

# ***Use of Drainage Act Assessments to Evaluate Costs of Rural Natural Channel Design***

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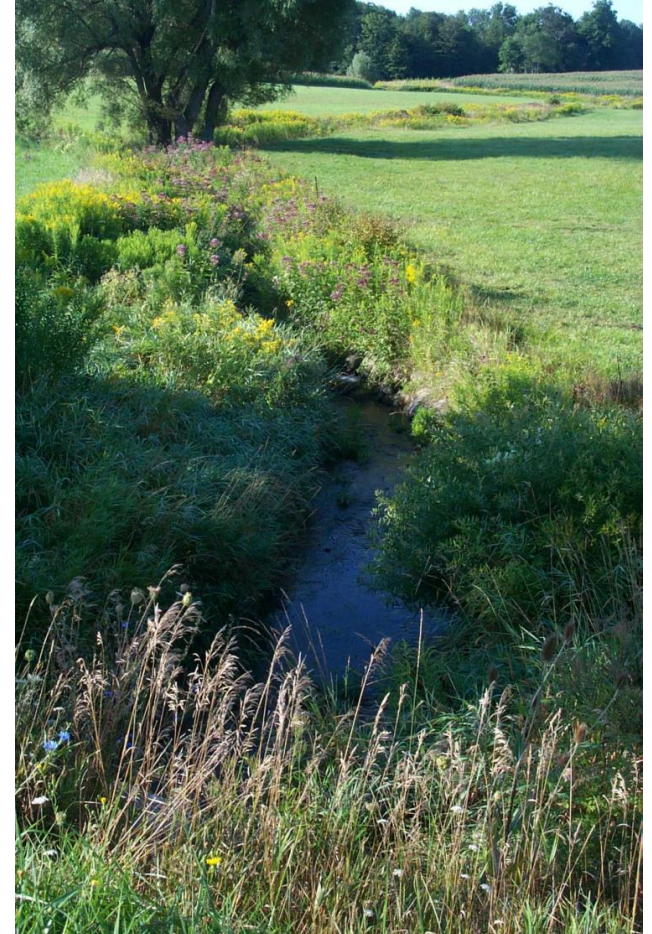
***Niagara Falls, ON***

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# Presentation Overview

- Purpose of the Presentation
- Overview of the Drainage Act
- Assessment Principles
- Illustrative Example
  - Design Options
  - Evaluating Costs
- Things to Ponder



## Purpose of the Presentation

Drainage Act can be an effective tool for naturalizing channels (creating new and enhancing existing) located on private land.

The purpose of the presentation is to:

- Provide a brief overview of the assessment process
- Compare the cost and impacts of a natural channel design on the property owners in the watershed that are paying for the project.

# Overview of the Drainage Act

- Provides a process to resolve drainage problems – referred to as “**an area requiring drainage**” (ARD)
- Construction of **new drains** initiated at the request of landowners and **improvements to existing drains** initiated by either landowners or municipality
- **User-pay**: Costs are assessed to the lands in the watershed, **not the entire municipal tax base**.
- Land owners can become financially responsible for **costs**, even if **drain is not constructed**
- **Assessment Schedule** outlines costs to **all landowners in the watershed** (including agricultural, roads, municipal, etc...)

# Assessment Principles

- Acres in **watershed** divided by property into agriculture, forest, road, etc...
- **Benefit value** is the estimated value the drain provides to the properties due to:
  - Better subsurface and surface water drainage
  - Direct connection
  - Increased market value
- **Benefit Value** from the drain must be higher than the **associated costs**

# Assessment Principles

- **Allowances** are compensation provided to a property owner affected by the drainage works including:
  - agricultural land taken permanently out of production
  - temporary construction corridors and access
  - damage to crops
- **Benefit** assessment is the share of the cost of the drain assessed as benefit to the properties
- **Special benefit** is where a feature provides value only to the individual property and not the entire watershed. These features can include:
  - additional or larger drain crossings
  - private drain connections
  - decorative structures

