

**ACTION ITEM  
BOARD OF SUPERVISORS**

**DATE:** July 1, 2008

**TO** Board of Supervisors  
**FROM** Keith C Dayton *KCD*  
Director of Code Administration  
**ISSUE** Amend the Erosion and Sediment Control Ordinance to Require Construction Phasing

**STAFF RECOMMENDATION** Approval

**BUDGET IMPACT** N/A

**ATTACHMENTS** (3)

- [1] Background Report [3] **Reso/Ord/Proc #** 008-52
- [2] Article on Construction Phasing [ ] **Reso/Ord/Proc #**
- [ ] [ ] **Reso/Ord/Proc #**

**REVIEW:** [X] County Administrator's Office *[Signature]*  
 [X] Legal *[Signature]*  
 [X] Planning and Zoning *[Signature]*

- [ ] **Consent Agenda** [ ] **Other Business** [X] **Public Hearing**
- [ ] **Discussion Item** [ ] **Presentation** [ ] **Unfinished Business**
- [ ] **New Business**

**PRESENTATION BY** Steven Hubble  
Environmental Programs Manager

**ELECTION DISTRICT** N/A

## **BACKGROUND REPORT**

Proposed Ordinance O08-52 would amend the Erosion and Sediment Control Ordinance (Chapter 11 of the County Code) to require construction phasing for certain development projects that disturb 40 acres or more of land

Mass grading of large development sites can result in increased sediment loads in runoff leaving construction sites. Conventional erosion and sediment controls, which generally rely on trapping of suspended solids (sediments), remove, on the average, 70% of suspended solids. Fine-grained soils and clays tend to pass through erosion and sediment controls increasing the turbidity of runoff. Construction phasing is a technique that can be used to reduce soil loss. Instead of relying on trapping already suspended solids, construction phasing relies on erosion prevention. Construction phasing involves disturbing only a specified portion of the site at any one time to prevent erosion in areas where no construction activity is occurring. Grading and construction are completed and soils effectively are stabilized on one part (phase) of the site before the developer can start at a subsequent phase.

There are positive and negative aspects associated with adding a construction phasing requirement to the Erosion and Sediment Control Ordinance. Some positive aspects of a construction phasing requirement would be

- Potential reductions in sediment losses from development sites
- A reduction in reliance of traditional erosion and sediment controls

Some negative aspects associated with a construction phasing requirement would be

- More complex or costly engineering and site plan preparation requirements
- Higher costs for construction site grading and earthwork
- Delays to larger construction projects

The attached article "*Construction Phasing*" prepared by the Center for Watershed Protection provides additional background information on construction phasing.

The proposed ordinance change would modify Sections 11-2, 11-12, and 11-32 of the Erosion and Sediment Control Ordinance. The proposed changes to Section 11-2 include the additions of definitions for *construction phasing*, *stabilization*, and *stabilized*. The proposed changes to Section 11-12 would encourage all land development projects to consider construction phasing as an erosion and sediment control measure and it would require all development projects except commercial projects that disturb 40 or more acres of land to provide a construction phasing plan as a component of the Erosion and Sediment Control plan. The proposed ordinance does not dictate the maximum size of each phase of the construction project, which would provide additional flexibility to the design engineer to meet the conditions of the specific development site. County plan reviewers would

review the phasing plan and determine its adequacy based on the following factors that the design engineer would need to address in the plan

- The total size of the project/land disturbance
- The presence of steep slopes greater than 25%
- The presence of highly erodible soils
- The proximity of the site to perennial or intermittent streams located either on the development or located on an abutting or adjacent property
- The ability of traditional/conventional erosion and sediment controls to provide adequate control of sediment and erosion for the land disturbing activity
- The proposed use or type of development occurring on the property and the anticipated duration of the land disturbing activity
- The ability to balance cuts and fills on the site within each phase of the development

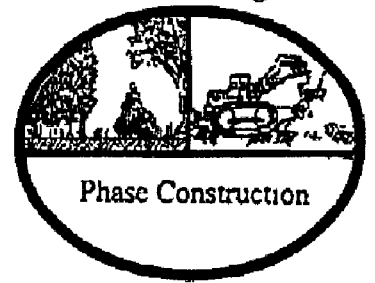
Finally, the proposed changes to Section 11-32 would update the plan preparation and review requirements to include a construction phasing plan in accordance with Section 11-12

The ordinance as proposed exempts commercial projects from the requirement for construction phasing. It is probable that institutional (schools, utilities, etc.) and industrial projects would be affected in a similar manner by this ordinance and accordingly, in addition to exempting commercial projects, staff recommends the Board exempt institutional, industrial, schools, and County projects.

