:

Flood Warning System – areas used for gages, telemetry and repeater station.

Tributary Stabilization – areas needed for construction, borrow and spoil areas and construction and maintenance ingress and egress. Estimated need is for 30-40 acres.

Dikes - the dikes and all appurtenances, such as diversions, stormwater management facilities, stream relocations, road closure structures and component storage, houses identified as having dike induced flooding. Estimated need is for 20-25 acres. An estimated 5 or 6 households will be eligible for relocation assistance in Wellsburg.

Relocations will comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646 (U.S.C. 4601 et. Seq. as implemented by 7C.F.R. 21).

In addition, written assurances, such as a Memorandum of Understanding (MOU) or equivalent must be acquired from the railroad in Wellsburg to ensure the continued maintenance and stability of the railroad embankment. The written assurances with the railroad company must include provisions that will ensure that the Sponsors will be able to operate and maintain the railroad embankment, in cooperation with the railroad company, to ensure continued functionality for the planned flood protection measures. The assurances should include language that will allow the sponsors to purchase the property/assume ownership in the event that the property comes under consideration for abandonment as a rail line.

Nonstructural – all voluntarily acquired homes. Acquired flood plain land will become a permanent conservation parcel, restricted to flood plain compatible uses. Estimated participation of about 6 homes, but 12 or more are eligible.

All acquired land rights will be retained by the Sponsors in perpetuity or for the evaluated life of the project (100 years), as required by the specific project measure. All land acquired or improved with Public Law 83-566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project, except to a public agency which will continue to maintain and operate the development in accordance with the Operations and Maintenance Agreement.

Cultural Resources

A mitigation plan will be required for one National Register of Historic Places eligible house, and associated outbuildings, to be acquired and removed from the floodplain as a result of induced flooding from the Wellsburg Dike. The house was evaluated during a Phase I Cultural Resource Survey (Birchwood Archaeological Services, 2007). The mitigation plan will be will be developed in consultation with the New York State Historic Preservation Office (NYS SHPO). NRCS is responsible for mitigation consultation.

Additional cultural resources investigation is required at the time of design of the Wellsburg Dike diversion outlet if the outlet remains in the vicinity of the cemetery near the Wellsburg Baptist Church. The NYS SHPO recommends additional testing to confirm that unmarked graves are not present in the construction area. The testing should consist of removal of topsoil along the entire diversion outlet project near the

cemetery. A qualified archaeologist should be used to examine the top of the subsoil in order to identify any possible grave shafts. NRCS should coordinate the findings with the NYS SHPO.

The location of borrow and spoil areas and other areas of disturbance not evaluated for cultural resources during planning will need to have cultural resource considerations before construction may begin.

Other than the cultural resource issues described above, the Pennsylvania and New York Phase I Cultural Resources Surveys completed by Birchwood Archaeological Services located no prehistoric cultural material, no other cultural features and no archaeological sites. However, if cultural resources are discovered during construction, NRCS will take action to mitigate the resources in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the regulations (36 CFR 800) of the Advisory Council on Historic Preservation and the New York State Historic Preservation Act (SHPA). In the case of a discovery during construction, NRCS will work closely with the Pennsylvania, New York and Seneca Nation of Indians Historic Preservation Officers to reduce project effects on cultural resources.

Solid and Hazardous Wastes

There are no known solid or hazardous wastes identified in the project area. If such wastes are discovered during construction, the Sponsors will ensure that such wastes are identified and disposed of in accordance with all applicable federal, state and local rules and regulations. The Sponsors will be responsible for waste identification and disposal, and if warranted, testing of soil and ground water and remediation plans. These activities will generally require the services of a hazardous waste consultant certified by the Pennsylvania Department of Environmental Protection, Bureau of Waste Management or New York State Department of Environmental Conservation.

Flood Plain Ordinances and Flood Insurance

All municipalities along Bentley Creek have ordinances that regulate development in the flood plain. All of the municipalities also participate in the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA). A Flood Insurance Study was done for the New York and Pennsylvania portions of Bentley Creek in 1981. This was done using the best principles and methods available at the time. In 2003, NRCS re-evaluated both the hydrology and hydraulics analysis related to establishing predicted 100-year flood elevations along the majority of Bentley Creek using the most current methods available. The NRCS analysis shows results that are different than FEMA's. It is recommended that the municipalities submit a Letter of Map Revision (LOMR) request to FEMA. There is currently no fee associated with the LOMR request since the information was developed by a federal agency.

Municipalities should be encouraged to strictly enforce current ordinances and to adopt enhanced ordinances that further restrict construction in the flood plain. Landowners that currently have flood insurance should be encouraged to acquire flood insurance whether or not they participate in the voluntary nonstructural project.

Financing

The NRCS share of installation costs will be provided from funds appropriated under the Watershed Protection and Flood Prevention Act (PL 83-566) through the Agricultural, Rural Development, Food and Drug Administration and Related Agencies Appropriations Bill, Title II – Conservation Programs, Natural Resources Conservation Service, Watershed and Flood Prevention Operations. This is not a fund-obligating document, and federal assistance is subject to the availability of Congressional appropriations.

The Sponsors have analyzed their financial requirements for carrying out the plan, including components that are not eligible for Federal assistance as part of this plan. The Sponsors will arrange for funds to be available, when needed, from donations, grants, cash reserves, tax revenues and other sources.

The Sponsors will be fully responsible for costs incurred for project administration, land rights, except those land rights that are eligible for program assistance, the development of Emergency Action Plans, permits, buried hazardous wastes, notification of landowners, public information/education, activities related to flood plain and storm water ordinances, operation and maintenance of installed measures and other costs not eligible for Federal assistance as part of this plan.

Table C shows the breakdown of estimated costs for each state's Sponsors and Table D shows the Sponsors' estimated annual operation and maintenance costs.

Table C. Estimated Sponsor Costs by Project Measure

Installation Cost Item	PL-83-566 NRCS	PA Sponsors			NY Sponsors			Total
		Real Property	Relo-cation	Project Admin	Real Property	Relo-cation	Project Admin	
Flood Warning System	$42,000	$0	$0	$1,500	$0	$0	$1,500	$45,000
Tributary Stabilization	$810,000	$12,500	$0	$1,500	$12,500	$0	$1,500	$838,000
Wellsburg Dike (PA-681)	$2,403,000	$0	$0	$0	$110,000	$1,000	$11,000	$2,525,000
Centerville Dike (PA-680)	$750,000	$5,000	$0	$1000	$0	$0	$0	$756,000
Nonstructural	$1,415,000	$5,000	$0	$16,000	$0	$0	$0	$1,436,000
Total	**$5,420,000**	**$22,500**	**$0**	**$20,000**	**$122,500**	**$1,000**	**$14,000**	**$5,600,000**

Table D. Estimated Sponsor Annual Operation and Maintenance Costs by Project Measure

Operation and Maintenance Cost Item	PA Sponsors	NY Sponsors	Total Annual O&M Cost
Flood Warning System	$7,000	$4,000	$11,000
Tributary Stabilization	$500	$500	$1,000
Wellsburg Dike (PA-681)	$0	$20,500	$20,500
Centerville Dike (PA-680)	$5,000	$0	$5,000
Nonstructural	$7,500	$0	$7,500
Total	**$20,000**	**$25,000**	**$45,000**

Conditions for Providing Assistance

Federal assistance is contingent upon the appropriation of funds for this purpose. Before federal funds are made available, the Sponsors will:

1. Give written assurance that they have the legal authority and sufficient funding; that they are willing and able to obtain all necessary land rights, easements, permits and that they will be responsible for ensuring the operation and maintenance of installed measures.
2. Complete State approved Emergency Action Plans for the dike protected areas of the project.
3. Give written assurance that all communities receiving Federal assistance remain in compliance with Federal flood plain management and flood insurance programs
4. Agree to carry out all work in accordance with Occupational Safety and Health Administration standards

5. Investigate, and where applicable, remove or remediate any potential upstream hazards that threaten the serviceability of the recommended project measures
6. Execute a Project Agreement, Grant Agreement or similar implementation agreement with NRCS for each project measure.
7. Execute an Operations and Maintenance (O&M) Agreement with NRCS for each project measure.

Operation and Maintenance (O&M)

Measures installed in this plan, will be operated maintained and replaced by the Sponsors with technical assistance from federal, state, and local agencies in accordance with their delegated authority. An O&M Agreement will be developed for the project area utilizing the NRCS-National Operation and Maintenance Manual, and will be executed when the implementation agreements are executed. At least one Sponsor will be fully responsible for all operation, maintenance, repair and replacement of each installed measures until such time that the structure is formally decommissioned in accordance with applicable laws and regulations.

The O&M Agreement will specify responsibilities of the Sponsor(s) and include detailed provisions for retention, use, and disposal of property acquired or improved with PL 83-566 cost sharing, requirements for operation and inspection, financial plan for conducting O&M activities, consultation requirements for modifications to works of improvement, notification requirements for emergency situations, policy related to violations of the agreement, recurring review and update of the agreement, preparation and review requirements for Emergency Action Plans (for the dikes), recordkeeping requirements, and other such requirements. Provisions will be made for free access of district, state, and federal representatives to inspect all structural measure and their appurtenances at any time.

The O&M Agreement will include O&M Plans for specific project measures. Typical Sponsor O&M responsibilities for each project measure include:

Flood warning system - repairs to or replacement of the rain gages, stream gages, repeater station, any needed fencing or other security features, base station computer, terminals, maps, weather radios, and other related components. Over the life of this project most, if not all, of these items will need to be replaced at the Sponsors expense.

Tributary stabilization - routine annual inspection, periodic replacement of rocks, if needed. These measures are dynamic in nature and will likely require adjustments with time if unfavorable changes occur in the stream reach.

Dikes - mowing at least twice per year, seeding of bare spots, brush removal, riprap replacement, annual inspection and other appropriate items to be detailed. Part of the operations will include training, periodic practice drills and real time operation of the road closure structures. In PennDOT District 3, municipalities often have agreements with the county for maintenance and operation of road closure structures.

Nonstructural - because most of the nonstructural measures will be implemented with individual landowners, much of the O&M responsibility will be transferred from the Sponsors to the landowners. Buildings addressed with nonstructural measures, such as dry “floodproofing”, protection of basement utilities, and mobile home elevation, will remain in the flood plain. These buildings will require ongoing O&M. O&M will be assured for these buildings by the placement of an encumbrance on the property in the form of deed covenants or restrictions. The encumbrance must be completed before construction commences.

The encumbrance will cover O&M requirements and prohibited activities. The encumbrance language will cover the primary conditions that need to be addressed and will include a comprehensive list of the types of actions that will be needed. The following items should generally be included, as applicable:

All Nonstructural Measures (except acquisition)

a. All parts of the building and property that are improved with Federal assistance funds will be operated, maintained and, if necessary, repaired or replaced to function as designed.
b. Outbuildings below the 100-year flood will not be used for living quarters.

c. Occupants will evacuate as directed by emergency management officials, police officers or other municipal / emergency personnel.
d. Works of improvement will be inspected by a qualified engineer after major flood events, those that produce in excess of three feet of floodwater adjacent to the building. The inspections should ensure that the works of improvement continue to function as designed ands that no health or safety problems have been created. Corrective actions will be completed as needed.
e. Informal surveillance of properties should be conducted between flood inspections. Corrective actions will be completed as needed.
f. New structures or facilities installed on the property may not interfere with the function, operation or maintenance of installed works of improvement. Any such changes must be evaluated and approved by an engineer.
g. It is recommended that the property owner purchase and maintain flood insurance.

Dry "Floodproofing"
Types of required maintenance, repairs and replacement include but are not limited to, backflow devices; sumps, drains and outlets; sump pumps and appurtenances, including periodic testing to assure proper function; concrete; caulking; floodproofing materials; waterstops; exterior stairs, ramps, porches and lift devices.

Protection of Basement Utilities:
Types of required maintenance, repairs and replacement include but are not limited to, backflow devices; drains and outlets; concrete; waterstops; exterior stairs, ramps, porches and lift devices.

Mobile Home Elevation
Types of required maintenance, repairs and replacement include but are not limited to, concrete; exterior stairs, ramps, porches and lift devices.

NRCS Standard Tables

Table 1. Estimated Installation Cost
Bentley Creek Watershed
Pennsylvania and New York
(Dollars)[1/]

Installation Cost Item	Units	Amount	PL-83-566 NRCS	Other Than PL-83-566	Total
Flood Warning System	no.	1	$42,000	$3,000	$45,000
Tributary Stabilization	ft.	19000	$810,000	$28,000	$838,000
Wellsburg Dike (PA-681)	ft.	4200	$2,403,000	$122,000	$2,525,000
Centerville Dike (PA-680)	ft.	2400	$750,000	$6,000	$756,000
Nonstructural	no.	≈60	$1,415,000	$21,000	$1,436,000
Total			**$5,420,000**	**$180,000**	**$5,600,000**

[1/] Price Base 2011

Table 2. Estimated Cost Distribution - Structural and nonstructural measures

Bentley Creek Watershed

Pennsylvania and New York

(Dollars) [1/]

Item	Installation Costs - PL 83-566 NRCS						Installation Costs - Other Than PL 83-566						Total Installation Cost
	Construction	Engineering	Real Property	Relocation	Project Admin.	**Total PL 83-566 NRCS**	Construction	Engineering	Real Property	Relocation	Project Admin.	**Total Other Than PL 83-566**	
Flood Warning System	$35,000	$5,000	$0	$0	$2,000	$42,000	$0	$0	$0	$0	$3,000	$3,000	**$45,000**
Tributary Stabilization	$650,000	$100,000	$0	$0	$60,000	$810,000	$0	$0	$25,000	$0	$3,000	$28,000	**$838,000**
Wellsburg Dike (PA-681)	$1,755,000	$265,000	$190,000	$15,000	$178,000	$2,403,000	$0	$0	$110,000	$1,000	$11,000	$122,000	**$2,525,000**
Centerville Dike (PA-680)	$605,000	$90,000	$0	$0	$55,000	$750,000	$0	$0	$5,000	$0	$1,000	$6,000	**$756,000**
Nonstructural	$785,000	$65,000	$475,000	$0	$90,000	$1,415,000	$0	$0	$5,000	$0	$16,000	$21,000	**$1,436,000**
Totals	**$3,830,000**	**$525,000**	**$665,000**	**$15,000**	**$385,000**	**$5,420,000**	**$0**	**$0**	**$145,000**	**$1,000**	**$34,000**	**$180,000**	**$5,600,000**

[1/] Price Base 2011

Table 3a. Structural Data – Dikes [1/]

Bentley Creek Watershed

Pennsylvania and New York

Dike	Stationing	Top Width (ft)	Average Side Slope	Average Height of Dike (ft)	100-Year Frequency Velocity (ft/sec)	Dike Protection	Volume of Earthfill (yd^3)
Wellsburg Dike (PA-681) with Road Closure Structures at STA 3+50 and STA 32+00	(Downstream End)						
	0+00 to 5+00	10	2.75:1	8.5	5.0	Riprap	6200
	5+00 to 10+00	10	2.75:1	12.0	3.5	Riprap	9500
	10+00 to 15+00	10	2.75:1	11.0	3.5	Riprap	6800
	15+00 to 20+00	10	2.75:1	10.5	6.0	Riprap	7300
	20+00 to 25+00	10	2.75:1	9.5	5.0	Riprap	5300
	25+00 to 30+00	10	2.75:1	8.0	5.0	Riprap	4000
	30+00 to 35+00	10	2.75:1	9.0	2.5	Vegetation	6200
	35+00 to 40+00	10	2.75:1	11.5	2.0	Vegetation	7200
	40+00 to 42+00	10	2.75:1	8.5	2.0	Vegetation	900
	(Upstream End)						
							53,400
Centerville Dike (PA-680) with Road Closure Structure at STA 1+50	(Downstream End)						
	0+00 to 3+00	10	2.75:1	3.5	3.0	Vegetation	1500
	3+00 to 7+00	10	2.75:1	6.0	5.5	Riprap	4000
	7+00 to 10+70	10	2.75:1	5.5	5.5	Riprap	2200
	10+70 to 14+70	10	2.75:1	5.5	5.0	Riprap	3100
	14+70 to 17+20	10	2.75:1	6.8	7.0	Riprap	1500
	17+20 to 18+70	10	2.75:1	8.8	7.0	Riprap	2100
	18+70 to 19+50	10	2.75:1	10.5	3.0	Vegetation	1200
	19+50 to 22+50	10	2.75:1	9.5	3.0	Vegetation	7500
	22+50 to 24+30	10	2.75:1	3.5	3.0	Vegetation	1800
	(Upstream End)						
							24,900

[1/] Dikes are Class I (Ref. NRCS Eng. Standard No. 356). All earth dikes have 3:1 land side slopes and 2.5:1 river side slopes.

