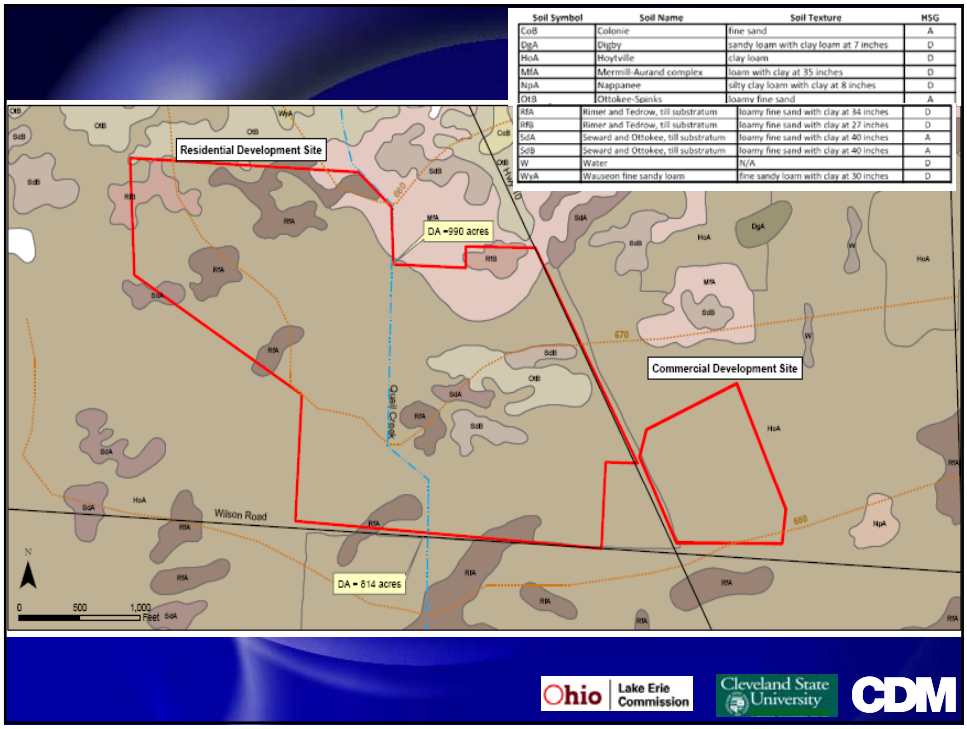
Section 3

TRIPLE BOTTOM LINE SITE PLANNING PROCESS

Decision Making Process for Site Planning in the Lake Erie Basin

Guiding Principles:

- Design to established project objectives
- Integrate existing water and terrestrial resources into site design
- Fix "dysfunctional" streams
- Focus on controlling the flow – pollution control will follow
  - "Start at the Source" to manage runoff
  - Control all runoff per site conditions: infiltrate & evapotranspirate & detain
- Use "Triple bottom line" approach to identify multi-objective benefits: community & environment & financial



Soil Symbol	Soil Name	Soil Texture	HSG
CoB	Colonie	fine sand	A
DgA	Digby	sandy loam with clay loam at 7 inches	D
HoA	Hoytville	clay loam	D
MfA	Mermill-Aurand complex	loam with clay at 35 inches	D
NpA	Nappanee	silty clay loam with clay at 8 inches	D
OtB	Ottokee-Spanks	loamy fine sand	A
RfA	Rimer and Tedrow, till substratum	loamy fine sand with clay at 84 inches	D
RfB	Rimer and Tedrow, till substratum	loamy fine sand with clay at 27 inches	D
SdA	Seward and Ottokee, till substratum	loamy fine sand with clay at 40 inches	A
SdB	Seward and Ottokee, till substratum	loamy fine sand with clay at 40 inches	A
W	Water	N/A	D
WyA	Wauseon fine sandy loam	fine sandy loam with clay at 30 inches	D

Residential Development Site (See Figure 1)

Proposed development is a single-family residential subdivision.

Site Characteristics

Property Area, acres	165
Predevelopment Land Use	Pasture
Existing Water Resources	
Quail Creek	
Length, ft	2,192
Slope, ft/ft	0.006
Upstream Drainage Area, acres	814
Downstream Drainage Area, acres	990
Property Purchase Price	$11,400 / acre

Applicable Regulations

Zoning Regulations	■ Single-Family Residential ■ Minimum of 20 percent open space. ■ Minimum lot size of 0.20 acres.
OEPA General Construction Permit	■ Post-Construction BMPs are required. ■ WQv is equal to runoff from 0.75 inch precipitation event ■ Designated drawdown for hydrologic control ■ Pollutant removal effectiveness
Flood Control Regulations	Critical Storm Methodology: ■ Post development 100-year peak discharge must be less than or equal to predevelopment 10-year peak discharge. ■ Post development 10-year peak discharge must be less than or equal to predevelopment 1-year peak discharge.

Commercial Development Site (See Figure 1)

Proposed development is a retail commercial site with 689,000 sq. ft. of floor space.