# Assessment Principles

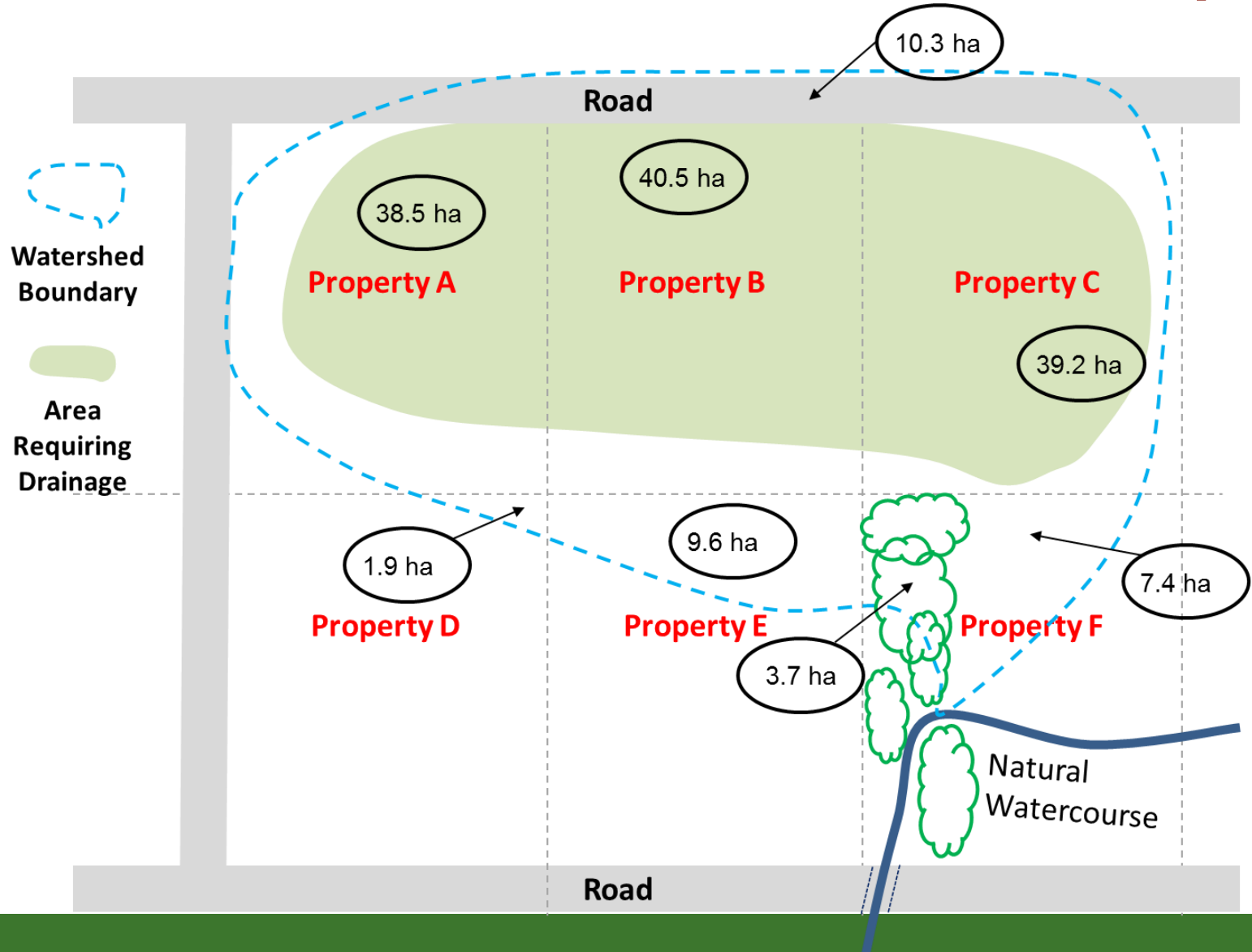
- **Outlet liability** assessments are made to all properties and roads in the watershed to allow the right of drainage into a drainage system
  - actively through a direct connection
  - passively through watershed contributions
- Total cost of the drainage system including allowances are assessed to all properties as **Benefit, Special Benefit** and/or **Outlet Liability**