Table 3b - Structural Data - Channel Work
100-Year Design Flow [1/]

Bentley Creek Watershed

New York

						Channel Dimensions			
Channel Name	**Station**	**Drainage Area** (mi^2)	**2-Year Design Q** (cfs)	**Water Surface EL** [1/] (ft-msl)	**Hydraulic Gradient** (ft/ft)	**Gradient** (ft/ft)	**Bottom Width** (ft)	**Elev** [1/] (ft-msl)	**Side Slope**
Tyler Run Extension	8+25	0.7	100	1.6 ft flow depth	0.013	0.013	8	1.6 ft flow depth	3:1
	825 ft long		100 cfs est. max. 2-yr Q	2-year Q				2-year Q	

	n Value		Velocities (fps)						
Channel Name	**Aged**	**As built**	**Aged**	**As built**	**Excavation Volume** (yd^3)	**Type of Work** [2/]	**Existing Channel Type** [3/]	**Present Flow Condition** [4/]	
Tyler Run Extension	0.04	0.04	4.6	4.6	2560	I	M	I	
	Rock-lined	Rock-lined	Bank-full (2-yr)	Bank-full (2-yr)			Modification date unknown (post 1902)		

[1/] This channel is located within the Bentley Creek 100-year flood plain. 100-year flow will be the same depth as the Bentley Creek 100-year flood. The 2-year design flow provides stability during normal flows. The dike will contain all out-of bank flows within the Bentley Creek 100-year flood plain.

[2/] I - Establishment of new channel including necessary stabilization measures

[3/] M - Manmade ditch or previously modified channel or stream

[4/] I - Intermittent- continuous flow through some seasons of the year

Table 4. Estimated Average Annual NED Costs
Bentley Creek Watershed
Pennsylvania and New York
(Dollars) [1/]

Evaluation Unit	Project outlays		Other Direct Costs	Total
	Amortization of Cost	Operation, maintenance and replacement cost		
Wellsburg	$139,000	$25,000	$0	$164,000
Upstream of Wellsburg	$ 91,000	$20,000	$0	$111,000
Totals	**$230,000**	**$45,000**	**$0**	**$275,000**

[1/] Price Base 2011, amortized over 100 years at a discount rate of 4.0 percent.

Table 5. Estimated Average Annual Flood Damage Reduction Benefits
Bentley Creek Watershed
Pennsylvania and New York
(Dollars) [1/]

	Estimated average annual damage		
	Ag. Related [2/]		
Item	Without project	With project	Damage reduction benefit
Buildings	$770,000	$210,000	$560,000
Sedimentation	$ 20,000	$ 10,000	$ 10,000
Totals	**$790,000**	**$220,000**	**$570,000**

[1/] Price Base 2011

[2/] Agricultural-related damage includes damage to rural communities

Table 6. Comparison of NED Benefits and Costs

Bentley Creek Watershed

Pennsylvania and New York

(Dollars) [1/]

Wellsburg	$430,000	$164,000	
Upstream of Wellsburg	$140,000	$111,000	
Total	**$570,000**	**$275,000**	**2.1 : 1.0**

[1/] Price Base 2011

[2/] From Table 5, Estimated Average Annual Flood Damage Reduction Benefits (all agriculture-related, including benefits to rural communities)

[3/] From Table 4, Estimated Average Annual NED Costs

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LIST OF PREPARERS

Bradford County Conservation District	Present Title	Education	Years Experience
Mike Lovegreen	District Manager	B.S. Environmental Management State University of New York	31
Jason Petlock	District Technical Team Leader	B.S. Environmental Science Susquehanna University	9
Chemung County Soil and Water Conservation District			
Mark Watts	District Manager	AAS Natural Resources Cobleskill College	28
NRCS-Pennsylvania			
Craig Aiello	Economist	B.A. Economics Messiah College	6
Geoffrey Cerrelli	Hydraulic Engineer	B.S. Civil Engineering/ Water Resources University of Maryland	24
John George	Supervisory District Conservationist	B.S. Agronomy Delaware Valley College	40
Jeff Mahood	Environmental Planning Specialist	B.S. Environmental Resource Management Penn State University	33
Colleen Tennity	Economist	B.S. Economics University of Pittsburgh	2
Travis Watkins	Natural Resources Specialist	B.S. Agibusiness Florida A&M University	3
Alan Wood	State Project Engineer	B.S. Ag Engineering Penn State University M.S. Civil Engineering Colorado State University PhD Ag & Bio. Engineering Penn State University	31
NRCS-New York			
Chris Henry	Civil Engineer	B.S. Civil Engineering Technology Penn State University M.E. Environmental Engineering (Hydrological) Stevens Institute of Technology	29

Note: The preliminary Watershed Project Plan-Environmental Assessment was reviewed by NRCS technical specialists, including the NRCS National Water Management Center staff in Little Rock, Arkansas.

Appendix A

Letters of Comment

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHCENTRAL REGIONAL OFFICE

February 13, 2012

Denise Coleman, State Conservationist
USDA-Natural Resource Conservation Service
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993

Re: Bentley Creek
Draft Watershed Project Plan – Environmental Assessment
Bradford County, Pennsylvania

Dear Ms. Coleman:

I am writing in regards to the above referenced project proposal. Regional staff has completed a preliminary review of your submittal and offer the following comments:

- This project will require Chapter 105 water obstruction and encroachment permitting. Please contact John Twardowski of the Waterways and Wetlands Program to discuss this project.

- A cursory review of the draft plan has determined that water quality improvements with the selected alternative are slight and may be offset by increased velocities through the diked areas with possible accelerated erosion downstream. However at this time, weighing all the factors involved in this process, no objections are being made to the selected alternative.

Sincerely,

James E. Miller
Assistant Regional Director

cc: Dave Garg
Tom Randis
ARD File
File

208 West Third Street, Suite 101 | Williamsport, PA 17701-6448
Phone 570.327.3695 | Fax 570.327.3565
www.depweb.state.pa.us

Pennsylvania Fish & Boat Commission

Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823
Phone: 814-359-5140
Email: daniryan@pa.gov

November 14, 2014

Denise Coleman
State Conservationist
USDA-Natural Resource Conservation Service
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993
Phone: 717-237-2221
Fax: 717-238-2239
ATTN: Bentley Creek Draft Watershed Project Plan,
Environmental Assessment

Dear Ms. Coleman:

The Pennsylvania Fish and Boat Commission (PFBC) concurs with the need for flood protection in this area and with flood-proofing structures in the floodway to prevent negative impacts to water quality during flood flows and/or periods of inundation.

A search in the Pennsylvania Natural Diversity Index (PNDI) within the project limits appeared to not result in any adverse impacts to state threatened or endangered organisms under the jurisdiction of the PFBC. However, a PNDI screening form will still need to be submitted to the Department of Environmental Protection (DEP) when applying for individual water encroachment permits.

The PFBC intends to review individual water encroachment permits on a permit-by-permit basis, with recommendations provided to DEP to protect aquatic resources in the area depending on the location and scope of the proposed project.

Sincerely,

Daniel Ryan
Encroachment Biologist, PFBC
Watershed Analysis Section
Division of Environmental Services

Division of Environmental
Planning and Habitat
Protection
717-783-5957

COMMONWEALTH OF PENNSYLVANIA
Pennsylvania Game Commission
2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

"To manage all wild birds, mammals and their habitats for current and future generations."

ADMINISTRATIVE BUREAUS:

ADMINISTRATION.....717-787-5670
HUMAN RESOURCES.....717-787-7836
FISCAL MANAGEMENT.....717-787-7314
CONTRACTS AND PROCUREMENT.....717-787-6594
LICENSING.....717-787-2084
OFFICE SERVICES.....717-787-2116
WILDLIFE MANAGEMENT.....717-787-5529
INFORMATION & EDUCATION.....717-787-6286
WILDLIFE PROTECTION.....717-783-6526
WILDLIFE HABITAT MANAGEMENT.....717-787-6818
REAL ESTATE DIVISION.....717-787-6568
AUTOMATED TECHNOLOGY SERVICES.....717-787-4076

www.pgc.state.pa.us

February 22, 2012

Ms. Denise Coleman
USDA-Natural Resource Conservation Service
One Credit Union Place, Suite 340
Harrisburg, Pennsylvania 17110-2993

Re: Bentley Creek – Draft Watershed Project Plan – Environmental Assessment
Bradford County, Pennsylvania and Chemung County, New York

Dear Ms. Coleman,

Thank you for submitting the Bentley Creek Draft Watershed Project Plan – Environmental Assessment to the Pennsylvania Game Commission (PGC) for review. The PGC has screened this project for potential impacts to species and resources of concern under its responsibility, which includes birds and mammals only.

Records indicate that no known occurrences of species or resources of concern under PGC jurisdiction occur in the vicinity of the project. Therefore, based on the information you submitted concerning the nature of the project, the immediate location, and our detailed resource information, the PGC has determined that no impacts to state listed **threatened or endangered** bird or mammal species are likely.

However, portions of **State Game Lands #123** are located within the boundaries of the Bentley Creek Watershed. Please contact the Northeast Regional Office at (570) 675-1143 to discuss any project activities and coordinate obtaining the necessary approvals if your project will impact State Game Lands. It is recommended that you coordinate with Game Commission Staff early in your project planning process.

We appreciate the opportunity to provide these comments at this stage in the planning process. If you have any questions or concerns, please contact me at (717) 783-5957.

Sincerely,

Olivia A. Mowery
Environmental Planner
Division of Environmental Planning & Habitat Protection
Bureau of Wildlife Habitat Management
Phone: 717-787-4250, Extension 3128

OS-2 (10-08)

pennsylvania
DEPARTMENT OF TRANSPORTATION
www.dot.state.pa.us

February 21, 2012

Ms. Denise Coleman
State Conservationist
USDA-Natural Resource Conservation Service
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993

Dear Ms. Coleman:

Thank you for the opportunity to review the Bentley Creek Draft Watershed Project Plan — Environmental Assessment.

PennDOT offers the following comments on the proposed Centerville Dike in Bradford County:

1. The project will require a Highway Occupancy Permit (H.O.P.) The PennDOT District 3-0 H.O.P. manger can help you determine any H.O.P. requirements.

   His contact information is:
   James Krise, Permit Manager
   715 Jordan Avenue
   Montoursville, PA 17754
   (570) 368-4290 • jkrise@pa.gov

2. PennDOT would not maintain the proposed road closure structure on Berwick Turnpike (SR 4013). The municipality would be responsible for maintenance. For similar structures in PennDOT District 3, municipalities have agreements with their counties for maintenance and operation.

Sincerely,

Gary Fawver, P.E.
Chief, Environmental Policy and
Development Section
Bureau of Project Delivery

Cc: Eric High, Asst. District Executive - Design, District 3-0

4380/GCF/jaa

New York State Department of Environmental Conservation
Bureau of Flood Protection and Dam Safety

Subject: Re: Fwd: Re: Bentley Creek Draft Watershed Plan

Date: Wed, 29 Feb 2012 11:01:42 -0500

From: William Nechamen <wsnecham@gw.dec.state.ny.us>

To: Joy Brewer <jpbrewer@gw.dec.state.ny.us>, Mark Watts <markwatts@stny.rr.com>

CC: Stephen Len <selen@gw.dec.state.ny.us>

I was able to open it. Here are my comments:

P. 49:
"The dikes will be NRCS Class I, high hazard. This classification is based on the potential for loss of life should the dike breach. High hazard structures are designed to the highest safety standards utilizing the latest techniques to ensure the structures will function as designed. The inundation area resulting from a breach of the dikes will not exceed what occurred prior to the dikes being placed. It is possible

that a breach failure of the dike would result in a shorter warning time for affected residents to evacuate."

Comment: An inundation area from a breach of a dike can exceed what occurred prior to the dikes being placed. This is for two reasons. First, the combination of a breach and interior drainage entrapment could result in floodwaters being trapped on the landward side of the levee, then running downstream until a path back to the creek can be found. Second, a catastrophic levee breach could release a sudden surge of water that is at a higher elevation then the flood waters would be without the dike. This is because the floodwaters constrained by a dike will be higher than in a without dike scenario and the sudden release would be a powerful surge that maintains a height and velocity in excess of the natural valley condition.

P. 49:

"The dikes are to be built such that they include the maximum freeboard specified by local, state, or federal laws or standards above the accepted 100-year flood elevation."

Comment: This is a minimum standard for showing a levee system as offering protection from a “base flood” on a FEMA Flood Insurance Rate Map. This is the flood that has a one percent chance of occurring each year, often called the 100 year flood. Larger floods can and do occur and the so called 100 year flood can be a moving target due to climate change. We recommend that the 500 year (.2%) flood be used as a basis for protection of developed areas.

Floodplain Mapping Issues: Because this will result in a change to the Special Flood Hazard Area and Floodway, a Letter of Map Revision to FEMA must be part of the design. We have no comments about the DOT in addition to the comments sent on 2/28/12. To repeat:

Regarding the floodway issue, if the land remains under local control (not federally purchased), then all local floodway requirements must be met. That means that an increase in the base flood elevation must be avoided. If it cannot be avoided, then a revision to the FEMA Flood Insurance Rate Map (FIRM) must be completed in the form of a Letter of Map Revision. The LOMR process includes a notice of community intent to modify the floodways and notification of all affected property owners. There must also be concurrence by the chief elected official of all impacted municipalities, and certification that no structures are located in areas that would be impacted by the increased base flood elevation.