Staff recommends the approval of proposed Ordinance O08-52 to require construction phasing for certain development projects that disturb 40 or more acres of land.

# 4

## Construction Phasing



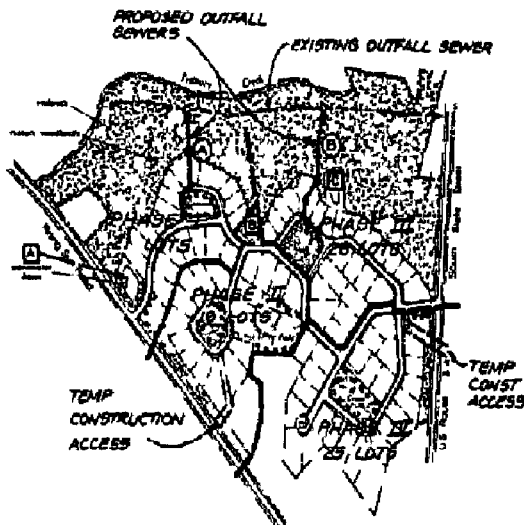
### DESCRIPTION/GOALS

In conventional construction, the entire site is cleared of vegetation at the beginning of the project, and the soil remains exposed until construction is completed. This can often be several months. In construction phasing, on the other hand, the project is divided into distinct portions or "phases." Only one phase is cleared at a time, and only before it is needed for the construction of the phase. This "just in time" clearing cuts soil erosion dramatically by reducing the amount of time that soils are exposed to rain and wind.

### TECHNIQUES

In order to develop a workable phasing plan, planners and engineers need to consider many factors such as people living in the development while construction continues, erosion and sediment control and stormwater management within the phase and the feasibility of completing construction. Claytor (1997) outlines design considerations to develop a phasing plan. These are:

- Provide construction access in each phase separate from access for permanent residents
- Determine if the site meets minimum "threshold" size (usually about 25 acres)



Source: *Watershed Protection Techniques* Vol. 2 #3

APPROXIMATE COST.	
No Construction Cost	Cost

EFFECTIVENESS			
	Low	Mod	High
Erosion/Sediment Control			✓
Long Term Pollutant Reduction	✓		
Habitat / Stream Protection	✓		

EASE OF APPLICATION			
	Difficult	Average	Easy
Installation		✓	
Maintenance		✓	

LIMITATIONS
• When it is impossible to balance earthwork by phase
• Small sites
• Where alternative access is not feasible for both construction equipment and occupants



- Balance earthwork in each phase (e.g. "cut" and "fill" amounts are equal)
- Locate temporary soil stockpiles and staging areas to prevent additional soil disturbance
- Establish a "trigger" for beginning a phase (e.g., % of previous phase stabilized)
- Accommodate utility construction within each phase
- Incorporate road segments, temporary turn-arounds and emergency access within each phase
- Address both temporary and permanent stormwater management in each phase
- Clearly identify sequence of construction of each phase and entire project on plan
- Identify key construction elements for inspection
- Ensure that later upstream phases address potential impacts to already completed downstream phases

### LIMITATIONS/CHALLENGES

Many developers perceive that phasing is more expensive because of increased earthwork costs. In traditional clearing, equipment only needs to be brought to the site once, while phasing projects require clearing for each phase. It is unclear how much phasing costs because very little economic research has been done to answer this question. It is even possible that phasing can actually save money because construction loans can be taken out over time, reducing interest payments.