# Assessment Principles

- **Fairness Test** is the process to ensure that the completed assessments are fair to all properties.
- The Province provides grants towards assessments on agricultural land for cost of municipal drains through the **Agricultural Drainage Infrastructure Program (ADIP)**.
  - Equal to 1/3 of **eligible** cost items in southern Ontario
  - Equal to 2/3 of **eligible** cost items in northern Ontario

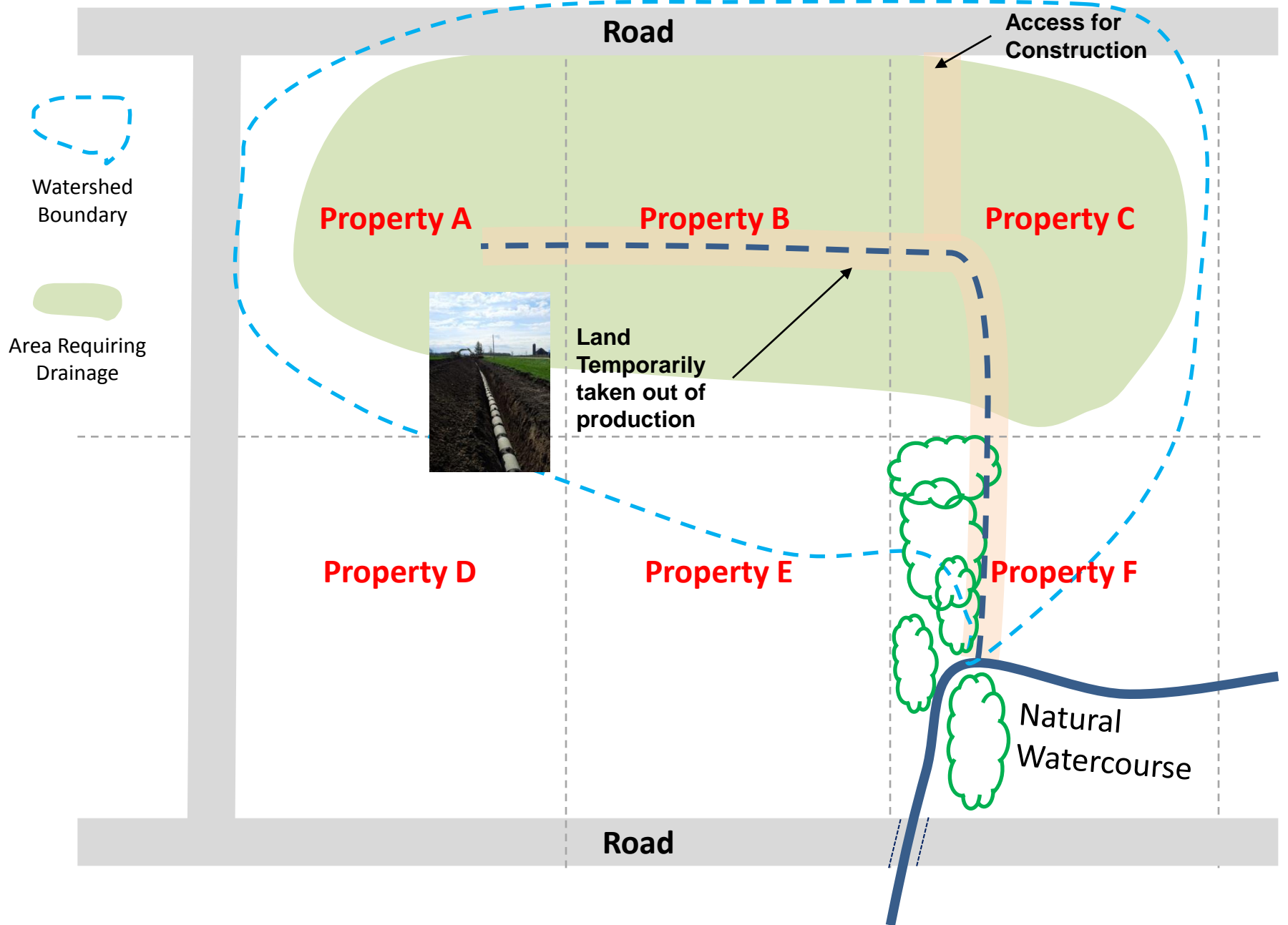