The federal regulations for floodways are as follows:

44CFR60.3(d): the community shall:

(3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;

(4) Notwithstanding any other provisions of § 60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of § 65.12, and receives the approval of the Administrator

44CFR§ 65.12 Revision of flood insurance rate maps to reflect base flood elevations caused by proposed encroachments.

(a) When a community proposes to permit encroachments upon the flood plain when a regulatory floodway has not been adopted or to permit encroachments upon an adopted regulatory floodway which will cause base flood elevation increases in excess of those permitted under paragraphs (c)(10) or (d)(3) of § 60.3 of this subchapter, the community shall apply to the Administrator for conditional approval of such action prior to permitting the encroachments to occur and shall submit the following as part of its application:

(1) A request for conditional approval of map change and the appropriate initial fee as specified by § 72.3 of this subchapter or a request for exemption from fees as specified by § 72.5 of this subchapter, whichever is appropriate; (NOTE: This may be fee exempt if 50% or more of the project's costs are federally funded)

(2) An evaluation of alternatives which would not result in a base flood elevation increase above that permitted under paragraphs (c)(10) or (d)(3) of § 60.3 of this subchapter demonstrating why these alternatives are not feasible;

(3) Documentation of individual legal notice to all impacted property owners within and outside of the community, explaining the impact of the proposed action on their property.

(4) Concurrence of the Chief Executive Officer of any other communities impacted by the proposed actions;

(5) Certification that no structures are located in areas which would be impacted by the increased base flood elevation; (NOTE: A structure is defined as a walled and roofed building or a gas or liquid storage tank that is principally above ground.)

(6) A request for revision of base flood elevation determination according to the provisions of § 65.6 of this part;

(7) A request for floodway revision in accordance with the provisions of § 65.7 of this part;

(b) Upon receipt of the Administrator's conditional approval of map change and prior to approving the proposed encroachments, a community

shall provide evidence to the Administrator of the adoption of flood plain management ordinances incorporating the increased base flood elevations and/project condition.

(c) Upon completion of the proposed encroachments, a community shall provide as-built certifications in accordance with the provisions of § 65.3 of this part. The Administrator will initiate a final map revision upon receipt of such certifications in accordance with part 67 of this subchapter.

Other comments:

Would any of the voluntary buy out structures have a higher BFE as a result of the project? If so, then the project cannot precede without a buyout of those structures in accordance with Letter of Map Revision requirements.

p. 54: Why was an 8' depth of flooding used for mobile home acquisitions when one foot of flooding above the floor is enough to destroy a mobile home?

p. 54: Note that dry floodproofing for residential structures may be done under NFIP requirements as long as the dollar value does not result in a substantial improvement to the structure. Substantial improvement is any improvement the cost of which equals or exceeds 50% of the market value of the structure prior to the improvement. Should such improvement be a substantial improvement, then the entire structure must be elevated to meet floodplain design standards. Also note that dry floodproofing of residential structures does not decrease the flood insurance rate on that structure.

P. 62:
"In 2003, NRCS re-evaluated both the hydrology and hydraulics analysis related to establishing predicted 100-year flood elevations along the entire Bentley Creek using the most current methods available. The NRCS analysis shows results that are different than FEMA's. It is suggested that the municipalities request FEMA to update the Flood Insurance Rate Maps (FIRM) for Bentley Creek with more modern methods and data similar to the NRCS procedures."
Comment: This data should be submitted to FEMA as a Letter of Map Revision. There is no FEMA fee if the information was developed by a federal agency. FEMA is unlikely to update the study on its own based upon a request due to limited mapping funds and the high number of similarly out of date flood studies throughout the state and the nation.
Finally, as per my previous email, note that DEC is required by state law to be the non-federal sponsor of all federally constructed flood control projects in New York State. USDA must coordinate any federally constructed flood control project with the Bureau's Flood Control Projects Section. Please coordinate with Steve Len on that.
Bill Nechamen

William Nechamen, CFM
Chief Floodplain Management Section
Bureau of Flood Protection and Dam Safety
New York State Department of Environmental Conservation
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107 Broadway
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BRIAN C. KELLY, P.E.
ACTING REGIONAL DIRECTOR

JOAN McDONALD
COMMISSIONER

February 27, 2012

USDA-Natural Resources Conservation Service
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993

RE: Bentley Creek Draft Watershed Project Plan
Environmental Assessment

Dear USDA – Natural Resources Conservation Service,

I am the Acting Regional Planning Engineer for the Region 6 Office of the NYSDOT. Our Region covers the Village of Wellsburg and all of Chemung County. When we received notice that there was a draft Watershed Project Plan for the Wellsburg Area, I had our Hydraulics Engineer review the document and provide any comments he may have.

As a brief summary, the watershed plan is being proposed to prevent future flooding of the village of Wellsburg. The proposed work along Bentley Creek in New York State consists of the construction of a dike system along the eastern side of Bentley Creek running from an existing railroad embankment approximately 250' downstream from BIN 1048400, State Route 427 over Bentley Creek, Wellsburg to approximately 600' upstream from BIN 1046800, State Route 367 over Bentley Creek, Wellsburg. Road closure structures would be installed where the dike crosses State Routes 367 and 427. The Report indicates these structures would be activated by local personnel when the water level in Bentley Creek is forecasted to overtop the road. In addition, approximately 200' north of BIN 1046800 on State Route 367, is a 14' x 6' culvert (CIN C650168) that carries Tyler Run under the highway. Approximately 1000' upstream from this culvert, the Report proposes to realign this creek southward toward State Route 367.

The following are the concerns that we have with the proposed plan:

1. A railroad bridge is located approximately 250' downstream from BIN 1048400. This structure is a two-span bridge, 110' long (total) with an approximate 15' wide pier in the center. This bridge appears to present a serious constriction to the flow of Bentley Creek. Replacing this bridge with a single-span structure and raising the bottom of the girders would greatly reduce this constriction and the associated backwater currently caused by the present bridge. The Report doesn't describe this railroad bridge or its effects on raising the backwater in Bentley Creek. We are not aware of any future plans by the railroad to replace this structure.

2. Water surface elevations of Bentley Creek for Q100 and Q500 were computed for the existing conditions without dikes and for the proposed conditions with dikes, and are listed in Tables in the Draft Environmental Assessment. These tables indicated the water surface of Q100 at the upstream faces of the State bridges, BINs 1048400 and 1046800, would rise after construction of the dikes by 2.7' at BIN 1048400 and by 3.9' at BIN 1046800. The water surface elevations in the Assessment were compared with the road centerline elevations in the Project Plans for these bridges. This comparison appears to indicate the water surface (Q100) of Bentley Creek would overtop State Route 427 at BIN 1048400 by 2'. Because State Route 327 slopes downward to the north, the water surface (Q100) of Bentley Creek, after construction of the dike system, would rise approximately 0.3' above the centerline of the road at the north abutment and would be approximately 2' below the centerline of the road at the south abutment.

3. The Report indicates these dikes would be constructed to an elevation of 3' above Q100. This Report also indicates the railroad embankment is slightly higher than the elevation of the 100-year Chemung River flood stage in the Wellsburg vicinity, but does not have any significant freeboard above that.

4. In December 1980, the Federal Emergency Management Agency published the Flood Insurance Study for the Village of Wellsburg, Chemung County (FIS). The "Flood Boundary and Floodway Map" indicates the proposed route of the Wellsburg dike will be constructed within the Bentley Creek Floodway. Figure 2 on page 10 of the FIS shows the 100-year floodplain is composed of two parts: the floodway, which is the center portion reserved for the floodwaters and where encroachment is not allowed, and the floodway fringe, which is the outer portion, where encroachment is permitted. These two areas are further defined on page 8 of the FIS. Table 2 of the FIS lists the base (Q100) flood water surface elevations in Bentley Creek, both without and with encroachment in the floodway fringe areas, and it also lists the increase in water surface elevations allowed. At BIN 1048400, the State Route 427 bridge, the maximum increase varies from 0.4' between the railroad bridge and BIN 1048400 to 0.7' approximately 300' upstream from BIN 1048400. At BIN 1046800, the State Route 367 bridge, the maximum increase varies from 0.4' at approximately 400' downstream from this bridge to 0.3' approximately 100' upstream from BIN 1046800. As proposed, this project appears to violate the above FEMA requirements in two areas; first, it involves construction of dikes within the Bentley Creek floodway and second, it raises the water surface elevations of Bentley Creek for Q100 above those allowed in Table 2 of the FIS.

5. The plan discusses Road Closure Structures on the Village side of the two State highways within the proposed dike. It would appear that similar structures would be appropriate south of the Village on State Highway 367 and West of the Village on State Highway 427.

6. The construction of any structure within the State right of way will require a Highway Work Permit from our Office. You will need to coordinate this effort as the watershed project progresses.

We are certainly willing to work with the appropriate Agencies on the plan but our funds are very limited and we do not have any current plans to replace or raise the NYSDOT owned structures on State Routes 367 and 427.

Thank you for allowing us to review the draft plan, you may contact me at the following should you wish to discuss our concerns:

Andrew H. Williams, PE
Acting Regional Planning & Program Manager
Region 6 Planning Office
107 Broadway
Hornell, NY 14843
email: awilliams1@dot.state.ny.us
phone: 607 324-8410

We look forward to hearing from you.

Sincerely,

Andrew H. Williams, PE
AHW:lf

cc: Paul Kieda - NYSDOT Hydraulic Engineer
Paul McAnany - NYSDOT Resident Engineer 6-2

State of New York
Department of Transportation
Region Six
107 Broadway
Hornell, New York 14843
www.dot.ny.gov

BRIAN C. KELLY, P.E.
ACTING REGIONAL DIRECTOR

JOAN McDONALD
COMMISSIONER

March 20, 2012

Mr. John Metrick
Natural Resource Specialist
USDA-Natural Resources Conservation Service
One Credit Union Place, Suite 340
Harrisburg, PA 17110-2993

Re: Bentley Creek Draft Watershed Project Plan
Environmental Assessment Comments

Dear Mr. Metrick:

Thank you for the recent conference call that gave us a chance to discuss the comments we provided on 2/27/12 for the Bentley Creek Draft Watershed Project Plan. As I mentioned, we had not seen this plan before so our comments may be late with respect to your schedule, but we believe the transportation issues are an important consideration for the study.

As a result of the discussion, we came to the agreement on how to address all of our comments with the exception of this one, "*Water surface elevations of Bentley Creek for Q100 and Q500 were computed for the existing conditions without dikes and for the proposed conditions with dikes, and are listed in Tables in the Draft Environmental Assessment. These tables indicated the water surface of Q100 at the upstream faces of the State bridges, BINs 1048400 and 1046800, would rise after construction of the dikes by 2.7' at BIN 1048400 and by 3.9' at BIN 1046800. The water surface elevations in the Assessment were compared with the road centerline elevations in the Project Plans for these bridges. This comparison appears to indicate the water surface (Q100) of Bentley Creek would overtop State Route 427 at BIN 1048400 by 2'. Because State Route 327 slopes downward to the north, the water surface (Q100) of Bentley Creek, after construction of the dike system, would rise approximately 0.3' above the centerline of the road at the north abutment and would be approximately 2' below the centerline of the road at the south abutment.*"

The following are the responses we recommend be added to the draft in order for the NYSDOT to agree that the issues related to the transportation have been adequately considered in the study:

1. The NYSDOT acknowledges the public benefit of the proposed levee systems to the Village of Wellsburg and is not asking for the proposed Watershed Protection Plan to spend a significant amount of the project funds to replace the two State Highway bridges.

2. The existing bridge over Bentley Creek on State Route 427 (BIN 1048400) was built in 1992 and is in very good condition. Under the existing condition, we anticipate that this bridge will give the traveling public many years of service. We currently have no plans to perform any work on this bridge with the exception of routine maintenance. As this is a more modern structure, specific design elements were incorporated into the construction of this bridge so it is able to withstand the periodic flooding under the current conditions. The data in the study shows that the proposed conditions will increase the amount of water over this bridge, which will exceed the design conditions.

3. The existing bridge over Bentley Creek on State Route 367 (BIN 1046800) was built in 1940 and had a major rehabilitation project on it in 1992. Under the existing conditions we anticipate this bridge will give the traveling public many years of service. We have no plans to perform any work on this bridge with the exception of routine maintenance. Due to its age, this truss structure does not have any design elements incorporated into it that will help it withstand the periodic and increased flood impacts of Bentley Creek. We would request that during the design phase of the study, consideration be given to incorporate a bearing protection retrofit for this bridge into the proposed work.

4. Based on the data shown in the study, we have concluded that there is an increased risk of damage or failure to the bridges which would potentially lead to a loss of service to the traveling public. In addition, the NYSDOT has a process in place to inspect bridges that are involved in high water or flood events by a licensed engineer experienced in structures. The proposed changes to the water surface elevation will likely require additional post flood inspections and could lead to a delay in a return of the bridges to service especially if they are found to be damaged. These issues need to be mentioned in the study.

5. As stated in my 2/27/12 letter, the construction of any structure within State Right-of-Way will require a Highway Work Permit from our office. The proposed levee and stop log structures appear to be within State Right-of-Way and as such, would require a Highway Work Permit. I can provide the contact at the appropriate time. The need for this permit must be added to the draft study.

6. If the USDA has not already contacted Norfolk Southern Railroad with respect to this study, we would recommend that they be given the opportunity to provide comments regarding the impacts to their bridge and track infrastructure.

As I stated earlier, we acknowledge the public benefit of the proposed levee for the Village of Wellsburg. However, we believe that the State transportation system around the Village will be impacted by the construction of it and that the study should state so.

We will continue to work with you on the draft Bentley Creek Plan; feel free to contact me if you have any questions.