Site Characteristics

Property Area, acres	23
Predevelopment Land Use	Agriculture
Existing Water Resources	None
High Infiltration Area, acres	0
Property Purchase Price	$11,400 / acre

Applicable Regulations

Zoning Regulations	■ Commercial ■ Parking requirements First 50,000 sq. ft. of floor area: 1 space per 300 sq. ft. 50,000+ sq. ft. of floor area: 1 space per 375 sq. ft.
OEPA General Construction Permit	■ Post-Construction BMPs are required. ■ WQv is equal to runoff from 0.75 inch precipitation event ■ Designated drawdown for hydrologic control ■ Pollutant removal effectiveness
Flood Control Regulations (met with downstream regional facility)	Critical Storm Methodology: ■ Post Development 100-year peak discharge must be less than or equal to Predevelopment 10-year peak discharge. ■ Post Development 10-year peak discharge must be less than or equal to predevelopment 1-year peak discharge.

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Section 4

STEP 1: OBJECTIVES AND PERFORMANCE STANDARDS

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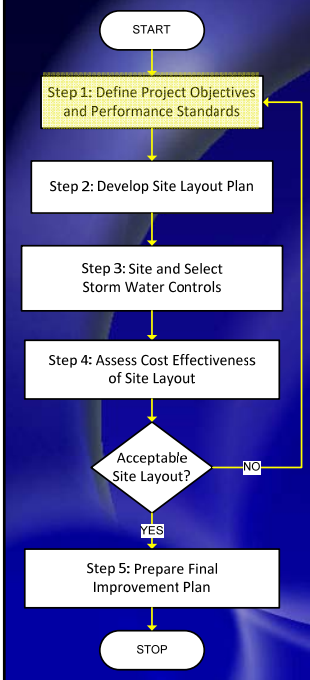
Designing to Project Objectives



Community Values

- Health
- Safety
- Welfare
- Aesthetics

Financial Viability

- Property value
- Construction costs
- Marketability
- Sustainability
- Maintenance

Environmental Values

- Quantity (Volume) discharges
- Quality (Pollutant) discharges
- Aquatic Habitat
- Terrestrial Habitat
- Regulations

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A. Confirm Project Objectives

B. Provide Site-Specific Details

C. Establish Weights per Perceived Importance

Co... ity Benefit Analysis / Performance Standards

Objective	Issues / Considerations / Performance Standards	Potential Impact (-1)	0	(+1)	Weight	Score
Public Health						
- Vector Control						
Public Safety						
- Traffic Safety						
- Pedestrian Safety						
- Emergency Vehicle Access						
- Drowning Risk						
- Handicap Accessible						
- Roadway Flooding						
Public Welfare						
- Land Use Compatibility						
- Risk of Property Damage						
- Aesthetics						
- Open Space						
- Recreation						
- Construction-Phase Impacts						
- Community Services						
- Public Infrastructure						
- Structure Flooding						
- Property Flooding						
				Total	100%	

Hold For Step 4

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A. Confirm Project Objectives

B. Provide Site-Specific Details

C. Establish Weights per Perceived Importance

Env ental Benefit Analysis / Performance Standards

Objective	Issues / Considerations / Performance Standards	Potential Impact (-)	0	(+)	Weight	Score
Discharge Quality Control						
- Stormwater Pollutants						
- Flow Regime						
- Groundwater						
- Thermal						
- Other Pollutant Discharges						
Aquatic Habitat Protection						
- Stream Morphology						
- Hydromodification						
- Vegetation						
- Macroinvertebrates						
- Fisheries						
Riparian Habitat Protection						
- Pollutant filtering						
- Streambank Stabilization						
- Stream Shading						
- Terestrial Species						
				Total	100%	