# Illustrative Example



## Option #1 – Buried Pipe

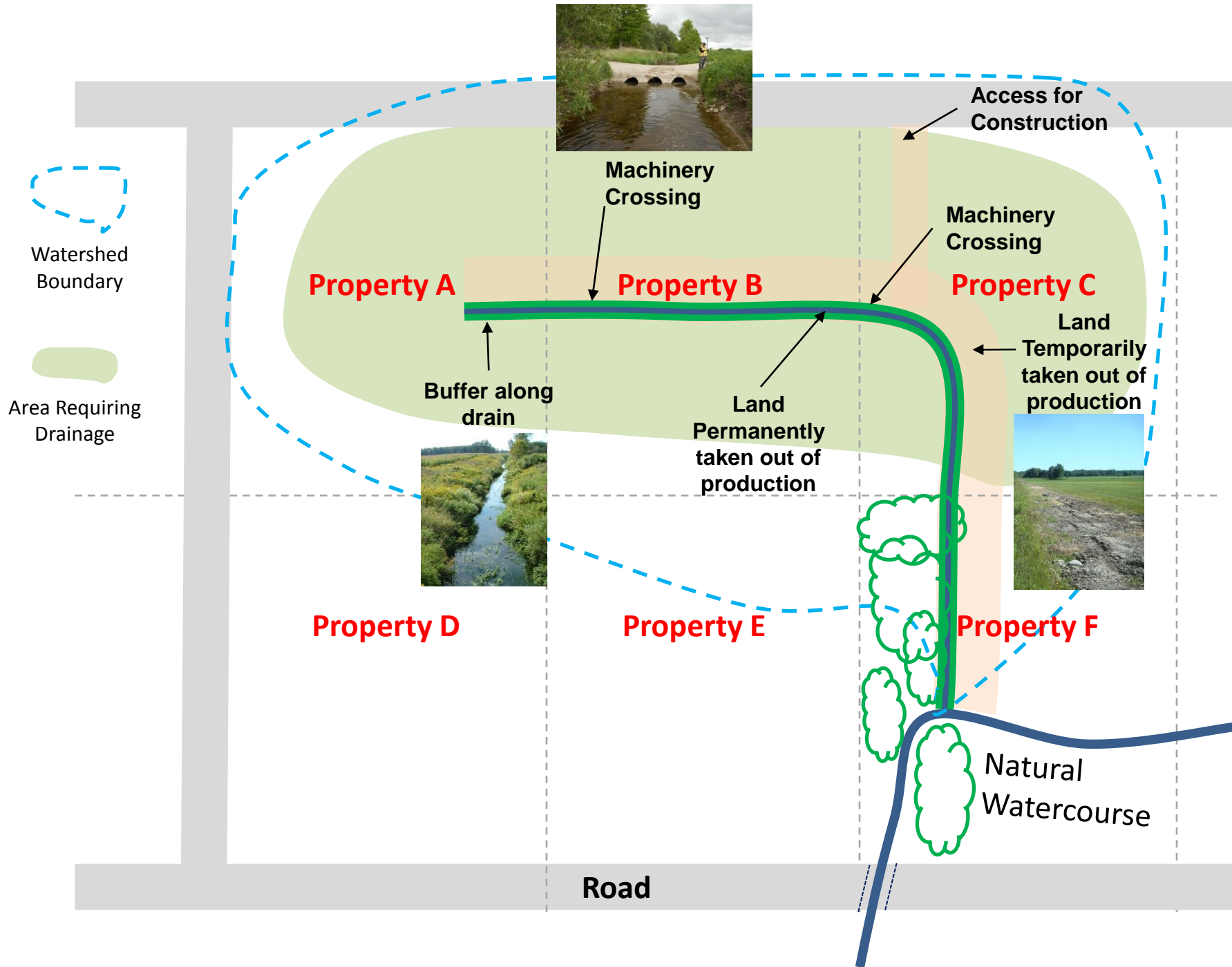






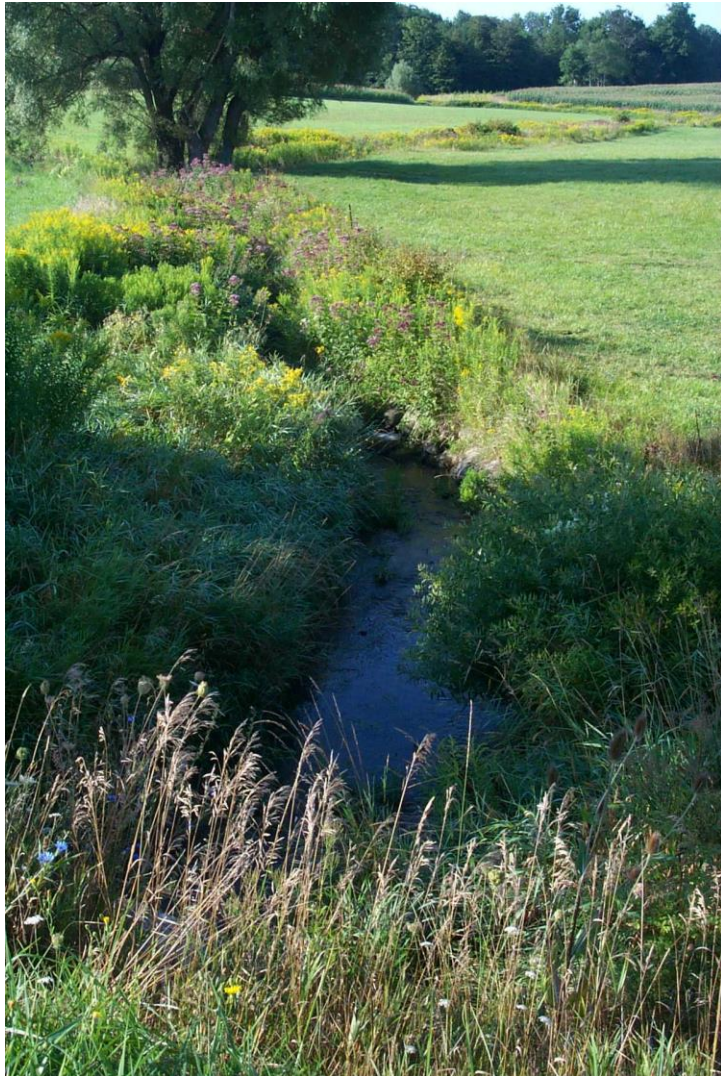
## Option #2 – Trapezoidal Channel

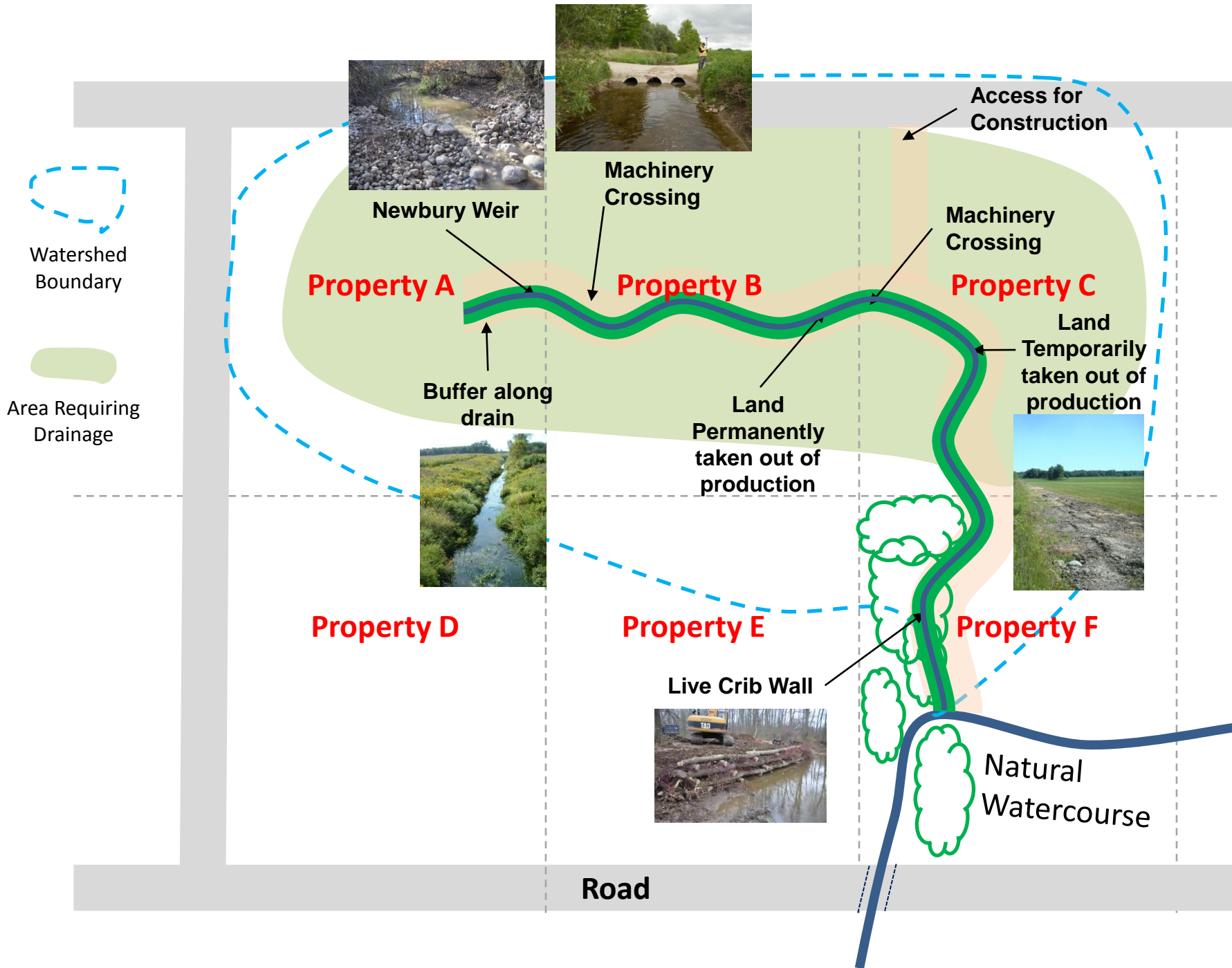






## Option #3 – Natural Channel





## Differences between Design Options

Criteria	Buried Pipe	Trapezoidal Channel	Natural Channel
<b>Total Project Cost</b>	\$120,220	\$135,870	\$367,300
<b>Length of Drain (m)</b>	1,310	1,310	1,455
