



# Economic Analysis of Innovative Agricultural Practices for Water Resiliency on the Albemarle Peninsula

Economic analysis of three options for reducing flooding from the Grassy Ridge Flood Reduction Study conducted by Kris Bass Engineering:

## CONSERVATION TILLAGE (CT)

Practices that reduce the intensity or frequency of field tillage: cover crops and no-till.

## CONTROLLED DRAINAGE (CD)

The use of water control structures to reduce drainage and raise water tables.

## TWO-STAGE DITCH

Modification of a drainage canal to form a floodplain-like second stage during high water.

### KEY FINDINGS:

- A global benefit-cost analysis shows social benefits are many times larger than costs, justifying government investment.
- Farm-level profitability analysis shows potential value of on-farm investment.
- Key barriers include uncertainty and the need for coordination.



TWO-STAGE DITCHES CAN CAN REDUCE FLOODING UPSTREAM



CONTROLLED DRAINAGE CAN REDUCE FLOODING AND NUTRIENT LOSSES

## Global Annualized Benefit-Cost Analysis

### Conservation Tillage

Phosphorus reduction:	\$0
Nitrogen reduction:	\$0
Reduced flooding:	\$100,191
Yield losses:	(\$16,987)
<b>Benefit-Cost Ratio:</b>	<b>6:1</b>

### Controlled Drainage

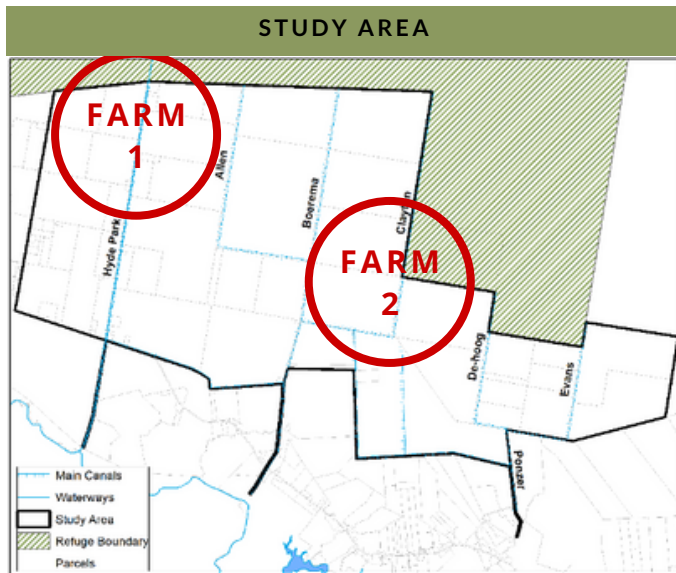
Phosphorus reduction:	\$92,329
Nitrogen reduction:	\$89,040
Reduced flooding:	\$100,191
Construction:	(\$14,765)
Maintenance:	(\$738)
<b>Benefit-Cost Ratio:</b>	<b>18:1</b>

### Two-Stage Ditch

Phosphorus reduction:	\$145,088
Nitrogen reduction:	\$0
Reduced flooding:	\$453,184
Land from production:	(\$20,920)
Construction:	(\$221,730)
Culverts:	(\$8,024)
<b>Benefit-Cost Ratio:</b>	<b>2.4:1</b>

Methodology and addition details for the estimates included in this factsheet are available from Kris Bass Engineering

# EXAMPLE FARM-LEVEL ECONOMIC ANALYSIS



Two locations in the study area were selected to model example benefits and costs of water management practices. Profitability results are based on spatially specific water management benefits but regional averages for farm productivity.

## COORDINATION REQUIRED

A key challenge to successfully securing the full economic benefits of each option lies in securing canal-wide adoption. In North Carolina, locally created drainage management districts provide a framework for coordination while allowing landowners to retain rights to sell, produce, and use their land as they see fit.

Without such a mechanism, coordinated action is more challenging. For this reason we assume costs of coordination similar to Hyde Co. Drainage District 7, which assesses fees up to \$18 per acre. A drainage district is formed through a court petition and local election, while a special service district is created through the County Board of Commissioners. Both may provide coordinating functions.

## FARM-LEVEL PROFITABILITY ANALYSIS

### FARM 1

A 100-acre farm growing cotton on the upper Hyde Park Canal that loses 25% of crop on flooded land.

### FARM 2

A 100-acre farm growing soybeans on the middle reach of Clayton Canal that loses 50% of crop on flooded land.

	CT	CD	2-STAGE	CT	CD	2-STAGE
Flooding	2,402	2,402	6,409	796	796	7,958
Construction	-	(321)	(2,268)	-	(328)	(2,268)
Subsidy	-	241	1,505	-	241	1,505
Ongoing Cost	600	(16)	-	1,300	(16)	-
Coordination	(1,800)	(1,800)	(1,800)	(1,800)	(1,800)	(1,800)
<b>Total</b>	<b>1,202</b>	<b>409</b>	<b>3,846</b>	<b>296</b>	<b>(1,197)</b>	<b>5,395</b>
<b>Net Per Acre</b>	<b>12</b>	<b>4</b>	<b>38</b>	<b>3</b>	<b>-</b>	<b>54</b>

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