Hold For Step 4

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A. Confirm Cost Categories

B. Provide Site-Specific Details

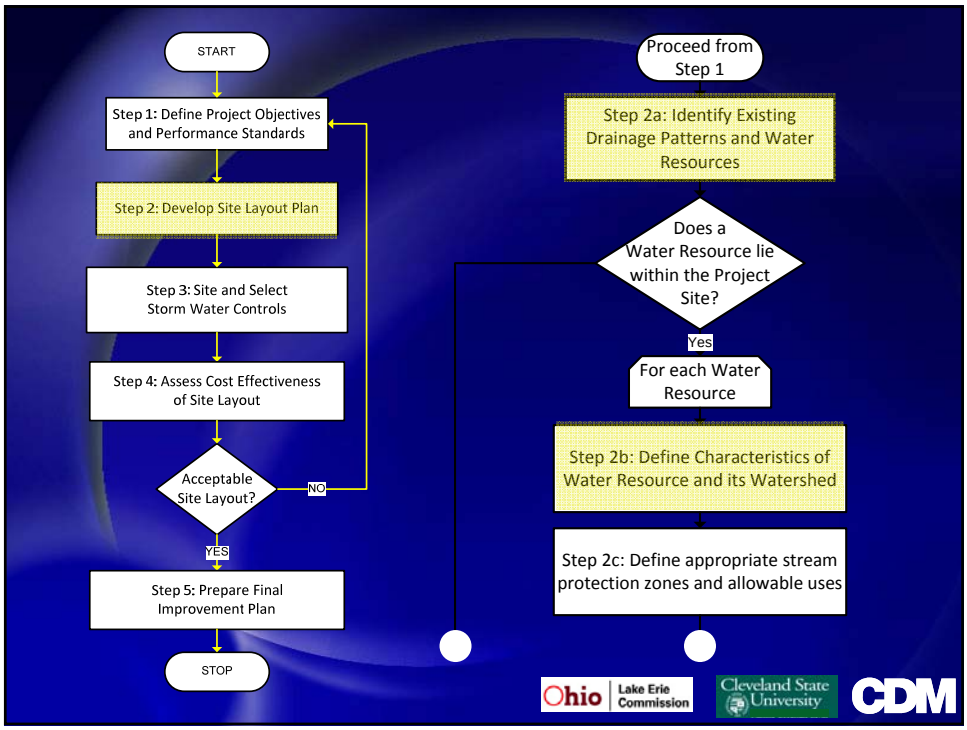
s / Performance Standards

Category	Description / Issues / Considerations	Present Worth Costs / Revenue
Pre-Construction		
- Design		
- Legal		
- Permitting		
- Property Acquisition		
- Financing		
- Other		
Subtotal		
Construction Cost		
- Site Preparation and Grading		
- Roads and Pavement		
- Utilities		
o Water / Sewer		
o Storm Water		
o Other		
- Buildings		
- Site Restoration and Landscaping		
- Other		
Subtotal		
Long-Term Sustainability		
- Operation and Maintenance		
- Long-Term Renewal		
Subtotal		
Marketability / Sales		
- Anticipated Property Value		
- Anticipated Sales Price		
Subtotal		
		Total

Hold For Step 4

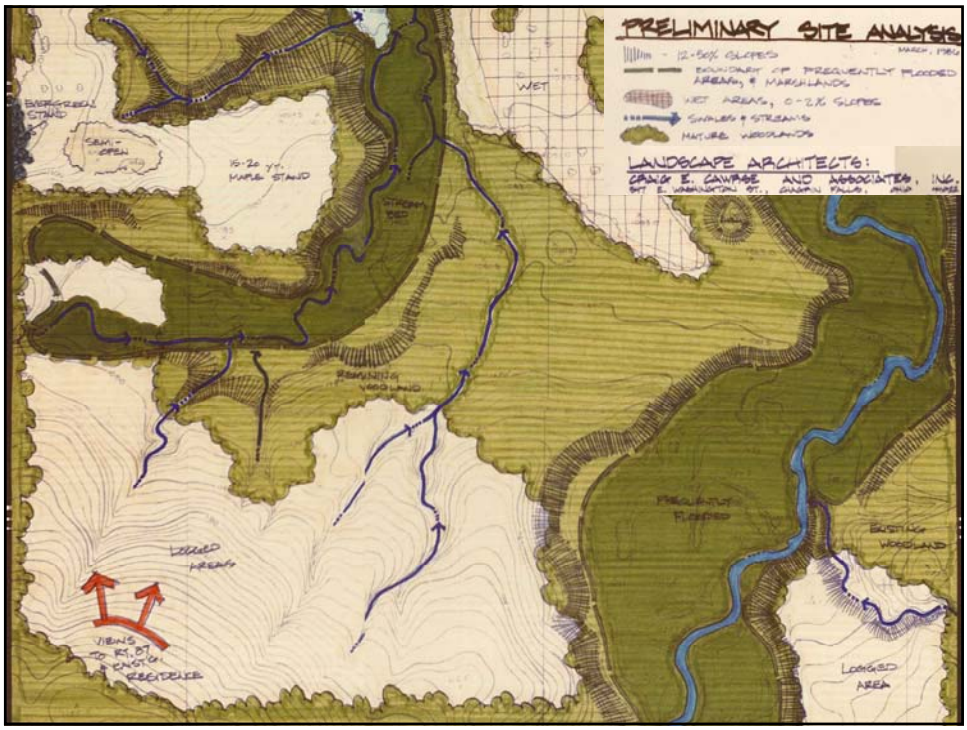
Section 5

STEP 2: SITE LAYOUT PLANS



Step 2a: ID Water Resources and Drainage Patterns

- Primary Conservation Areas
  - Regulated Waterbodies (Streams, Lakes, Wetlands)
  - Riparian areas (floodplains, floodways, stream meandering)
  - Soils suited for infiltration (groundwater recharge zones)
  - Mature trees
- Primary Development Areas
  - Proximity to existing development (roads, utilities)
  - Areas requiring minimal clearing, grading



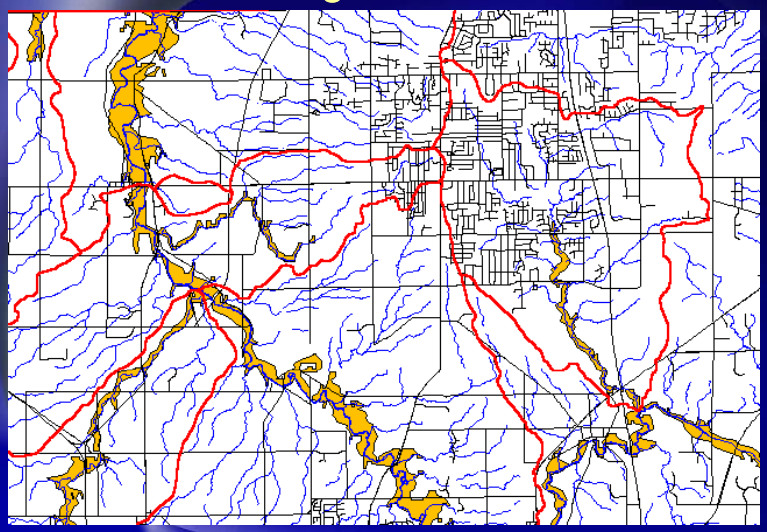
Step 2b: Define Characteristics of Water Resource and its Watershed