<b>Long term maintenance</b>	Medium	High	Low
<b>Ongoing Impact / Cost on Agricultural Operation</b>	Low	Medium	High
<b>Impact on Water Quality</b>			
- Nutrients	Medium	Medium	Low
- Sediment	Low	High	Low
<b>Water Flow / Velocity at Outlet</b>	High, Flashy	Medium, Flashy	Low, Moderate
<b>Fish Habitat</b>	None	Good	Excellent



## Assessment Comparison

Costs	Buried Pipe	Trapezoidal Channel	Natural Channel
<b>Total Project</b>	<b>\$120,220</b>	<b>\$135,870</b>	<b>\$367,300</b>
<b>Construction</b>	\$78,600	\$70,900	<b>\$226,300</b>
<b>Engineering, Construction Supervision, etc...</b>			
	\$39,300	\$35,440	\$113,130
<b>Allowances</b>	<b>\$2,320</b>	\$29,530	\$27,870
<b>Land taken out of production – permanently</b>			
	<b>\$0</b>	\$22,340	\$24,640
<b>Damages – crops and land</b>			
	\$1,530	\$2,580	\$2,830
<b>Land taken out of production – future access &amp; maintenance</b>			
	\$790	<b>\$4,610</b>	\$400
<b>ADIP Grant</b>	\$32,140	\$36,340	<b>\$98,210</b>

