INTRODUCTION AND BACKGROUND

1.1 Introduction

This Erosion Prevention and Sediment Control (EPSC) Manual provides technical guidance for the design, installation, maintenance, and inspection of temporary and permanent erosion prevention and sediment control measures. The manual is intended for use by site designers, developers, contractors, and inspectors during all disturbed earth activities. These include clearing and grubbing, excavation, fill, construction, and any other activities that contribute to erosion and the movement of sediments. This manual is also intended to provide an educational resource to the public.

1.1.1 The Manual

The Erosion Prevention and Sediment Control Manual is divided into five chapters:

Chapter 1 Introduction and Background
This chapter provides an introduction to the manual with information regarding the background and basis for the City's development of erosion prevention and sediment control (EPSC) guidelines. This chapter also contains an overview of erosion processes and the environmental impacts created by erosion from disturbed earth activities.

Chapter 2 Permitting and Process
This chapter describes the requirements of the City of Albany's Erosion Prevention and Sediment Control Program. It defines the City's permitting requirements as set forth in Title 12 of the Albany Municipal Code, and describes the related administrative processes.

Chapter 3 Erosion Control Planning and Design
This chapter discusses the issues important to the planning and design processes for an effective erosion prevention and sediment control plan.

Chapter 4 Erosion Prevention and Sediment Control Measures
This chapter presents best management practices (BMPs) for erosion prevention and sediment control on construction sites, and is intended to help the designer choose the most appropriate measure or control.

Chapter 5 Construction Site Pollution Control Measures
This chapter gives an overview of the environmental impacts created by pollution generated by construction site activities. The chapter describes planning and implementation activity controls that can be used on a construction site.

Chapter 6 Maintenance and Inspection
This chapter provides guidelines for the proper implementation, maintenance, and inspection of erosion prevention and sediment control measures.

1.1.2 Goal Statement

It is the intent of this manual to describe proactive practices designed to prevent erosion and the release of sediments and other pollutants generated at a site of ground disturbance. Site planning and good site control are the best practices that can be used to prevent discharges. This manual is organized to emphasize measures preventing erosion and controlling stormwater runoff, as opposed to practices designed to strictly control sediment.

1.1.3 Disclaimer

This EPSC Manual was developed for the sole purpose of providing up-to-date erosion prevention and sediment control Best Management Practices (BMPs). The contents of this manual should not be interpreted as necessarily representing the policies or recommendations of other referenced agencies or organizations. The mention of trade names, products, or companies does not constitute an endorsement.

It is intended this manual and alternative methods acceptable for use in other jurisdictions, will be reviewed on a regular basis, with the Manual updated as needed.

1.1.4 Common Acronyms

AOS	Apparent Opening Size
BMP	Best Management Practice
DEQ	Department of Environmental Quality
DSL	Division of State Lands
ECRM	Erosion Control and Revegetation Mats
EPA	Environmental Protection Agency
EPCM	Erosion and Pollution Control Manager
EPSC	Erosion Prevention and Sediment Control
HDPE	High Density Polyethylene Pipe
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
PCP	Pollution Control Plan
USLE	Universal Soil Loss Equation
RUSLE	Revised Universal Soil Loss Equation
TMDL	Total Maximum Daily Load
TRM	Turf Reinforcement Mats
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers

1.2 Background and Policies

It is the City of Albany's goal to comply with all conditions of Federal, State, County, and City regulations and requirements. This manual is intended to comply with current Willamette Basin Total Maximum Daily Load (TMDL) requirements and the anticipated requirements of a future National Pollutant Discharge Elimination System (NPDES) Phase II General Permit issued to the City of Albany for a Municipal Separate Storm Sewer System (MS4). Additionally, this manual is intended to comply with Title 12 of the Albany Municipal Code.

1.2.1 Total Maximum Daily Loads

In September 2006, the Department of Environmental Quality (DEQ) issued the Willamette River Basin Total Maximum Daily Load (TMDL) Order. The TMDL is a regulatory mechanism required under the Federal Clean Water Act, and TMDLs must be issued for streams that do not meet water quality standards. For the Willamette River, current levels of bacteria, temperature, and mercury exceed state water quality limits. The TMDL issued in 2006 is the beginning of a long-term plan to reduce the pollutant load in the river. It places requirements on cities, counties, state agencies, and federal agencies and will be updated every five years as necessary. Every agency required to respond to the TMDL is labeled a Designated Management Agency (DMA).

The City of Albany is a DMA and is required to take steps to reduce the pollutant loads within our jurisdiction that contribute to the Willamette Basin. Because the TMDL is basin-wide, it applies not just to pollutants entering the Willamette River directly, but also to those entering tributaries to the Willamette, such as the Calapooia River and the creeks within Albany. The City's EPSC Program is one component of the City's efforts to meet TMDL requirements.