- Flood Frequency
  - 100-year floodplain
  - 100-year floodway
- Stream Meandering
  - Streamway
- Water Quality / Hydrologic Control
  - Bank-full Channel
  - Floodprone Areas
- Watershed Characteristics
  - Soils
  - Vegetation
  - Terrain
  - Imperviousness

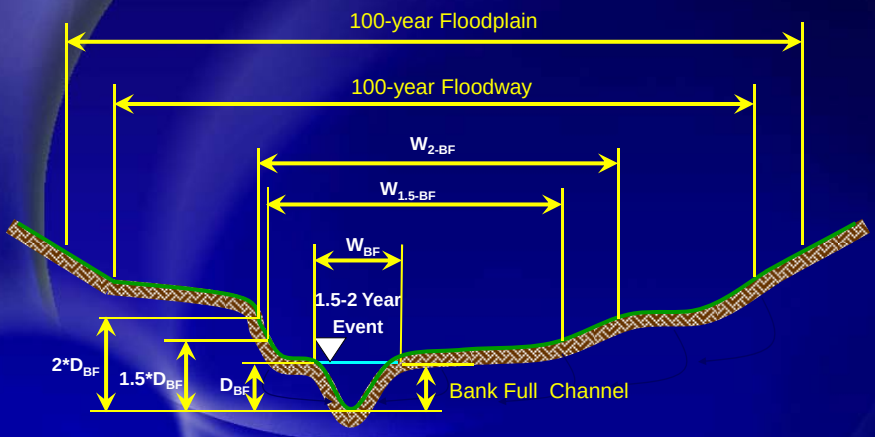
Structural BMPs Complement Non-Structural BMPs

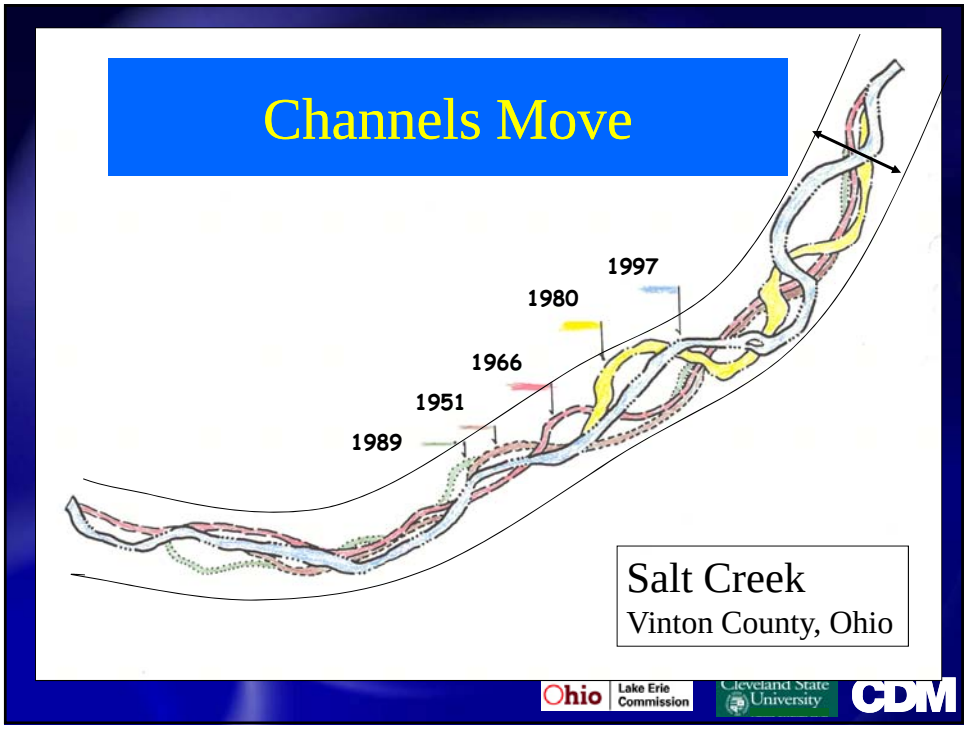
- Non-structural BMPs (Step 2)
  - Keep structures away from the stream
  - Maintain biological health of the stream
  - Provide access along the stream
  - Minimize generation of runoff and pollution
- Structural BMPs (Step 3)
  - Control flow into the stream
  - Remove pollutants before entering the stream

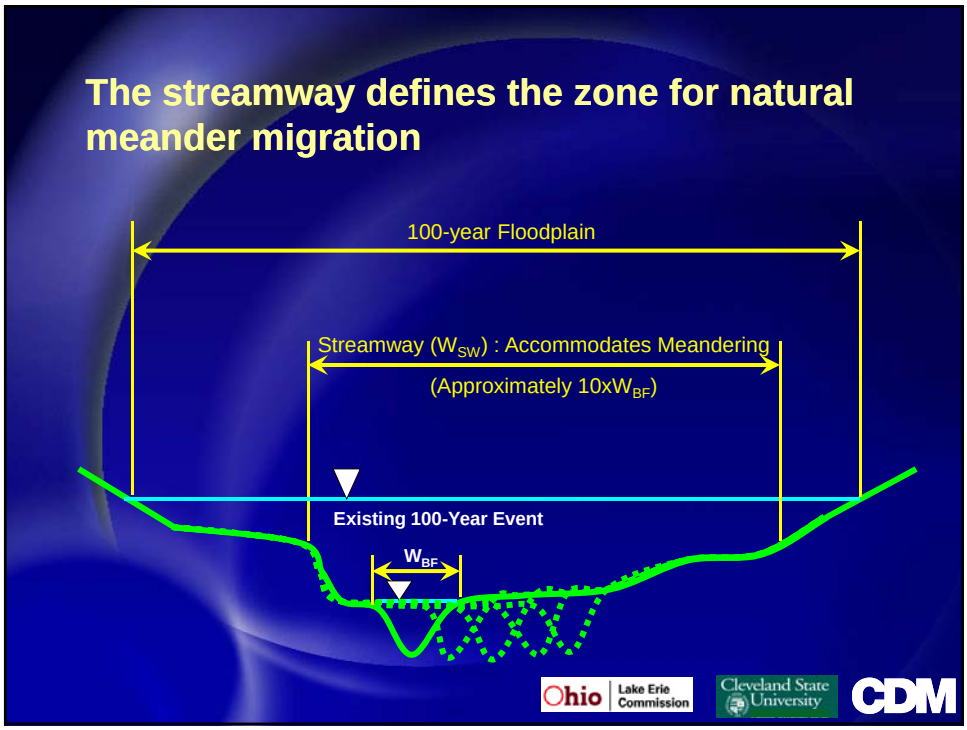
Floodplain preservation retains significant natural flood storage volume



