Tookany Creek Feasibility Study

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Public Meeting Overview

- Study Update
- Plan Formulation
- Measures to Advance to Detailed Analysis
- Technical Presentation – Engineering Modeling
- Question and Answer Period

Public Meeting Expectations

- Provide the public with a progress report on the ongoing efforts between Cheltenham Township and USACE.
- Discuss potential measures to address flooding in the community.
- Provide an opportunity for public participation with questions and answers.

- **Level of detail for potential measures is NOT ready for discussion at the neighborhood level.**

Feasibility Study Process

Feasibility Study Process

Study Schedule (Feasibility Study)

Range 18-24 Months

Action Item	Actual/Anticipated Completion
Cheltenham Township Approval	**April 2012**
Feasibility Cost Share Agreement Execution	**June 2012**
Existing Conditions Modeling	**December 2012**
Formulating Alternative Plans	**February 2013**
Evaluation of Alternative Plans	July 2013
Decision Point: Proceed to Phase 2 of the Feasibility Study	
Comparison of Alternative Plans and Draft Feasibility Report	December 2013
Public Notice/ Public Review	February 2014
Final Feasibility Report	June 2014

Plan Formulation Process

- **Determine planning objectives and constraints**
- **Determine potential measures to address planning objectives**
- **Eliminate the less promising measures**
- **Combine measures into plans by using formulation strategies**
  - The planner's goal is to develop the best plans irrespective of cost-sharing.

- Iteratively screen and reformulate plans
- Select and designate plans

Measures and Plans

- Measures are single features or activities which address the planning objectives A management measure is a feature or an activity that can be implemented at a specific geographic site to address one or more planning objectives. It may be structural feature that requires construction or assembly on site, or it could be a nonstructural action that requires no construction. Management measures are the building blocks of alternative plans.

- Plans are combinations of one or more measures functioning together to address one or more objectives. Sometimes a plan is one measure. More often it is a set of measures. Different plans consist of different measures, or they combine the same measures in significantly different ways.

Formulation Criteria

- Completeness – The extent to which an alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of all planned effects.
- Effectiveness– The extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities, as established in the planning objectives.
- Efficiency – The extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities as established in the planning objectives, consistent with protecting the nation's environment.
- Acceptability – The workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies.

Standard Categories for Measures

- USACE Policy and Guidance dictates that the project team consider measures under two specific categories as defined below:
  - **Structural Measures**: Decrease flood damages when plan features physically limit flooding of the flood prone area are constructed.
  - **Non-Structural Measures**: Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding.

Study Categories for Measures

- For the purposes of evaluating measures for this particular study, the project team defined the categories of measures as:
  - **Carrying Capacity Modifications**: Reduces water surface elevations through channel/floodplain modifications without impacting peak volume of water
  - **Flow Adjustments**: Reduces water surface elevations through reductions in the peak volume of water
  - **Property Protection**: Protects property by modifications to the structure or management practices by reducing the impacts of flood water

Identified Measures

Carry Capacity Modifications

- Inlet Modifications
- Bridge Modifications
- Channel Modifications
- Reconnection of Floodplains
- Riparian Buffer

Property Protection

- Elevation
- Buyout
- Levee/Floodwall
- Floodplain Management

Flow Adjustments

- Retention/Detention
- Dry Dam/Detention
- Wetland Creation/Large Scale Rain Gardens
- Underground Storage
- Stormwater Controls
- Porous Pavement
- Residential Rain Gardens
- Rain Barrel
- Bio-swale