Sincerely,

Andrew H. Williams, PE
Acting RPPM
AHW:lf

cc: B. C. Kelly, Acting Regional Director
P. McAnany, Resident Engineer, Res. 6-2
P. Kieda, Regional Hydraulics Engineer

Appendix B

Flood Plain Maps

Three sets of flood plain panels:

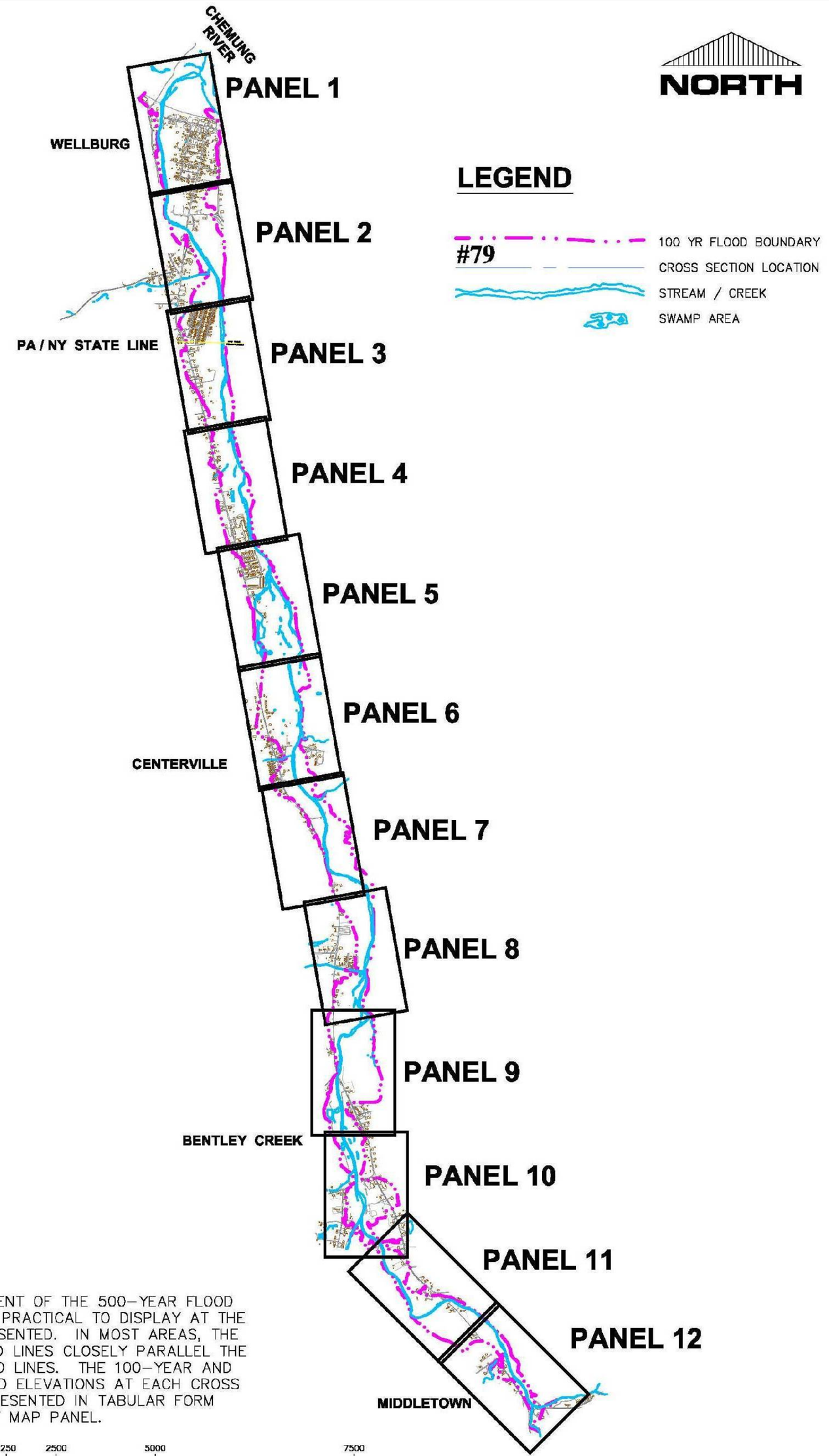
- **1st set** - **100-Year Flood Plain,** based on Existing and Expected Future Conditions. Existing Condition and Expected Future Conditions are identical, except as shown in the second set of panels where the dikes are planned.
- **2nd set - 100-Year Flood Plain With Dikes**
- **3rd set - Dike Breach Inundation Areas**. Note that the dike breach area is identical to the 100-year flood plain represented on the first set of panels.

Notes:

1. The aerial extent of the 500-year flood plain was not practical to display at the map scale presented in the following panels. In most areas, the 500-year flood lines closely parallel the 100-year flood lines. The 100-year and 500-year flood elevations are presented in tables at the end of the set of panels.

2. In the event of a dike breach, the aerial extend of the 100-year and 500-year flood plain will be essentially the same as if the dikes were not in place. It is possible that a breach failure of the dike would result in a shorter warning time for affected residents to evacuate and the initial surge of a breach may have a higher velocity and height near the point of breach than if the dikes were not there.

3. Grid lines on panels are 500 feet x 500 feet.



99

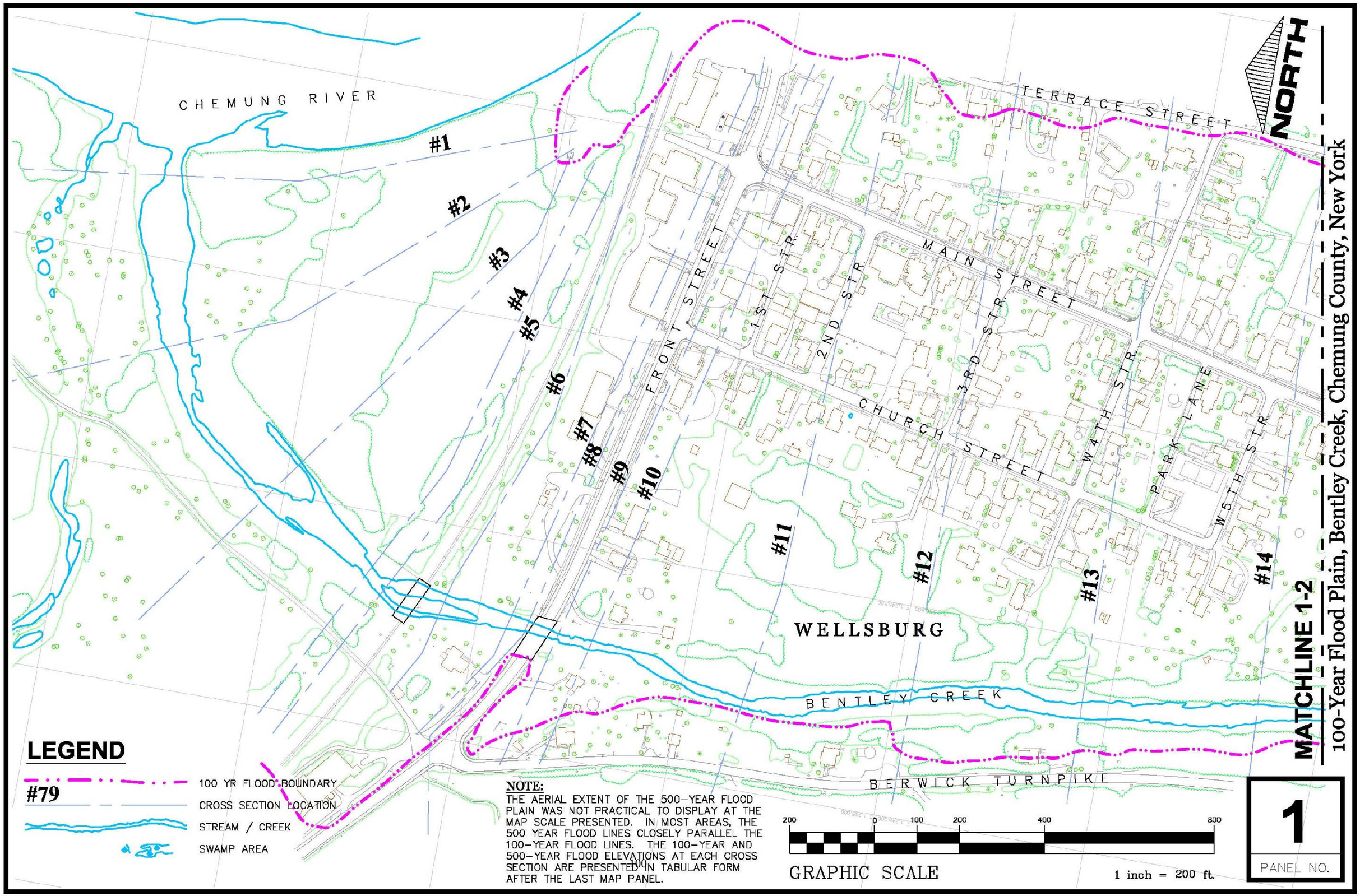
NOTE:
THE AERIAL EXTENT OF THE 500–YEAR FLOOD PLAIN WAS NOT PRACTICAL TO DISPLAY AT THE MAP SCALE PRESENTED. IN MOST AREAS, THE 500 YEAR FLOOD LINES CLOSELY PARALLEL THE 100–YEAR FLOOD LINES. THE 100–YEAR AND 500–YEAR FLOOD ELEVATIONS AT EACH CROSS SECTION ARE PRESENTED IN TABULAR FORM AFTER THE LAST MAP PANEL.

2500 0 1250 2500 5000 7500

GRAPHIC SCALE 1 inch = 2500ft.

100-Year Flood Plain

Bentley Creek, Chemung County, New York & Bradford County Pennsylvania


CHEMUNG RIVER
TERRACE STREET
NORTH
FRONT STREET
1ST STR.
2ND STR.
MAIN STREET
3RD STR.
4TH STR.
CHURCH STREET
W 4TH STR.
PARK LANE
W 5TH STR.
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
#12
#13
#14
WELLSBURG
BENTLEY CREEK
BERWICK TURNPIKE
MATCHLINE 1-2
100-Year Flood Plain, Bentley Creek, Chemung County, New York
LEGEND
#79
100 YR FLOOD BOUNDARY
CROSS SECTION LOCATION
STREAM / CREEK
SWAMP AREA
NOTE:
THE AERIAL EXTENT OF THE 500-YEAR FLOOD PLAIN WAS NOT PRACTICAL TO DISPLAY AT THE MAP SCALE PRESENTED. IN MOST AREAS, THE 500 YEAR FLOOD LINES CLOSELY PARALLEL THE 100-YEAR FLOOD LINES. THE 100-YEAR AND 500-YEAR FLOOD ELEVATIONS AT EACH CROSS SECTION ARE PRESENTED IN TABULAR FORM AFTER THE LAST MAP PANEL.
200 0 100 200 400 800
GRAPHIC SCALE
1 inch = 200 ft.
1
PANEL NO.

MATCHLINE 1-2

MATCHLINE 2-3

NORTH

TERRACE STREET

MAIN STREET

6TH STR.

BENTLEY CREEK

BERWICK TURNPIKE

COMFORT HILL

DOTY HILL RD

WELLSBURG

#15 #16 #17 #18 #19 #20 #21 #22 #23 #24 #25

LEGEND

	100 YR FLOOD BOUNDARY
#79	CROSS SECTION LOCATION
	STREAM / CREEK
	SWAMP AREA

NOTE:
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200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

101

100-Year Flood Plain, Bentley Creek, Chemung County, New York

2

PANEL NO.

MATCHLINE 2-3

MATCHLINE 3-4

NEW YORK
PENNSYLVANIA

NORTH

#26

#27

#28

#29

#30

#31

#32

#33

#34

BELL AIR TRAILER COURT

BENTLEY CREEK

BERWICK TURNPIKE

NOTE:
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LEGEND

100 YR FLOOD BOUNDARY

#79 CROSS SECTION LOCATION

STREAM / CREEK

SWAMP AREA

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

100-Year Flood Plain, Bentley Creek, Chemung County, New York & Bradford County, Pennsylvania

3

PANEL NO.

MATCHLINE 3-4

MATCHLINE 4-5

NORTH

BENTLEY CREEK

BERWICK TURNPIKE

#34 #35 #36 #37 #38 #39 #40 #41 #42 #43 #44

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

LEGEND

100 YR FLOOD BOUNDARY

#79 CROSS SECTION LOCATION

STREAM / CREEK

SWAMP AREA

NOTE:
THE AERIAL EXTENT OF THE 500-YEAR FLOOD PLAIN WAS NOT PRACTICAL TO DISPLAY AT THE MAP SCALE PRESENTED. IN MOST AREAS, THE 500 YEAR FLOOD LINES CLOSELY PARALLEL THE 100-YEAR FLOOD LINES. THE 100-YEAR AND 500-YEAR FLOOD ELEVATIONS AT EACH CROSS SECTION ARE PRESENTED IN TABULAR FORM AFTER THE LAST MAP PANEL.

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

4

PANEL NO.

MATCHLINE 4-5

MATCHLINE 5-6

NORTH

BENTLEY CREEK

BERWICK TURNPIKE

#45 #46 #47 #48 #49 #50 #51 #52 #53 #54

LEGEND

#79 — CROSS SECTION LOCATION

100 YR FLOOD BOUNDARY

STREAM / CREEK

SWAMP AREA

NOTE:
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104

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

5

PANEL NO.

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

MATCHLINE 5-6

MATCHLINE 6-7

NORTH

LEGEND

- 100 YR FLOOD BOUNDARY
- #79 CROSS SECTION LOCATION
- STREAM / CREEK
- SWAMP AREA

#55 #56 #57 #58 #59 #60 #61 #62 #63 #64

BENTLEY CREEK

COWELL HILL CREEK

CENTERVILLE ROAD

BERWICK TURNPIKE

THREE FALLS CREEK

CENTERVILLE

105

NOTE:
THE AERIAL EXTENT OF THE 500-YEAR FLOOD PLAIN WAS NOT PRACTICAL TO DISPLAY AT THE MAP SCALE PRESENTED. IN MOST AREAS, THE 500 YEAR FLOOD LINES CLOSELY PARALLEL THE 100-YEAR FLOOD LINES. THE 100-YEAR AND 500-YEAR FLOOD ELEVATIONS AT EACH CROSS SECTION ARE PRESENTED IN TABULAR FORM AFTER THE LAST MAP PANEL.

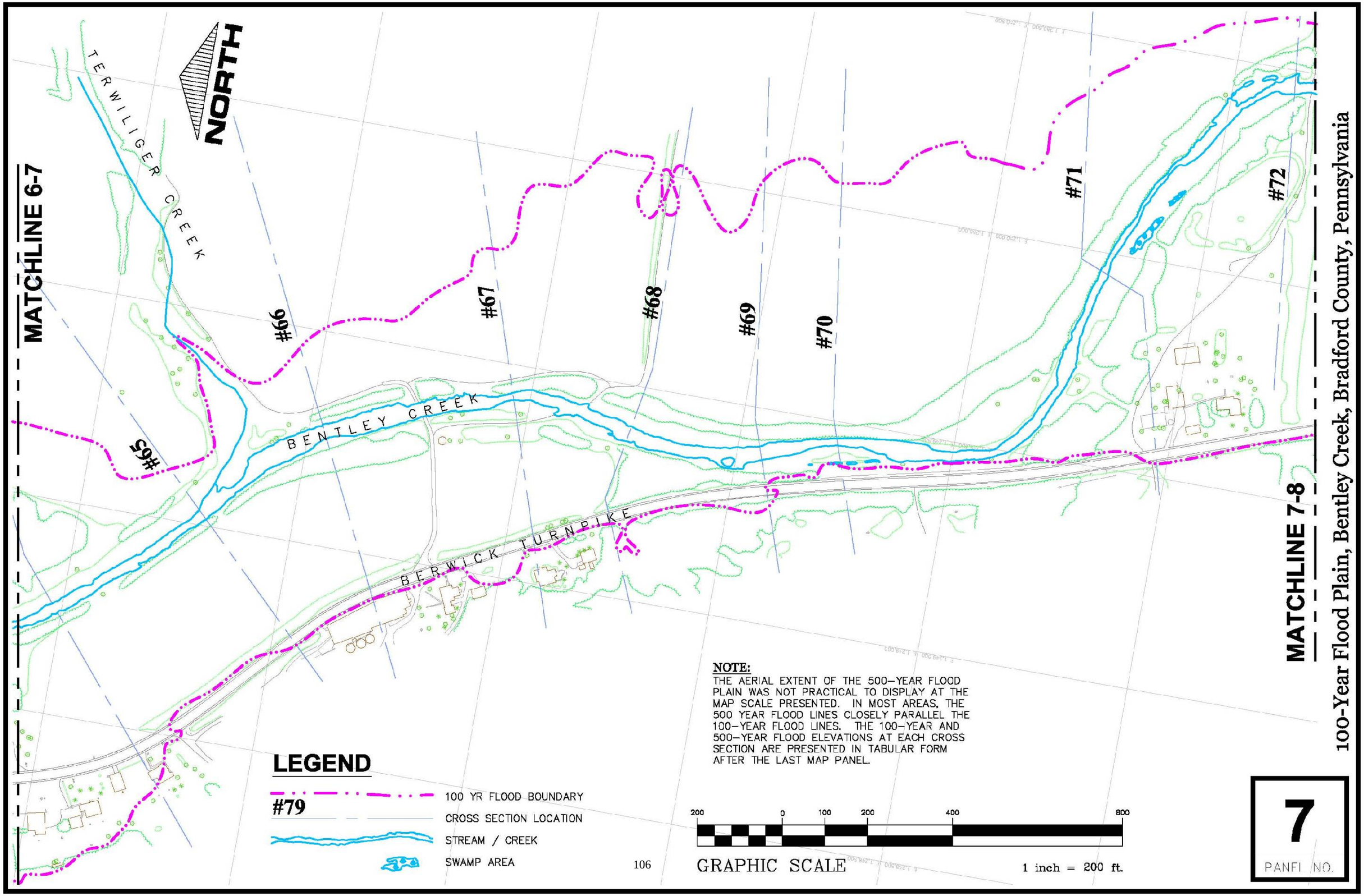
200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

6

PANEL NO.