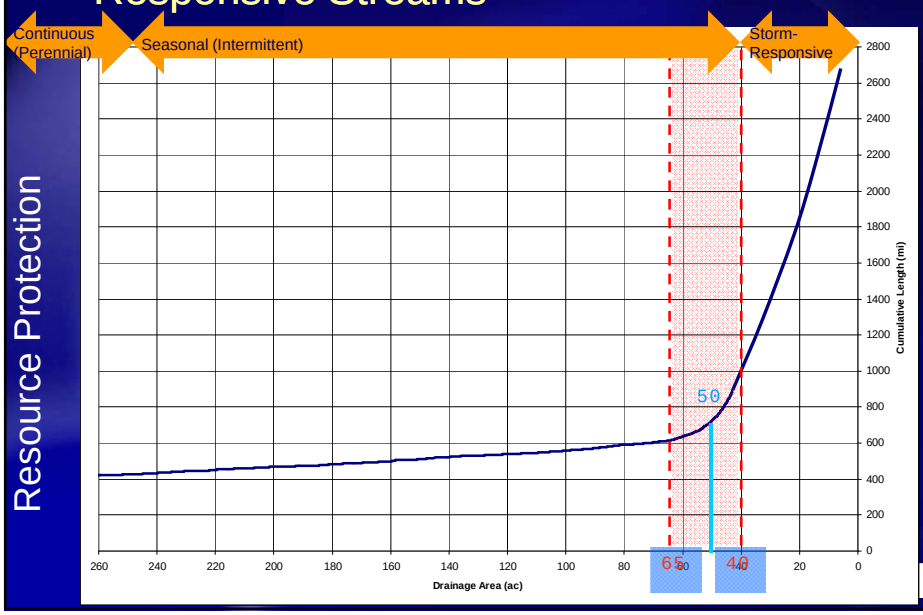
Maintaining the hydrologic function of a stream requires an understanding of the frequency of floodplain inundation




Channels Move
1997
1980
1966
1951
1989
Salt Creek
Vinton County, Ohio
Ohio Lake Erie Commission
Cleveland State University
CDM


The streamway defines the zone for natural meander migration
100-year Floodplain
Streamway (W_{SW}) : Accommodates Meandering
(Approximately 10xW_{BF})
Existing 100-Year Event
W_{BF}
Ohio Lake Erie Commission
Cleveland State University
CDM

Most Streams are Intermittent and Storm-Responsive Streams



Stream Corridor Protection Recognizes Characteristics of Intermittent and Storm-Responsive Streams

Type of Stream	Continuous and major seasonal	Average seasonal	Most small seasonal	Storm-responsive
Drainage Area to Stream Segment	>250 ac → 250 ac	250 ac → 100 ac	100 ac → 40 ac	40 ac → 6 ac
Length of Stream Segment	425 mi	132 mi	423 mi	1750 mi
Proposed Corridor Width (each side, from top of bank)	75 ft → 45 ft**	35 ft **	25 ft → 20 ft	20 ft → 10 ft
Function Provided				
Stream Functions				
Aquatic Habitat				
"Fishable" Segments				
In stream Pollutant Assimilation*				
In-stream flow control*				
Corridor Functions				
Reduced pollutant loading through:				
- Vegetation stabilizing streambanks				
- Vegetation filtering runoff through corridor *				
Flow control into streams				
Shade canopy (to maintain water temperature)				
Reduces other storm water controls				
Protection of structures from				
- Stream erosion				
- Flooding				
Socio-Economic Factors				
Development layout consideration				
Compliment to CSO /SSO control objectives				
Green Space preservation				
Water related amenities				

