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.

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
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).

"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 recommended plan 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 and New York State Department of Environmental Conservation (NYS-DEC).

In addition, the Wellsburg stream reconstruction 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.

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.

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 the recommended plan features 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
- 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

Contracting

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 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.

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.

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.

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 2010

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 2010

Table 3. 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

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/] 100-yr flow will be the same depth as Bentley Creek 100-yr. This channel is in the Bentley Creek 100-year flood plain. Unknown EL.

[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	$142,000	$25,000	$0	$167,000
Upstream of Wellsburg	$ 93,000	$20,000	$0	$113,000
Totals	**$235,000**	**$45,000**	**$0**	**$280,000**

[1/] Price Base 2010, amortized over 100 years at a discount rate of 4.125 percent.

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

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

[1/] Price Base 2010

[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/]

Evaluation unit	Average annual benefits [2/]	Average annual costs [3/]	Benefit cost ratio
Wellsburg	$430,000	$167,000	
Upstream of Wellsburg	$140,000	$113,000	
Total	**$570,000**	**$280,000**	**2.0 : 1.0**

[1/] Price Base 2010

[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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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

(reserved)

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 the same as if the dikes were not in place.

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

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)