# Individual landowners – Gross Assessment

Property	Buried Pipe	Trapezoid Channel	Natural Channel	Premium Factor for Natural Channel vs.	
				Pipe	Trapezoid
<b>A</b>	\$37,460	\$42,330	<b>\$114,410</b>	3.1	2.7
<b>B</b>	\$35,790	\$40,450	<b>\$109,340</b>	3.1	2.7
<b>C</b>	\$20,710	\$23,410	<b>\$63,270</b>	3.1	2.7
<b>D</b>	\$240	\$270	\$750	3.1	2.8
<b>E</b>	\$2,270	\$2,570	\$6,960	3.1	2.7
<b>F</b>	\$3,710	\$4,190	\$11,340	3.1	2.7
<b>Road</b>	\$20,040	\$22,650	<b>\$61,230</b>	3.1	2.7
<b>Total</b>	<b>\$120,220</b>	<b>\$135,870</b>	<b>\$367,300</b>	<b>3.1</b>	<b>2.7</b>

## Individual landowners – Net Assessment

Property	Buried Pipe	Trapezoid Channel	Natural Channel	Premium Factor for Natural Channel vs.	
				Pipe	Trapezoid
<b>A</b>	\$24,790	\$25,060	<b>\$73,110</b>	2.9	2.9
<b>B</b>	\$23,150	\$14,850	<b>\$61,370</b>	2.7	<b>4.1</b>
<b>C</b>	\$12,630	<b>\$3,810</b>	<b>\$30,840</b>	2.4	<b>8</b>
<b>D</b>	\$170	\$190	\$500	2.9	2.6
<b>E</b>	\$1,510	\$1,730	\$4,640	3.1	2.7
<b>F</b>	\$3,470	<b>\$1,720</b>	<b>\$9,530</b>	2.7	<b>5.5</b>
<b>Road</b>	\$20,040	\$22,640	<b>\$61,230</b>	3.1	2.7
<b>Total</b>	<b>\$85,760</b>	<b>\$70,000</b>	<b>\$241,220</b>	<b>2.8</b>	<b>3.4</b>

**Note: No ADIP grant applied to Property F and Road**

## Things to Ponder

- What do the different designs mean to individual property owners' assessments?
  - Insignificant to 1 property (D) at edge of watershed
  - Moderate to 2 properties (E and F) near outlet
  - Significant to 4 properties in ARD (A, B, C and Road)
- How does application of the ADIP grant affect the choice of design?
  - Design choice does not significantly change the percentage of costs landowners receive in grant
  - Costs to both landowners and province impacted by choice

# Things to Ponder

## Impacts on Agricultural Property Owners

- The pipe design provides advantages:
  - No nutrient management restrictions
  - More available land
  - Less disruption to cropping activity
  - No Conservation Authorities Act regulations
- Channels with buffer:
  - Access to portions of field
  - Weed control
  - Wildlife crop damage
- Meandering channel:
  - less land that can be effectively used for agriculture

## Things to Ponder

- Benefits versus Costs for natural channel design
  - Are the benefits of the natural channel worth the additional costs?
  - Can the benefit value from a drain include ecological function, habitat features, etc...?
  - How can these benefits be monetized to be included in the benefit value?
- What options exist to redistribute additional costs of natural channel design?

## Assumptions and Data

	Buried Pipe	Trapezoid Channel	Natural Channel
<b>Basic Construction Cost</b>	\$60 /m	\$48 /m	\$150 /m
<b>Crossing Cost</b>	-	\$8,000	\$8,000
<b>Engineering, Construction Supervision, etc...</b>	40% of construction costs		
<b>Land Prices</b>	\$5,000 /ha (pasture) to \$36,000 /ha (cropland)		
<b>Crop Prices</b>	\$1,700 /ha		
<b>Maintenance Frequency</b>	25 years	10 years	50 years
<b>Assumed Interest Rate</b>	4%		
<b>Benefit</b>	40%		
<b>Benefiting Properties</b>	Property A, B, C, F and Road		
<b>Outlet Liability Rate</b>	\$575.32 /ha	\$650.19 /ha	\$1,757.55 /ha