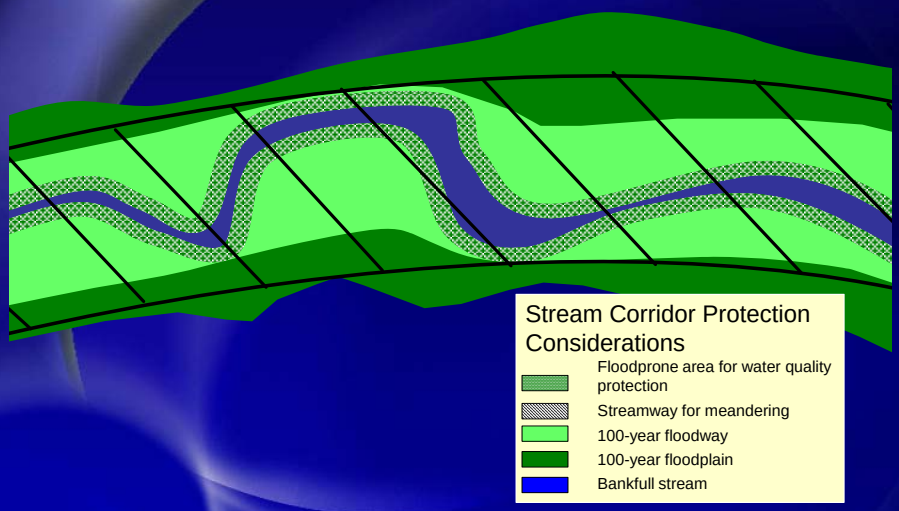
* BMPs required under Article V also perform this function

**Narrower widths apply where existing uses encroach into corridor

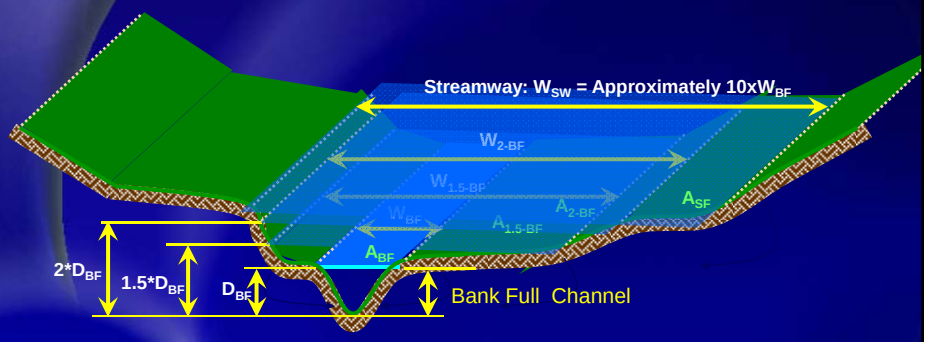
Level of Influence from Function Provided

Most — Least

Stream corridor protection zones should be designated to provide specific benefits



Maintaining the hydrologic function of a stream requires an understanding of the frequency of floodplain inundation



Ohio DNR has developed a method for calculating floodprone area for water quality protection

Stream Condition	Floodprone Area, ft^2 ($A_{_} = L*0.5*(W_{_U} + W_{_D})$)	Incremental Area, ft^2
- @ Bankfull Depth	A_{BF} = _____	$I_{BF} = A_{BF}$ = _____
- @1.5 * Bankfull Depth	$A_{1.5BF}$ = _____	$I_{1.5BF} = A_{1.5BF} - A_{BF}$ = _____
- @ 2.0 * Bankfull Depth	A_{2BF} = _____	$I_{2BF} = A_{2BF} - A_{1.5BF}$ = _____
- Streamway	A_{SW} = _____	$I_{SW} = A_{SW} - A_{2BF}$ = _____ (min.=0)

Stream Condition	Entrenchment Ratios ($E_{_} = I_{_} / A_{SW}$)	Floodprone Area Weighting Factors ($C_{_} = 0.6/2^{E_{_}} + 0.7$)
- @ Bankfull Depth	E_{BF} = _____	C_{BF} = _____
- @1.5 * Bankfull Depth	$E_{1.5BF}$ = _____	$C_{1.5BF}$ = _____
- @ 2.0 * Bankfull Depth	E_{2BF} = _____	C_{2BF} = _____

Adjusted Floodprone Area, ft^2

- For $S \leq 2\%$, $A_{FP} = (I_{BF} * C_{BF}) + (0.8*I_{1.5BF}*C_{1.5BF}) + (0.4*I_{2BF}*C_{2BF})$= _____
- For $S>2\%$, $A_{FP} = (1.1*I_{2BF}) + (0.5*I_{SW})$ = _____

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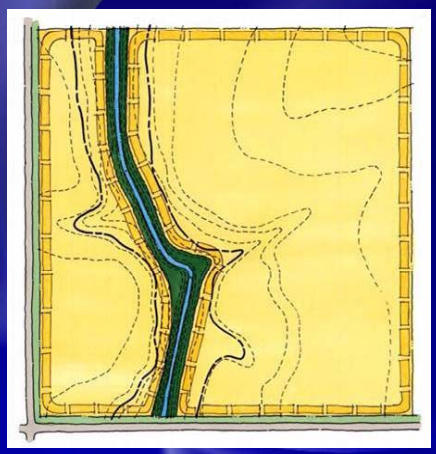
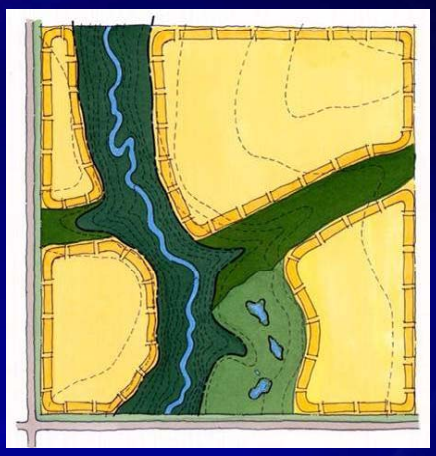
Ohio DNR's methodology suggests integrating stream setbacks, floodprone areas, and BMPs