1.2.2 NPDES Program for Municipal Separate Storm Sewer Systems (MS4)

In 1990 the U.S. Environmental Protection Agency (EPA) began requiring large municipalities, those with a population of 100,000 or more, to obtain National Pollutant Discharge Elimination System (NPDES) permits for their municipal separate storm sewer systems (MS4). In Oregon, the Department of Environmental Quality (DEQ) has been charged with administering the MS4 NPDES permit program. An MS4 is a storm water conveyance system that includes roads, ditches, gutters, catch basins, and storm drains owned or operated by a public body. These permits are known as "Phase I" permits and require communities to implement programs and practices that reduce the amount of stormwater pollutants discharged into local rivers and streams.

In December 1999, EPA adopted rules to implement "Phase II" of the stormwater program. Phase II expanded the stormwater permitting program to include smaller communities located in U.S. census-defined urban areas. Phase II rules require communities to develop, implement, and enforce stormwater management programs that address six minimum control measures. "Construction site runoff control" is one of six minimum control measures the City is required to include in its storm water management program to meet the conditions of its NPDES permit.

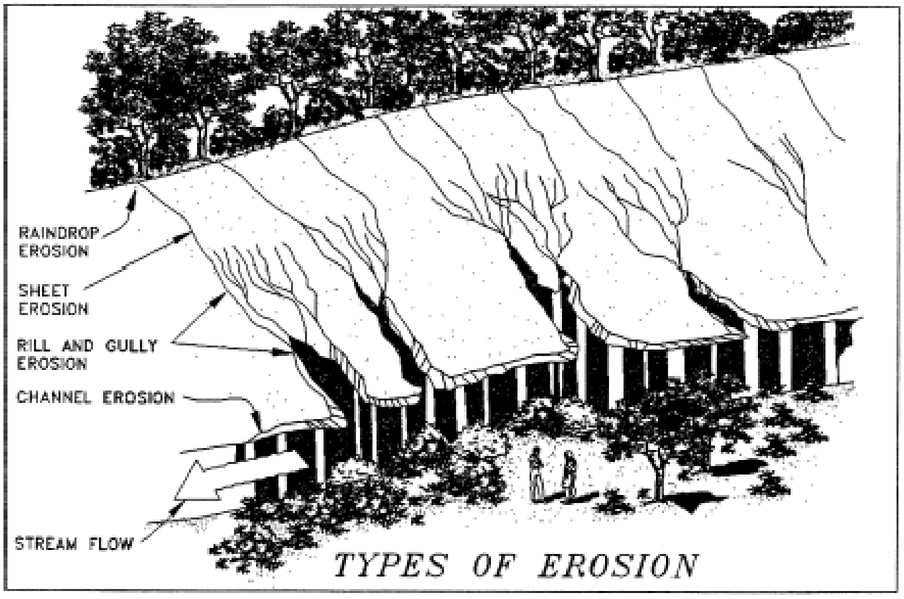
Although the City of Albany operates an MS4 in a census defined urban area, the City has not yet been required to obtain a Phase II permit. The City has developed the EPSC program and this manual to protect water quality consistent with the Willamette Basin TMDL requirements discussed above and the anticipated NPES MS4 permit requirements. DEQ has indicated Albany should expect to be one of the next communities pulled into that permitting system during the permit renewal cycle scheduled to occur in 2012.

1.2.3 City Municipal Code Title 12

In October 2009 the Albany City Council adopted Erosion Prevention and Sediment Control requirements as part of an update to Title 12 of the Albany Municipal Code (AMC). Specifically, Chapter 12.40 has been dedicated to Erosion Prevention and Sediment Control. Details of the City's EPSC program requirements, including permitting and inspection, are included in Chapter 2 of this manual.

1.3 The Erosion and Sedimentation Processes

Figure 1-1



When land is disturbed at construction sites the soil erosion rate accelerates dramatically. The major problem associated with erosion at a construction site is the movement of soil from the site and the impact of the transported soil on water quality in streams, rivers, and wildlife habitat.

Erosion occurs when rain or wind loosen soils from the surface. Rain generated runoff cuts rills and larger gullies into exposed soils to convey sediment laden flows. Wind erosion creates a more consistent, area-wide stripping of soils from the soil surface. Both types of erosive forces are capable of depositing large amounts of sediment, sometimes at great distances, away from the site of ground disturbance.