NORTH
MATCHLINE 6-7
MATCHLINE 7-8
TERWILIGER CREEK
BENTLEY CREEK
BERWICK TURNPIKE
#65
#66
#67
#68
#69
#70
#71
#72
#79
LEGEND
100 YR FLOOD BOUNDARY
CROSS SECTION LOCATION
STREAM / CREEK
SWAMP AREA
NOTE:
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200 0 100 200 400 800
GRAPHIC SCALE
1 inch = 200 ft.
100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania
7
PANEL NO.

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

NORTH

BENTLEY CREEK

#73 #74 #75 #76 #77 #78 #79 #80 #81

BERWICK TURNPIKE

MONKEY RUN ROAD

JUSTICE RUN

MATCHLINE 7-8

MATCHLINE 8-9

NOTE:
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LEGEND

- 100 YR FLOOD BOUNDARY
- #79 CROSS SECTION LOCATION
- STREAM / CREEK
- SWAMP AREA

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

8

PANEL NO.

MATCHLINE 8-9

MATCHLINE 9-10

NORTH

#82

#83

#84

#85

#86

#87

#88

#89

#90

#91

HIGH STREET

BERWICK TURNPIKE

BENTLEY CREEK

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

NOTE:
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LEGEND

- 100 YR FLOOD BOUNDARY
- #79 CROSS SECTION LOCATION
- STREAM / CREEK
- SWAMP AREA

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

9

PANEL NO.

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

LEGEND

#79 — CROSS SECTION LOCATION

100 YR FLOOD BOUNDARY

STREAM / CREEK

SWAMP AREA

NORTH

BENTLEY CREEK

NOTE:
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MATCHLINE 9-10

MATCHLINE 10-11

BERWICK TURNPIKE

BUCKS CREEK RD

BENTLEY CREEK

BUCK CREEK

WESLEYAN CHURCH CREEK

BUCKS CREEK RD

#92 #93 #94 #95 #96 #97 #98 #99 #100 #101 #102 #103

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

10

PANEL NO.

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

NORTH

MATCHLINE 10-11

MATCHLINE 11-12

BERWICK TURNPIKE

BENTLEY CREEK

#103 #104 #105 #106 #107 #108 #109 #110 #111 #112 #113 #114

LEGEND

- 100 YR FLOOD BOUNDARY
- #79 CROSS SECTION LOCATION
- STREAM / CREEK
- SWAMP AREA

NOTE:
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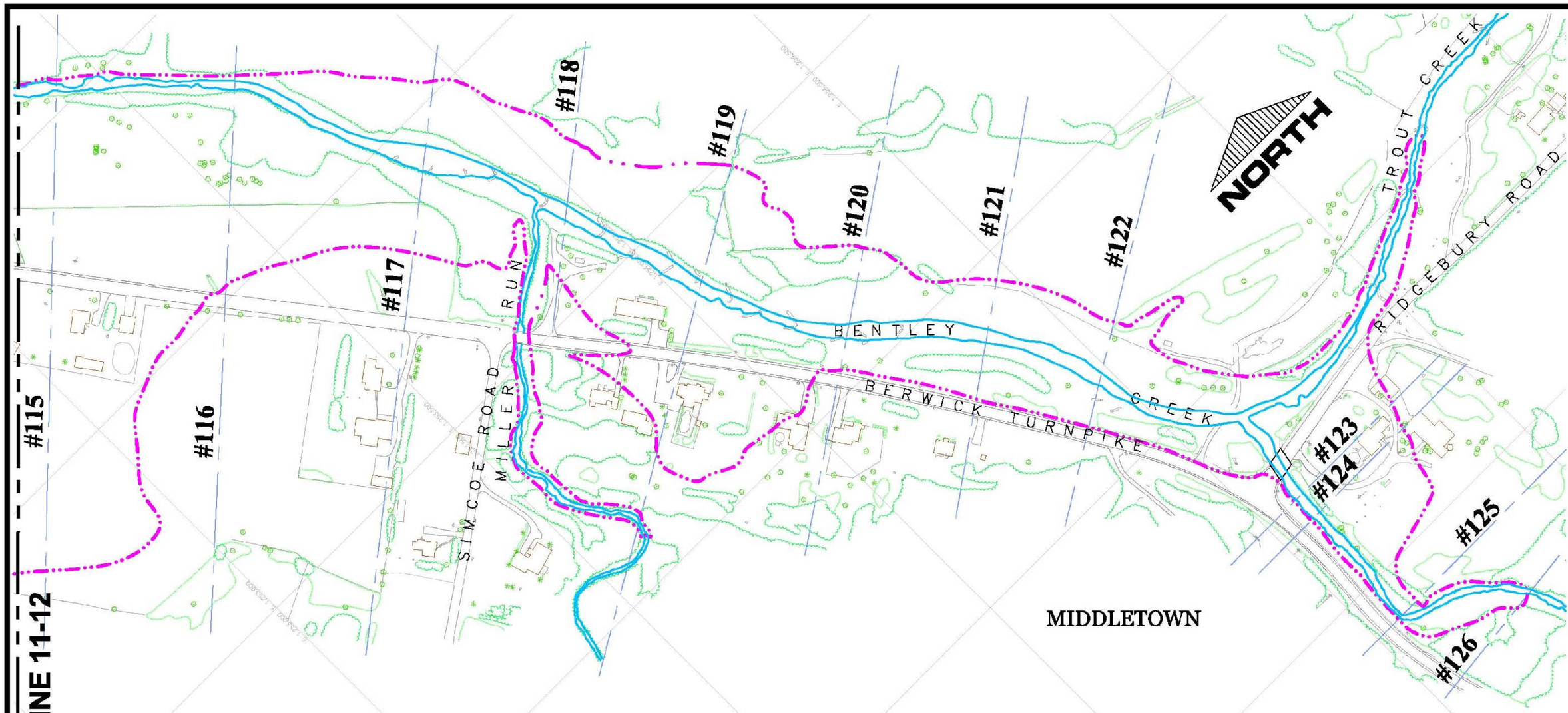
200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

11

PANEL NO.



LEGEND

- 100 YR FLOOD BOUNDARY
- #79 CROSS SECTION LOCATION
- STREAM / CREEK
- SWAMP AREA

NOTE:
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200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

12

PANEL NO.

100-Year Flood Plain, Bentley Creek, Bradford County, Pennsylvania

100 and 500-Year Flood Elevations* - Bentley Creek

Existing Condition and Expected Future Condition, except in areas of planned dikes.
For areas to be diked, see Diked Area Panels.

Cross Section Number (From Flood Plain Maps)	Creek Station (Lineal Feet)	100-Year Flood (Feet-MSL)	500-Year Flood (Feet-MSL)
#1	80	824.3	827.3
#2	480	824.4	827.3
#3	880	824.5	827.4
#4	1180	824.6	827.4
#5	1260	828.7	829.2
#6	1390	829.9	830.4
#7	1530	829.9	830.4
#8	1565	829.9	830.4
#9	1680	829.9	830.5
#10	1730	830.0	830.5
#11	2110	830.3	830.9
#12	2500	833.4	834.1
#13	3000	837.7	838.3
#14	3300	841.1	842.0
#15	3700	842.1	843.1
#16	4300	844.7	845.5
#17	4675	847.3	848.1
#18	4725	847.9	848.5
#19	4800	850.4	851.5
#20	4850	850.7	851.8
#21	5150	851.8	852.8
#22	5550	854.6	855.4
#23	6095	859.3	860.5
#24	6340	861.4	862.6
#25	6740	863.1	865.1
#26	7015	866.9	867.6
#27	7410	867.7	868.5
#28	7815	870.4	871.2
#29	8115	872.1	872.8
#30	8370	874.2	874.9
#31	8725	875.7	876.5
#32	9105	877.8	878.8

Cross Section Number (From Flood Plain Maps)	Creek Station (Lineal Feet)	100-Year Flood (Feet-MSL)	500-Year Flood (Feet-MSL)
#33	9570	881.4	882.5
#34	9925	884.1	885.2
#35	10210	886.6	887.5
#36	10425	888.1	889.1
#37	10725	890.3	891.4
#38	10980	892.3	893.3
#39	11425	895.0	896.0
#40	11790	897.9	899.0
#41	12095	901.0	901.2
#42	12265	901.5	902.4
#43	12590	904.5	905.3
#44	12890	908.2	909.3
#45	13190	910.1	911.4
#46	13710	912.4	913.3
#47	14110	916.0	917.2
#48	14590	920.3	921.6
#49	14740	920.8	922.0
#50	15090	922.4	923.4
#51	15400	925.6	926.3
#52	15760	928.5	929.4
#53	16090	931.0	931.8
#54	16525	933.1	933.9
#55	16830	935.2	936.0
#56	17120	938.5	939.1
#57	17420	940.9	941.5
#58	17825	944.5	945.2
#59	18280	948.2	949.0
#60	18660	951.8	952.7
#61	18790	956.9	958.4
#62	18935	957.4	958.9
#63	19380	959.3	960.5
#64	19770	962.6	963.0

* Feet MSL – Feet above Mean Sea Level (NAVD-1988)

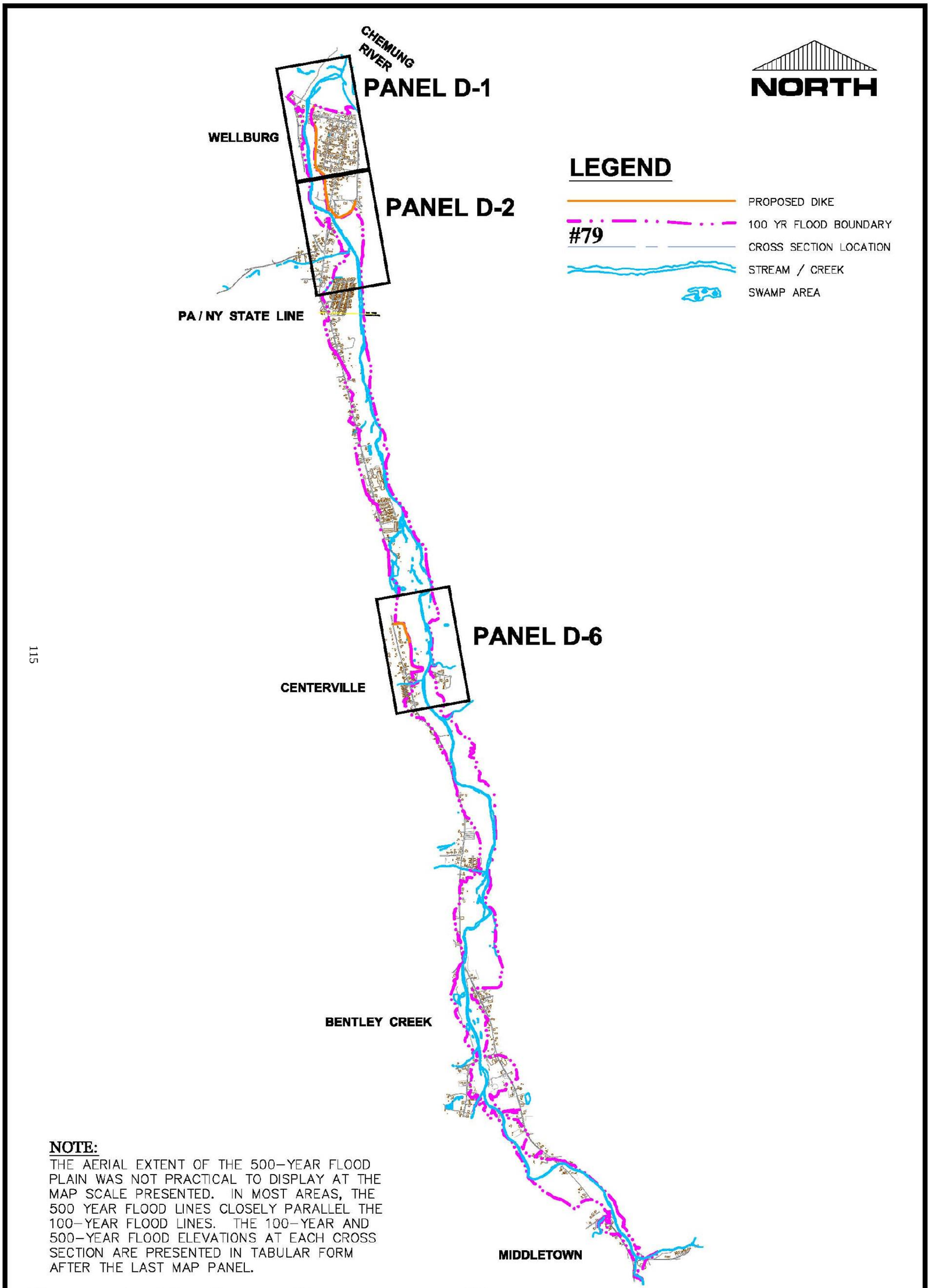
100 and 500-Year Flood Elevations* - Bentley Creek

Existing Condition and Expected Future Condition, except in areas of planned dikes.
For areas to be diked, see separate panels labeled “100-Year Flood Plain With Dikes”