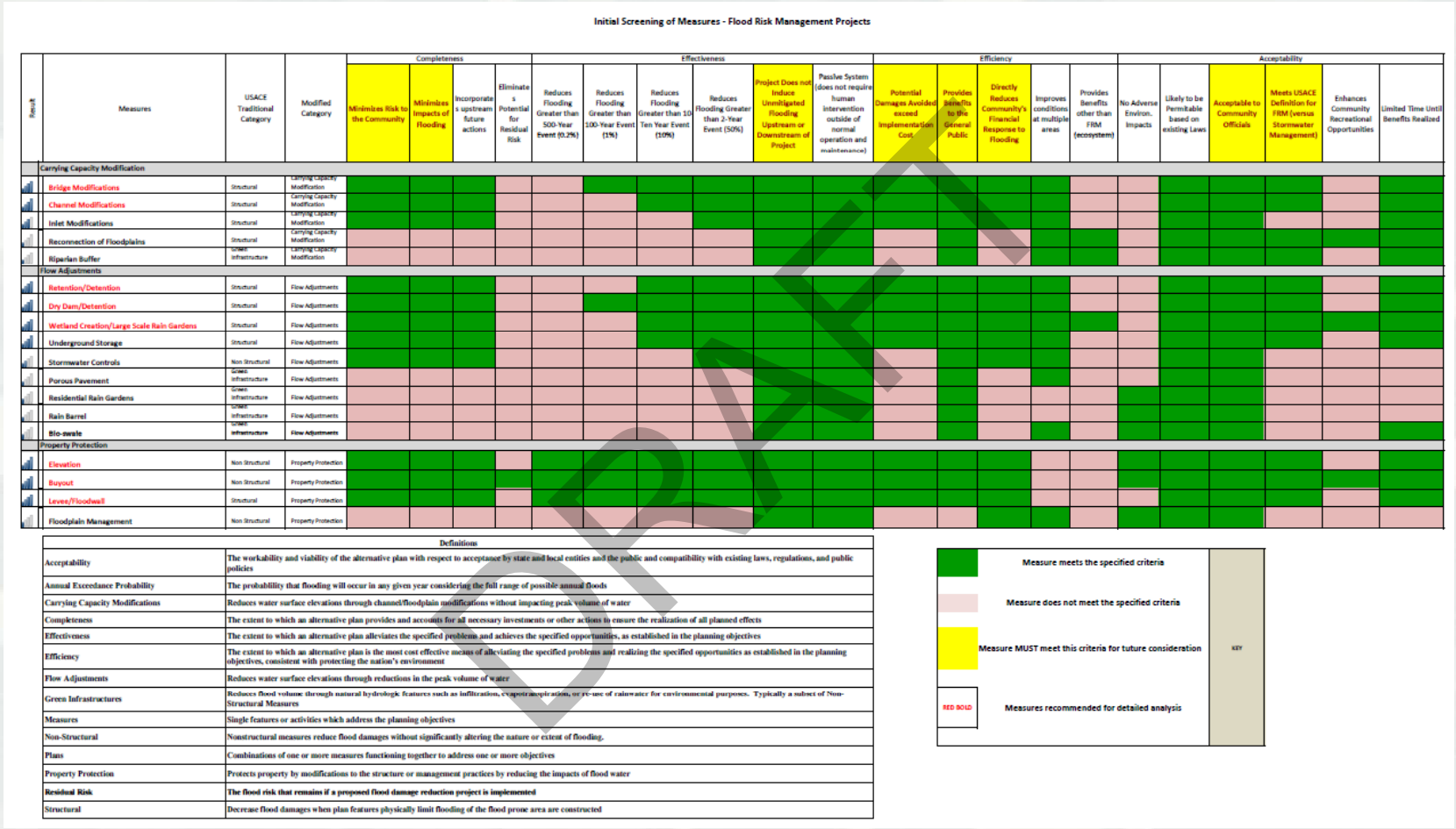
Screening Criteria

- **Minimizes Risk to the Community**
- **Minimizes Impacts of Flooding**
- Incorporates upstream future actions
- Eliminates Potential for Residual Risk
- Reduces Flooding Greater than 500-year event
- Reduces Flooding Greater than 100-year event
- Reduces Flooding Greater than 10-year event
- Reduces Flooding Greater than 2-year event
- **Project Does not Induce Unmitigated Flooding Upstream or Downstream of Project.**
- Passive System (does not require human intervention outside of normal operation and maintenance)

- ***BOLD ITEMS ARE CRITICAL CRITERIA***

- **Potential Damages Avoided exceed Implementation Cost**
- **Provides Benefits to the General Public**
- **Directly Reduces Community's Financial Response to Flooding**
- Improves conditions at multiple areas
- Provides Benefits other than FRM (ecosystem)
- No Adverse Environmental Impacts
- Likely to be Permitable based on existing Laws
- **Acceptable to Community Officials**
- **Meets USACE Definition for FRM (versus Stormwater Management)**
- Enhances Community Recreational Opportunities
- Limited Time Until Benefits Realized