There are four main factors that influence erosion:

❖ **SOIL ERODIBILITY**

Soil characteristics which influence the potential for erosion by rainfall and runoff are those properties which affect the infiltration capacity of a soil and those which affect the resistance of the soil to detachment and being carried away by falling or flowing water. The following four factors are important in determining soil erodibility:

- Soil texture (particle size and gradation)
- Percentage of organic content
- Soil structure
- Soil permeability

Soils containing high percentages of fine sands and silt are normally the most erodible. As the clay and organic matter content of these soils increases, the erodibility decreases. Clays act as a binder to soil particles, thus reducing erodibility. However, while clays have tendency to resist erosion, once eroded, they are easily transported by water. Soils high in organic matter have a more stable structure which improves their permeability. Such soils resist raindrop detachment and infiltrate more rainwater. Clear, well-drained, well- graded gravel, and gravel-sand mixtures are usually the least erodible soils. Soils with high infiltration rates and permeability either prevent or delay and reduce the amount of runoff.

❖ VEGETATIVE COVER

Vegetative cover plays an extremely important role in controlling erosion as it provides the following five benefits:

- Shields soils surface from raindrop and wind erosion
- Provides root systems which hold soil particles in place
- Aides soil in absorbing water
- Slows velocity of runoff
- Evapotransporates sub-surface water between rain storms

By limiting and staging the removal of existing vegetation and by decreasing the area and duration of exposure, soil erosion and sedimentation can be significantly reduced. Special consideration should be given to the maintenance of existing vegetative cover on areas of high erosion potential such as moderately to highly erodible soils, steep slopes, drainageways, and the banks of streams.

❖ TOPOGRAPHY

Topography (the size, shape, and slope) of a watershed can influence the amount and rate of stormwater runoff. High slope lengths and steep gradients increase the rate of runoff (creating a higher probability for erosion) and can limit abilities to establish and maintain vegetative cover.

❖ CLIMATE

The frequency, intensity, and duration of rainfall are fundamental factors in determining the amounts of runoff produced in a given area. As both the volume and velocity of runoff increases, the capacity of runoff to detach and transport soil particles also increases. Where storms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature, as well as variations in rainfall, help to define the high erosion risk period of the year. When precipitation falls as snow, no erosion will take place. However, when the temperature rises, melting snow adds to runoff, and erosion hazards are high. Because the ground is still partially frozen, its absorptive capacity is reduced. Frozen soils are relatively erosion-resistant. However, soils with high moisture content are subject to uplift by freezing action and are usually very easily eroded upon thawing. Although both water and wind erosion should be anticipated throughout the year, the likelihood of water erosion increases during the wet weather season (October 1st – April 30th) and wind erosion is more prevalent during the dry weather season.

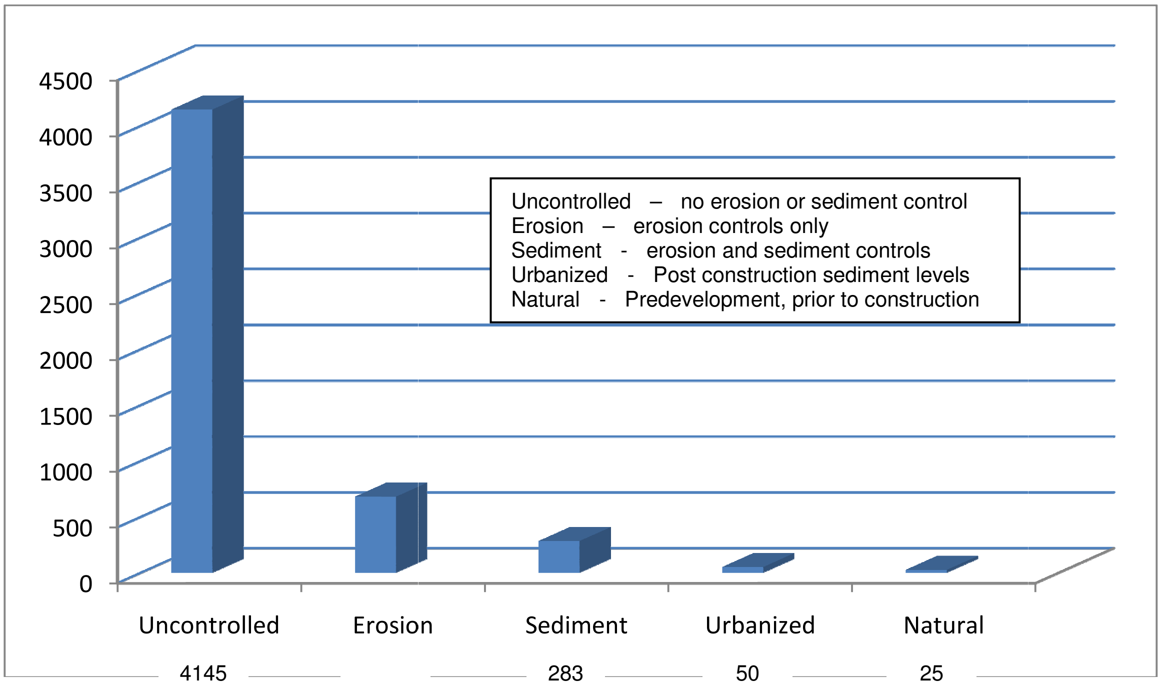
Every year, tons of sediment are washed and blown from sites of ground disturbance into streams, rivers, and lakes. The U.S. Environmental Protection Agency estimates approximately 600 million tons of soil erodes from U.S. construction sites alone each year (1993). As the community continues to grow, our local waterways are being affected by ground disturbance with the greatest sediment impacts occur during the land grubbing, clearing, grading and other excavation phases of development.