Cross Section Number (From Flood Plain Maps)	Creek Station (Lineal Feet)	100-Year Flood (Feet-MSL)	500-Year Flood (Feet-MSL)
#65	20175	965.9	966.7
#66	20530	967.5	968.5
#67	20980	971.0	971.8
#68	21265	974.2	974.9
#69	21580	975.7	976.5
#70	21760	976.9	977.8
#71	22625	983.2	983.8
#72	23275	986.6	986.7
#73	23540	988.1	988.9
#74	23730	989.5	990.1
#75	24030	993.0	993.6
#76	24330	996.2	997.0
#77	24780	1000.1	1001.0
#78	25185	1003.4	1004.4
#79	25535	1006.4	1007.5
#80	25850	1008.5	1009.3
#81	26200	1011.3	1011.8
#82	26505	1014.2	1014.8
#83	26910	1016.7	1017.2
#84	27310	1020.8	1021.3
#85	27615	1022.6	1023.2
#86	27960	1026.2	1026.4
#87	28280	1031.8	1039.2
#88	28390	1032.4	1039.2
#89	28690	1033.6	1039.2
#90	29030	1034.1	1039.3
#91	29440	1037.8	1039.5
#92	29935	1041.9	1042.5
#93	30410	1045.1	1046.2
#94	30690	1048.5	1049.2
#95	31000	1052.1	1053.1

Cross Section Number (From Flood Plain Maps)	Creek Station (Lineal Feet)	100-Year Flood (Feet-MSL)	500-Year Flood (Feet-MSL)
#96	31050	1054.0	1055.9
#97	31200	1058.9	1061.9
#98	31250	1059.0	1061.9
#99	31385	1059.1	1061.9
#100	31650	1059.4	1062.1
#101	32265	1063.5	1064.3
#102	32620	1068.2	1069.0
#103	32990	1071.0	1071.3
#104	33455	1076.4	1077.7
#105	33800	1081.2	1082.2
#106	34150	1083.3	1083.8
#107	34460	1087.3	1088.6
#108	34715	1090.2	1091.0
#109	35000	1093.3	1094.0
#110	35450	1097.2	1097.9
#111	35845	1102.2	1102.2
#112	35895	1102.2	1103.2
#113	36025	1104.7	1105.9
#114	36170	1104.8	1105.9
#115	37115	1113.6	1113.9
#116	37465	1119.4	1120.1
#117	37870	1123.2	1124.1
#118	38170	1126.2	1127.1
#119	38470	1130.8	1131.9
#120	38770	1133.4	1133.9
#121	39070	1136.5	1137.6
#122	39375	1139.6	1140.3
#123	39860	1151.2	1152.0
#124	39910	1153.0	1154.1
#125	40175	1153.1	1154.1
#126	40435	1157.4	1158.6

* Feet MSL – Feet above Mean Sea Level (NAVD-1988)



115

NOTE:
THE AERIAL EXTENT OF THE 500-YEAR FLOOD PLAIN WAS NOT PRACTICAL TO DISPLAY AT THE MAP SCALE PRESENTED. IN MOST AREAS, THE 500 YEAR FLOOD LINES CLOSELY PARALLEL THE 100-YEAR FLOOD LINES. THE 100-YEAR AND 500-YEAR FLOOD ELEVATIONS AT EACH CROSS SECTION ARE PRESENTED IN TABULAR FORM AFTER THE LAST MAP PANEL.

2500 0 1250 2500 5000 7500

GRAPHIC SCALE 1 inch = 2500ft.

100-Year Flood Plain with Dike

Bentley Creek, Chemung County, New York & Bradford County Pennsylvania

CHEMUNG RIVER

#1 #2 #3 #4 #5 #6 #7 #8 #9 #10 #11 #12 #13 #14

TERRACE STREET

FRONT STREET

1ST STR.

2ND STR.

MAIN STREET

3RD STR.

CHURCH STREET

W 4TH STR.

PARK LANE

W 5TH STR.

WELLSBURG

BENTLEY CREEK

BERWICK TURNPIKE

NORTH

MATCHLINE 1-2

100-Year Flood Plain with Dike, Bentley Creek, Chemung County, New York

LEGEND

PROPOSED DIKE

100 YR FLOOD BOUNDARY

#79 CROSS SECTION LOCATION

STREAM / CREEK

SWAMP AREA

NOTE:
THE AERIAL EXTENT OF THE 500-YEAR FLOOD PLAIN WAS NOT PRACTICAL TO DISPLAY AT THE MAP SCALE PRESENTED. IN MOST AREAS, THE 500 YEAR FLOOD LINES CLOSELY PARALLEL THE 100-YEAR FLOOD LINES. THE 100-YEAR AND 500-YEAR FLOOD ELEVATIONS AT EACH CROSS SECTION ARE PRESENTED IN TABULAR FORM AFTER THE LAST MAP PANEL.

200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

D-1

PANEL NO.

MATCHLINE 1-2

TERRACE STREET

MAIN STREET

6TH STR.

BENTLEY CREEK

BERWICK TURNPIKE

COMFORT HILL

DOTY HILL RD

WELLSBURG

#15 #16 #17 #18 #19 #20 #21 #22 #23 #24 #25

NORTH

100-Year Flood Plain with Dike, Bentley Creek, Chemung County, New York

LEGEND

PROPOSED DIKE

100 YR FLOOD BOUNDARY

#79 CROSS SECTION LOCATION

STREAM / CREEK

SWAMP AREA

NOTE:
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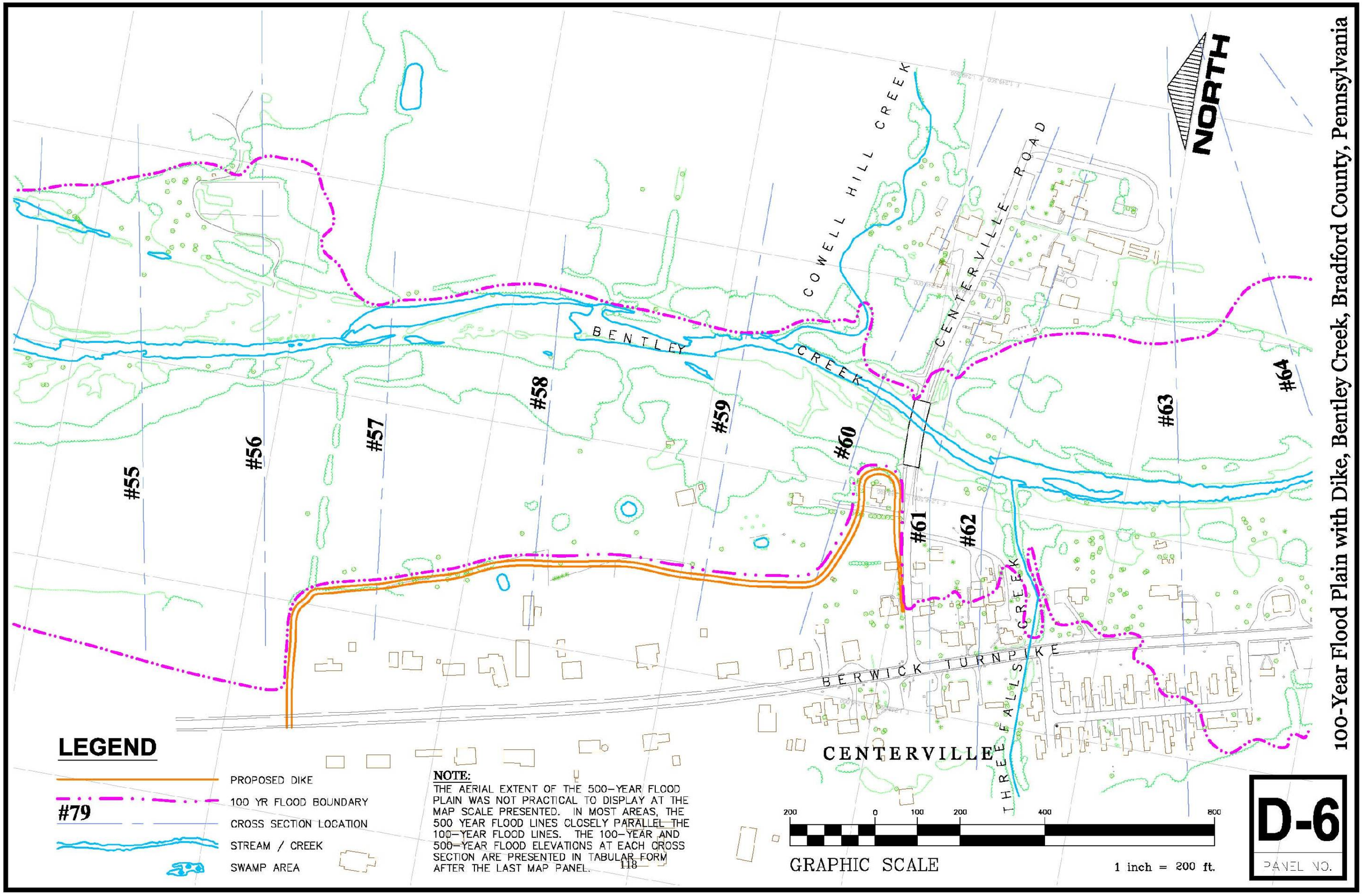
200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

D-2

PANEL NO.


NORTH
BENTLEY CREEK
COWELL HILL CREEK
CENTERVILLE ROAD
BERWICK TURNPIKE
THREE FALLS CREEK
CENTERVILLE
#55
#56
#57
#58
#59
#60
#61
#62
#63
#64
LEGEND
PROPOSED DIKE
100 YR FLOOD BOUNDARY
#79
CROSS SECTION LOCATION
STREAM / CREEK
SWAMP AREA
NOTE:
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200 0 100 200 400 800
GRAPHIC SCALE
1 inch = 200 ft.
D-6
PANEL NO.
100-Year Flood Plain with Dike, Bentley Creek, Bradford County, Pennsylvania

100 and 500-Year Flood Elevations* With Dikes
Bentley Creek

The following cross sections are affected by dike implementation.
Areas inside the dikes are protected for the 100-year flood plus freeboard.

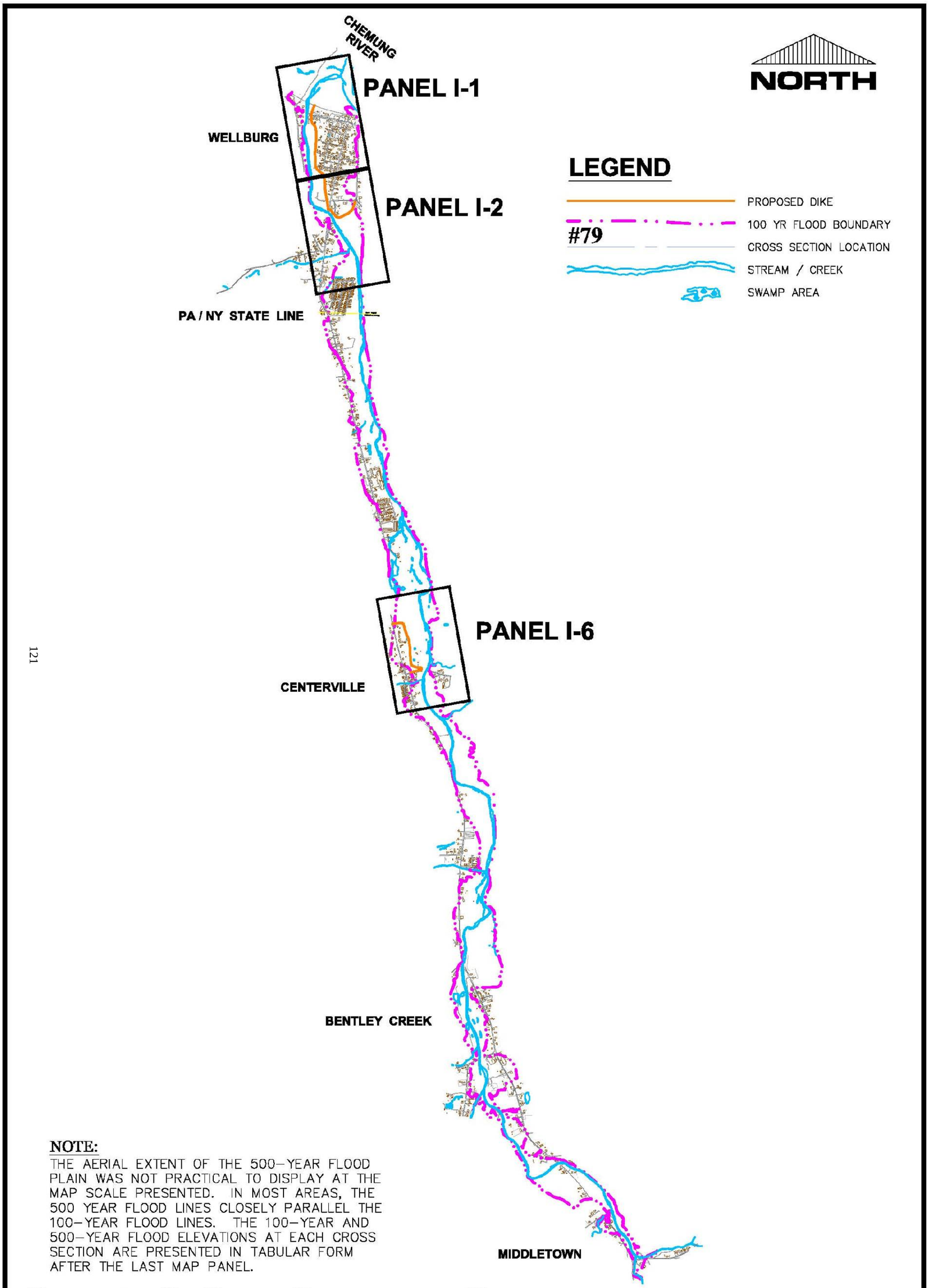
WELLSBURG DIKE

Cross Section Number (From Flood Plain Maps)	Creek Station (Lineal Feet)	100-Year Flood (Feet-MSL)	500-Year Flood (Feet-MSL)
#7	1530	829.9	830.6
#8	1565	829.8	830.5
#9	1680	832.6	834.4
#10	1730	832.3	834.0
#11	2110	835.3	836.9
#12	2500	836.7	838.4
#13	3000	839.7	839.3
#14	3300	842.7	844.3
#15	3700	843.4	845.0
#16	4300	845.7	846.6
#17	4675	848.2	849.2
#18	4725	848.6	850.0
#19	4800	854.3	856.8
#20	4850	854.2	856.9
#21	5150	855.5	857.0
#22	5400	855.8	857.2
#23	5550	855.9	857.4
#24	6095	858.8	859.6
#25	6340	861.5	862.7
#26	6740	863.1	865.1

CENTERVILLE DIKE

Cross Section Number (From Flood Plain Maps)	Creek Station (Lineal Feet)	100-Year Flood (Feet-MSL)	500-Year Flood (Feet-MSL)
#53	16090	931.0	931.8
#54	16525	933.2	934.0
#55	16830	935.4	936.2
#56	17120	938.5	939.1
#57	17420	940.5	941.1
#58	17825	944.1	944.7
#59	18280	948.4	949.3
#60	18660	951.6	952.4

* Feet MSL – Feet above Mean Sea Level (NAVD-1988)



121

NOTE:
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2500 0 1250 2500 5000 7500

GRAPHIC SCALE 1 inch = 2500ft.

Dike Breach Inundation Area
Bentley Creek, Chemung County, New York & Bradford County Pennsylvania

CHEMUNG RIVER

TERRACE STREET

NORTH

FRONT STREET

1ST STR.