Measures Matrix



Initial Screening of Measures - Flood Risk Management Projects

Result	Measures	USACE Traditional Category	Modified Category	Completeness: Minimizes Risk to the Community	Completeness: Minimizes Impacts of Flooding	Completeness: Incorporates upstream future actions	Completeness: Eliminates Potential for Residual Risk	Effectiveness: Reduces Flooding Greater than 500-Year Event (0.2%)	Effectiveness: Reduces Flooding Greater than 100-Year Event (1%)	Effectiveness: Reduces Flooding Greater than 10-Ten Year Event (10%)	Effectiveness: Reduces Flooding Greater than 2-Year Event (50%)	Effectiveness: Project Does not Induce Unmitigated Flooding Upstream or Downstream of Project	Effectiveness: Passive System (does not require human intervention outside of normal operation and maintenance)	Efficiency: Potential Damages Avoided exceed Implementation Cost	Efficiency: Provides Benefits to the General Public	Efficiency: Directly Reduces Community's Financial Response to Flooding	Efficiency: Improves conditions at multiple areas	Efficiency: Provides Benefits other than FRM (ecosystem)	Acceptability: No Adverse Environ. Impacts	Acceptability: Likely to be Permitable based on existing Laws	Acceptability: Acceptable to Community Officials	Acceptability: Meets USACE Definition for FRM (versus Stormwater Management)	Acceptability: Enhances Community Recreational Opportunities	Acceptability: Limited Time Until Benefits Realized
	Carrying Capacity Modification																							
	Bridge Modifications	Structural	Carrying Capacity Modification																					
	Channel Modifications	Structural	Carrying Capacity Modification																					
	Inlet Modifications	Structural	Carrying Capacity Modification																					
	Reconnection of Floodplains	Structural	Carrying Capacity Modification																					
	Riparian Buffer	Green Infrastructure	Carrying Capacity Modification																					
	Flow Adjustments																							
	Retention/Detention	Structural	Flow Adjustments																					
	Dry Dam/Detention	Structural	Flow Adjustments																					
	Wetland Creation/Large Scale Rain Gardens	Structural	Flow Adjustments																					
	Underground Storage	Structural	Flow Adjustments																					
	Stormwater Controls	Non Structural	Flow Adjustments																					
	Porous Pavement	Green Infrastructure	Flow Adjustments																					
	Residential Rain Gardens	Green Infrastructure	Flow Adjustments																					
	Rain Barrel	Green Infrastructure	Flow Adjustments																					
	Bio-swale	Green Infrastructure	Flow Adjustments																					
	Property Protection																							
	Elevation	Non Structural	Property Protection																					
	Buyout	Non Structural	Property Protection																					
	Levee/Floodwall	Structural	Property Protection																					
	Floodplain Management	Non Structural	Property Protection																					

Definitions

Acceptability	The workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies
Annual Exceedance Probability	The probability that flooding will occur in any given year considering the full range of possible annual floods
Carrying Capacity Modifications	Reduces water surface elevations through channel/floodplain modifications without impacting peak volume of water
Completeness	The extent to which an alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of all planned effects
Effectiveness	The extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities, as established in the planning objectives
Efficiency	The extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities as established in the planning objectives, consistent with protecting the nation's environment
Flow Adjustments	Reduces water surface elevations through reductions in the peak volume of water
Green Infrastructures	Reduces flood volume through natural hydrologic features such as infiltration, evapotranspiration, or re-use of rainwater for environmental purposes. Typically a subset of Non-Structural Measures
Measures	Single features or activities which address the planning objectives
Non-Structural	Nonstructural measures reduce flood damages without significantly altering the nature or extent of flooding.
Plans	Combinations of one or more measures functioning together to address one or more objectives
Property Protection	Protects property by modifications to the structure or management practices by reducing the impacts of flood water
Residual Risk	The flood risk that remains if a proposed flood damage reduction project is implemented
Structural	Decrease flood damages when plan features physically limit flooding of the flood prone area are constructed

KEY	
	Measure meets the specified criteria
	Measure does not meet the specified criteria
	Measure MUST meet this criteria for tuture consideration
RED BOLD	Measures recommended for detailed analysis

Identified Measures

Carry Capacity Modifications

- Inlet Modifications
- **Bridge Modifications**
- **Channel Modifications**
- Reconnection of Floodplains
- Riparian Buffer

Property Protection

- **Elevation**
- **Buyout**
- **Levee/Floodwall**
- Floodplain Management

Flow Adjustments

- **Retention/Detention**
- **Dry Dam/Detention**
- **Wetland Creation/Large Scale Rain Gardens**
- Underground Storage
- Stormwater Controls
- Porous Pavement
- Residential Rain Gardens
- Rain Barrel
- Bio-swale

Identified Measures

Carry Capacity Modifications

- Stormwater management is not considered a Federal interest.
  - Inlet Modifications
- Typically increase flood heights at project locations by causing increased friction. Excellent options for increased infiltration and ecosystem restoration, but do not provide the level of flood reductions measures necessary.
  - Reconnection of Floodplains
  - Riparian Buffer

Property Protection

- Administrative program that does not require further analysis as part of this study.
  - Floodplain Management

Flow Adjustments

- Most likely would not prove cost beneficial
  - Underground Storage
- Administrative and maintenance programs that would fall outside of the Federal Interest
  - Stormwater Controls
- Great measures to increase infiltration, improve water quality, and capture the "first flush" but do not provide the necessary reductions necessary.
  - Porous Pavement
  - Residential Rain Gardens
  - Rain Barrel
  - Bio-swale

Sample Screening Justification

- **BIOSWALES**
- Qingfu Xiao & E. Gregory McPherson (2011): *Performance of Engineered Soil and Trees in a Parking Lot Bioswale*, Urban Water Journal, 8:4, 241-253
- Potential to control 10-year event from parking lots.
- Not sufficient to control target flows for the study.

- **STORAGE TANKS**
- Philadelphia Combined Sewer Overflow Long Term Control Plan Update: Supplemental Documentation Volume 3 – Basis of Cost Opinions
- 23.3 MG existing potential storage
- $Y=3.48x^{0.826}$
- $46.9Million

Questions