Responsible development requires that steps be taken to control erosion and sedimentation from construction sites. Figure 1-2 demonstrates the ability of good erosion and sediment controls, versus no controls, in minimizing the detrimental effects of sedimentation.

This chart also demonstrates the fact that once a naturally vegetated area has been developed, sediment levels can be twice the pre-development rate. It is well known that the erosion and sediment threat is greatest during construction. Once development is complete (stabilization techniques implemented), there is a dramatic decrease in the pollutant level yield.

Figure 1-2

STORM MEDIAN SEDIMENT CONCENTRATION (mg/l)



Source: Performance of Current Sediment Control Measures at Maryland Construction Sites, Metropolitan Washington Council of Governments

Sediment, resulting from disturbed soils, can move onto neighboring properties and streets or into drainage systems and other bodies of water. Excessive sediment has significant negative impacts on how the natural watershed runoff and soil conveyance system works. Under natural conditions, runoff moves through a watershed as groundwater through infiltration or as surface water by spreading across floodplains and migrating downstream through stable stream and waterway channels. In a natural watershed system, sediment, cobbles and gravel travel throughout the stream network creating deposition, scour and gravel areas that are important for fish habitat. The natural system survives by its ability to contain flows and balance sediment loads within the stream network.

1.4 Impacts of Erosion and Sedimentation

Erosion and sedimentation cause both environmental and economic impacts. Both are important, but is often only an economic impact that spurs a jurisdiction to take action. Environmental impacts are harder to see and quantify as they tend to build slowly and do not produce dramatic results for many years when it may be too late to correct the problem. Erosion and sedimentation can cause expensive site damage and construction delays. Lack of maintenance often results in failure of control practices and costly cleanup and repairs.

1.4.1 Environmental Impacts

Many environmental impacts from sediment pollution are cumulative and the ultimate results and costs may not be evident until years later. Some environmental impacts include:

- Eroded soil contains nitrogen, phosphorus, and other nutrients. When carried into water bodies, these nutrients trigger algal blooms that reduce water clarity, deplete oxygen, lead to fish kills, and create odors.
- Erosion of streambanks and adjacent areas destroys streamside vegetation that provides aquatic and wildlife habitats.
- Excessive deposition of sediments in streams smothers the bottom fauna, seals stream beds, and destroys fish spawning habitat.
- Turbidity from sediment reduces in-stream photosynthesis, which leads to reduced food supply and habitat.
- Turbidity increases the amount of sunlight absorbed in water, raising stream temperatures.
- Suspended sediment abrades and coats aquatic organisms.
- Erosion removes the smaller and less dense constituents of topsoil - those clays, fine silt particles and organic materials that hold nutrients that plants require for healthy establishment. The remaining subsoil is often hard, rocky, infertile, and fails to hold moisture; thus making reestablishment of vegetation difficult.

1.4.2 Economic Impacts

Many economic impacts are hard to quantify. How can a dollar value be assigned to loss of aquatic habitat or diminished water clarity? Other impacts may be readily quantified, for example the cost of dredging and disposing of the accumulated sediment in a silted-up reservoir. Some potential economic impacts include:

- Excessive sediment accumulation reduces reservoir storage capacity and more frequent sediment removal is required.
- Sediment deposited into streams reduces flow capacity, interferes with navigation, and increases the risks of flooding.
- Local governments and their tax payers must pay for removing sediment from streets, sewers, ditches, sumps and culverts, and for dredging sediment from harbors and navigation channels.
- Excess sediment creates cloudy or turbid water conditions, interfering with recreational uses.
- Erosion severely diminishes the ability of the soil to support plant growth. To restore this ability is costly.
- Loss of wildlife habitat due to erosion and sedimentation could lead to additional species being classified as endangered. Additional endangered species listings increases time and fees for permitting, design, and construction in the affected watersheds. Some costs are directly assessed to specific projects while many other costs are distributed statewide by spending additional monies for habitat restoration.
- Litigation is an expensive alternative

Many of these costs could be largely avoided through implementation of adequate erosion control practices.