2ND STR.

MAIN STREET

3RD STR.

CHURCH STREET

W 4TH STR.

PARK LANE

W 5TH STR.

#1

#2

#3

#4

#5

#6

#7

#8

#9

#10

#11

#12

#13

#14

WELLSBURG

BENTLEY CREEK

BERWICK TURNPIKE

MATCHLINE 1-2

Dike Breach Inundation Area, Bentley Creek, Chemung County, New York

LEGEND

PROPOSED DIKE

100 YR FLOOD BOUNDARY WITH BREACHED DIKE

CROSS SECTION LOCATION

STREAM / CREEK

#79 SWAMP AREA

NOTE:
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200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

I-1

PANEL NO.

MATCHLINE 1-2

TERRACE STREET

MAIN STREET

6TH STR.

WELLSBURG

#15 #16 #17 #18 #19 #20 #21 #22 #23 #24 #25

BENTLEY CREEK

BERWICK TURNPIKE

COMFORT HILL

DOTY HILL RD

NORTH

Dike Breach Inundation Area, Bentley Creek, Chemung County, New York

LEGEND

PROPOSED DIKE

100 YR FLOOD BOUNDARY WITH BREACHED DIKE

#79 CROSS SECTION LOCATION

STREAM / CREEK

SWAMP AREA

NOTE:
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200 0 100 200 400 800

GRAPHIC SCALE

1 inch = 200 ft.

I-2

PANEL NO.

LEGEND

PROPOSED DIKE

100 YR FLOOD BOUNDARY WITH BREACHED DIKE

#79 CROSS SECTION LOCATION

STREAM / CREEK

SWAMP AREA

NORTH

COWELL HILL CREEK

CENTERVILLE ROAD

BENTLEY CREEK

BERWICK TURNPIKE

THREE FALLS CREEK

CENTERVILLE

#55 #56 #57 #58 #59 #60 #61 #62 #63 #64

NOTE:
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200 0 100 200 400 800

GRAPHIC SCALE 1 inch = 200 ft.

I-6

PANEL NO.

Dike Breach Inundation Area, Bentley Creek, Bradford County, Pennsylvania

Appendix C

Investigations and Analyses Report

Investigations and Analyses Report
Bentley Creek Watershed

Introduction

The Investigations and Analyses Report presents information that supports the formulation, evaluation, and conclusions of the Bentley Creek Watershed Project Plan-Environmental Assessment. This report contains information required by the U.S. Water Resources Council's "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies." Duplication of information presented in the main text of the document was avoided unless required for clarity.

Hydraulics and Hydrology

The hydrology analysis for the project was conducted using state of the art analytical methods and tools. The Bentley Creek Watershed area of 56.35 square miles was subdivided into 29 subareas with a median drainage area equal to 1.5 square miles. The present condition NRCS Runoff Curve Number (RCN) was analyzed for each subarea and calibrated to more closely match results obtained from the U.S. Geological Survey- Pennsylvania regression equations. RCN's ranged from 60 to 74 with a median value of 72. Time of Concentration values ranged from 0.15 hours to 3.48 hours with a median value of 1.35 hours. It was estimated that little change for these values is anticipated in the future provided that proper stormwater management for newly developed land is enacted. Little new developed land is expected.

The NRCS Win TR20 hydrologic computer program (USDA-NRCS, Jan 2004) was used to evaluate peak discharge frequency analysis for the 2 through 500 year, 24-hour storms, for the conditions listed above. The resulting peak discharges, by reach, were applied as steady state flow data within the United States Army Corps of Engineer's Hydrologic Engineering Center River Analysis System (HEC RAS) computer program (USACE, 2003) to evaluate the flood frequency analysis along the main Bentley Creek watercourse. Chemung River flood elevations were used in the development of backwater elevations for the portions of Bentley Creek which converge with the Chemung River flood plain. An aerial survey was conducted that produced a contour map of the area at a scale of 1 inch equal to 100 feet and one foot contour interval. This map was used to define the stream valley cross sections required as geometry data within the HEC RAS model. All Bentley Creek bridges were surveyed to establish cross sectional geometry for the modeling. The resulting 100-year flood elevations were plotted on the map at the specified cross section locations with interpolated values used in between to produce the estimated 100-year flood inundation lines. The 500-year floodplain was not delineated on the report maps because it was impractical at the scale used. The 500-year flood elevations are presented on the maps, but the aerial extend of the floodplain are minimal in most locations.

In addition, detailed analyses were conducted for the railroad bridge and Rt 427 bridge in Wellsburg, NY, including the effect of bridge blockages, sediment accumulation and center bridge piers on flood elevations.

Economic Evaluation

A least-cost analysis was used to determine the cost of alternatives. Alternatives were then narrowed down to two action alternatives and a no action alternative. Ecological and social factors were also considered when developing and narrowing the list of alternatives.

Total costs for installation, technical assistance and project administration as well as operation, maintenance, and replacement costs were determined and amortized over the 100-year evaluation period at the current discount rate. All benefits and costs were calculated at a current price base.

The URB-1 computer program (USDA-SCS, 1990) combines the flood elevations from the river hydraulic model (HEC-RAS) with the surveyed property elevations and stage damage tables to estimate flood

damages for each property over a range of storm frequencies. It uses this data to compute an average annual damage based on the probability of different magnitude storms occurring over a 100-year period. The change in hydrology resulting from each alternative evaluation is inputted into the URB-1 computer model to determine the damage reduction or benefit associated with each alternative. The average annual benefit is compared to the amortized cost of each alternative to determine its relative benefit to cost ratio.

The market value of each property was estimated using the assessed value adjusted by the Pennsylvania State Equalization Board factor for Bradford County. Content values were assumed to be 50 percent of structure value and represent the typical relationship used by the homeowners' insurance industry. Content values for mobile homes were set at a fixed rate due to the low value of the structures.

Each property was assigned a category based on building style, whether or not it had a basement and the number of stories. Standardized stage damage tables from the Corps of Engineers were used to determine the amount of damage incurred at various depths of flooding.

Sediment removal costs for Wellsburg were derived from actual sediment removal costs provided by village officials. Sediment is removed after significant flood events. Bedload moving down Bentley Creek tends to deposit in this reach during flood events as flow velocities slow as Bentley meets the Chemung River. These cleanout costs were annualized for the economic evaluation.

A net monetary benefit analysis based on the least cost alternatives selected for evaluation was used. The average annual benefits and costs were determined. Economic benefits were based on the level of protection for the existing buildings and reduced costs for sediment removal in Wellsburg. Reduced sediment removal costs were based on estimated sediment load reductions resulting from upstream tributary stabilization efforts that are part of each alternative.

Alternatives Evaluation

Two primary evaluation units were developed to facilitate the analysis of alternative treatments. The first evaluation unit was the Village of Wellsburg. Due to its size and the concentration of flood prone buildings, it seemed logical to analyze it separately. Consideration was given to evaluating the entire New York portion of the watershed as a unit, but the character of the properties upstream of Wellsburg was more similar to the rest of the watershed than to Wellsburg. Areas upstream of Wellsburg were lumped into the second evaluation unit. Although there are some small concentrations of flood prone buildings in the communities of Centerville and Bentley Creek and elsewhere, most of the impacted area consists of buildings strung out along several miles of stream.

When considering alternatives such as flood warning and flood control dams, the evaluation units were of limited value. However, when evaluating more site specific alternatives such as dikes, bridge/culvert modification, stream rehabilitation and nonstructural measures, the evaluation units were valuable to the analysis. Dikes were considered in all areas where there were concentrations of flooded buildings. The economic costs and benefits were reviewed to determine if the dike was economically viable for the location. In areas evaluated for dikes, a preliminary evaluation of nonstructural measures was also conducted as basis for comparison. This analysis resulted in three dikes that were potentially viable alternatives.

Various approaches were used to evaluate nonstructural measures. Complete acquisition and removal of properties from the flood plain was evaluated for each evaluation unit and also for mobile home parks and each area where a dike was considered to be viable. Early in the process it was determined that there was little economic value to applying nonstructural measures to outbuildings, garages, sheds and the like. The Sponsors decided to focus the nonstructural evaluation on residential, commercial and public buildings. These buildings were further evaluated by categorizing them into specific types of cost-efficient nonstructural measures. Due to the high cost of building elevation and the overall low values of real estate, it was determined that building elevation as a project level measure was not economically viable in this watershed except for mobile homes. The only cost-effective approaches for addressing permanent buildings with first floor flooding were house acquisition, and in some cases, house dry

“floodproofing”. Acquisition, flood walls and other measures were evaluated for non-residential buildings, but no project wide cost effective approach was found.

Mobile homes presented additional considerations. Mobile home values are extremely low. Voluntary acquisition of mobile homes at fair market value would not work because the residents would be unable to purchase replacement housing with the acquisition offers. In addition, moving the parks would be very expensive due to the cost to establish a new park, including roads and utilities, the cost of moving and re-establishing the mobile homes and the cost of housing displaced residents during the move. The elimination of these nonstructural approaches left elevation as the only cost-effective nonstructural means of addressing the mobile homes. Mobile homes that are concentrated in parks provide additional concerns due to the potential for improperly elevated and anchored mobile homes to dislodge during floods and damage adjacent mobile homes. It was determined that all mobile homes in parks would need to be elevated to the 100-year flood elevation plus applicable freeboard to be eligible for assistance. This increased the cost of addressing the mobile home parks, but was found to be cost effective in this watershed.

Effects Analysis

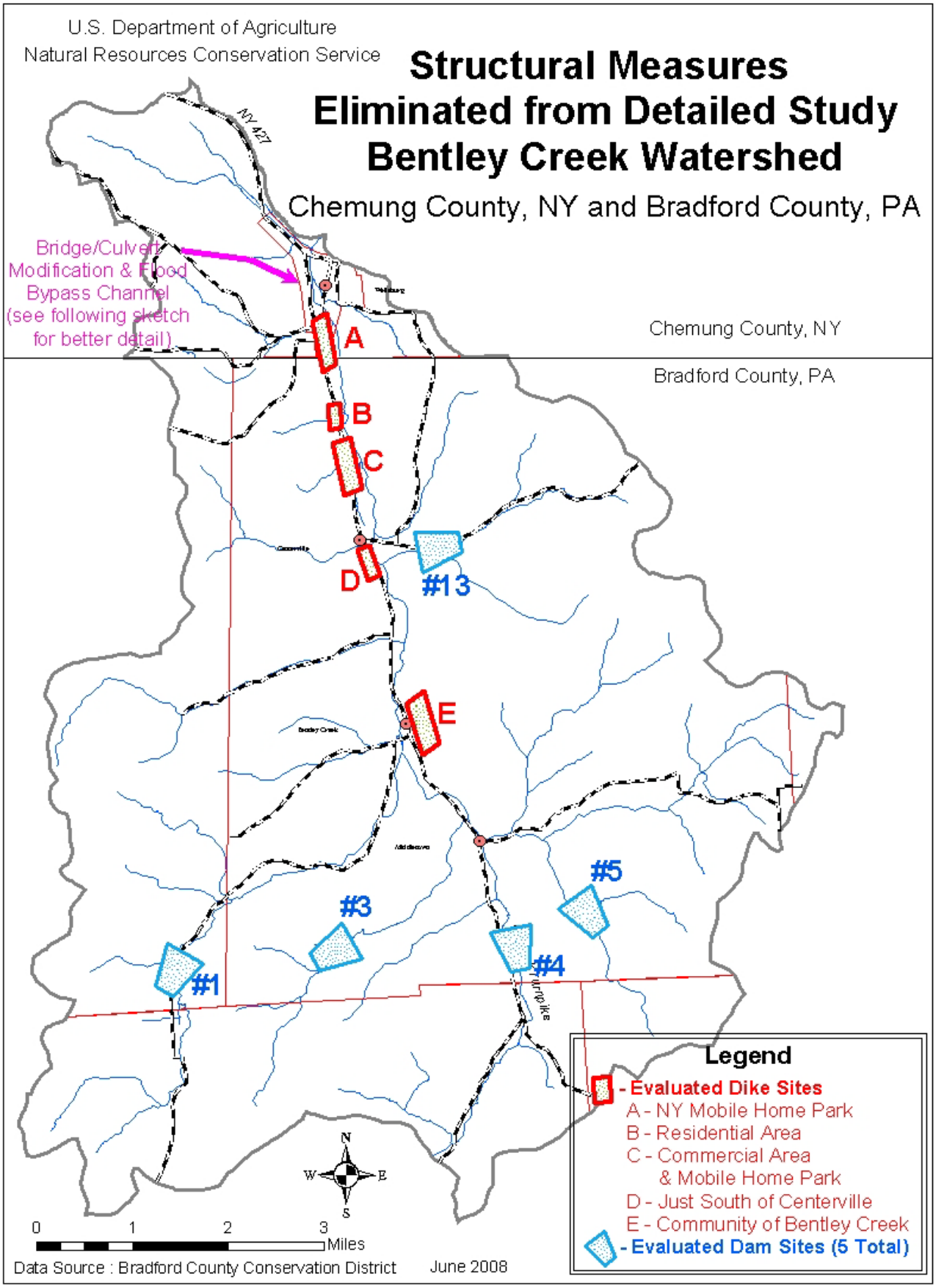
Ecological, cultural and socio-economic effects of alternatives were evaluated through a variety of techniques. Site investigations, literature review and consultation with state and local agencies were conducted to assess the existing condition of wetland, fish and wildlife habitat, cultural resources, water quality, flood plain, threatened/endangered species and other resource concerns. These evaluations were used in conjunction with the above analyses to evaluate effects that would result from changes in hydrology and flood levels, landscape features, and vegetative cover and land use; including direct and indirect impacts to any identified cultural resources or threatened/endangered species. Sediment reduction estimates for each alternative were based on the proportion of sediment yield that is attributable to the tributaries and other reaches to be stabilized. These sediment estimates were derived from studies of tributary sediment loads and the effectiveness of ongoing stabilization efforts conducted by the Bradford County Conservation District. See the following table regarding the effects of the Preferred Alternative on Resources of National Recognition.