One physical limitation to phasing is site size. Phasing is generally recommended for sites larger than 25 acres, with exceptions for smaller sites where land will be idle for long periods of time. On small sites, the overhead cost associated with multiple clearing may be more significant. In addition, some of the required characteristics for each phase, such as stormwater management, may be difficult to meet on a small scale.

### INNOVATIONS/IMPROVEMENTS

The primary innovations are from local jurisdictions who encourage phasing during construction. Some jurisdictions require phasing on larger projects, and others are considering incentives, such as faster review times for phased projects or reduced permit fees or bonds.

### REFERENCES

Clayton, R. A. 1997. Practical Tips for Construction Site Phasing. *Watershed Protection Techniques* 2(3) 413-417.

Sample 100-Acre Single-Family Residential Development Project Potential Sediment Loss for a Mass-Graded Project Versus a Phased Project	
<b>Development Scenario - Conventional Project</b> 100-acre site, mass-graded over a 6-month period.	
<b>Assumptions:</b> Good sediment control practices, successful vegetative stabilization of disturbed areas within 30 days of completion of grading. Approximately 3/4 of site exposed during 6-month grading operation, with 1-month stabilization period. 20 tons/year loss from construction site with sediment trapping effectiveness of 60% for sediment control devices.	
<b>Sediment loss:</b> Exposure: 3/4 of 100 acres exposed over 7 months Sediment loss: (.75)(100 ac)(20 tons/yr)(7/12 yr)(.4) = 350 tons	
<b>Development Scenario - Phased Project</b> 100-acre site, graded in 4 separate phases over a 6-month period, each phased exposed for one and a-half months.	
<b>Assumptions:</b> Good sediment control practices, successful vegetative stabilization of disturbed areas within 30 days of completion of grading. Each phase completely disturbed during 1 1/2 month grading operation with a 1-month stabilization period. 20 tons/year loss from construction site with sediment trapping effectiveness of 60% for sediment control devices. 1 ton/year loss from undisturbed site. 2 ton/year loss from stabilized portions of site.	
<b>Exposure</b>	<b>Sediment loss</b>
4 phases of 25 ac exposed over 2.5 month period	$(4)(25 \text{ ac})(20 \text{ tons/yr})(2.5/12 \text{ yr})(.4) = 166.7 \text{ tons}$
1 phase of 25 ac undisturbed for 4.5 months	$(25 \text{ ac})(4.5/12 \text{ yr})(1 \text{ ton/yr}) = 9.4 \text{ tons}$
1 phase of 25 ac encroached for 3 months	$(25 \text{ ac})(3/12 \text{ yr})(2 \text{ tons/yr}) = 12.5 \text{ tons}$
1 phase of 25 ac restabilized for 1.5 months	$(25 \text{ ac})(1.5/12 \text{ yr})(2 \text{ tons/yr}) = 6.3 \text{ tons}$
1 phase of 25 ac completed for 4.5 months	$(25 \text{ ac})(4.5/12 \text{ yr})(2 \text{ tons/yr}) = 18.8 \text{ tons}$
1 phase of 25 ac completed for 3 months	$(25 \text{ ac})(3/12 \text{ yr})(2 \text{ tons/yr}) = 12.5 \text{ tons}$
1 phase of 25 ac completed for 1.5 months	$(25 \text{ ac})(1.5/12 \text{ yr})(2 \text{ tons/yr}) = 6.3 \text{ tons}$
<b>Total</b>	<b>223.1 tons</b>
<b>Result:</b> Phasing results in a 36% reduction in sediment export compared to regular mass grading.	

Source: *Watershed Protection Techniques* Vol 2 #3

PROPOSED

BOARD OF SUPERVISORS  
COUNTY OF STAFFORD  
STAFFORD, VIRGINIA

ORDINANCE

At a regular meeting of the Stafford County Board of Supervisors (the Board) held in the Board Chambers, Stafford County Administration Center, Stafford, Virginia, on the 1st day of July 2008

MEMBERS

VOTE

George H Schwartz, Chairman  
M S "Joe" Brito, Vice Chairman  
Harry E Crisp II  
Mark Dudenhefer  
Paul V Milde III  
Cord A Sterling  
Robert "Bob" Woodson