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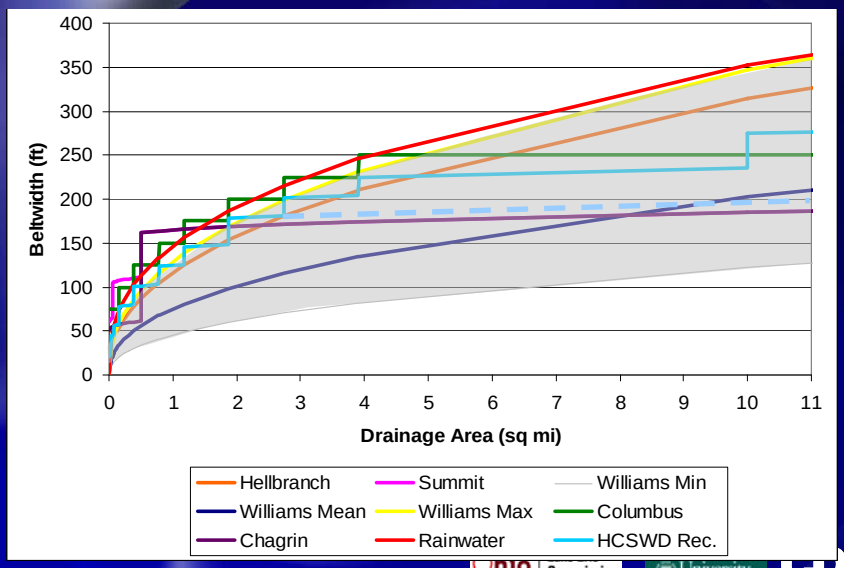
Step 2c: Define appropriate stream corridor zones and allowable uses

- Protection Goals by Stream Type
- Appropriate Dimensions (from Step 2b)
- Allowable Facilities / Activities

Comparison of Ohio DNR "Streamway" Criteria and Typical Stream Setback Criteria



What Facilities are allowable near streams?

Facilities	Allowed? Yes	Allowed? No	Conditions
▪ Facilities pre-existing before regulation	X		Regulation only applies to development/redevelopment
▪ Buildings, structures, and other facilities subject to building permits / zoning approval		X	Unless otherwise allowed by these Regulations
▪ Swimming Pools	X		
▪ Signs and Billboards	X		
▪ Parking lots and paved areas		X	
▪ Roads:			
o Crossing the stream	X		If impact minimized and stream crossing BMP provided
o Parallel to the stream		X	Unless necessary and approved by ***Enforcing Official***
▪ Paved foot and bike paths	X		Must relocate paths damaged by natural erosion
▪ Levees and dikes	X		If impact to stream corridor minimized
▪ Pipe lines (water, sewer, storm):			
o Crossing the stream	X		If impact minimized and stream crossing BMP provided
o Parallel to the stream	X		If necessary and approved by ***Enforcing Official***
▪ Septic systems	X		If necessary and approved by the Local Heath Department
▪ Storm water quantity/quality control facilities	X		If compatible with habitat function and permitted under floodplain regulations
▪ Fences	X		If impact to corridor, flooding minimized
▪ Public utility transmission lines	X		If necessary and approved by ***Enforcing Official***
▪ Electric, telecommunication, cable TV lines:			
o Crossing the stream	X		If impact minimized and stream crossing BMP provided
o Parallel to the stream	X		If necessary and approved by ***Enforcing Official***
▪ If inconsistent with Earthwork Regulations (Article III of the Rules and Regulations of the HCSWD)		X	

Source: Hamilton County Storm Water District

What Activities are allowable near streams?

Activities	Allowed? Yes	Allowed? No	Conditions
▪ Clearing of existing vegetation		X	Unless required to support an allowed facility or activity
▪ Vegetation management intended to:			
o maintain hydraulic function	X		Per approved maintenance agreement under Post-Construction Regulations (Article V of the Rules and Regulations of the HCSWD), Section 516
o protect levees / dikes	X		
o maintain habitat function	X		
o remove damaged / diseased trees	X		
o control invasive species	X		
o maintain pre-existing vegetation condition (e.g., mowing)	X		
o abate nuisance conditions	X		
o re-vegetate / re-forest to improve corridor function	X		
▪ Debris removal	X		Per approved maintenance agreement
▪ Passive uses including hiking, fishing, picnicking, and similar uses	X		
▪ Soil disturbance by grading, stripping, or other practices		X	Unless required to support an allowed facility or activity
▪ Filling or dumping		X	Unless required to support an allowed facility or activity
▪ Resource restoration activities:			
o compensatory floodplain storage	X		
o stream and/or wetland restoration / enhancement / mitigation	X		
▪ Any activity authorized by a Section 401 / 404 permit	X		
▪ Agricultural Activities	X		
▪ Construction activities related to landslide stabilization	X		
▪ Use, storage, or application of pesticides		X	Except for spot spraying of noxious weeds or non-native species consistent with ODNR recommendations
▪ Storage or operation of motorized vehicles		X	Except for approved maintenance and emergency use

Source: Hamilton County Storm Water District

Emerging Regulations for "Dysfunctional" Streams

- 2/3rds of Ohio Streams are hydrologicly impaired
- Proposed modifications to Ohio EPA 401 Certification Requirements
- Proposes 4 tiered stream mitigation category approach.
- Mitigation design premise: maximize the stream's natural state within site constraints
- Focus:
  - Restoring / protecting floodplain areas
  - Promotes restoration of degraded streams, ditches

