Assessing the Impacts:

Evaluating the Potential Physical Changes to Wetlands and Watercourses from Upland Development

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- Introduction
- Runoff Processes in Connecticut Landscapes
- Impacts on Physical Characteristics
- Hands-On Exercise

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"…unless such activity will have a likely impact or effect on the physical characteristic of such wetlands or watercourses."

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I ♥ Wetlands

"How do I love thee? Let me count the ways …"

Sonnet XLIII, from the Portuguese
Elizabeth Barrett Browning (1806-1861)

Sonnet XXL, From the Corporatese

How do I hurt thee wetland? Let me count the ways.
I fill thee to the depth and breadth and height I shall but

- excavate thee
- dessicate thee
- drown thee
- starve thee
- overfeed thee
- poison thee
- fragment thee
- change thee biota

I shall but love thee better after death.

B. Box Sprawling, American, 1950 - ?

Preparing to Assess the Impacts

- What are the wetland and upland soil landscapes, and their major characteristics? Their relationships?
- Where are wetland and watercourses in relation to activity?
- What is the watershed or recharge area?
- What functions and values is the wetland/ watercourse currently providing?

Preparing to Assess the Impacts

(continued)

- Where are areas of groundwater recharge and discharge?
- What is the surface water runoff pattern?
- What is the current land cover of adjacent upland areas?

Relationships Between Physical Characteristics, Uplands, and Potential Development Impacts

"Physical Characteristics"

- Organic Matter
- Saturated Conditions
- Anaerobic Conditions
- Redoximorphic Features
- Movement of Sediments and Organic Matter
- Seasonal Flooding
- Landscape Position

Relationship of *Organic Matter* to Uplands

Plant materials (roots, leaves, twigs) wash, drop, or blow into wetlands; wetter conditions from seasonal saturation from water supplied by uplands slows decomposition of organic materials.

Potential Impacts to *Organic Matter* from Development*

- Increased runoff adds additional sediments and organic matter.
- Decreases/changes in seasonal groundwater levels create drier conditions; organic matter decomposes faster, with less accumulation.
- Changes to the vegetation community change the rate of organic matter accumulation.

*Traditional development of non-cluster housing, curved roads, catch basin to storm sewer system, large areas of paved surfaces.

Relationship of *Saturated and Anaerobic Conditions and Redoximorphic Features* **to Uplands**

Depends upon fluctuations of seasonal groundwater during the growing season supplied by surface and groundwater from upland watershed through surface runoff, infiltration, and percolation to downslope areas.

Potential Impacts to *Saturated and Anaerobic Conditions and Redoximorphic Features* **from Development***

- Drainage systems associated with development change the depth of the water table and the length of saturation by reducing base flows to wetland soils.
- Areas with municipal water/no sewer, sewer, and individual wells can change baseflow and saturation of wetland soils.

Potential Impacts to *Saturated and Anaerobic Conditions and Redoximorphic Features* **from Development** *(continued)*

- Increased runoff changes time-of-year and part of the soil profile is saturated.
- Changes in saturation and time of year of saturation may increase or decrease anaerobic conditions and redoximorphic features.
- Sedimentation from uplands may increase the depth to saturation, causing drier aerobic conditions.

Relationship of *Movement of Sediment and Organic Matter and Seasonal Flooding* **to Uplands**

- Saturation of upland soils leads to surface runoff in the watershed; amount and timing of runoff, stream dynamics, and stream bank erosion determine amount of sediment, organic matter.
- Saturation, base flow, and surface runoff determines flooding duration and extent.

Potential Impacts to *Movement of Sediment and Organic Matter and Seasonal Flooding* **from Development***

- Increased runoff and/or decreased baseflow changes frequency, depth, and duration of flooding events.
- Changes to streamside vegetation, runoff and baseflow, and increases in road sand may cause down cutting and/or bank erosion with corresponding increases or decreases in sedimentation.

Potential Impacts to *Accumulations of Sediment and Organic Matter and Seasonal Flooding* **from Development** *(continued)*

- Changes in the watershed from culverts, bridges, streamside vegetation, and wetlands saturation can change duration, location and storage, and release of floodwaters.

Relationship of *Landscape Position* **to Uplands**

Concave slopes, depressions, and areas along watercourses capture surface runoff and groundwater flow.

Potential Impacts to *Landscape Position* from Development*

- Changes to direction and concentration of surface flow and base flow changes the amount of surface and subsurface water accumulating in wetland soil landscape position and into watercourses/riparian areas.

Checklist of Potential Impacts to Wetlands and Watercourses

Evaluate Location and Extent Of:

Landscape Changes

_____ Cuts/fills
_____ Changes in size of watershed/recharge area
_____ Berms, swales, slope changes
_____ Manipulation of slopes adjacent to wetlands and watercourses
_____ Roadside ditches
_____ Changes in frequency and duration of flooding
_____ Changes in frequency and duration of runoff

Checklist of Potential Impacts to Wetlands and Watercourses

Evaluate Location and Extent Of:

Landuse/Landcover Changes

_____ Changes in % impervious area
_____ Vegetation removal in riparian areas, floodplains, adjacent to wetlands
_____ Lawns up to edge of wetlands and watercourses
_____ Invasive plants allowed
_____ Percent of watershed/recharge area already developed

Checklist of Potential Impacts to Wetlands and Watercourses

Evaluate Location and Extent Of:

Infrastructure

_____ Road layout
_____ Curbs; connected to storm drains or runoffs
_____ Storm drains and outlets
_____ Retaining walls
_____ Curtain and perimeter drains and outlets
_____ Culverts and/or bridges
_____ Municipal water and/or sewer

Checklist of Potential Impacts to Wetlands and Watercourses

Evaluate Location and Extent Of:

E&S and Stormwater Management

_____ Sediment basins
_____ Detention basins
_____ Stormwater quality and quantity BMP's
_____ Cleanouts and maintenance needs

Summary

- Development of upland areas can and do change the functions, values, and “physical characteristics” of wetlands and watercourses.
- The physical, chemical, and biological characteristics of wetland soils and their relationship to upland areas are inextricably linked.
- It’s all about the hydrology.

Summary

- The potential impacts of development can be mitigated or lessened by the use of BMP's, updated regulations, standards, and codes.
- Support SMART GROWTH CONCEPTS.