On motion of , seconded by , which carried by a vote of , the following was adopted

AN ORDINANCE TO AMEND AND REORDAIN STAFFORD COUNTY CODE, SECTIONS 11-2, 11-12, AND 11-32 OF THE EROSION AND SEDIMENT CONTROL ORDINANCE TO REQUIRE CONSTRUCTION PHASING

WHEREAS, local Erosion and Sediment Control programs are authorized by the Code of Virginia to have more stringent regulations than the State minimum criteria, and

WHEREAS, mass grading of large development sites can result in increased sediment loads in runoff leaving construction sites, and

WHEREAS, conventional erosion control practices on the average remove only seventy percent of sediments in runoff, and

WHEREAS, the Board desires to amend the Erosion and Sediment Control Ordinance to require construction phasing for development projects, and

WHEREAS, the Board has considered the recommendations of staff and the testimony at the public hearing, and

WHEREAS, the Board finds that public necessity, convenience, and general welfare requires adoption of such an ordinance,

NOW, THEREFORE, BE IT ORDAINED by the Stafford County Board of Supervisors on this the 1st day of July, 2008, that Stafford County Code, Sections 11-2, 11-12, and 11-32 of the Erosion and Sediment Control Ordinance be and they hereby are amended and reordained as follows

#### **Section 11-2 Definitions**

Construction phasing or "staging of construction," as the term is used in this Chapter, means a construction process to control erosion and sedimentation where only a specified portion of an entire construction site is disturbed at any one time for the construction of the required infrastructure within that portion, and no subsequent portion of the construction site is allowed to be disturbed until the previous portion of land has been stabilized. Construction phasing is not to be confused with the terms "phasing of development" or "construction sequencing."

Stabilization means the physical act of installing, applying or planting vegetative or structural soil cover to an area of land to a stabilized condition.

Stabilized means the condition of an area of land that can be expected to withstand normal exposure to atmospheric conditions without incurring erosion and or sediment damage to it or to any abutting or adjacent land or water feature.

#### **Section 11-12 General Standards**

- (b) The following criteria shall apply to all applications for permits under this chapter. These criteria are in addition to those standards set forth in the handbook referred to in subsection (a) above.

(10) Construction phasing is encouraged for all land development projects and shall be required for those projects that will disturb more than 40 acres of land, except for commercial development. The size of the separate construction phases on a project and the elements of the phasing plan shall be established during plan review and are subject to approval by the plan approving authority. The phasing plan shall address, but not be limited to, the following factors:

- a. The size of the land disturbance.
- b. The presence of steep slopes greater than 25%.
- c. The presence of highly erodible soils.
- d. The proximity of the site to perennial or intermittent streams located either on the development site or located on an abutting or adjacent property.
- e. The ability of traditional/conventional erosion and sediment controls to provide adequate control of sediment and erosion for the land disturbing activity.

- f. The proposed use or type of development occurring on the property and the anticipated duration of the land disturbing activity
- g. The ability to balance cuts and fills on the site within each phase of the development

Where construction phasing is required, no additional portions of the development site shall be disturbed until it has been determined by inspection and approval, that the initial or previous phasing area has been stabilized. The permit holder shall be required to mark the limits of clearing allowable for any construction phasing area as established by the approved plan either with temporary fencing, reflective tape, signs or such other acceptable methods clearly delineating for workers on the site the limits of clearing allowed in any single approved construction phase. No applicant shall be permitted to circumvent the requirement for phasing by applying for separate permits for adjoining portions of lands smaller in size than the threshold size requirement for construction phasing provided above when it is clear from other documents and/or plats or plans that the intended development of the land, as a whole, is for a single connected project. This ordinance shall apply to erosion and sediment control plans submitted on or after the date of the adoption of this ordinance

**Section 11-32 Requirements for preparation and review**

- (c) The erosion and sediment control plan shall contain a construction phasing plan in accordance with Section 11-12 of this chapter
- ~~(e)~~(d) In addition to subsections (a) ~~and~~, (b) ~~and~~ (c) above, the plan-approving authority may require additional information or plans where deemed necessary to carry out the intent of this chapter