Proposed OEPA 401 Water Quality Certification – Stream Mitigation Rule

OEPA's proposed Tiered Mitigation Approach:

- Minimize the deviation of new or existing streams from their natural condition.
- Goal is to protect existing and downstream uses through tiered mitigation categories.
- 4 Proposed Tier Mitigation Categories

Proposed OEPA 401 Water Quality Certification – Stream Mitigation Rule

OEPAs proposed Tiered Mitigation Approach:

- 4 Proposed Tier Mitigation Categories
  - Tier 4 – Intended to maintain biota, habitat, form and function.
  - Tier 3 – Intended to maintain habitat, form and function.
  - Tier 2 – Intended to maintain form and function
  - Tier 1 – Intended to maintain function
- Opportunity exists in the Tier 1/Tier 2 areas to fix "dysfunctional" streams

Why Work in the Stream?

- ✓ Can restore functionality of a stream / ditch that is currently degraded with little to no permitting burden.
- ✓ Retaining / restoring natural stream form minimizes structural measures to maintain stream alignment.
- ✓ Can integrate into site design to maximize multiple uses (aesthetics, amenities, recreation, trails, flood control, water quality control).
- ✓ Material excavated for floodplain is on-site borrow source.
- ✓ Can "bank" mitigation for use as credits for future development w/in same watershed area (OEPA debit-credit model as part of 401 rule revisions).

Proposed OEPA 401 Water Quality Certification – Stream Mitigation Rule

OEPA's proposed Tier 1 Mitigation Criteria:

- Anti-degradation exclusion applies.
- No linear foot replacement limits / requirements.
- Incorporate existing methodologies.
- Recommended for existing streams < 2% grade.
- Flood prone area must be replaced at the greater of:
  - Existing flood prone area or,
  - Area >30% of the streamway target width (12.6 $DA^{0.38}$).
- Ensure vertical stability – Address velocity issues.
- No ecological function requirements
- Monitoring related to stability and design requirements.
- Soil suitable for native vegetation and floodplain function

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Proposed OEPA 401 Water Quality Certification – Stream Mitigation Rule

OEPAs proposed Tier 2 Mitigation Criteria:

- On-site replacement / restoration of stream channel and water quality services (BMPs).
- Design must be vertically stable.
- Stream channel must include length > or equal to existing condition (channel length) for self-forming or constructed channels.
- Flood prone area must be replaced at the greater of:
  - Existing flood prone area or,
  - Area >30% of the streamway target width (12.6 $DA^{0.38}$).
- Ecological function requirements associated w/ vertical stability.
- Monitoring related to stability, design requirements and stream recovery.
- Soil suitable for native vegetation and floodplain function.

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Proposed OEPA 401 Water Quality Certification – Stream Mitigation Rule

OEPA 401 Water Quality Certification

- Where do I go for more information on these proposed rule changes:

www.epa.ohio.gov/dsw/rules/draft_401_sep08.aspx

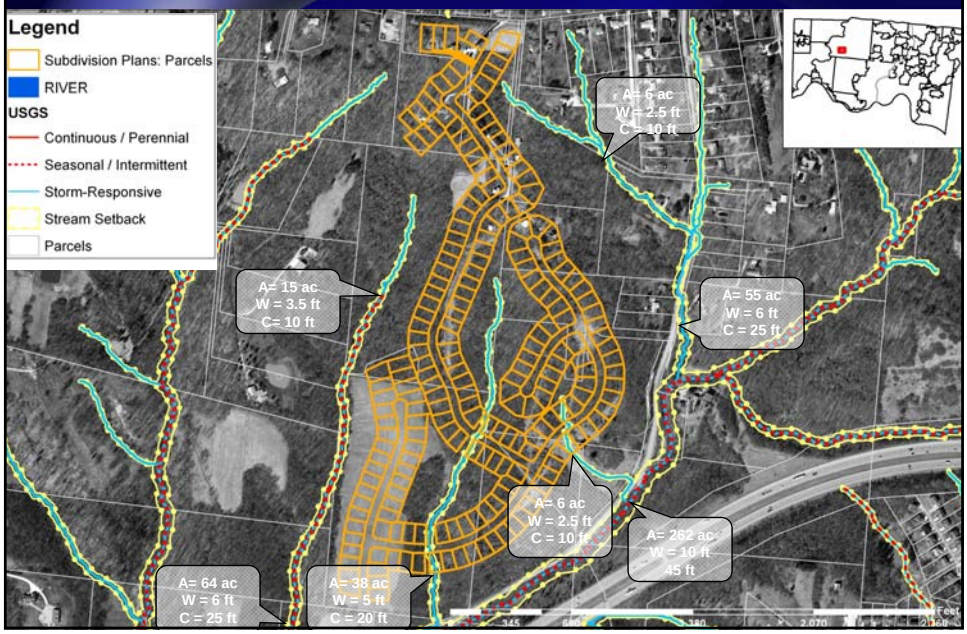
- How can I get involved or submit comments?

For additional information or to submit comments

Please submit any comments you have on the draft rules in one of the following manners.

By e-mail: bob.heitzman@epa.state.oh.us

By mail: Bob Heitzman
Ohio EPA
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049

By fax: (614) 644-2745

Development patterns accommodate setbacks