Effect of the Preferred Alternative on Resources of National Recognition

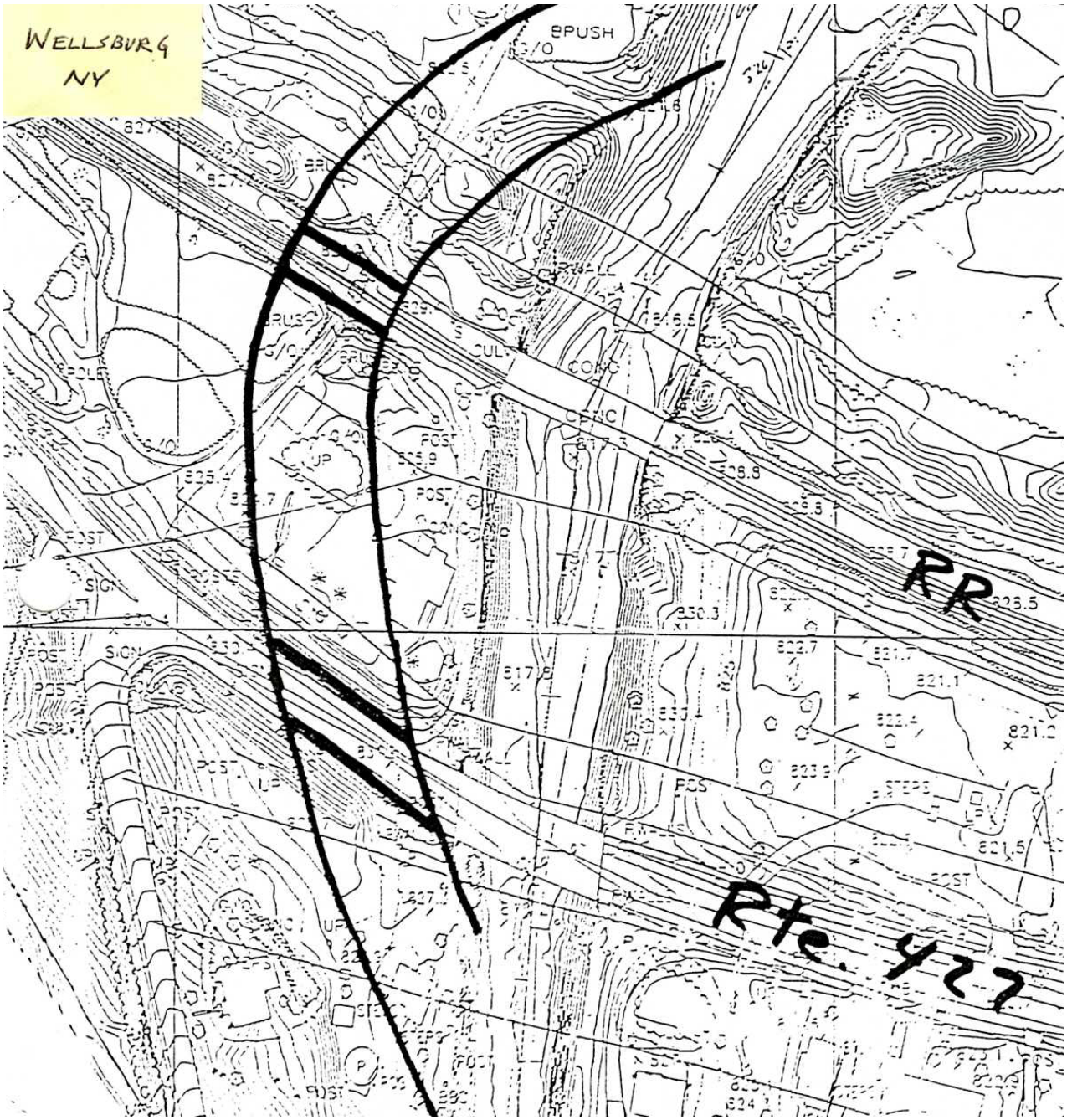
Types of Resources	Principal Sources of National Recognition	Measurement of Effects, Resource Gain or Loss
Air Quality	Clean Air Act, as amended (42. U.S.C 1857b. et seq.).	**Short term increase in dust and exhaust during construction**
Areas of particular concern within the coastal zone	Coastal Zone management act of 1973, as amended (16 U.S.C. 1451 et seq.)	**Not Applicable to planning area**
Endangered and Threatened Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	**No Effect.** None found during project area investigation
Fish and Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.).	**Moderate improvement**. Improved riparian and aquatic habitat. Existing habitat protected.
Flood Plains	Executive Order 11988, Flood Plain Management	**Localized decrease** in vicinity of dikes. **Five acres restored** where houses removed. 200 buildings protected from flood damage
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec 470 et seq)	**Mitigation required**. 1 house eligible for the National Register of Historic Places will be removed and mitigated
Prime and Unique Farmland	CEQ Memorandum of August 1,1980; Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act	**No Effect**
Water Quality	Clean Water Act of 1977 (33U.S.C. 1251 et seq.)	**Moderate improvement**. Reduced sediment and nutrient loads
Wetlands	Executive Order 11990, Protection of Wetlands Clean Water Act of 1977(42 U.S.C 1857h-7, et seq.).	**No Effect**
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq.).	**Not Applicable to planning area**

Appendix D

Location of Structural Measures Eliminated from Detailed Study


U.S. Department of Agriculture
Natural Resources Conservation Service
Structural Measures
Eliminated from Detailed Study
Bentley Creek Watershed
Chemung County, NY and Bradford County, PA
NY 427
Bridge/Culvert
Modification & Flood
Bypass Channel
(see following sketch
for better detail)
A
Chemung County, NY
Bradford County, PA
B
C
D
#13
E
#5
#3
#4
#1
Turnpike
Legend
- Evaluated Dike Sites
A - NY Mobile Home Park
B - Residential Area
C - Commercial Area
& Mobile Home Park
D - Just South of Centerville
E - Community of Bentley Creek
- Evaluated Dam Sites (5 Total)
N
W
E
S
0
1
2
3
Miles
Data Source : Bradford County Conservation District
June 2008

Bridge/culvert modification and flood bypass channel eliminated from detailed study



Appendix E

PL 83-566 Project Information

PL 83-566 PROJECT INFORMATION
BENTLEY CREEK WATERSHED
BRADFORD COUNTY, PA; CHEMUNG COUNTY, NY

General Project Data

Project Number:	2040
Acres (Watershed):	33,500
Price Base Year:	2011
Evaluated Life of Project:	100 years
Project Discount Rate:	4.0%
Total Planned Cost (Table 1):	$5,600,000
Total Federal (PL 83-566) Cost (Table 1):	$5,420,000
Benefit Cost Ratio:	2.1:1
Approval by:	State Conservationist
Project Purpose	Flood Prevention
Latitude (decimal format):	41.93
Longitude (decimal format):	-76.71
Counties	Bradford, PA & Chemung, NY
Congressional Districts:	10-PA & 29-NY
Hydrologic Unit Area:	02050105

PL 83-566 PROJECT INFORMATION
BENTLEY CREEK WATERSHED
BRADFORD COUNTY, PA; CHEMUNG COUNTY, NY

Benefits Data and Performance Measures

Price Base:	2011
Monetary Agricultural-Related Flood Damage Reduction (Average Annual):	$570,000
Monetary Agricultural-Related Non-Flood Damage Reduction (Average Annual):	$0
Monetary Non-Agricultural-Related Flood Damage Reduction (Average Annual):	$0
Monetary Non-Agricultural-Related Non-Flood Damage Red. (Average Annual):	$0
Beneficiaries (No.):	1200
Visitor Days (Optional):	0
Farms and Ranches Benefited (No.):	0
Bridges Benefited (No.):	0
Public Facilities Benefited (No.):	5
Businesses Benefited (No.):	10
Homes Benefited (No.):	170
Domestic Water Supplies Benefited (No.):	0
Reduced Erosion (Tons/Yr.):	1700
Reduced Sedimentation (Tons/Yr.):	1700
Streams/Corridors Enhanced/Protected (Miles):	5
Lakes/Reservoirs Enhanced/Protected (Surface Acres):	0
Chemical and Nutrient Management (Acres)	0
Animal Waste Management (Tons/Year)	0
Incidental Recreation Benefited (No. of Water Bodies/Stream Segments):	0
Groundwater Recharge (Acre-Feet):	0
Water Conserved (Acre-Feet):	0
Wetlands Created, Enhanced, or Restored (Acres):	0
Upland/Riparian Habitat Created/Enhanced (Acres):	20
Threatened and Endangered Species Benefited:	none
Number of Single Purpose Floodwater Retarding Structures Planned	2
Number of Other Flood Prevention or Mitigation Measures Planned	60

PL 83-566 PROJECT INFORMATION
BENTLEY CREEK WATERSHED
BRADFORD COUNTY, PA; CHEMUNG COUNTY, NY

Sponsor Data

	SPONSOR 1	SPONSOR 2
Organization:	Bradford County Commissioners	Bradford County Conservation District
Sponsor Representative (optional):	--------	Mike Lovegreen
Sponsor Title: (Director, Manager, etc.):	Chairman	District Manager
Sponsor Type: (County, State, etc.):	County	Conservation District
Address:	301 Main Street	Stoll Natural Resource Center 200 Lake Rd., Ste. E
City:	Towanda	Towanda
State:	PA	PA
Zip:	18848	18848
Phone:	570-265-1727	570-265-5539
Email:	--------	--------
Fax:	570-265-1729	570-265-7435
O&M Responsibility (Yes/No):	Yes	Yes

PL 83-566 PROJECT INFORMATION
BENTLEY CREEK WATERSHED
BRADFORD COUNTY, PA; CHEMUNG COUNTY, NY

Sponsor Data

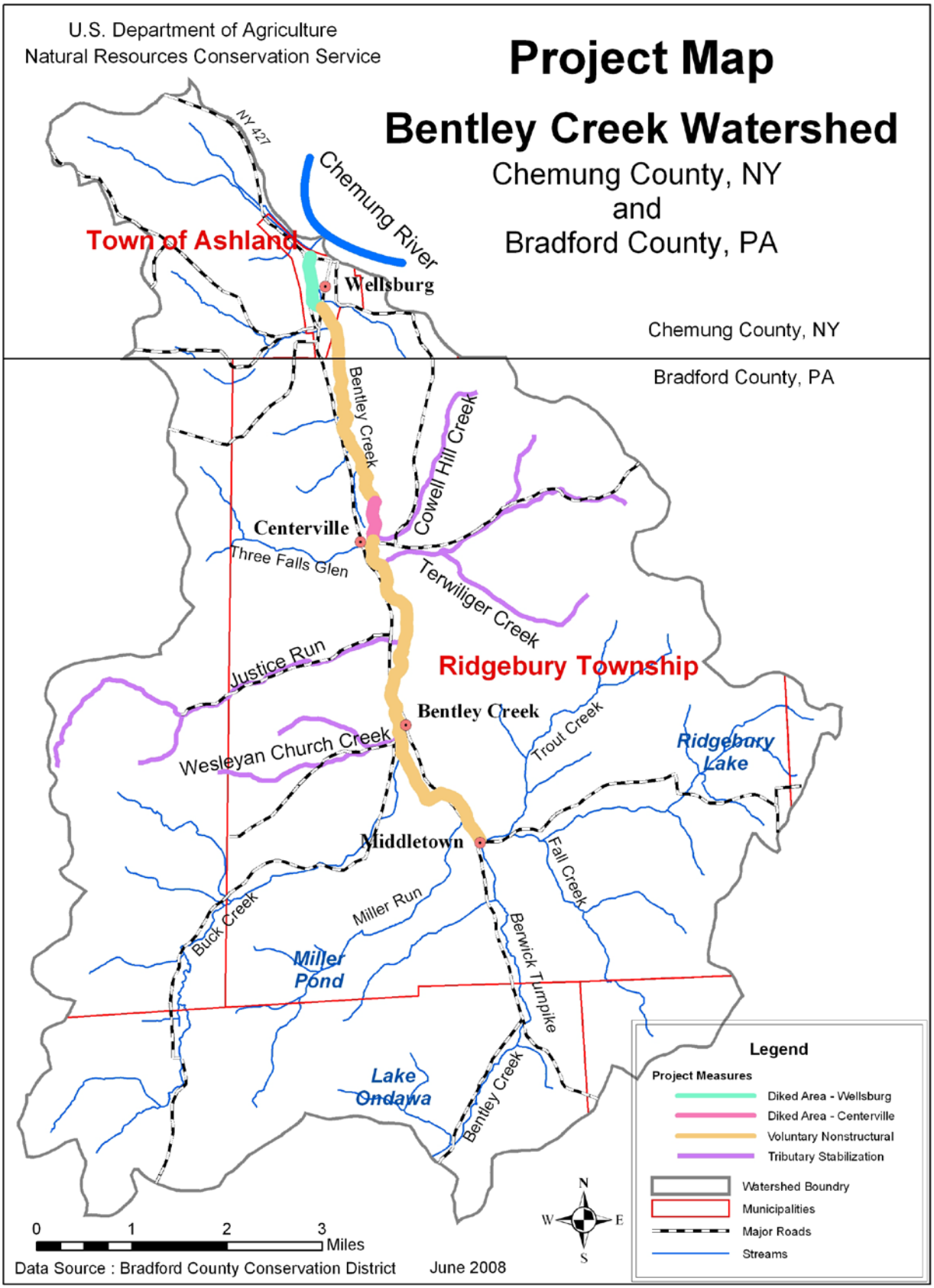
	SPONSOR 3	SPONSOR 4
Organization:	Village of Wellsburg	Town of Ashland
Sponsor Representative (optional):	Malcolm Coles	Vern Robinson
Sponsor Title: (Director, Manager, etc.):	Mayor	Supervisor
Sponsor Type: (County, State, etc.):	Village	Town
Address:	3663 Sixth St.	3663 Sixth St.
City:	Wellsburg	Wellsburg
State:	NY	NY
Zip:	14894	14894
Phone:	607-271-9129	607-732-0723
Email:	--------	info@TownOfAshland.net
Fax:	N/A	607-732-5445
O&M Responsibility (Yes/No):	Yes	Yes

PL 83-566 PROJECT INFORMATION
BENTLEY CREEK WATERSHED
BRADFORD COUNTY, PA; CHEMUNG COUNTY, NY

Sponsor Data

	SPONSOR 5	SPONSOR 6
Organization:	Chemung County Legislature	Chemung County SWCD
Sponsor Representative (optional):	Donna Draxler Thomas Santulli	Mark Watts
Sponsor Title: (Director, Manager, etc.):	Chairman County Executive	District Manager
Sponsor Type: (County, State, etc.):	County	Conservation District
Address:	P.O. Box 588	851 Chemung St.
City:	Elmira	Horseheads
State:	NY	NY
Zip:	14902-0588	14845
Phone:	607-737-2066 607-737-2912	607-739-2009
Email:	cmilliken@co.chemung.ny.us tsantulli@co.chemung.ny.us	markwatts@stny.rr.com
Fax:	607-737-2851 607-737-0351	607-739-4392
O&M Responsibility (Yes/No):	Yes	Yes

Appendix F
Project Map


U.S. Department of Agriculture
Natural Resources Conservation Service
Project Map
Bentley Creek Watershed
Chemung County, NY
and
Bradford County, PA
NY 427
Chemung River
Town of Ashland
Wellsburg
Chemung County, NY
Bradford County, PA
Bentley Creek
Cowell Hill Creek
Centerville
Three Falls Glen
Terwilliger Creek
Justice Run
Ridgebury Township
Bentley Creek
Trout Creek
Ridgebury Lake
Wesleyan Church Creek
Middletown
Fall Creek
Miller Run
Buck Creek
Miller Pond
Berwick Turnpike
Lake Ondawa
Bentley Creek
Legend
Project Measures
Diked Area - Wellsburg
Diked Area - Centerville
Voluntary Nonstructural
Tributary Stabilization
Watershed Boundry
Municipalities
Major Roads
Streams
N
W
E
S
0
1
2
3
Miles
Data Source : Bradford County Conservation District
June 2008

In Cooperation with:
Bradford County Commissioners
Bradford County Conservation District
Village of Wellsburg
Town of Ashland
Chemung County Legislature
Chemung County Soil and Water Conservation District